WATER FIRST

A Political History of Hydraulics in Vietnam's Red River Delta

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CANDIDATE'S STATEMENT

Except where otherwise indicated this thesis is my own work

S. Andrew Enticknap Smith

November 2002

Nhất nước, nhì phân, tam cần, tư giống

First water, second fertiliser, third labour, fourth seeds

-- Vietnamese proverb

to Meg,

my partner in the adventure

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Abstract

Between 1961 and 1976 Hải Hưng province -- present day Hải Dương and Hưng Yên -- lost the equivalent of two entire districts of agricultural land. How could so much land be abandoned under a collectivised agriculture system? And what role did poor water control infrastructure play in creating such a situation?

I answer these questions by examining the historical patterns of hydraulic development in northern Vietnam from the beginning of the 19th century until the introduction of the Production Contract system in 1981. Underlying both the French colonial and communist visions of modernity and economic development was a belief that improving agricultural productivity, of which large-scale hydraulic infrastructure was an important component, could catalyse growth in the rural economy, which could then finance industrialisation. I argue throughout this thesis that developing large-scale hydraulic infrastructure in the Red River delta has relied upon the creation of a hydraulic bargain between the state and water users. This is in contrast to Wittfogel's theory of the hydraulic state, insofar as developing hydraulic infrastructure has depended upon the active political and economic participation and support of water users, and not the absolute power of the state. The political economic history of the hydraulic bargain highlights the relative power of peasants to influence the direction of large-scale hydraulic development and, as such, the shape of the Red River delta's wet-rice economy.

List of abbreviations

BEFEO	Bulletin de l'Ecole Française de l'Extrême Orient
BEI	Bulletin Economique de l'Indochine
BHH	The Bắc-Hưng-Hải large-scale irrigation and drainage project
BNTQD	Bộ Nông trường Quốc doanh [Ministry for State Farms]
BTL	Bộ Thủy lợi [Ministry of Hydraulics]
CAEV	Centre for Agricultural Extension Volunteers
CCA	Canadian Co-operative Association
CIDA	Canadian International Development Agency
DRV	Democratic Republic of Vietnam (1954-76)
FYP	Five-Year Plan
GGI	Gouvernement Général de l'Indochine
NCLS	Nghiên Cứu Lịch Sử [Journal of Historical Research]
NTL	Nha Thủy lợi [Bureau for Hydraulics]
QH	Quốc Hội [National Assembly]
RSA	Résident Supérieur de l'Annam
RST	Résident Supérieur du Tonkin
SRV	Socialist Republic of Vietnam (1976 -)
TT	Tạm Thời (Used to indicate archival material that is held for a limited period)
VCP	Vietnam Communist Party [Đảng Cộng Sản Việt Nam] (1976 -)
VV	Vĩnh Viễn (Used to indicate archival material that is kept indefinitely)
VWP	Vietnam Workers' Party [Đảng Lao Động Việt Nam] (1945-76)

List of Vietnamese terms

Ban Công tác Nông thôn Trung ương	Central Committee for Countryside Work
Bộ Lao động	Ministry of Labour
Bộ Thủy lợi	Ministry of Hydraulics
Bộ Kinh tế	Ministry of Economics
Bộ Nông nghiệp	Ministry of Agriculture
Đảng Cộng Sản Việt Nam	Vietnam Communist Party
Liên đoàn lao động tỉnh Hải Hưng	Hải Hưng province Trade Union
Niên giám Thống kê	Statistical Annual
Tập Chí Thủy Lợi	Journal of Hydraulics
Thủ tướng Chính phủ	Prime Minister
Tổ công tác chuyên gia lúa	Hải Dương province rice expert team
Tổng cục Thống kế	General Department of Statistics
Viện Kinh tế	Institute for Economics

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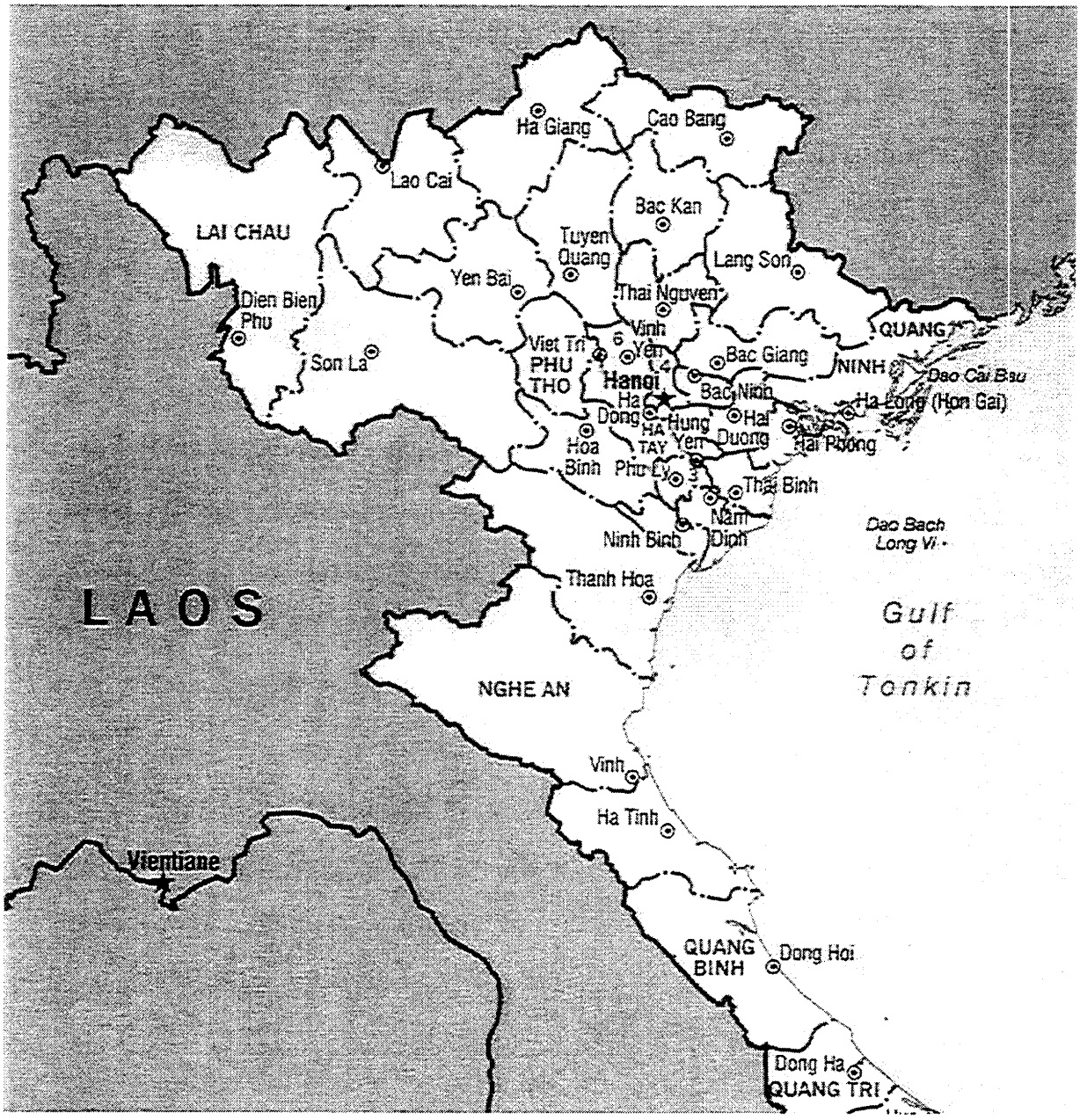
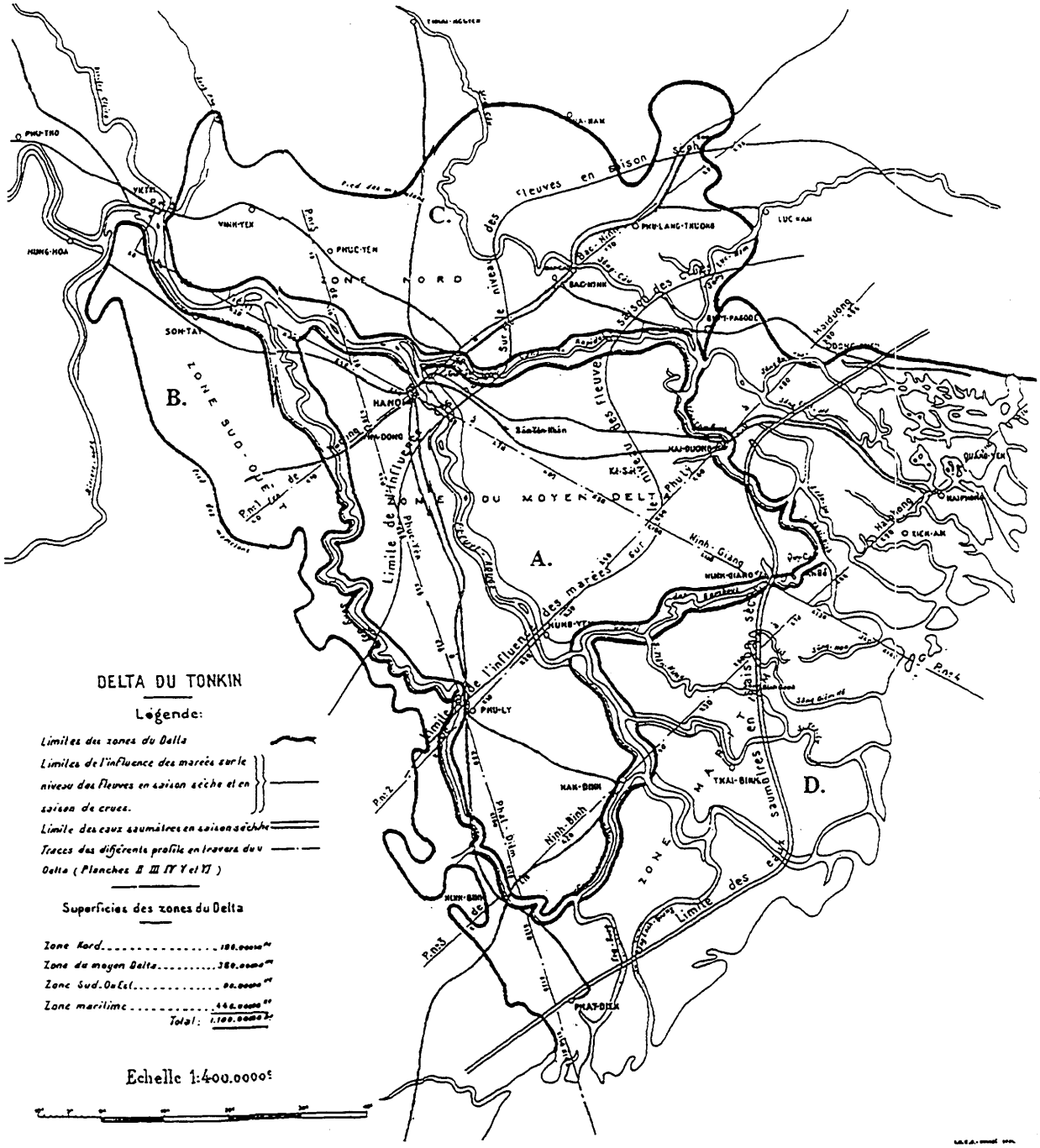


Figure 2 Hydrological map of the Red River delta



Source: (Pouyanne, 1931, Plate 1).

A. Central delta
B. Southwest delta
C. Northern delta
D. Maritime zone

Introduction

Colonial and post-colonial visions of an industrialised Red River delta have been premised on modernising hydraulic infrastructure. The developmental ideologies of both communist and colonial states have been greatly influenced by the belief that the smallholder rural economy in the Red River delta would need to be modernised in order to increase agricultural productivity. A growing agricultural surplus would then provide the capital required for industrialisation. The French colonial regime considered rice exports to be critical in providing the surplus foreign exchange necessary for industrialisation. The more rice of better quality the greater the economic return to the state and the producer. In post-colonial northern Vietnam, increased agricultural productivity was also the basis for the state's vision of socialist transformation and industrialisation. Within both the colonial and communist states' developmental visions the key to increasing agricultural yields, and, therefore, industrial growth, has been constructing large-scale hydraulic infrastructure networks.

Large-scale hydraulic infrastructure is defined by the level of capital and labour investment required for construction, the geographical area that the water control system serves and the institutional and organisational arrangements that are needed for the operation and maintenance of the system. Large-scale hydraulic systems encompass a number of smaller administrative jurisdictions. Likewise, large-scale systems require taxation, corvée labour and/or subsidies from the central government. In northern Vietnam since 1954 irrigation and drainage infrastructure has been grouped into three categories: large-scale (*đại thủy nông*), medium scale (*trung thủy nông*) and small-scale (*tiểu thủy nông*). Both medium and large-scale infrastructure are managed by the state. However, small-scale

irrigation and drainage has always been the responsibility of the "People" to construct themselves.[1]

While considering the historical development of large-scale hydraulic infrastructure in the Red River delta, I have, in the words of Clifford Geertz, examined "the relation of the lords to the organisation and management of irrigation" (Geertz, 1980, 69). My research has focussed primarily on understanding how, between 1900 and 1981, a policy framework of industrialisation and large-scale wet-rice production has affected the relationship between peasants in Vietnam's Red River delta, and both the colonial and communist states. As I have mentioned, under the colonial regime industrialisation was premised on improving the productivity of smallholder hydraulic agriculture. However, the French colonial regime constructed very little large-scale irrigation infrastructure. They took pride in their scientific and engineering skill but because of the enormous cost of irrigating and draining the central Red River delta,[2] investments went instead to the under-populated but relatively water-scarce, and potentially more profitable, midlands. During the colonial period, relatively few peasants in the Red River delta encountered the modernising forces that accompanied large-scale hydraulic infrastructure.

These forces were only fully unleashed once peace was established in 1954. The Vietnam Workers' Party (*Đảng Lao Động Việt Nam*) (VWP)[3] began immediately to transform the French colonial images of co-operatives, pumping stations and canal networks into reality. The Party organised the construction of large-scale

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[1] (Plan to eliminate drought in the northern region, 17 April 1958, VNA3/BTL 64 VV, 1958). (For an explanation of how to decipher my archival references please see the note on archival citations on the first page of the bibliography.) The Chinese Communist Party also distinguished between irrigation and drainage systems in a similar manner (Nickum, 1981, 63-65).

[2] The area I refer to as the "central delta" is also known as the "upper" and "lower" delta, it is enclosed by the Red River flowing southeast and the Đuống river on the north flowing from west to east (See Figure 2). The upper delta is distinguished by an elevation greater than two metres above sea level and the lower delta is lower than two metres (Takaya, 1975, 272).

[3] From 1951 until 1976 the Communist Party in Vietnam was known as the Vietnam Workers' Party (VWP) (*Đảng Lao động Việt Nam*). After 1975 the VWP became the Vietnam Communist Party (*Đảng Cộng sản Việt Nam*) (VCP). Throughout the text I use "the Party" to represent the VWP, the VCP or the two in combination if referring to a historical period when they overlapped.

infrastructure throughout the central Red River delta and encouraged co-operative members to construct local-level canal networks that would join up with the state-financed headworks. From 1960 to 1980, the central Ministry of Hydraulics[4] pushed co-operative members as well as district and provincial officials to "complete and perfect" (*hoàn chỉnh*) irrigation and drainage infrastructure and to "synchronise" (*đồng bộ*) pumping stations with co-operative fields.

Meanwhile, as the state was attempting to construct modern irrigation networks in order to increase yields by expanding and intensifying cultivation, there was a parallel process of economic decline marked by an overall decrease in cultivated land area. A 1968 Ministry of Agriculture study presented to the Standing Committee of the Council of Ministers (*Thường vụ Hội đồng Chính phủ*) reported that Hưng Yên province had lost 10 000 hectares of agricultural land between 1958 and 1967. Half of this, 5000 hectares, was used to build up canal embankments and construct hydraulic infrastructure. Overall, between 1964 and 1967, the DRV lost 216 410 hectares of agricultural land, a fact that was causing alarm within the Ministry of Agriculture.[5]

> The area of cultivated land generally and one, two and three crop paddy fields in particular, according to studies done between 1964 and 1967, are in serious decline in nearly every province (Bộ Nông Nghiệp, 1968, 16).

For more than a decade this situation did not improve -- in fact, it worsened. Between 1961 and 1977, the cultivated land area of the combined province of Hải Dương and Hưng Yên -- Hải Hưng province -- declined by 31 168 hectares. This

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[4] The Ministry of Hydraulics (*Bộ Thủy lợi*) was first created in April 1958 and continued under this name until July 1960 when it took on the added responsibility of managing electrical power. The Ministry of Hydraulics and Electric Power (*Bộ Thủy lợi-Điện lực*) existed for two and a half years until December 1962 when the Ministry of Heavy Industry (*Bộ Công nghiệp nặng*) took over the electrical power portfolio.

[5] This phenomenon, moreover, was not only taking place on co-operative land, but state farms were also transforming land due in large-part to poor water control. In 1970, the Ministry of State Farms liquidated (*thạnh lý*) 5 million hectares of perennial crops such as coffee and tea. Approximately 4 million of that was due to its susceptibility to flooding and, on the rare occasion, frost. What exactly "liquidation" involved was not made clear in the documents, although they do point out that liquidated land was to be subject to more intensive (*thâm canh*) production. This likely meant removing industrial crops and cultivating paddy or food crops such as corn or potatoes (Ministry of State Farms, Decision No. 119 QĐ/KH, 4 March, 1970 VNA3/BNTQD 25 VV, 1970).

amounted to just under twelve per cent of the 1961 figure of 270 100 cultivated hectares (*Hải Hưng,* 1977e).[6]

What, if any, was the relationship between these two processes -- irrigation modernisation and declining amounts of cultivated land. On one hand, cultivated land area was shrinking as the population grew and new houses and schools claimed agricultural land. On the other hand, cultivable land was actually being left fallow. In Hải Hưng province, at least, an important reason for this had to do with poor water control (*Hải Hưng,* 1977e). This is surprising considering that under the First Five-Year plan the DRV pledged to modernise irrigation and drainage infrastructure (*thủy lợi hóa*) in the central Red River delta by connecting canal networks and river systems using large pumps. Fallow land was one result of inefficiencies within these large-scale hydraulic networks.

In the minds of peasants in the Red River delta there were many arguments against joining co-operatives (*hợp tác xã*) but relatively few incentives to collectivise (*tập thể hóa*).[7] On the negative side, peasants were reluctant to give up land, which had only recently been redistributed under the land reform of 1954-56, to a co-operative. Although peasants were generally comfortable with informal labour exchanges that involved groupings equivalent in size to a neighbourhood (*xóm*) they "generally disliked" working in larger co-operatives that appeared in the late 1960s and early 1970s (Kerkvliet, 1995, 402). Moreover, in some cases coercion was

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[6] Official cultivated area includes the 1961 total for cultivated paddy area -- 252 400 ha -- and the 1960 figure, 1961 figures were not available, for area planted with cereals -- 17 700 ha (Niên Giám Thống Kê, 1973, 111, 236).

[7] It is important to note that under the central planning system a co-operative (*hợp tác xã*) was also a collectivised organisation. "Hợp tác" is commonly translated as the verb to co-operate. To collectivise, "tập thể", however, lacks a noun form. "Communities" can be translated as "tập đoàn" or even "tập thể", but they lack the connotation of collective ownership that was associated with the "co-operatives" of the 1960s and 1970s. Confusion over terminology has had implications for the co-operative movement in Vietnam since the passage of the Law on Co-operatives in 1996. In order to avoid ambiguity, "collectivised co-operatives" are often referred to as "old-style co-operatives" (*hợp tác xã cũ*) while more recent co-operatively managed organisations are known as "new-style co-operatives" (*hợp tác xã kiểu mới*). For my purposes, since co-operatives during the period 1961-81 were by definition collectivised, I have chosen to continue with the convention of referring to "hợp tác xã" as "co-operatives" and refer to "the collective" when stressing the issue of collective ownership.

employed to get peasants to enter co-operatives.[8] One positive aspect of co-operativisation was modern canal irrigation, which was being developed alongside co-operatives and promised peasants increased convenience (*thuận tiện*). The Party's assurances of more efficient irrigation and drainage were important components of the hydraulic bargain that grew up around the development of large-scale hydraulic infrastructure in the late 1950s and early 1960s. As far as irrigation was concerned, co-operatives had to expand in the late 1960s in order to benefit from larger-scale infrastructure. In Quốc Tuấn commune, Nam Sách district, co-operative members with whom I spoke agreed that irrigation systems functioned better as co-operatives were enlarged. This, however, is not to suggest that these same people supported every aspect of large-scale collectivised agriculture. The largest village in Quốc Tuấn commune did not join with the three other villages, which had banded together in the late 1960s, until 1972. But once it did there were improvements in the efficiency of local-level irrigation and drainage systems, and, consequently, in productivity and living standards for villagers throughout Quốc Tuấn.[9]

What my research attempts to understand are the historical trends, beginning with the early Nguyễn dynasty, that led to the creation, in the 1950s, and the eventual disintegration, in the 1970s, of the hydraulic bargain. As far as the Party was concerned, irrigation work and co-operativisation were interchangeable. At a conference in Hải Dương province in 1958 the two were conceptualised as follows:

> Where co-operativisation is pushed strongly then you will awaken [*thức dậy*] irrigation work. Where irrigation work develops then the co-operativisation movement will awaken and move forward.[10]

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[8] There are accounts of Party members who refused to join co-operatives being expelled from the Party and children of families that had not joined co-operatives being denied access to schools (Interview with Professor of Economics, Hanoi, November 2001).

[9] (Interview Quốc Tuấn commune, Nam Sách district, 17 May 2000).

[10] (Some issues concerning irrigation work to be brought up for debate, VNA3/BTL 1 VV, 1958).

Within the context of a collectivised agriculture and the centrally planned economy, the hydraulic bargain proved to be difficult to maintain. In reality, modern pump-based irrigation and drainage systems were expensive to construct and operate. In order to save scarce investment capital the state encouraged co-operatives to be self-sufficient, while forcing villagers to accept a disproportionate share of constructing and financing both small and large-scale irrigation systems. As the economic situation worsened during the war against the Americans, 1965-73, and again as Soviet assistance began drying up in the late 1970s, living standards on co-operatives in Hải Hưng deteriorated. In the hopes of resuscitating the collectivised system following the withdrawal of American troops from southern Vietnam in 1973, the state attempted to mobilise co-operatives to complete and perfect irrigation and drainage networks. This only compounded the demands put on the average co-operative, and, in any case, by the mid-1970s Hải Hưng province rarely had enough electricity to operate the pumping stations that were designed to provide irrigation or drainage to co-operatives. As the hydraulic bargain gradually broke down, many co-operative members asked why it was in their interest to continue supporting the hydraulic bargain and, in turn, participating in the collectivised economy.

Thus, people looked outside the boundaries of the centrally planned economy. They concentrated their efforts on cultivating their private plots while leaving fallow the co-operative land that might be waterlogged or parched by drought. The inefficiencies of collectivised production, in many areas, made working only a fraction of available land more profitable than contributing one's share to the co-operative. In rare cases land was even decollectivised at the co-operative level. Such activities have been described by economists as "fence breaking" or "fence jumping": "unplanned adjustments by micro-level units to the changes occurring in the plan in the interests of achieving equilibrium in the macro aggregates (Beresford, 2000, 10; Fforde & deVylder, 1995). More generally, Ben Kerkvliet has documented numerous examples of "everyday politics" that occurred

throughout the 1960s and 1970s in northern Vietnam in response to the difficulties peasants had adapting to a collectivised agricultural system.

Such acts of everyday politics were eventually measured in hectares of abandoned land. Parcels of land in co-operative after co-operative in Hải Hưng province slowly added up during the 1970s until 1977 when they came to equal the area of two entire districts (*Hải Hưng,* 1977e). High level Party cadres and government officials could not ignore this situation, especially if land was being abandoned to the same degree in other provinces. Contrary to what one might have expected from an authoritarian government, the state did not march co-operative members back into the fields. Instead in 1981, the Party implemented Instruction 100 (*Chỉ thị* 100), which effectively abandoned collectivised agriculture. The product contract system (*khoán sản phâm*), which emerged from Instruction 100, was based on co-operatives contracting land to households via production brigades in return for a fixed quota of the yield. Everything that was produced above the "contract" (*khoán*) could be divided among brigade members. This fundamental change to incentive structures led to an immediate improvement in agricultural yields (Nguyễn Sinh Cúc, 1991, 43-45). However, by 1988, neither incentives nor organisational reforms could overcome a series of "policy bottlenecks" that led to a levelling off of productivity increases. They nor could they fully compensate for the disrepair in which hydraulic infrastructure found itself in the 1980s and 1990s (Pingali & Xuan, 1992, 715; Pingali et al, 1997, 351).

Methodology

Hydraulics[11] in the Red River delta has not been well researched by English-speaking scholars. Seminal works in French include (Chassigneux, 1912) and

[11] Hydraulics is a term used to refer to flood control and irrigation/drainage. In Vietnamese there are a number of different terms used to describe flood control and irrigation; the most general is "thủy lợi", which subsumes all other water control terms. The etymological roots of thủy lợi can be found in the Chinese word *shuili*, which literally means "turning water to advantage" (Bray, 1986, 68). Terms referring to specific aspects of water control often include the word *thủy* (water): *trị thủy* (suppress, control, harness water or, more specifically, flood control), *thủy nông* (water for

(Gourou, 1964). In 1937 Virginia Thompson published an insightful analysis of the French colonial government's flood control and irrigation investments in Tonkin (Thompson, 1937, 215-219). Karl Pelzer offers a relatively detailed account of the hydraulic situation in Tonkin up to 1948, relying exclusively on (Gourou, 1964) and (Robequain, 1939). A relatively more recent study by Martin Murray includes a discussion of how the French attempted to increase land productivity using hydraulic infrastructure (Murray, 1980, 182-184). His sources are more varied but he also relies primarily on Thompson as well as other French secondary material. Moving forward to hydraulic development in the post-1954 period, Beresford argues that the construction and reconstruction of irrigation works "increased the sown area and the productivity of labour in the 1960s (Beresford, 1990, 486 fn. 7)." There would have been examples where this was the case but this was not a general pattern. The most thorough English-language analysis of irrigation and drainage in the DRV is found scattered throughout Andrew Vickerman's economic history of collectivisation (Vickerman, 1986).

It was within a context of very limited secondary sources that I arrived in Hanoi in September 1999 to begin my field research. With national elections scheduled for November, it was difficult to organise permission to visit rural areas so I was confined to the Vietnam National Archive No.1 (*Lưu Trữ Quốc Gia số 1*), which houses the remnants of the French administration's official documents from the Protectorate of Tonkin. I also spent many days in the National Library (*Thư Viện Quốc Gia*) which is conveniently located next door to the Archive No. 1. In addition to colonial and post-1954 monographs, the National Library stores colonial-era French and Vietnamese language journals, as well as provincial and national newspapers published since 1945.

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agricultural purposes or irrigation), *thủy triều* (irrigation that uses tidal forces to move water on and off the land) and *thủy điện* (water used to make electricity or hydropower). Each of these terms deals with at least one of the three basic components of hydraulics (*thủy lợi*): flood control, irrigation and drainage.

I found provincial newspapers to be a valuable source of information, and I rely heavily on them throughout Chapter 9. The provincial newspaper for Hải Hưng province, creatively entitled *Hải Hưng,* was of particular importance because it was in Nam Sách district, presently in Hải Dương province -- one half of the former Hải Hưng province -- that I carried out the bulk of my field interviews. In addition to this, I also read several years of *Ninh Bình*. At first blush a newspaper published in a one-Party authoritarian regime would not be expected to provide valuable information. Nevertheless, as I read several years of Hải Hưng and compiled a database of articles, I began to find patterns with regard to subject matter and geographical focus. For example, because there was and still is very little industry in Hải Hưng the newspaper devoted almost every page of every issue between 1975 and 1989 to agricultural matters. I soon realised that the inescapable link between water and paddy production meant that other agricultural issues such as new seeds or fertiliser usage would often touch on some aspect of irrigation or drainage. By reading broadly and connecting different hydraulic and agricultural concerns I was able to trace over time how access to irrigation and drainage was affecting agriculture production in specific co-operatives and districts.

Newspapers in Vietnam often print letters that they receive. In Hải Hưng province they were published during the 1970s and 1980s under titles such as "Voice of the People" (*Tiếng dân*), "Reader's criticism" (*Bạn đọc phê bình*) or "Reader's opinion" (*Ý kiến bạn đọc*). Editorials encouraged people to submit their comments and pledged that *Hải Hưng* staff would encourage the appropriate agency or individual to respond to the complaint. Under a 1980 law the paper was given thirty days to respond to readers' letters (*Hải Hưng,* 1980d). Such letters were being published in 1975, the first year that I read, and continued throughout the 1970s and into the 1980s, appearing in fits and starts. In many cases reader letters had something to do with hydraulics, and generally highlighted corrupt practices. In a letter from 1981, for example, a Mr. Tới, who was head of the tax office at the boat dock in Hưng Yên town, was accused of regularly accepting 2000 *đồng* bribes from smugglers (*Hải Hưng,* 1981). In another letter, a co-operative member

complained that cadres in the reader's co-operative were expropriating collective land for private cultivation (*Hải Hưng,* 1983a).

Letters to the newspaper, however, were not the only source of information in *Hải Hưng*. As I have explained, I was able to organise articles according to geographical area and subject so that a relatively innocuous article about slow work or a small piece about waterlogging in the context of several years of similar articles could become valuable. In other cases, an article written to congratulate a co-operative for draining waterlogged land might, at the same time, highlight the difficulties the co-operative had been having in the past. Although a specific article might try and claim that a co-operative had solved the problems that had led to land being waterlogged, later articles could contradict this assertion. The Party made every attempt to control the flow of information but by virtue of simply publishing a newspaper it was providing information that, if read carefully, was informative.

In addition to reading newspapers and French archival materials, I eventually had a chance to spend approximately one year reading documents in the Vietnam National Archives No. 3 (*Lưu Trữ Quốc Gia số 3*). This archive holds documents submitted by government agencies since 1945. Documents are catalogued in indexes (*mục lục*) which list all the files (*hồ sơ*) for a particular ministry or government office. The majority of documents that I examined came from the Bureau for Hydraulics (*Nha Thủy lợi*) (1954-56) and its successor the Ministry for Hydraulics (*Bộ Thủy lợi*), as well as the Ministry for State Farms (*Bộ Nông trường*). Early government documents were often written without diacritical marks making them very difficult to read. By the late 1950s the quality of paper began to improve and the volume of documentation began to increase. According to staff at the archives, documents produced after 1970 were inaccessible, although I did receive some files with documents from as late as 1974.

Field interviews

I supplemented my library and archival research with field interviews. In order to gain permission to undertake fieldwork in the countryside it was necessary to

arrange letters of introduction (*giấy giới thiệu*). I would begin with a letter of introduction from the Director of my official sponsor in Vietnam, the Institute of Ethnology (*Viện Dân tộc học*). This letter would be addressed to the provincial Peoples' Committee (*Ủy ban Nhân dân*) in the province where I intended to carry out my research. From the provincial officials I would then have to arrange a letter of introduction for the district (*huyện*), from which I would need another letter for the commune (*xã*). Officially, this was the procedure that I was to follow each time I went into the countryside to do research. As I became familiar with officials in the areas where I was working, however, and when I was only going for a short time I could arrive saying I was only visiting (*đi chơi*) and not working (*đi công tác*). Most of my field interviews took place in Nam Sách district, Hải Dương province. Hải Dương is situated on the eastern extreme of the central delta with the western half located within what the French referred to as the Kẻ Sặt casier or what is today known as the Bắc-Hưng-Hải (BHH) polder.[12] The western border of Nam Sách district is contiguous with the eastern border of the BHH polder formed by the Thái Bình River and bounded on the east by the Kinh Thày river. It is about sixty-five kilometres east of Hanoi, on National Highway 5 (*Quốc lộ số 5*), the major highway between the national capital and the port of Hải Phòng.

Within Nam Sách district, most of my time, approximately two months in total, was spent in Quốc Tuấn commune. While I was in the field I commuted daily by motorcycle from Hải Dương City, where I was forced to stay in the evening, to Quốc Tuấn commune. Sometimes a research assistant accompanied me, while other times I visited on my own. On some days interviews would be organised by the Co-operative Manager (*Chủ nhiệm Hợp tác xã*), especially when I wanted to speak to a specific group such as older people. Other times I was free to wander around the commune and speak to whomever I pleased. Interviews were conducted

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[12] *Casier* in French means "locker" and refers to areas in the Red River delta that had been completely diked. I use polder to refer to this specific sense of *casier*. Although polder is generally used to refer to an enclosed area of reclaimed land, a *casier* does not necessarily include land that has been reclaimed.

in Vietnamese which I taped whenever possible. As my Vietnamese improved the tape recorder became less important but I continued using it for two reasons. Firstly, after several interviews the tape recorder became part of my way of doing things, which people came to trust. Secondly, it is unlikely that the presence of a tape recorder during interviews at the commune Peoples' Committee office would have made respondents anymore reticent than they would have been by virtue of the location. In peoples' private homes the tape recorder was often set aside.

In addition to visiting Nam Sách district I also travelled extensively throughout the Red River delta in search of French-built infrastructure. Along the way I discussed irrigation issues with people I met. I discovered that people were very open about answering questions I had about contemporary or historical matters concerning water control. Often some of the older French infrastructure would have been built before anyone in the area had been born, and yet there would be someone who had some knowledge of the site and could answer questions. Hydraulic infrastructure in Vietnam -- primarily dams and sluice gates -- often double as tourist attractions and, as such, wandering around or asking questions was not considered inappropriate.

I have tried to spread my research over three levels of data collection and analysis. First, I have examined the ideas and visions that have influenced government policies with regard to the development of large-scale hydraulic infrastructure. Second, I have considered how these visions have been translated into reality in the form of, for example, dikes, canals, pumping stations or agricultural co-operatives. And, third, I have analysed how peasants and groups of peasants have responded to state visions and policies regarding modern hydraulic infrastructure. I bring these three interlocking political processes together from a comparative perspective as I examine broader questions concerning the historical patterns of hydraulic development in the Red River delta.

Before continuing, I feel the need to include some caveats to my work. The first is that none of my archival material was collected in the Archives d'Outre Mer in Aix-en-Province in France. One area that has probably suffered from this are

details concerning Monsieur Bédat and the water monopoly that the Governor General of Indochina granted him in 1900 (See Chapters 5 and 6). Although there is a wealth of material in National Archive No. 1 in Hanoi, I was unable to gather any background data concerning Bédat and how he came to be involved with irrigation in Tonkin. A visit to the colonial archives in Aix-en-Province would also have provided further information concerning the immediate causes of the French decision to abandon the Vĩnh Yên overflow reservoir in 1918. I discuss the colonial regime's fear of peasant protests in the area but it is not clear from my research exactly what form protests in Vĩnh Yên had taken up until 1918.

Second, most of my field interviews have come from one district in Hải Dương province.[13] There is such variation in terms of geography and water control management within the central delta that drawing broad analytical conclusions from one case is difficult. I have tried to temper the narrow range of field interviews with newspapers and archival data that touches on other areas of the Delta. Finally, although the vast majority of this thesis deals with the Red River delta, in Chapter 7 I have used information concerning the Chu River irrigation system in Thanh Hóa to illustrate canal management issues that were unavailable for similar irrigation systems in the Red River delta. For the most part information from Thanh Hóa has been used to supplement data from and make comparisons with the situation in Hải Dương province in the latter half of the 1950s.

Chapter summaries

This thesis considers the development of hydraulic infrastructure in the Red River delta from roughly the beginning of the 19th century. The bulk of my research concerns the period from 1895 -- beginning with the first colonial Dike Commission -- until 1981, and the introduction of the Product Contract System (*khoán sản phâm*), which legitimated private production on co-operative land. Chapter 1

[13] Since 1997, Hải Dương and Hưng Yên -- formerly Hải Hưng province -- have been administered individually.

examines the theoretical concepts that underpin the chapters that follow. In broad strokes, I argue that since 1954 Vietnam has been pursuing a developmentalist agenda, which it inherited in part from the colonial regime. In order to implement its particular developmental vision, the DRV was forced to establish a hydraulic bargain with peasants in the Red River delta. This is in contrast to the colonial regime, which neglected the importance of the hydraulic bargain. This is most apparent in the context of the Vĩnh Yên floodgates (see Chapter 4) and Bédat's failed irrigation venture in Hà Đông province (see Chapters 5 and 6). Hydraulic bargains underscore the mutual responsibilities that the state and peasants have shared with regard to the twin processes of hydraulic modernisation and economic development. In Chapter 2, I flesh out the various patterns and themes that characterise the historical evolution of the hydraulic bargain. The chapter begins with an analysis of pre-colonial hydraulic infrastructure within the context of Wittfogel's hydraulic thesis. I conclude that the development of large-scale hydraulic infrastructure in the Red River delta is representative of a system of joint management, between state and water users, rather than a hydraulic state. An important objective of this chapter is to highlight that the state has a well-established historical role in constructing and maintaining flood control infrastructure in the Red River delta. In terms of large-scale irrigation infrastructure, the state has had an equally important responsibility to construct and manage headworks. However, as irrigation systems, with the exception of French-built gravity-fed systems in the midlands, remained at the village or commune level throughout the central Red River delta in the period before 1954, the need for state involvement and, consequently, a hydraulic bargain was circumscribed.

Chapters 3, 4, 5 and 6 examine the pre-colonial and colonial periods, and provide the historical background to large-scale hydraulic construction in the post-colonial period. Chapter 3 considers the important transformation that took place under Emperor Minh Mệnh whereby "protective" and "productive" hydraulic infrastructure were integrated in order to achieve the modernising goals that the Nguyễn dynasty had set for itself. In Chapter 4, I consider how French science

wrestled with the "siltation hypothesis", and how the colonial regime finally concluded that diking the Red River delta was the most effective means of flood control. By diking the Red River delta the colonial regime set the stage for the large-scale irrigation and drainage projects in the central delta that were constructed by the Communist Party. Chapters 5 and 6 focus on how large-scale irrigation and drainage fit into the colonial conceptions of development and hydraulic agriculture, and how, without first establishing a hydraulic bargain, it was difficult to construct the large-scale infrastructure that was needed to realise the colonial developmental vision. In Chapter 5, I consider attempts by the French entrepreneur Bédat to sell irrigation in Hà Đông province, as well as some of the reasons why his venture failed. Bédat's legacy -- a disoriented colonial irrigation policy characterised by endless debate, zealous engineers and a lack of financial resources -- is the subject of Chapter 6.

Chapters 7, 8 and 9 examine the period 1954-81. In Chapter 7, the bureaucratic limitations of the DRV, the importance of foreign aid and the ideological vision of large-scale hydraulic agriculture are considered in an effort to understand why the DRV chose to move forward with large-scale rather than small-scale irrigation projects. Chapter 8 discusses how, within the rubric of the First Five-Year Plan (1961-65), the DRV attempted to co-operativise agriculture and modernise irrigation. The resulting production-construction dichotomy helped create a tension between local self-reliance and efforts by the state to integrate local canals systems and headworks. The production-construction dichotomy put demands on co-operative labour that led the Party to establish specialised hydraulic brigades. How, in the 1970s, local and large-scale hydraulic infrastructure was to be integrated, a process known as "synchronisation", is the subject of Chapter 9. The state's limited success at synchronising irrigation and drainage networks represented a breakdown in the hydraulic bargain. The latter part of Chapter 9 considers the implications this had for the collectivised rural economy.

Chapter 1 Authoritarian discourses: Negotiating development and the hydraulic bargain

Introduction

Since the early 19th century, hydraulic bargaining has been integral to the process of implementing large-scale hydraulic infrastructure projects in the Red River delta. In this chapter, I focus on the theoretical aspects of the bargain and examine how it can evolve into a political discourse that has wider implications for state society relations. Having said this, the lack of a hydraulic bargain or the peasantry's selective acceptance of certain aspects of the hydraulic bargain, has been equally important in defining the process of large-scale hydraulic development during the Nguyễn dynasty and later during the colonial period. Large-scale projects, such as the Cửu Yên and Thiên Đức canals, that the Nguyễn rulers had envisioned, were left unfinished or poorly constructed because the state lacked the financial means while peasants were unwilling to provide the necessary labour. Again, during the colonial era, instead of using public funds, the colonial administration contracted Mr. Bédat to sell irrigation to peasants in Hà Đông. Bédat failed to convince peasants of the potential economic benefits that irrigation would provide and, thus, they refused to agree to purchase his water.

Hydraulic bargains represent a certain degree of state legitimacy, in addition to a practical recognition on behalf of peasants of the benefits of increased wet rice productivity. A hydraulic bargain is often contained within a set of broader developmental and modernisation goals that the state supports by providing financial and political investments through concrete policy programs. Such an ideological rubric was not the foundation on which the Nguyễn dynasty rationalised its investments in large-scale hydraulic infrastructure. During the colonial period, the colonial administration had a well-developed vision of an industrialised Red River delta, which was contained within the developmental

framework of *mise en valeur*. The colonial authorities, however, never made the financial and political commitments that were necessary to implement, at least in terms of large-scale irrigation and drainage infrastructure, their image of modernity. In the case of water users during this same period, they were generally reluctant to adopt the modified cropping patterns for which canal irrigation would provide. Apart from select regions, where the French had constructed large-scale infrastructure, irrigation systems remained highly localised. As such, the colonial state and the peasantry never established a thoroughgoing hydraulic bargain in the Tonkin delta.

Hence, as this chapter is concerned with the political and economic integration of the various facets of the hydraulic bargain, which finally came together in the form of the First Five Year Plan (1961-1965), most examples of hydraulic bargaining discussed within this chapter are taken from the post-1954 period. As a history of hydraulic development, this thesis is concerned with understanding both the components of the hydraulic bargain in isolation as well as the historical process by which they interacted and the impact this process had on the wider political economy. In the pre-colonial and colonial periods certain pieces of the political economic puzzle that would allow a hydraulic bargain to emerge were in place while others were neglected or non-existent. For example, during the 19th century, what I have described as a "proto-modernist" approach toward hydraulic development did not embody the productivist tendencies that would have committed the Nguyễn to the developmental policies that were pursued by the DRV. During the colonial period, *mise en valeur* presented itself as an ideological basis for large-scale hydraulic development but the state lacked the political and economic resolve to implement their vision. How the different components of the hydraulic bargain, which are outlined in this chapter, emerged and then shrank back during the pre-colonial and colonial periods are discussed in greater detail in Chapters 3, 4, 5 and 6.

My research has also been concerned with understanding how, within a one-Party authoritarian political economic system, there is room for political and

economic negotiation. In the first section of this chapter I will consider Vietnam as a developmental state from the perspectives of both the colonial and post-1954 regimes in northern Vietnam. The DRV gambled much of its political legitimacy upon its ability to bring improved living standards to peasants, and an important factor in achieving this goal was modernising irrigation and drainage infrastructure. In doing so, the DRV found itself engaged in a hydraulic bargain, the dynamics of which played an important role in undermining the centrally planned economy. Likewise, during the pre-colonial and colonial periods, the failure to establish a hydraulic bargain impacted on the state's ability to pursue its limited hydraulic objectives. In either case, hydraulic bargain or not, peasants have been actively involved in determining the success or failure of large-scale hydraulic projects. It is in light of this, that I turn in the second section to consider hydraulic bargaining as a form of political and economic discourse and the impact that it can have on the broader political economy.

Vietnam as a developmental state

Vietnam's current political system is based on the Soviet model, a model that contains no official political space for public dissent. Because of its communist-Leninist political institutions the Vietnamese political economic system has most often engendered comparisons with other communist countries. However, writing in the early 1970s, when the previously dominant totalitarian approaches to communist studies were being challenged by alternate theories, Andrew Janos warned against reverting to a single analytical model to understand the workings of a range of individual communist systems.

> The assumption that the politics of communist societies is explicable in terms of a single model, and that the earlier totalitarian model ought to be simply substituted by a new one, is a somewhat startling recommendation, especially because it is being made at a time when the political diversity of

> communist countries has already become a journalistic and academic commonplace (Janos, 1970, 438).[1]

Since the fall of the Berlin War in 1989, former East European communist countries have evolved into "post-communist transition economies". Because of their shared communist past, comparisons are made between Vietnam and countries in transition such as Hungary, Poland and the Czech Republic.[2] Other studies have focussed on comparisons between China and Vietnam (Chan et al, 1999). One area of comparison that has not been well explored, however, has been the similarities and differences found between East Asian developmental states and Vietnam.

Taiwan, South Korea, China and Vietnam are all "transitional economies" in as much as they have been pursuing a historical process of state-led economic development, which has involved attempts to industrialise national political economies based largely on wet-rice, or at least irrigated agriculture. From a historical perspective the "transition" of the Vietnamese political economy in the Red River delta has been on-going since the beginning of the colonial period. Although Vietnam has, since the early 1960s, been pursuing the goal of socialist industrialisation, this objective reflects the earlier colonial vision of "development" (*mise en valeur*), modernisation and industrialisation. Thus, I argue that within the rubric of "large-scale socialist industrialisation" the Party was applying a generic form of "development" that it had inherited from the French colonial regime. Under such circumstances there are comparisons to be made with East Asian "developmental states" in as much as the modernist and productivist sub-text of

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[1] Janos' analysis was responding to work being done at the time on pluralist politics in the Soviet Union. In the early 1950s, Karl Deutsch was one of the first scholars to consider the political fault lines that existed within "totalitarian" political economies (Deutsch, 1953, 321-333). More than a decade later a conference held at the Australian National University considered the extent that pluralism had begun to appear as "de-stalinization" was taking place in the Soviet Union (Rigby, 1965, 44-45). Pluralist trends within the Soviet political economy were more confidently exposed in (Skilling, 1966) and in a follow-up article (Skilling, 1983).

[2] There are certainly those in the Government of Vietnam who believe they can learn from eastern European transition experiences. In March 2001, Janos Kornai travelled to Vietnam at the request of the Government of Vietnam. He gave a number of talks to high level groups including the Prime-Minister's Advisory Committee. Kornai, an expert on the political economy of socialism and

"large-scale socialist industrialisation" resonates with the "export-oriented industrialisation" strategies in Korea and Taiwan.

Despite the obvious differences between the Vietnamese political economy of the 1960s and 1970s and the East Asian developmental states -- no formal free market institutions, little political space for bargaining and low levels of economic growth -- the Vietnamese political economy has nonetheless been "developmental".[3] Developmental states exist because there is widespread acceptance that the state has a legitimate if not a necessary role in integrating the activities of various sectors of the national economy within the larger context of the state's developmental vision. The essence of this definition of the developmental state is that state authority is legitimate and that the state defines for itself and society a "developmental" ideology that sets out concrete economic goals.[4] It is, therefore, the ideological vision that the Party shared with the peasantry in the early years of the DRV, and the state's attempts within the agriculture sector to pursue this vision through large-scale hydraulic infrastructure construction and co-operativisation that characterise the DRV state as being "developmental". As for the colonial state, although large-scale hydraulic agriculture was envisioned as the basis for growth in the agriculture economy, only a handful of large-scale hydraulics projects were actually implemented. Moreover, as the August Revolution and War

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economic transition in Eastern Europe, has been a long-time advocate of gradual economic liberalisation rather than the "Big Bang" approach.

[3] This assertion resonates with those authors who would apply the term "developmental" to any state that professes an interest in development regardless of whether it has achieved positive economic results (Evans, 1992, 147, fn. 20).

[4] For example, one writer has concluded that the existence of a developmental state in France was represented, if not determined by the ontological existence of a "moral ambition", an "informed 'mythological' conceptualisation of how the world works and what can be achieved in it (Loriaux, 1999, 237)". Similarly, Robert Wade and Gordon White argue that as far as late-developing economies are concerned the state must be involved because the development process in these late developers is more rational and less spontaneous than it was in 19th century England. White and Wade go so far as to state that late developers have a 'teleological determination' toward developmentalism. Thus, developmentalism and the interventionist state are inseparable (Wade & White, 1988, 1). Developmental states in their efforts to achieve programmatic economic goals "have been essentially mobilising states in which political and bureaucratic components have been virtually fused (Leftwich, 1995, 410).

of Resistance against the French can attest, the colonial regime lacked the legitimacy of the VWP during the early years of the DRV.

Political economy: Bringing history and politics back in

An effort to reaffirm the importance of history and politics within political economy was one objective of early writings on the developmental state, and it is this same goal that has informed my research into the development of large-scale hydraulic infrastructure in the Red River delta. Chalmers Johnson's seminal work on the Japanese developmental state in *MITI and the Japanese miracle* (Johnson, 1982) was intended to "go beyond the contrast between the American and Soviet economies (Johnson, 1999, 32)". Comparisons between the American and Soviet economic systems had become a central feature of "virtually all the canonical works of the American side during the Cold War... (Johnson, 1999, 32)."[5] According to Johnson, Japan "squared the socialist circle" -- high levels of social goal setting without the consequences of communism (Johnson, 1995, 10). Japan specifically and developmental states in general did not fit the neat Cold War categorisations of command economies or market capitalism.[6] What was required, Johnson argued, was a broader approach to political economy, which he categorised as "sociological theories of the market". Such a methodology would incorporate

> not just market principles and forces but also, institutions, rules, histories, legal judgements, and cultural norms concerned with such things as gender, age, inheritance, and family obligations. This is the realm not of *economic theory* but of *political economy*. In one sense the Japanese have built their economic system on a sociological rather than an economic theory of the market -- one that recognises *the links and connections* between manufacturers and consumers and tries to make the most of them (italics added) (Johnson, 1995, 43).

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[5] For an analysis of the causal factors involved see (Stubbs, 1999). In terms of the Cold War's effect on scholarship surrounding East Asian development and the advent of the developmental state model see (Johnson, 1995, 8-10, 45; Johnson, 1999, 32-38).

[6] For discussions of the developmental state in Korea see (Amsden, 1989; Woo-Cumings, 1991) and for comparisons of state-led industrialisation in Korea and Taiwan see (Fields, 1995; Wade, 1992; White, 1988).

Johnson's sociological theory of the market provides a cornerstone around which a more political-historical approach to political economy can be constructed.[7]

Developmental state theories have helped counter the strength of neo-classical economic analyses, which argued that the economic success being realised in East Asia during the post-World War II period was the result of an adherence to market principles exemplified by "getting the prices right".[8] Nevertheless, by the early 1980s, neo-classical economists such as Hugh Patrick -- who believed the role of the Japanese government in "creating an environment of growth" was exaggerated (Patrick, 1977, 239) -- had difficulties denying that the state had a positive hand in guiding the market in East Asia (see Wade, 1992, 271-285). If the evidence was so undeniable, then why had neo-classical economists disregarded the role of the state in East Asian economies during the 1970s? Wade and White argue that Taiwan and South Korea, "assiduously propagated a 'liberal' economic image, for the very good reason that they want to give as little grounds as possible for other countries to levy restrictions against their exports." They made trade controls "disappear from view" with the help of those western writers, the argument continues, who wanted to believe that the East Asians are like "us" -- not communist (Wade & White, 1988, 8).

Chalmers Johnson's developmental state coincided with the appearance in the mid-1980s of a movement to "bring the state back in" to social science research. Adherents to the call were responding to what they believed was a conceptual problem found within "society-centred" political theories. Bringing the state back in was a response to a broad array of American and European post

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[7] Chalmers Johnson echoes Eric Wolf's approach to political economy. Wolf's political economy is based on analysing the interaction of social, political and market *forces* rather than reified conceptions of state and society, within a global, historical framework (Wolf, 1982, 6). Similarly, Vivienne Shue refers to her analysis of "process" as tracing "the mutually conditioning interactions among elements that tend more commonly to be dichotomised into abstraction like 'state and society', 'structure and culture' (Shue, 1988, 4)".

[8] Hobson refers to this phenomenon as the "economistic consensus" whereby analyses of economic change and policy making focus on the importance of "economic interest groups" while excluding the influence of politics (Hobson, 1997, 3).

World War II social science research that had been unable to explain the autonomous activities of "states" *vis-à-vis* "society" (Skocpol, 1985, 4-7). International political economy began to re-examine the role of the state in determining international policy outcomes (Katzenstein, 1978, 3-5). Likewise, Marxist theorists were forced to confront criticism from international relations scholars who were critical of their adherence to structural explanations of the international system while neglecting the "agency" of the individual (Wendt, 1987, 337-340).

Out of this movement came attempts to understand the degree to which states as autonomous actors in domestic and international political economies maintained their autonomy from societies. In some cases, "embedded" was used to describe a state that was not entirely insulated from society. Embeddeness meant that state and society maintained a "concrete set of social ties" (Evans, 1995, 12) (See also Chan et al, 1998; Fine, 1999; Putnam, 1993). Even if embedded, however, the state remained in control. Likewise, statist theorists have assumed the state to be relatively more "capable" than society. What this means is that the state achieves its policy objectives using a variety of mechanisms of power that the autonomous state can wield as a result of its unique organisational characteristics (Mann, 1986, 113-136; Weiss, 1998, Ch. 1). Thus, a murky dichotomy has been established between "statist" and "institutional" approaches to political economic analysis with the point of contention being the relative "autonomy" of the state. In order to attempt a synthesis of these two schools of thought it is first necessary to consider the origins of the institution/state autonomy debate, or, in other words, the bifurcation of state and society, within the context of classical political economy.

Classical political economy

Classical political economy only became a victim of Cold War politics after it had first suffered at the hands of 19th century European intellectuals who were coming to terms with the social upheavals brought on by industrialisation. During the 18th

century, economics had been subsumed within the notion of politics and together they provided the foundation for what is now known as classical political economy:

> The art of domestic management, from which by extension, the earliest meaning of *political economy* developed, referring to the art of managing a country's economy (Staniland, 1985, 11).

In practice this meant that economies were to be managed by statesmen in the same manner that fathers had managed households. Liberal economics, however, challenged this approach to political economy by attaching natural laws to economic processes that precluded the need for human intervention in the management of the market. One result of this was that "the adjective *political* was dropped in favour of *economics* ('pure' or 'positive') (Staniland, 1985, 14)."

The separation of politics and economics into distinct analytical spheres was not unique in the history of 19th century science. In fact, modern social science, as it has been parcelled into discreetly organised disciplines, emerged from the effective disintegration of classical political economy in the 19th century. According to Eric Wolf, one important distinction between political economy and the new disciplines was that the former dealt with the dialectical relations between classes while the latter focused on the individual and "social relations" (Wolf, 1982, 20). Since the early 19th century, western social science has been challenged by the problem of how to understand the relationship between politics, the rise of national economies, the social impact of capitalism and the class conflicts that emerged from industrialisation.[9]

In England between the late 1700s and the mid-1800s one result of the industrial revolution was the disintegration of the pre-industrial social order. In *Captain Swing* (Hobsbawm & Rudé, 1969), Eric Hobsbawm and George Rudé describe the process by which the familial ties between English farmers and agricultural labourers were weakened by economic factors. As prices for agricultural

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[9] Questions concerning these themes have been the subject of a wealth of twentieth century political economy scholarship. See for example (Hirschman, 1977; Moore, 1969; Polanyi, 1957; Schumpeter, 1947).

commodities increased during the Napoleonic wars it became more cost effective for farmers to pay labourers a cash wage with which they would purchase their own food. Previously labourers had eaten with the farmer's family and often lived with the farmer under the same roof. As the ties that had linked farmers and labourers dissolved, grievances were aired in the form of riots, strikes and open rebellion. Hobsbawm and Rudé sum up the broad contradictions inherent in social and economic changes wrought by the industrial revolution:

> Nobles, squires and farmers...advocated an economy which implied mutually antagonistic classes, but did not want to disrupt a society of ordered ranks (Hobsbawm & Rudé, 1969, 47).

As class conflict threatened to destroy the old social order it became imperative to understand the types of social relationships that would engender stability in "society".[10] Wolf argues that sociology, the study of society, emerges from the need to believe order is the by-product of social relationships. The stronger, and more dense these ties become the more order there is in society.[11] One of the problems for sociologists was that in order to examine society it was necessary to conceptually de-link state from society, politics from economics. In the process of dissecting political economy into its modern disciplinary forms, so too were state and society naturally separated into two units of analysis (Wolf, 1982, 7-8).

The state-society dichotomy

States and societies are peculiar in that they are difficult to define as discrete concepts. Individually they maintain both a tangible structural coherence and more abstract imagined qualities. For many writers, states and societies have existed as if

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[10] Bruce Cummings explains how, in a similar vein, Asian states have tried to maintain what are perceived to be threatened traditional "Asian values".

> In East Asia *all* the modern states, including the communist ones, have responded in some fashion to Hegel's passion for conserving a threatened organic heritage -- leading to what Meiji thinkers called the "family state" or what became in North Korea a state/society modelled on the ruling family (Cumings, 1999, 81).

[11] Likewise, understanding how social ties can overcome problems of collective action and generate "social capital" has been at the centre of a number of recent studies. Seminal works on social capital include (Coleman, 1988; Putnam, 1993).

in a "global pool hall in which the entities spin off each other like so many hard and round billiard balls" (Wolf, 1982, 6). For the most part, however, societies are "constructed" or "imagined" communities that exist in an abstract sense in the minds of their members (Anderson, 1983; Hobsbawm, 1983, 14). Just as societies have structural and imagined qualities, so too do states. On the one hand, the state manifests itself in the form of the military, the courts and police. On the other hand, the broader conceptualisation of the state as a nebulous power that leads people off to jail and to pay income tax voluntarily, which exists beyond the individual or society, can be viewed as a "structural effect" (Mitchell, 1991, 93). In other words, as people are raised within a system where paying taxes and obeying the law are cultural norms, they rationalise this behaviour by creating an abstract conception of "the state".[12]

Dichotomising state and society is a distinctly modern phenomenon. The ancient Greeks even lacked a word for society.[13] Life for the Greeks was divided between clearly defined public and private realms. The emergence of society as we would recognise it today is the result of

> The rise of the 'household' (*oikia*) or of economic activities to the public realm, housekeeping and all matters pertaining formerly to the private sphere of the family have become a 'collective' concern (Arendt, 1958, 31).

Arendt's argument highlights the central *problematique* of modern state-society relations: as national economies have emerged to create the foundation of modern

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[12] This combination of a structural definition of the state with Mitchell's definition of the state as a "structural effect" can be summed up as follows:

> A maximal definition of *the state* would thus include not just the reference to "*coercion* wielding *organisations*", but also the claim that the distinctness of the state and its priority over other entities is the result of cultural techniques (Steinmetz, 1999, 8).

These cultural techniques could include perceptions of one's relationship to the state as they are transmitted through public education systems, the mass media or churches.

[13] Sociologists would argue that the Greek *polis* was in fact a society by definition. Abraham argues: for the Greeks the distinction between what was political and what was social was meaningless. "The way in which the city state -- or society -- was organised describes its political character; so when Aristotle described man as 'a political animal' it would be equally correct to substitute 'social' for 'political'" (Abraham, 1973, 21-22). What Abraham has done here is to impose a "modern" concept on to the realities of ancient Greece using a very broad definition of 'society': organisation + norms = society. Using this definition almost any human organisation would constitute a society.

society, the distinction between public and private has become obscured. In terms of hydraulic agriculture in the Red River delta, this can be represented by the integration of large-scale and small-scale infrastructure. As Arendt writes: "In the modern world the two realms indeed constantly flow into each other like waves in the never-resting stream of the life process itself (Arendt, 1958, 31)".[14]

In summary, modern society has emerged from the economic integration of the private and public worlds of the family and the political realm. Modernising irrigation infrastructure in the Red River delta has followed a similar trajectory, insofar as traditional forms of irrigation were village-based and involved limited state involvement. As the state has gradually become more involved in constructing headworks and integrating local and large-scale infrastructure, it has become difficult to separate state from the non-state infrastructure. In this way, the political economy of large-scale hydraulics is represented well by Arendt's image of a "never resting stream" of political and economic forces and the overall framework of classical political economy.

Ideology, legitimacy and the Vietnamese state

The "never ending stream" of interaction between state and society, private and public, which typified classical political economy, has reappeared in political science literature. State and society have been perceived as being "mutually

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[14] Foucault broadens Arendt's analysis of economics as the key distinguishing feature between ancient and modern. He examines the process of government, or "how to introduce economy":

> That is to say, the correct manner of managing individuals, goods and wealth within the family (which a good father is expected to do in relation to his wife, children and servants) and of making the family fortunes prosper (Foucault, 1991, 92).

The introduction of economy has resulted in, according to Foucault, the priorities of household management being conflated to the priorities of national government. Since governing a household "does not essentially mean safeguarding the family property", governing a state is not most importantly concerned with acquiring "sovereignty over territory for a prince...what counts essentially is this complex of men and things; property and territory are merely one of its variables (Foucault, 1991, 94)." Foucault's argument that the focus of government is not territory but a "complex composed of men and things" fits neatly into the historical realities of political economic management in pre-colonial Southeast Asia where, unlike western Europe, political power has historically been a function of controlling populations rather than territory (Reid, 1988, find page number; Scott, 1998, 185-191).

determined" (Migdal, 1994, 8-11; Shue, 1988, 25-29). Implicit in such conceptions of state-society relations is an understanding that, regardless of the apparent lack of political space available to individuals, there are an array of discourses between and among state and societal actors (Scott, 1990, 74). Often communities that appear to be quiescent, Scott argues, maintain a "hidden transcript" or "hidden discourse" consisting of rites and traditions, myths and music (Scott, 1990, page number). It is the socio-political discourse that members of a subordinate group share, which allows marginalised communities to "let off steam" often engaging in acts of "everyday resistance" or practising "everyday politics". In this way, subordinate groups can remain politically engaged and yet avoid open conflict with more powerful elements in society.

And yet, if these discourses are perceived to be inherently adversarial there is little scope for "developmental" change. Industrial development often consists of a series of "shared projects" that involve a degree of ideological coherence between state and society (Evans, 1995, 37). For example, in the 1950s and early 1960s, Vietnamese peasants cautiously welcomed labour-saving improvements such as agricultural mechanisation and canal irrigation that were part of collectivised agriculture. Their Chinese counterparts shared this enthusiasm (Shapiro, 2001, 80-81). Eventually these same projects would engender conflict, but not immediately. The VWP incorporated promises of modernised canal irrigation within the co-operative system but at the same time forced the rural economy to make inordinate sacrifices for the sake of industrial growth. Nguyễn Khắc Viện summed up the dilemma of DRV industrial policy in a rhetorical plea to agriculture workers:

> Agricultural development cannot be divorced from industrial development, nor the interests of the peasants from those of the workers and other consumers: just prices must take all of this into account. The question is can one convince the peasants of the usefulness of certain sacrifices to industrialize the country? Can the ideological factor play a role? Or must one resort only to the stimulus of material advantages (Nguyễn Khắc Viện, 1964, 6)?

These questions would undoubtedly have been among the most pressing for the DRV's ideologues and its economic planners throughout the 1960s and 1970s.

By gathering broad societal support for both the national liberation struggle as well as the post-1954 phase of economic development, the DRV maintained high levels of legitimacy among peasants. Consequently, it was on this basis that the Party constructed a hydraulic bargain with peasants in the Red River delta. A hydraulic bargain consists of the implicit (or potentially contractual) agreement between the state and water users concerning their mutual responsibility for constructing and maintaining large-scale hydraulic infrastructure. More broadly, it involves the process of political economic negotiation that is required to achieve the hydraulic objectives of the "bargain". This element of the hydraulic bargain is defined by a dynamic relationship in which the state has material and organisational resources to offer potential water users in return for their support of the state's productivist developmental vision.[15]

The DRV's developmental vision established one half of the hydraulic bargain. In general terms, the DRV's developmental vision can be defined as a "goal-rational ideology". Such ideologies are "resources" that can support a state's claims of legitimacy (Alagappa, 1995, 31-32). The legitimating potential of "goal-rational ideologies" depends on a number of factors.

> First, the goal must be accepted by all or most of the strategic groups as relevant and valid for the whole society. Second, progress must be made in realizing the goal. If reality is substantially different from the posited goal, then belief in the goal and the associated political system will decline. Third, the goal must have the potential to constitute a specific political system (Alagappa, 1995, 36).

The DRV's vision of large-scale socialist industrialisation meets each of these criteria, including both aspects of the second, while the colonial policy of *mis en valeur* was left wanting on all three levels. In the post-colonial period, at least initially, there was widespread peasant support for land reform, and, arguably, even co-operativisation. In terms of improving hydraulic infrastructure, there was significant backing, which can be measured in high labour mobilisation rates between 1954-56, among peasants in the patriotic afterglow of victory over the

[15] Thanks to Professor Bill Turley for his help in refining this definition.

French. This began to dissipate as early as the late 1950s when constructing local irrigation systems proved to be highly labour intensive, while small-scale systems failed to offer peasants much convenience if they were not linked to larger canals and pumping stations. Despite, or perhaps as the result of this initial breakdown in the embryonic hydraulic bargain, the Party moved forward with its co-operativisation and irrigation modernisation policies until, by the late 1970s, it was clear that fundamental reforms to collectivised agricultural would be required. The first official step in this direction was the introduction of the "product contract" (*khoán sản phẩm*) in 1981.

Limited pluralism under an authoritarian state

As the hydraulic bargain gradually eroded how did this affect the political discourse between the state and co-operative members and what impact did it have on the rural political economy? Industrial transformations are not typically the result of carefully focussed despotic power.[16] They are, instead, the result of a multitude of daily negotiations that take place beyond or with the tacit approval of state authorities. In this way the post-colonial Vietnamese political economy has exhibited elements of "limited pluralism".[17] By limited pluralism I am referring to a term applied by Juan Linz to authoritarian regimes, which allows for a distinction

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[16] By industrial transformations I am referring to the acceptance of productivist norms, which are discussed further below, that allow for long-term industrial growth, which support the development of modern capitalism. Stalinist Russia is an example of how despotic power can be used to drive a country toward industrialisation. I would argue, however, that in large part the Soviet Union never achieved a thoroughgoing industrial transformation despite periods characterised by high levels of industrial growth.

[17] Brantly Womack goes so far as to describe the relationship during the revolutionary period between the VWP and the People as a quasi-democratic system (QDS). Within this system the Party was mass-regarding when it needed the revolutionary support of the peasantry. It was following the consolidation of the revolution in the 1960s, however, that the QDS disintegrated and the Party became more isolated and government cadres looked upward for political power (Womack, 1987, 484-487). Kerkvliet raises the question whether in fact this shift did occur (Kerkvliet, 1995, 400). My own research suggests that the Party has had little choice but to continue managing the political economy in a largely mass-regarding manner. Mass-regarding does not necessarily imply responsive policymaking. Rather, in the case of the DRV, mass regarding behaviour took the form of *de facto* decentralisation of public policy implementation, which then allowed for a type of limited pluralism.

to be made between democratic pluralism and the monopoly control of totalitarianism (Linz, 1970, 255-257).

Western social science research has tended to classify Vietnam's communist-Leninist political system toward the totalitarian end of the political spectrum (Kerkvliet, 1995, 397-401). Examples of such approaches include writers such as Carl Thayer who argues that Vietnam represents a "mono-organisational" system where "there is little scope for the organisation of activity independent of the Party-led command structures" (Thayer, 1992, 111). Also, within this first group is Porter's "bureaucratic polity", a system where "major decisions are made entirely within the bureaucracy and are influenced by it rather than by extra-bureaucratic forces in society -- whether parties, interest groups, or mass movements..." (Porter, 1993, 101).

However, there is also a growing literature that recognises the existence of political negotiations within Vietnam's authoritarian political system. Work has been done recently on the decentralised nature of state power in post-revolutionary Vietnam and the opportunities this offers for political negotiation to take place (Vasavakul, 1999). Corporatist theory has been applied to the highly structured lobbying that takes place between mass organisations such as the Vietnam Chamber of Commerce and Industry (VCCI), private firms and government ministries (Stromseth, 1998, Ch. 1). Corporatist analyses have stressed that the Vietnamese political economy is characterised by a hierarchy of official organisations that provide opportunities for political interests to be channelled from either the top or the bottom of the system (Jeong, 1997, 159-167). These approaches to Vietnam's political economy recognise that mass organisations and other state-sanctioned groups have limited but tangible political influence over the central state.

A third grouping is concerned with examples of political bargaining that take place outside officially recognised state structures or organisations. Much of the work done on examining the role of non-state actors has been limited to the activities of individuals or small groups within agricultural co-operatives (*hợp tác xã*

nông nghiệp). This work has highlighted the relative autonomy of co-operatives with regard to central-state management (Beresford, 1990; Fforde, 1989; White, 1985). Ben Kerkvliet has found that throughout the 1970s there were attempts by local government officials as well as members of agricultural co-operatives to engage in forms of "everyday resistance" against state agriculture policies (Kerkvliet, 1995; Kerkvliet & Selden, 1999, 108-110). This followed Christine White's 1986 analysis of everyday resistance in Vietnam, the scope of which was constrained by limited access to primary sources (White, 1986). Cases of everyday resistance also appear in the work of Adam Fforde and Stefan de Vylder where in their research they encounter examples of "fence breaking/jumping".[18]

Fence breaking and other acts of everyday resistance reflected co-operative members' dissatisfaction with collectivised agriculture. The everyday politics of the late 1970s, however, were not centred on attacking the Party's broader developmental goals of "modernisation and industrialisation" (*hiện đại hóa công nghiệp hóa*) that continue to drive economic policy in Vietnam. Recently, the Party-controlled press has addressed the question of how to deal with protests that do not attack the basic ideological premises of the Party. According to one journalist writing for the paper "The Countryside Today" (*Nông thôn Ngày nay*), peasant protests based on legitimate grievances ought to be seen as valid forms of political expression that need to be taken seriously, at least publicly (Lê Văn Sang, 2000). When acts of everyday politics are perceived to be legitimate, in so far as they are broadly congruent with official ideology, they can take on the air of political participation.[19]

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[18] Fence breaking is defined as those spontaneous acts of "reform from below" that resulted from the failure of the planning system to maintain control of economic resources (Fforde & deVylder, 1995, 12-13).

[19] Legitimate resistance -- forms of protest that are not perceived by the state to be politically motivated partly because they integrate and reflect the symbols of state authority -- has also been characterised as "rightful resistance". Rightful resistance is the quintessential "critique within the hegemony." Those who pursue it at least appear to take the values and programs of political and economic elites to heart while demonstrating that some authorities do not. They launch attacks that are legitimate, by definition, in a rhetoric that even unresponsive authorities must recognise, lest

However, Roeder has argued that: "the political activity that the Leninist polity has typically sought to institutionalise is not participation (nor is it simply sham participation, as others argue) but a functionally distinct form of political activity -- involvement in coproduction." Participation is distinct from coproduction in that political participation influences governmental decision-making while "coproduction is the implementation of decisions already made (Roeder, 1989, 861)". But coproduction and participation need not be mutually exclusive terms, just as expressions of everyday politics are not necessarily attempts to subvert the larger ideological goals of the state. Moreover, within an authoritarian context, participation and resistance are often two sides of the same coin. Although resistance implies a reaction to a "decision already made" it is also a form of participation. Resistance carries with it a message to decision-makers that future decisions will have to be modified in order to facilitate successful policy implementation in the future. What sets the colonial and Communist states apart is the ability of peasants to influence how hydraulic projects were implemented. The colonial state was not wedded to the idea of industrialisation and modernisation in the same way as the Communist Party. Thus, when the colonial regime's policy to irrigate the central delta in the first decade of the 20th century proved difficult to implement, instead of finding alternative methods of implementation, which were more conducive to the specific conditions of northern Vietnam, they effectively abandoned future efforts.

The hydraulic bargain, participation and authoritarianism

The hydraulic bargain provides a framework for understanding how central authorities and peasants have needed to co-operate in order to construct and manage large-scale hydraulic infrastructure. Under the Communist Party, the bargain has been based on the state providing *subsidies* in return for local

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they risk being charged with hypocrisy and disloyalty to the system of power they represent (O'Brien, 1996, 36).

mobilisation of taxes, labour for hydraulic construction and soldiers.[20] Co-operation has been required in order to work effectively toward the larger developmental goals that have been founded on the power of science and rationalist planning to overcome the natural obstacles, such as floods and drought, which lay between economic backwardness and industrialisation. French colonial and Communist Party visions of industrialisation have been based on statistical analyses of society and the re-engineering of productive relationships among peasant producers. Colonial and communist visions of development can be defined by what James Scott refers to as "high modernism": an ideological form that places its faith in the "legitimacy of science and technology" and "productivism" (Scott, 1998, 4).

The hydraulic bargain is closely connected to the "productivist" philosophies that informed the French colonial and Communist states' visions of development. In general terms, productivism is "a totalizing framework that subordinates all social activities to production" (Rabinbach, 1992, 4). As capitalism and co-operativisation have influenced productive relationships in northern Vietnam they have altered the peasantry's perception of their position in the national economy and their relationship to the state. Convincing peasants to accept a productivist mentality has been the goal of both the colonial and Communist states. Sustainable productivity increases and industrialisation, according to Frederick Taylor, were the result of a "complete mental revolution" and not simply financial incentives or bonus systems (Taylor, 1991, 73). Taylor, one of the seminal theorists of late 19th century industrial management, argued that this mental revolution would only come about once management and labour, state and society, had agreed to move forward together in order to achieve higher levels of productivity. In effect, industrial capitalism as well as socialist industrialisation, if

[20] (Interview, Ministry of Hydraulics, November 2000). Bargains also existed in other areas of the collectivised economy. For example, state procurement prices for agricultural commodities were kept artificially low with the understanding that input prices for fertiliser and seeds would be supplied to co-operatives at prices below free market value. Problems emerged, however, when either state supplies of agricultural inputs were limited or when international assistance could no

they were to achieve productivity increases would have to be based on a bargain between state and society whereby strategic sectors of the economy accept the legitimacy of productivist aims in return for improved living conditions.

The basic premise of high modernist ideals, according to Scott, is that economic processes can be rationalised to the degree that planners could replace capitalists, and labour would be redefined in mechanical terms. Under high modernist schemes people become cogs in the industrial machine (Scott, 1998, 98-99). According to Scott, planners have often faced a "prostrate civil society" lacking the capacity to resist the state's high modernist projects and it is because of this that high modernist programs can be attempted (Scott, 1998, 5). Conversely, liberal democratic ideals, liberal political economy and resistance by representative institutions have thwarted many attempts at implementing high modernist projects (Scott, 1998, 101-102). Scott hints that if the productivism of high modernism is accepted by a society then this reflects a certain weakness on its behalf. I would argue, however, that Vietnamese rural water users quite willingly accepted the productivist elements of hydraulic modernisation, which were presented to select groups of midland peasants during the colonial era and by the VWP in the late 1950s.

The hydraulic bargain is similar to the compact between state and society that Taylor argued was essential to the success of productivist reforms.

> Scientific management does not exist and cannot exist until there has been a complete mental revolution on the part of the workmen working under it, as to their duties toward themselves and toward their employers, and a complete mental revolution in the outlook for the employers, toward their duties, toward themselves, and toward their workmen (Taylor, 1991, 72).

In addition to Scott, distopian writers such as George Orwell (Orwell, 1951) and Yevgeny Zamyatin (Zamyatin, 1993 (1924)) criticised the dehumanising effects of the labour rationalisation process that Taylor expounded. Nevertheless, at some level, societies must accept the state's productivist reforms or "high modernist"

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longer maintain Vietnam's domestic subsidy scheme, as was the case in the late 1970s. (Interview

projects if they are to succeed; as Taylor highlights, the state cannot impose productivist policies and hope that they will be broadly accepted by society. Taylor argues that "scientific management" is an evolutionary process whereby workers work faster because it is in their interest to do so.

In addition to certain liberal values, as Scott argues, an equally effective counter to specifically "high modernist" projects is to accept the state's overarching "productivist" ideology, and the economic benefits it promises, and, within this framework, apply modes of resistance to subvert those elements that are unacceptable. The hydraulic bargain is founded on productivist ideals and by accepting the benefits of large-scale irrigation and drainage, co-operative members were agreeing to increase wet-rice productivity. This was not necessarily the case during the colonial period when peasants were concerned primarily with subsistence production. With this in mind, as I will show in Chapters 5 and 6, the peasantry's initial reluctance to double crop irrigated land was short-lived, and prompted nearby peasants who were cultivating unirrigated land, to petition the colonial authorities to have canal networks extended to their fields. During the 1960s and 1970s, co-operative members resisted select aspects of co-operativisation such as collective production but accepted the co-operative management structures that were essential to the operations of large-scale irrigation and drainage systems. This, I will argue, in the final chapter, is borne out in the 1980s when productivity increased rapidly as collectivisation was abandoned, while many production activities, especially irrigation and drainage, were still managed co-operatively.

Bargaining as political discourse

In his account of the relationship between the public and hidden narratives that exist between politically dominant and subordinate groups, James Scott remarks:

> The public transcript is, to put it crudely the *self*-portrait of the dominant elites as they would have themselves seen.... If, however, this flattering self-portrait is to have any rhetorical force among subordinates, it necessarily

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with an economics professor, Hanoi, October 2001).

> involves some concessions to their presumed interests. That is, rulers who aspire to hegemony in the Gramscian sense of that term must make out an ideological case that they rule, to some degree, on behalf of their subjects. This claim, in turn, is always highly tendentious but seldom completely without resonance among subordinates (Scott, 1990, 18).

Scott's argument is a warning to political analysts that harmony cannot necessarily be equated with quiescence. Even in the most repressive situations, subordinate groups maintain a "hidden discourse" beyond the purview of the dominant elites.

Hidden discourses exist in Vietnam in a variety of forms. One of the few times I have witnessed an open expression of what would normally be a very well-hidden discourse was during a visit to a pumping station in Nam Sách district. Over a meal of sliced pumpkin fried with tomatoes, pork offal, and rice wine (*rượu*), an older workman began to complain about the Party (*Đảng*). He argued that the Party had never done anything to improve his life so what good was it having a Party at all. "Other countries don't have a Party," he said. This was not a plea for multi-party democracy; he was, instead, questioning the utility of any political party, and in turn openly questioning the legitimacy of the central authorities. What made this outburst even more noteworthy was that it took place with a district and commune official present. The district cadre responded by saying that the Party had given the Vietnamese nation the opportunity to develop (*phát triển*) -- to defeat the enemy. Another cadre cautioned that they ought to keep their voices down if they didn't want the police (*công an*) to show up. The discussion continued with the others trying to placate the tradesman. My contact Thủy, who was visibly distressed, turned to me and told me to keep eating. Ironically, he was less concerned about the district and commune officials than he was about my presence. As a foreign scholar with a direct relationship to a central government agency I was considered by him to be more representative of the state than were any of the others.[21]

For the most part, however, my research examines political communication that takes place within the context of official, legitimated political expression, and

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[21] (Interview, Nam Sách District, February 2001).

not within a hidden discourse. Concerning the development of large-scale hydraulic infrastructure in the Red River delta, what I have discovered is that the range of political interaction that is acceptable within this official realm is surprisingly broad. This relatively open public narrative addresses the mutual rights and responsibilities that exist between authorities and rural water users. For instance, in mid-winter 2001, while travelling through Hà Tây province a western colleague working at the Ministry of Agriculture and Rural Development (MARD) (*Bộ Nông nghiệp Phát triển Nông thôn*) and I found ourselves in the midst of a village festival. At the time, MARD was being pressured by farmers to open a partially completed sluice gate at Liên Mạc on the Nhuệ river just east of Hanoi in order to provide water to a large area of Hà Tây province. The sticking point was that if the water were allowed to flow it would destroy the construction work that had already been completed. This story had been reported on Vietnamese television the night before.

Among the carnival rides and games of chance, we struck up a conversation with a local villager. Once this fellow realised that my friend worked with MARD he became quite animated. He described how his village had been without water during a crucial period of the Spring crop and that it was the government's responsibility to provide water when required.[22] His comments were not directed to the sympathetic ear of a fellow villager but rather a representative, albeit a foreign

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[22] Generally speaking, paddy is planted on lower land during the dry *vụ chiêm* where water would have been collected during the previous year's rainy season. The French called these rice fields 5th month paddy fields, *rizière de 5ième mois*, because the crop was harvested during the 5th month of the lunar calendar. These same fields would often be flooded during the rainy summer period but in some cases would be capable of producing a second rice crop. On higher land, where water was scarcer during the *vụ chiêm*, paddy was cultivated during the second cropping period, or *vụ mùa*. The French referred to *vụ mùa* as the 10th month crop because it was harvested during the 10th month of the lunar calendar. During *vụ chiêm*, land that was not producing rice would often be planted with secondary crops such as potatoes or beans. Throughout the text I refer to *vụ chiêm* as the Spring crop and *vụ mùa* as the Autumn crop. Technically, the Spring crop would be translated as *vụ xuân*, which was introduced in the early 1960s when the DRV began cultivating fast growing rice varieties that could be planted later in the crop year but still be harvested with the *chiêm* paddy. There were also variations introduced to the 10th month crop whereby a fast growing autumn crop of paddy was introduced. As is the case with the Spring crop, I have decided to refer to one or the other, or both, as the Autumn crop.

one, of a central government ministry. It is arguable that, because reports concerning the water shortage had recently been broadcast on television, that the subject had been placed within the official discourse. As such it was a subject that was open for public discussion and the villager believed that MARD's dilemma and his plight were legitimate topics for public discussion. Two points emerge from this.

First, within an authoritarian system such as Vietnam's, the public discourse is intended, for the most part, to substantiate the developmental objectives and policy programs as they are set out by the Party-state. Under these circumstances, it would appear incongruous to find reports in the Party-controlled media that a key government ministry was unable to achieve its short-term construction objectives and, because of this, farmers were not receiving their water. And yet, examples of just this kind of "admission" appear within the print media throughout the 1970s and 1980s. The second point concerns how individuals can make the step from "the politics of disguise and anonymity" to what could be described as "the politics of complaint". The farmer not only expressed his concern that he and his fellow villagers would suffer without water but that the government was to blame for the shortage. From the government's perspective, this is often referred to as "ỷ lại", an unnecessary dependence on public resources.[23] The official media, however, effectively legitimised the villagers complaint. It paved the way for a transition from what had surely been a topic within the subordinate narrative for some time to an open complaint and verbal petition concerning the government's responsibility to provide irrigation in a timely fashion.

The Liên Mạc sluice gate was eventually completed and water was provided to farmers. However, the following example highlights what can happen when the state is unable to provide irrigation and localities have to take matters into their own hands. In 1975, *Hải Hưng* reported that the secondary canal (*kênh*) T9 that received water from the Văn Giang pumping station in Khoái Châu (Châu Giang)

[23] The issue of "dependence" and water control in the Red River delta is discussed further in Chapter 2.

district was not being protected well.[24] Part of it had been dug away (*cuốc*) and a co-operative had intruded on (*xâm phạm*) a fifty metre section of the canal embankment where it had built two "clandestine sluice gates" (*cống ngầm*). Consequently, when water was pumped into the canal it flowed until it reached the first set of sluice gates where it would pour through. For those co-operatives at the tailend of the canal the result was less water. Tailenders were then forced to waste thousands of workdays pumping and pulling water. In light of this, the province ordered the locality to repair the damage that had been done, but according to *Hải Hưng* the co-operative refused to obey the order (*Hải Hưng,* 1975d).

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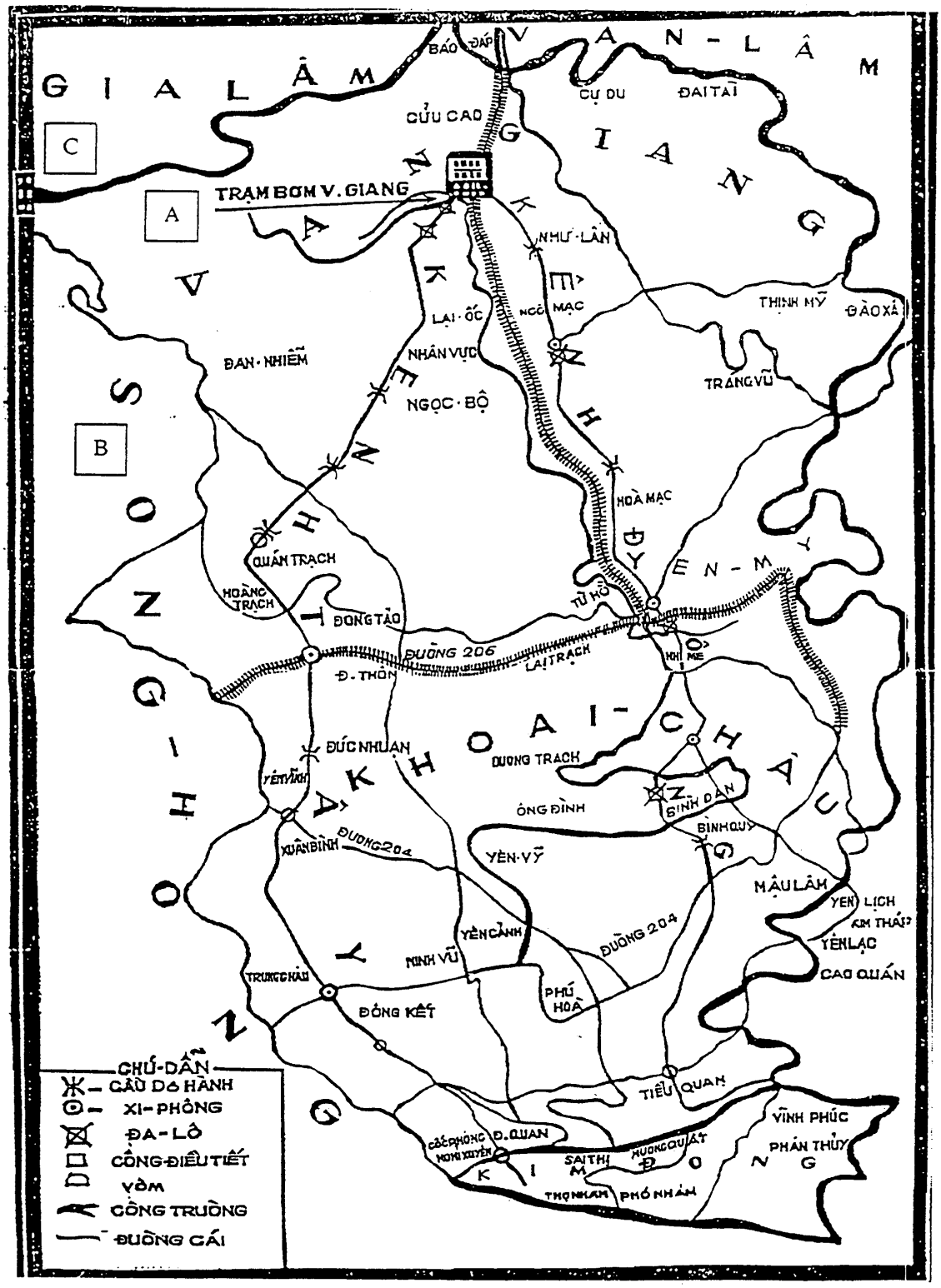
[24] The Châu Giang pumping station was built in conjunction with the Bắc-Hưng-Hải (BHH) large-scale irrigation and drainage network, which is discussed further in Chapter 7. In Figure 1.1, note the proximity of the Châu Giang pumping station to the Xuân Quan sluice gate, which was the main water source for the BHH system.

Figure 1.1 Map of the Văn Giang pumping station and canal network (c. 1962)



A. Văn Giang pumping station
B. Red River
C. Xuân Quan sluice gate

Source: (*Hưng Yên*, 1962).

Why were provincial officials reluctant to bring the full weight of the state's administrative authority down on the guilty co-operatives at the head of the canal, to force them to repair the canal embankments? Another example will help to answer this question. In 1978 the Cầu Sộp pumping station in Cẩm Bình district, Hải Hưng province, failed to provide water for co-operatives to break up their dry fields (*làm ngả* or *làm ải*) until the beginning of March, when seedlings would normally have already been transplanted. As people were preparing the Spring crop there were many cadres as well as co-operative members who dug holes in thirty places along the banks of the main canal in order to steal water and irrigate illegally. The best example of this was in Tân Hồng commune where there were eight breaks with the widest being two metres. Moreover, the province had just supplied this same commune with twenty-one valves designed to open and close sluice gates. Seven of these valves were broken as people prised open locked sluice gates (*Hải Hưng,* 1978b). An order issued by the Province under the authority of ministerial Decision 141, (*Nghị định 141*), and provincial Definition 45, (*Quý định 45*), concerning the protection of state property, were ignored by co-operatives serviced by Cầu Sộp. It took until early 1979, when the pumping station was finally able to provide water to the fields on schedule, before water conflicts began to subside. With water in the fields the pumping station was then in a position to see that the locally controlled sluice gates were destroyed and canal embankments repaired (*Hải Hưng,* 1979a).[25]

These examples highlight the fact that the Vietnamese state, within the parameters of the socialist hydraulic bargain, has had to accept a certain amount of

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[25] Problems for co-operatives connected to the Cầu Sộp pumping station continued into the 1980s. In 1982 the water level in the Cầu Sộp pumping station's main canal was so low that co-operative members began to reclaim land along the canal bottom and plant sweet potatoes. These findings were from a District Management Cadres' meeting held in March 1982 and included similar examples from other districts. In Từ Lộc district at the Điền Nhi pumping station the main canal designed to provide water to 410 hectares was planted with peanuts. The Hòa Bình river, which is the main water course for the entire district of Phu Tiền was being encroached upon by brick production with kilns built along the banks and the bed of the river (*Hải Hưng,* 1982a). These practices have continued throughout the 1980s and 1990s and are inevitable where water levels are low enough to tempt people to make the riverbed more productive.

responsibility for the efficient operation of large-scale hydraulic infrastructure.[26] The public discourse, as it applies to large-scale hydraulic infrastructure, has been greatly influenced by the state's need to maintain publicly its position of responsibility. As a result of this, the state opens itself up to public criticism or even disobedience. From the perspective of co-operative members, however, cultivating irrigated rice land during the 1960s and 1970s came with a price: collectivised production and labour contributions. In the 1970s, as co-operative members reacted to the inefficiencies of central planning, government officials complained about co-operatives and their members who failed to meet labour targets, made poor use of planning techniques, relied on outdated irrigation methods and wasted scarce construction materials. For my purposes, such complaints, which often appeared in the official press, provide a glimpse of how everyday politics were manifest in Hải Hưng province in the 1970s.

Summary

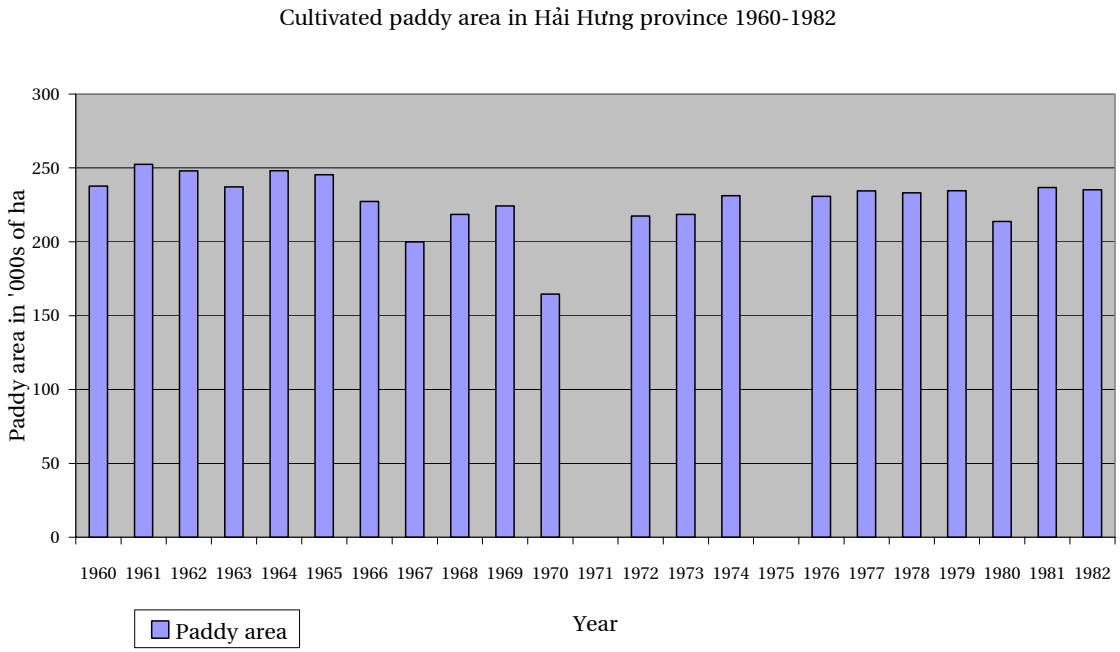
A developmental vision has provided the political and economic rationality for the colonial and post-colonial states in northern Vietnam. It is a vision with high modernist tendencies informed by a productivist approach to labour and economic growth that peasants have alternatively accepted and rejected. The colonial developmental vision was more theoretical than practical, especially when it was applied to hydraulics. Although officials in the colonial regime understood where hydraulic infrastructure could fit in a larger policy of economic development, very little was done in terms of constructing irrigation and drainage networks in the densely populated central delta. As such, the colonial regime lacked an important component of the political economic legitimacy it could accrue through its developmental vision: a credible commitment to achieving its developmental goals. Under the Communist Party, water users initially agreed to provide the labour

[26] The 1998 Law on Water Resources spells out clearly the state's responsibilities in this regard (Quốc Hội, 1998, Section VII, 42-48).

necessary to construct large-scale irrigation and drainage infrastructure, in addition to rejecting subsistence cropping patterns in favour of double cropping. Far from exhibiting "weakness" with regard to the state's productivist objectives, villagers engaged the Party in a hydraulic bargain that allowed them to influence the terms by which large-scale hydraulic infrastructure projects would be implemented. As large-scale hydraulic development was transformed from a marginal colonial activity to a defining characteristic of socialist industrialisation, the significance of the hydraulic bargain in relation to the larger rural economy increased accordingly.

Tables and figures

Figure 1.2 Cultivated paddy area in Hải Hưng province, 1960-82



Note: Data for 1971 and 1975 are as follows.

1971 -- 163 400 hectares

1975 -- 230 500 hectares

Source: (General Statistical Office, 1976, Table 15; General Statistical Office, 1992, 75; Niên Giám Thống Kê, 1973, 113, 115; Niên Giám Thống Kê Loại Nhỏ, 1972, 59; Niên Giám Thống Kê Tóm Tắt, 1977, 81).

Chapter 2 Historical patterns of hydraulic management: The state, peasants and water control in the Red River delta

Introduction

At a Vietnam studies conference in Hanoi in 1998, the well-known Vietnamese agricultural scientist, Professor Đào Thế Tuấn, referred to Vietnam in the pre-revolutionary period as a "hydraulic state of Oriental despotism type [sic]" (Đào Thế Tuấn, 1998, 1). I begin this chapter by considering the accuracy of this statement. In order to do so, I examine the state's role in constructing and managing pre-colonial flood control and irrigation infrastructure in the Red River delta. From this, I conclude that a history of both non-state dikes and local co-operation to construct and manage flood control infrastructure precludes the existence of a hydraulic state in pre-colonial northern Vietnam. In the second section I shift my focus away from flood control and turn toward an analysis of small-scale irrigation systems in the central Red River delta. Traditional pond and creek irrigation in the Red River delta evolved highly localised management patterns in contrast to flood control infrastructure involving inter-village co-operation and the large-scale irrigation projects found in imperial China. The third and final section moves the time frame ahead to the co-operative period.

On the surface, what appeared during the 1960s and 1970s to be a bureaucratically controlled large-scale irrigation system, one that maintained the trappings of a hydraulic state, was in fact jointly managed. It was a system based on the mutual obligations between the state and co-operative members, obligations that helped define the post-1954 hydraulic bargain. The importance of the hydraulic bargain has been as a counter to the fiscal and mobilisational constraints, which are discussed in this chapter, that have faced the state whenever attempts have been made to modernise hydraulic infrastructure in the Red River delta. These obstacles have been important causal factors in the development of jointly

managed irrigation and drainage systems in the Red River delta and as such emerge throughout the discussion contained in the chapters that follow.

Karl Wittfogel in the Red River delta?

The power of the pre-colonial state to manage water and control rural populations was highly circumscribed. Northern Vietnam's history of landlessness, vagabonds, banditry and peasant rebellion throughout the 19th century was indicative of the Nguyễn dynasty's inability to prevent adequately the annual floods that pushed people off their land and swelled the ranks of bandit armies.[1] This does not reflect the realities of feudal Asia as Karl Marx described them in his theory of the Asiatic mode of production (*phương thức sản xuất châu Á*). For Marx the Asiatic mode was defined by a stagnant political and economic system consisting of an isolated village-bound peasant society and a state intent on wielding the despotic power it gained from control over large-scale hydraulic infrastructure (Marx, 1978, 653-658). Marx's Asiatic mode was based on his analysis of India's pre-colonial political economy but it is unclear if he ever intended to have his theories applied to other Asian countries such as China (Fogel, 1988, 56-58).[2] Nevertheless, the German-born scholar Karl Wittfogel eventually took up this task.

Wittfogel's hydraulic hypothesis extends Marx's model beyond the confines of India to include imperial China and other pre-modern civilisations. The hydraulic hypothesis concerns the primacy of irrigation and flood control in the creation of "hydraulic states":

> Chinese society originated in the Yellow River basin under semi-arid conditions. In this setting agricultural man created a stable economy by manipulating water productively and protectively (for the purposes of

[1] For a discussion of the impact of flooding on seasonal migration and rebellion in northern Vietnam during the early 19th century see (Shiraishi, 1984, 353-354).

[2] In the 1950s DRV researchers debated the relevance of the Asiatic mode of production with regard to the future of economic development in Vietnam. It was a relevant topic for academic discussion in the early 1960s before the exigencies of war brought new issues to the fore (Đỗ Đức Hùng, 1997, 19). See (Chử Văn Tần, 1966) for a discussion of irrigation and the Asiatic mode of production in Vietnam and throughout Southeast Asia and for a broader analysis of the Asiatic mode in Vietnam see (Wiegersma, 1982).

> irrigation and flood control); and whenever these tasks transcended the strength of individuals or local groups, he did so by means of large work teams directed by the government (Wittfogel, 1957a, 343-344).

Wittfogel's hydraulic state revolved around an "agromanagerial despotism" (Wittfogel, 1957b, 59-50) and a "monopoly bureaucracy" (Wittfogel, 1957b, 45-46), which when combined were a potent force capable of controlling masses of corvée labour. Wittfogel argues that large-scale flood control and irrigation systems necessarily lead to the creation of centralised political structures.

Wittfogel's examination of the relationship between irrigation, political power and social change has reverberated through a number of social science disciplines. In terms of political science, Wittfogel's *Oriental despotism* was an important historical source for authors concerned with totalitarian regimes of the 20th century (Friedrich & Brzezinski, 1965, 4, 15, 415; Schapiro, 1972, 94). Anthropologists and archaeologists were more concerned with the methodological and comparative elements of Wittfogel's study: could his work be applied to other political economies that rely on irrigated agriculture? More specifically, what effect does modern canal irrigation have on the social structure of peasant societies (Lees, 1974, 123)? An extensive literature review produced in the mid-1970s, during the heyday of Wittfogel's influence on English-speaking social scientists, argued that methodological flaws in most of the current research made it impossible to draw general conclusions about the impact of canal irrigation on social structures and political systems (Hunt & Hunt, 1976, 390).

Nevertheless, there were individual case studies that countered Wittfogel's theory that large-scale canal irrigation naturally led to highly centralised authoritarian political systems. In the early 1970s, several studies questioned Wittfogel's analysis of the situation in China (Elvin, 1975, 82-83). A more recent analysis of community water management argues that imperial Chinese government departments responsible for water control were not "omnipotent" as Wittfogel suggested (Lamouroux, 1998, 192). Concerning Cambodia, there has been a longstanding debate surrounding the political power associated with the large reservoirs (*barays*) built at Angkor. Were they state-financed irrigation reservoirs

that allowed for double cropped rice and represented a centralised authoritarian state, or did they serve some ritual purpose (Mabbett & Chandler, 1995, 147-155)? With regard to Bali, Clifford Geertz argued that *subaks*, Balinese irrigation management organisations, had evolved independently of central authorities, describing a *subak* as "a technically specialized, cooperatively owned public utility, not a collective farm (Geertz, 1980, 74)." An expression of this same argument is found in Edmund Leach's work on irrigation systems in the semi-arid region of northern Sri Lanka. Leach concluded that based on archaeological evidence:

> We cannot infer from an inspection of these works the existence of a large labour force under central government control; nor can we make inferences about the size of the population, which was fed by irrigation. Still less can we make inferences about the nature of political authority in the ancient state (Leach, 1959, 23).

If anything, Leach argued, constructing and managing large-scale hydraulic systems in ancient northern Sri Lanka did not require a centralised bureaucracy but could emerge from an inter-weaving of a multitude of smaller systems. Leach provides an alternative to Wittfogel's deterministic explanation that large-scale hydraulic systems required the top-down managerial capacity of a powerful central authority.

It is important to note that both Wittfogel and Leach were concerned with hydraulic systems that were constructed in semi-arid regions. The Red River delta, however, is in a sub-tropical environment where water is not a chronically scarce resource.[3] The Red River delta is more susceptible to the ravages of flooding than it is to drought. However, the devastation caused by prolonged drought in the delta can in some cases be much more severe than flooding. Edmund Chassigneux wrote his seminal work on irrigation in the Red River delta precisely to

> Prove the absolute necessity of irrigation in the Tonkin Delta, by showing the great suffering caused by droughts throughout history, and during our time... (Chassigneux, 1912, 4).

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[3] In terms of aggregate annual rainfall the Red River delta does not suffer from water shortages, although within any one year there could be several extended periods of drought followed by heavy rain.

Among French scholars there were differing opinions concerning how much weight to accord pre-colonial accounts of drought.[4] Gourou questioned the value of references to drought that were pulled from the imperial records. Gourou believed such stories were too subjective and disorganised to be of any real scientific use. Principal among his concerns was that examples of drought were not necessarily correlated with crop losses. Furthermore, rivers bursting their banks or dikes breaking, according to Gourou, "happened with much more frequency than droughts and were a greater danger to the prosperity of the peasantry (Gourou, 1964, 69)". Therefore, the imperial state was naturally more inclined to finance hydraulic infrastructure in the Red River delta that was concerned with flood control rather than irrigation. With this distinction in mind I will consider whether the 19th century dike network found in the Red River delta was the product of a centrally controlled hydraulic bureaucracy or, rather, a tapestry of local networks.

Elite politics during the 19th century Nguyễn dynasty were influenced by a "literati culture" that tended toward centralised political control, with efforts to penetrate Vietnamese society down to the district level, and a history of constructing hydraulic infrastructure. Literati culture was based on a "totalistic vision of the state" and a desire to control the moral and political consequences of economic growth (Whitmore, 1997,668). For example, the ruling elite in the 1700s attempted to regulate which crops were grown and how they were consumed. This reflected a broader tension that existed between producers and the state concerning political order, private desires and agricultural production (Woodside, 1997, 257). Within such a matrix, controlling water would allow the state to have significant influence over which crops were cultivated, which could then be translated into political power. On the surface it would, therefore, appear that the

[4] Statistics are incomplete for the pre-colonial period but, using extant records, Gourou concluded that in Hưng Yên province between 1806 and 1900 the rainy season 10th month crop was destroyed once every four years by floods caused by dike breaks (Gourou, 1964, 87). On the other hand, according to Chassigneux, during the period 1808-96 there were twenty years during which a large proportion of the population in the Red River delta suffered from famine. Only seven of these famines, however, were caused by serious droughts (Chassigneux, 1912, 9).

Nguyễn dynasty was guided by authoritarian attitudes that tended more toward Wittfogel's state-controlled large-scale hydraulic systems than Leach's ad hoc expansion of small-scale projects.

Despite the influence of a "literati culture" within the Nguyễn court the imperial state, although it did standardise the dimensions of state and non-state infrastructure, never fully centralised control over the construction and management of dikes. Both state (*đê công*) and non-state (*đê tư*) dike systems co-existed in pre-colonial northern Vietnam.[5] By 1829, forty-two per cent of all dikes in Vietnam's northern provinces were classified as non-state (see Table 2.1). Generally speaking, state dikes were those that lined the larger rivers while non-state dikes protected lands that bordered tributaries. Non-state dikes were constructed and maintained according to the requirements and means of a village (*làng xã*). According to an 1809 decree issued by the first Nguyễn emperor, Gia Long (1803-1821), small dikes were officially classified as having a top width of 3.8 metres, with a base width (*chân rộng*) and height (*chiêu cao*) of twelve metres (Đỗ Đức Hùng, 1997, 158) (See Table 2.2). Additionally, although the state was responsible for authorising the construction of new sluice gates, it delegated sluice gate repairs to local authorities below the district level (Đỗ Đức Hùng, 1997, 157, 191).

Despite standardised design specifications, dikes built during the 19th century were unable to protect the delta adequately; dike breaks were a common occurrence. One reason for the poor quality of dikes was that contractors

[5] State and non-state dikes could just as easily be translated as public and private dikes. On many levels state and non-state dike management was closely linked. Because central authorities, for example, were not responsible for the construction and maintenance of non-state dikes the labour involved in their upkeep was unpaid. This did not preclude district (*huyện*) and central mandarins from sanctioning individuals or groups who failed in their responsibility to ensure the integrity of non-state dikes (Đỗ Đức Hùng, 1997, 189). District officials, representatives of the central authorities, were responsible for carrying out annual assessments of dikes in their area and noting what repairs were required. This was normally done in the tenth month of the lunar calendar, at the end of the Autumn rice crop. If a non-state dike required repairs, peasants from the commune (*xã*) would be mobilised to carry them out. Regarding repairs to large-scale dikes, it was the responsibility of the district-level mandarins to organise repairs using local labour. Normally, work would begin in the first month of the lunar calendar and would have to be finished by the middle of the third in order to prepare for the coming floods (Đỗ Đức Hùng, 1997, 153).

constructed non-state dikes without an overall plan and with little concern for the quality of their work (Phan Khánh, 1981, 267; Trần Đức, 1994, 48). Imperial construction techniques were generally unsound. One account of 19th century dike construction argued that the Nguyễn's construction techniques were inadequate and based on a long-standing formula that had not changed in centuries.

> The labourers dig up the earth and place it in innumerable small, round baskets. These baskets are grouped in twos and then hung from a long stick carried by women on their shoulders [*gánh*]. Although their loads were light there were many of them, and they would walk in single file depositing the contents of their baskets where stakes marked the site of the future dike. They would then return with their baskets empty, laughing and singing, to where they would again gather their next load (Chassigneux, 1914, 88).

As the earth arrived at the site it would be compacted as well as it could be without the assistance of heavy machinery and the dike would slowly begin to appear. Instead of reinforcing dikes with stone or building protective embankments (*kè*), vulnerable sections of earthen dikes would be left directly exposed to the river's current and were thus easily eroded. This situation was exacerbated when the inside face of the dike was too steep or when the earth was not properly compacted (Chassigneux, 1914, 89).

In accord with Chassigneux, Gourou believed that poor construction techniques as opposed to irresponsible dike surveillance, for example, caused dikes to rupture during the 19th century. Referring to the standard height of dikes in the pre-colonial Red River delta, Gourou wrote:

> If a nine-metre dike adequately protected Hanoi, it is because the Red River had never risen higher than this...(Gourou, 1964, 86).

Why the Red River had never risen any higher than nine metres can be attributed to the inevitable dike breaks further upstream which helped lower flood waters as they approached Hanoi.[6] Despite an ideological penchant for centralised control, the imperial state's policy of financing dike construction through tax concessions encouraged the development of non-state dike networks. Thus, 19th century dike

networks in the Red River delta included elements from both Wittfogel's hydraulic state as well as Leach's patchwork of self-organised hydraulic systems. With state and non-state dikes co-existing within an ideological framework of centralised state control it was inevitable that along the frontier between state and non-state hydraulic infrastructure conflicts would erupt.

The "19 villages"

Tension between the state and localities was most likely to manifest itself where authority over state and non-state infrastructure was contested. According to information recorded on communal house steles (*bia đình)* and in village laws (*hương ước*), the 19th century witnessed a number of examples where inter-village consortia pooled financial and human resources in order to construct and maintain non-state dikes and sluice gates (Huy Vu, 1978, 48, 49). The example that is most often cited is the so-called "19 villages" incident involving localities in Mỹ Lương (Chương Mỹ) and Yên Sơn (Quốc Oai) districts in Hà Tây province (Phan Khánh, 1981, 254, 258; Trần Đức, 1994, 41-42). In this example, nineteen villages co-operated in the construction of the Thập Cửu dike and sluice gate during the early years of the 19th century. The dike itself was reportedly fifty kilometres long, protecting nearly 2800 hectares of paddy fields (Phan Khánh, 1981, 258). Before its construction some villages had suffered from "six months of drought followed by six months of flooding".[7] During the wet season others "floated like islands above the flooded rice fields" (Huy Vu, 1978, 49).[8]

Administratively, the nineteen villages established a "management committee" (*ban phụ trách*), which consisted of an elected representative from each village. The management committee was responsible for designing a construction plan that clearly set out the duties of each village. Committee

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[6] See Chapter 4 for a discussion of scientific findings in 1913 concerning the impact of stronger dikes on water levels in the Red River.

[7] "6 tháng khô và 6 tháng ngập"

[8] "nổi lên trên cánh đồng như một hòn đảo"

delegates were responsible for organising construction work in their village. The head of the committee (*trư□ng ban*) was the representative from Yên Nội village. With both the responsibility and the privilege of chairing the committee, Yên Nội was required to fête the others as a means of developing solidarity (*tình cảm*) among villagers (Huy Vu, 1978, 50). Once the project was completed the inter-village association was then faced with the equally important task of establishing mechanisms for overseeing management responsibilities. Throughout the Red River delta, rules guiding dike management were typically codified within village laws. In the case of the nineteen villages, the inter-village committee drafted a set of conventions (*khoán ước*) that dealt with dike protection and management. These conventions, which were administered by the inter-village committee, were applicable in each of the communes that benefited from the Thập Cửu dike. Villages suffered collective sanctions if individuals were found to have breached any of the inter-village conventions and were required to contribute land and capital to those groups who were responsible for monitoring the weakest points along the dike (Huy Vu, 1978, 50, 51).

Because the size of the completed "19 villages" project would have placed it within the category of a state dike, the Nguyễn court decided to dismantle the inter-village management authority by ordering each village to monitor its own section of the dike. Dike management was transferred to district officials and the Thập Cửu dike was, effectively, split into several non-state dikes. Years later, in 1822, a district official from Mỹ Lương (Chương Mỹ) challenged the authority of local custom by fishing at the Thập Cửu sluice gate. Despite the time that had passed, inter-village solidarity remained, as did resentment over the state's earlier actions. When the district official arrived at the sluice gate, residents of the "19 villages" approached the district chief (*tri huyện*) from along the dike road, caught him and summarily killed him. He was buried in a knoll (*gò*) near the sluice at a

point that is now known as the mandarin's grave (*Mả quan*) (Huy Vu, 1978, 51).[9] The "19 villages" example suggests that although the imperial state permitted, and even depended on a certain amount of local initiative, it was wary of local projects that could be perceived as challenging the central authority's right to construct and manage large dike systems. The state's legitimate involvement with hydraulic modernisation did not wane during the colonial period and was only strengthened as the Communist Party expanded the hydraulic bargain in the late 1950s and early 1960s. All of this underscores the complexity of state and non-state actors in the historical development of hydraulic infrastructure in the Red River delta.

The limits of pre-modern irrigation

Historically, irrigation and drainage projects in the Red River delta have been constructed on a relatively smaller scale than flood control infrastructure. This is a defining characteristic of traditional irrigation and drainage systems in the Red River delta and a fact that the state in northern Vietnam has had to address whenever attempts have been made to modernise irrigation and drainage networks. As Gourou writes, since irrigation was not required on a year-round basis:

> It did not have to be organised very well, and it remained very often an individual affair rather than a collective enterprise (Gourou, 1940, 245).

Despite its semi-tropical climate, water sources in the Red River delta were relatively scarce. By Gourou's calculations the Red River delta in the 1930s consisted of 21 400 hectares of shallow ponds, which were required to irrigate 1.2 million hectares of cultivated land (Gourou, 1940, 246-247). Pre-colonial irrigation systems in most areas of the Red River delta were rudimentary and often cut across village boundaries, which precluded them from falling under the administrative

[9] It ought to be noted that Huy Vu's article was written at a time when the feudal Nguyễn were not a subject that received objective academic treatment in Vietnam. Peasant uprisings against feudal lords were a favourite subject of historical research and this comes out in the passage concerning the execution of the district official. Likewise, the article reflects a discourse within the Party that lionises the peasantry and which emphasises whenever possible its capacity to overcome obstacles to increase agriculture production.

control of a single village. In other cases, they were built on such a small scale that they only serviced a fraction of the total land area controlled by a village. This is in contrast to state-managed river dikes and sluice gates that were designed primarily to fight floods which threatened the village as a whole.[10]

In *The Rational Peasant,* Samuel Popkin concludes incorrectly that the corporate nature of the pre-colonial Tonkinese village grew out of a long history of village-level irrigation management (Popkin, 1979, 97-98). More recently, O'Connor makes the erroneous claim that in pre-colonial northern Vietnam "ordinary farmers were adept irrigators" and were responsible for transforming the Red River basin into "one of the world's most successful irrigation networks" (O'Connor, 1995, 975). Both Popkin and O'Connor would have been on more solid ground if they had limited their discussion of hydraulics and northern Vietnamese village institutions to flood control. Although village laws (*hương ước*) often contain sections describing how village or inter-village co-operation designed to manage dikes and sluice gates was organised, only in rare cases did they refer specifically to irrigation management.[11] Village-regulated irrigation activities could include constructing canals or mobilising surveillance teams to combat water thieves (Chassigneux, 1912, 118; Trần Đức, 1994, 44). However, because most peasants in the Red River delta during the pre-colonial and colonial periods cultivated rain-fed crops, there was little demand for irrigation canals. When water was stolen it was most often drained away from an adjacent field, which would not necessarily have village-wide implications.

Post-colonial Vietnamese researchers have tended toward the view that a hydraulic state existed in pre-colonial Vietnam, one based on a commitment to building flood control infrastructure. The historical distinctions between the size

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[10] There is a saying in Vietnamese that refers to this: "If it floods then the entire village is immersed" (*Lụt thì lút cả làng*) (Phan Khánh, 1981, 251).

[11] There is ample evidence in village laws that villages organised for flood control, but after examining a handful of village records from Hải Dương province I have found almost no mention of village-level rules for irrigation management. My findings resonated with comments made early on in my

and complexity of flood control and irrigation systems are neglected by most authors in favour of more teleological arguments that support the Party's efforts to construct large-scale hydraulic infrastructure in the context of socialist industrialisation. An example of this is Trần Đức's description of how large-scale irrigation systems develop organically, as merely an expanded version of small-scale "water keeping" (*giữ nước*) techniques.

> Field bunds that "keep" water become dikes that stop floods. First they are small and gradually they expand. Small channels in fields also grow to become canals that can lead water to ever-larger paddy fields (Trần Đức, 1994, 39).

The key to managing enlarged irrigation and drainage systems, according to Trần Đức and others, is an amorphous "community spirit" (*tinh thần cộng đồng*). This spirit of co-operative harmony, so the argument continues, should have allowed localities simply to incorporate traditional dike administration practices within modern large-scale irrigation management organisations, or, in other words, co-operatives (Vũ Huy Phúc & Lê Đình Sỹ, 1977, 186-187). Without a clear understanding of the norms and rules of traditional irrigation management institutions it is dangerous to assume that such transference was feasible.

There are a number of different organisations within Vietnamese rural society -- "phiên", "đội", "hộ" or "nậu" -- each of which have played an active role in managing flood control infrastructure (Trần Đức, 1994, 39-52). Prior to co-operativisation, however, the "community spirit" that had brought people together to construct and manage flood control infrastructure was not manifest in comparable irrigation management organisations. Instead, it was up to the DRV to manufacture this "community spirit" within agricultural co-operatives (*hợp tác xã nông nghiệp*), as a means of creating "active" (*chủ động*) irrigation and drainage communities. One explanation for the lack of community spirit surrounding irrigation management is that when "intimidated" (*đe dọa*) by natural disasters

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research by Professor Đào Thế Tuấn. If I wanted to study rural organisations, he implored, focus on flood control not irrigation (Interview with Professor Đào Thế Tuấn, Hanoi, May 1999).

such as floods, peasants have traditionally joined together for the benefit of the community (*lợi ích chung*). But, once the threat has passed, and the water levels in the river have dropped, then individual benefits (*lợi ích riêng*) are again paramount. In fact, Mai Văn Hai and Bùi Xuân Đính argue that whatever conflicts had existed historically over water management were only exacerbated under the collectivised system (Mai Văn Hai & Bùi Xuân Đính, 1997, 137).

Comparing patterns of hydraulic development in China and northern Vietnam

The small scale of hydraulic infrastructure in the pre-colonial Red River delta contrasts sharply with the vast flood control and irrigation systems that have existed in many parts of China for up to ten centuries.[12] Technological improvements in water control and wet-rice cultivation methods were a driving force behind the economic revolution that took place in southern China between the 8th and 12th centuries (Elvin, 1973, 113). One author has likened these changes to a "medieval Green Revolution" (Bray, 1986, 202). The water moving *technologies*, scoops and baskets present in the Red River delta during the early 20th century were introduced from China as early as the 13th century. Irrigation and drainage *infrastructure* that was built on the scale of hydraulic systems found in medieval China, however, was not evident when the French arrived in Tonkin in the late 19th century (Chassigneux, 1912, 63-68). Irrigating vast areas of land using river water required technology, fixed capital and labour resources that were unavailable to the imperial regime, let alone individual villages. For the most part, the Vietnamese were "powerless to bring under their control, for the purposes of irrigation, the large rivers that make their way across the Red River delta" (Chassigneux, 1912, 54). Why has there been this historical discrepancy between the scale of hydraulic infrastructure in China and northern Vietnam?

Prior to collectivisation, and except for a period of land concentration under the French colonial regime, independent peasant smallholders were the foundation

of the Red River delta's agricultural economy.[13] By contrast, the Chinese rural economy has been dominated for extended periods by powerful landed interests. Until its demise in the 17th century, the Chinese manorial system was capable of mobilising the financial and human resources required to organise, implement and maintain large-scale hydraulic works without the direct intervention of central authorities (Elvin, 1973, 82, 113). Chinese manors acted as financial and technological intermediaries between local administrative authorities and the central government, competing with the central government to construct hydraulic works and, therefore, control the peasant serfs that these systems serviced. Creating institutions with qualities similar to Chinese manors -- typified by large landholdings and transit points for new technologies -- was one of the Vietnamese Communist Party's rationales for linking co-operativisation and irrigation modernisation in the early 1960s. This subject is discussed in further detail in Chapter 8.

Pre-modern irrigation in the central Red River delta

Although Chinese-style large-scale irrigation never appeared in the pre-colonial Red River delta, small-scale village irrigation was relatively well developed. During the 19th and early 20th centuries one of the most widespread irrigation methods involved the use of naturally occurring dikes -- *bourrelets* in French and *đê bối* in Vietnamese.[14] These dikes would protect paddy fields from all but the highest

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[12] For historical discussions of hydraulic infrastructure in China see (Elvin, 1975; Marks, 1998, 312-318; Perdue, 1982; Willmott, 1989)

[13] See Chapter 5 for a discussion of the relationship between hydraulic infrastructure construction and landlords during the colonial period.

[14] The French refer to *bourrelet* as natural or submersible dikes that result from annual silt depositions. Rivers such as the Red and the Mississippi would, before the construction of large-scale dike systems, annually flood low-lying areas. As the river proceeded over its banks it would deposit silt and over time this would form a natural dike (Chassigneux, 1912, 36-37). Such lengths of high ground allowed for early settlers from the midlands to begin cultivating rice in the western section of the Red River delta (Sakurai Yumio, Undated, 62-66). These dikes were common along rivers found within the Thái Bình delta where high water levels corresponded with high tides and the threat of salt-water intrusion. As a result, these dikes tended to be much smaller and less costly to construct or maintain (Janet, 1886, 311). Throughout the colonial period the French considered

floodwaters, which would flow over the *đê bối* and be channelled into nearby irrigation ponds (*ao*) and *arroyos*/creeks (*ngòi*), where it would be stored until required. These methods of "keeping water" I will refer to generally as pond or creek irrigation depending on the type of water reservoir involved.[15] Another traditional irrigation method, tidal irrigation (*thủy triệu*), was common in coastal areas.[16] Tidal irrigation involves breaching dikes intermittently with sluice gates (*cống*) which allow fresh water -- forced upstream and through sluice gates by high tides -- to fill creeks. In order to avoid salt water intrusion villagers regularly tasted the water until it was determined to be too salty, at which time the sluice gates would be shut.

Even with the convenience of tidal irrigation, moving water onto fields has always been, for peasants in the Red River delta, very tiresome work.[17] Lifting water into and out of diked fields has historically been done using large scoops: *gầu sòng* or *gầu dai*. The process is known as "scooping" or "pulling" water (*tát nước*). *Gầu*

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dikes within the Thái Bình watershed to have been secondary to dikes along the Red River. A consequence of this neglect was the floods of 1936-37 (See Chapter 7).

[15] More general descriptions of pond and creek irrigation can be found in (Bray, 1986, 71-80, 90-100; Kaida, 1991, 132-133).

[16] Tidal irrigation was and continues to be used throughout the year, unlike reservoir irrigation, which depends on heavy rains or floodwaters to recharge creeks and ponds. The area of the delta that is influenced by tides and, therefore, capable of benefiting from tidal irrigation, extends beyond coastal areas several kilometres inland in provinces such as Hải Dương, Thái Bình, Nam Định and Ninh Bình. In terms of more modern irrigation methods, in the midlands that surround the Red River delta one finds large-scale gravity-fed irrigation schemes, the first of which were built by the French. These systems generally consist of a dam, which diverts water into canals from where it flows naturally to nearby paddy fields. By the early 20th century mechanical lifting devices had appeared in the Red River delta but their use would not become widespread until the 1960s and 1970s. Presently, electric-powered (*bơm điện*) and smaller diesel pumps (*bơm dầu*) are used to lift water from rivers into canals or from larger canals into smaller canals. Pumps are a vital component of modern irrigation and drainage systems in the Red River delta, but they have never superseded much older water lifting mechanisms that are necessary for pulling water out of the field canals and into paddies.

[17] Under colonial rule, landless peasants had to pull water for their landlords, which made the task even more unpleasant. It was unforgiving work without having to endure the badgerings of an overseer. In the colonial-era novel, *Impasse*, as she scoops water under the midday sun "older sister" Pha sings to relieve her fatigue:

> Working in the fields at noontime,
> I get drenched all through with sweat like a ploughed field under the rain.
> Do those who take their bowl of rice,
> Know that each soft and fragrant grain is obtained at the cost of untold hardships?

sòng involve a tripod with an elongated basket suspended from the middle, which one person can move backward and forward, and are most effective when lifting water up to a height of approximately 50 cm (Figure 2.2). *Gầu dai* are operated using cords attached to each side of a rounded, shallow basket (Figure 2.1). Holding two cords each, two people manipulate the basket so that it is dipped into the water source, lifted to a height of up to 1.5 metres and then emptied.[18] Pond and creek irrigation involved scooping water from narrow scooping stations (*nong*) -- patches of land that were at their largest only wide enough to hold a maximum of four people, two pairs with one scoop each -- located at the edge of the water source.

(Nguyễn Công Hoan, 1963 (1938), 176)

[18] (Interview, Quốc Tuấn commune, Nam Sách district, 16 May 2001/1). Norias (*guồng*), or waterwheels, are another form of traditional lifting device.

> Buckets, pots or bamboo tubes are attached to the circumference of a single wheel collecting at the bottom and discharging at the top. This wheel may be driven by the force of the current, if it is furnished with paddles, but in still water it must of course be powered by men or animals (Needham, 1965, 356).

In the Red River delta the use of norias has been limited for a number of reasons discussed later in Chapters 6 and 8.

Figure 2.1 Scooping water with a *gầu dai* from a tertiary canal

Source: SAE Smith

Figure 2.2 Scooping water from a tertiary canal with a *gầu sòng*

Source: SAE Smith

Sometimes peasants would have to move water up to 500 metres from the scooping station. In such cases it could take as long as 2.5 hours for the water to

reach the field and then another two to three days of pulling water to fill it to the proper depth.[19]

> In order to have enough water to break up the soil of one *sào*[20] of paddy, peasants have to spend at least one full day pulling water with all their might -- in the case of a paddy field that is close to the water source. If the field is far away, the effort it takes to pull the water increases because the water will leak through field dikes and you end up having to provide water for all the fields in between the water source and your land (Mai Văn Hai & Bùi Xuân Đính, 1997, 58).

In the central delta, canals did not traditionally connect fields, as this would have wasted valuable agricultural land. Therefore, a pair of small dikes (*bờ nong*) would be built from the scooping stations through the interceding fields in order to channel water to its destination. It was very important that water not escape as it flowed through neighbouring fields containing seedlings or secondary crops such as maize that could easily be waterlogged (Mai Văn Hai & Bùi Xuân Đính, 1997, 66).

Local irrigation systems in most areas of the central Red River delta remained relatively unchanged during the colonial period. There were the French-built gravity-fed systems in the midland areas, which are discussed in Chapter 6, and the French did construct numerous canals in the coastal provinces of Thái Bình and Nam Định in order to improve extant tidal irrigation systems. In the central Red River delta, including the provinces of Hà Tây, Hải Dương, Hưng Yên and southern Bắc Ninh, traditional pond and creek irrigation persisted throughout the colonial period and beyond. It was only with the establishment of agricultural co-operatives beginning in 1959 that traditional irrigation and drainage management systems in the central Red River delta were significantly modified. The VWP believed co-operatives would help overcome the historical management patterns of localised irrigation systems and provide an organisational basis for commune-level networks. I address these subjects in more depth in Chapters 7 and 8.

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[19] In Quốc Tuấn commune before canals were constructed people regularly scooped water 200-300 metres (Interview, Nam Sách district, 17 May 2000).

Managing pond and creek irrigation

Ethnographic accounts of how traditional creek and pond irrigation was managed are rare. In Chassigneux's work on irrigation in the Red River delta there is hardly a mention of pre-colonial irrigation management structures; likewise in Gourou's *Les paysannes du delta tonkinois*. Even contemporary Vietnamese accounts of village life in northern Vietnam during the 1920s and 1930s have little to say about irrigation management. For example, in the journal *Nam Phong*, a "statistical investigation" (*điều tra thống kê*) based on "research" (*khảo cứu*) of the demographic and administrative aspects of an "average" village in the Red River delta devotes a single sentence to irrigation. It simply states that:

> There are two sluice gates because there are two streams [*ngòi*] that flow from the Cái River in order to bring water into and out of the village (Đào Đình Hào, 1924, 352).

There is no discussion of who controlled access to the water or whether there were irrigation fees.[21]

Considering the dearth of ethnological literature on traditional irrigation management in the Red River delta, the wealth of information contained in *Thủy lợi và quan hệ làng xã* [Hydraulics and village relations] makes it a valuable resource.[22] Although Mai Văn Hai and Bùi Xuân Đính limit their account to a single district, traditional pond and creek irrigation as it was found throughout northern Vietnam can be assumed to have followed a general pattern of who gets water when and from where. For example, water that was stored in ponds in An Bình commune was privately controlled by individual landowners who maintained

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[20] One *sào* is equivalent to one tenth of a *mẫu*. A northern *mẫu* is the equivalent of 360 square metres.

[21] From the above-cited report it is possible that the water being led into the village was not even used for irrigation. Creek water was also used for human consumption and hydraulic infrastructure was at times built precisely for this purpose (Huy Vu, 1978, 47).

[22] *Hydraulics and village relations*, an ethnographic survey of hydraulic agriculture in An Bình commune in what is now Nam Sách (Nam Thanh) district, Hải Dương province, is one of several research projects that was supported in the 1990s by the French-financed Red River Program (*Programme Fleuve Rouge*). Written by a sociologist, Mai Văn Hai, and an ethnologist, Bùi Xuân Đính, it provides the most comprehensive account presently available of traditional irrigation management practices in the central Red River delta.

access rights to scooping stations (*nong*) that were located on their property. Scooping stations on the banks of an arroyo, however, were publicly accessible (Mai Văn Hai & Bùi Xuân Đính, 1997, 63). This general pattern was likely repeated throughout the central Red River delta although there would have been local variations in management patterns concerning sanctions or schedules depending on local cropping patterns, number of water sources, access to water sources, number of water users, type of land and so on.

In addition to whether water was being scooped from public creeks or private ponds, access to scooping stations was determined by the type of irrigation, "breaking up" (*tưới ải*) or "nourishing" (*tưới dưỡng*), and the time of day one intended to scoop water.[23] Despite the existence of water use rules, conflicts still arose. In An Bình, conflict was most often centred on the issue of "right of first use" (Mai Văn Hai & Bùi Xuân Đính, 1997, 82). Fights would often break out at scooping stations. With only one access point, people would wait for hours to scoop water, regardless of the weather, sometimes spending the entire night in the field in order to defend their position in the queue and then scoop water throughout the following day (Mai Văn Hai & Bùi Xuân Đính, 1997, 72-73). Having to wait one's turn under normal conditions can bring out the worst in people, so it is easy to believe that conflicts over placement in the water user hierarchy were exacerbated when the weather was miserable or when there were water shortages.

Water theft (*tháo trộm* or *ăn trộm*) also occurred, although, in Đào Xá village, An Bình commune, it was rare because the village was so small people were always "coming face to face" (*giáp mặt*) with one another. Nevertheless,

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[23] Breaking up the soil is an important part of the cultivation process, most often required at the beginning of the Spring crop when the ground is dry and hard. If done properly it can lead to impressive yield increases when compared with land that is not broken up before ploughing.

> After nearly two months of the land drying itself [*phơi mình*] under the sun and the dry wind, every field of any quality will be dry and cracked [*khô xác*]. When the water enters the fields the land takes the opportunity to have a drink [*uống nước*] (Mai Văn Hai & Bùi Xuân Đính, 1997, 59).

Water is moved into the paddy fields until the right amount has been soaked up by the soil but not enough to waterlog the field.

> there were people who would take a tiny piece of bamboo [*một đoạn nứa tép nhỏ*] and skewer it into the bottom of the dike separating their field from their neighbour's. The water would flow down from the higher field through the "secret" bamboo pipe. The owner of the land being drained very rarely discovered the culprit (Mai Văn Hai & Bùi Xuân Đính, 1997, 82-83).

This type of theft worked best when the water was clouded with silt, making it difficult to find leaks along the edge of the field dike. At least in An Bình, potential conflicts over right of first use were mitigated by local customs. It was apparently uncommon for landlords to exploit their position as the owners of scooping stations. It would have been very easy for them to monopolise access to water, especially when reservoirs were low. Instead, landlords passed along the right of first use to the family whose land was furthest from the scooping station (Mai Văn Hai & Bùi Xuân Đính, 1997, 85-86).[24]

The limited scale of pre-modern irrigation and drainage networks highlights two important factors that re-emerge throughout the chapters that follow. First, without the financial and technological means that, in northern Vietnam, are only available to the state, peasants have historically been unable, on their own, to expand irrigation and drainage networks. Second, once the state resolved to modernise irrigation and drainage networks, as was the case with the Communist Party-state in the late 1950s, it initially had to coax peasants out of the confines of traditional patterns of pond and creek irrigation, with promises of improved crop yields. This general pattern of hydraulic modernisation is not unique to Vietnam, but was also apparent in the relationship between the state and water users in Bali and the northern Philippines.

Self-organised irrigation systems in comparative perspective

Pond and creek irrigation in northern Vietnam shared management qualities with small-scale irrigation systems in Bali and the northern Philippines in so far as they

[24] This was not always the case as one former scooping station owner in Đao Xa village, An Binh commune, Nam Sách district, noted that, although the village rule was that water could not be refused to anyone, this did not apply during periods of drought (Fabre, 1993, 48).

are all self-organised systems with limited, if any, formal relationship to central authorities.[25] Balinese irrigation involves two management systems: one based on agricultural requirements and the other on the spiritual needs of water users. The agricultural and spiritual components are known jointly as *subaks*. Geertz describes a *subak* as an "irrigation society" designed to control water at the hamlet level, just as the village, which would contain a number of *subaks*, shaped "a harmonious pattern of civil attachments" (Geertz, 1963, 50). According to Lansing, Dutch colonial bureaucrats disregarded the role that ritual played in regulating irrigation in favour of irrigation management based on the secular aspects of the *subak* (Lansing, 1991, Ch. 1).

Another example of self-organised water resource management is the *zanjera*, found in the Ilocos Norte region of the Philippines. *Zanjera* are communal irrigation organisations that operate more or less independently of financial or technical assistance from the government and were designed to function with little regard to the administrative authority of the village (Siy, 1982, 55-56).

> Villages in Ilocos Norte are socially very limited, amounting to little more than place names on a map. Their existence is almost entirely imposed by political administrative entities -- municipalities, provinces, and a national government -- which require that they exist (Lewis, 1991, 19).

In that both *subak* and *zanjera* existed outside of the financial and political control of the village they were broadly similar institutions. The institutionalisation of ritual, based on a wealth of local knowledge, underpinned the norms and roles that guided water management in both *subaks* and *zanjeras*.

A major difference between *subaks, zanjeras* and traditional creek and pond irrigation in the Red River delta is the relative size of traditional Vietnamese systems. In Bali and the Philippines, *subaks* and *zanjeras* are incorporated into multi-village networks in order to manage entire catchment areas. In the Red River delta, pond and creek irrigation systems were comparatively tiny. Such

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[25] There is a rich literature on self-organised irrigation systems. Examples include (Bagadion & Korten, 1985, 55-69; Korten, 1986, 276-286; Uphoff, 1986, 203-205).

diversification and miniaturisation was the result of the topography of the Delta. Small variances in elevation leave land in the Red River delta unirrigable, using traditional methods, or prone to waterlogging. This fact made it very difficult to expand the command area of traditional creek and pond irrigation systems. On the relatively flat plain of the Red River delta, without the benefit of mechanical pumps, gravity was replaced by human labour, which put heavy constraints on how far water could be moved. *Subaks* and *zanjeras* are, however, both highland gravity-fed irrigation systems, which apply readily available technologies and terraced fields, in order to irrigate large portions of entire watersheds.

Other than their independence from central authorities, traditional Vietnamese irrigation systems did share certain management qualities with *subaks* and *zanjeras*. Similar to the Balinese *subak*, the regulations governing timing and access to water within villages in the Red River delta were embedded in cropping patterns rather than determined by village or central authorities. Where traditional pond and creek irrigation management practices were codified they would likely have overlapped with flood control or drainage activities. An example of this would be work to dredge the village creek, which would have involved village-wide co-operation or inter-village agreements. However, the number of villagers who were actively irrigating their land -- pulling water from a scooping station -- might have been so small in proportion to the total village population that tasks relating solely to irrigation would normally not have been written into the villages laws. Generally speaking, northern Vietnamese pond and creek irrigation was less formalistic than the village-wide or inter-village co-operation required to construct and maintain flood control infrastructure.

These three irrigation systems all experienced significant changes during the 1960s and 1970s. Parallel ritual and secular institutions were maintained in Bali up until the onset of Indonesia's Green Revolution in the late 1960s. With the Green Revolution came attempts to improve agricultural technologies and rationalise irrigation management. For bureaucrats who saw the potential to cultivate high-yield varieties of rice, the Balinese ritual irrigation calendar was outdated and

impractical. By the mid-1980s, however, with the failure of the Green Revolution to bring improved yields, water temples were again directing Balinese irrigation management practices (Lansing, 1991, 112-116). Similar problems arose in the Philippines when the National Irrigation Administration (NIA) was created in 1964 as a means of establishing rice self-sufficiency. At first, the NIA neglected the importance of management practices in favour of technical solutions and watched as irrigated areas within large-scale irrigation systems declined to thirty per cent of capacity during the dry season (Bagadion, 1988, 5). After years of waste and shrinking water fee revenues, in 1974, the NIA began incorporating lessons-learned from the *zanjeras* and initiating a participatory approach to irrigation management (Siy, 1988, 20).

The co-operative period in the Red River delta is similar to the Green Revolution in Bali and the Philippines. The Party's vision was of modern irrigation consisting of what one farmer described to me as a network of multi-legged spiders: a central pumping station connected to co-operatives by segmented canal systems. Water, although first among equals, became one of several different inputs -- along with fast growing rice and chemical fertilisers -- that were necessary for increasing agricultural production. The large-scale irrigation systems introduced in the 1960s, however, bore little resemblance to the traditional management patterns typical of creek and pond irrigation. As part of an integrated large-scale irrigation network, previously independent local systems became dependent on the state for providing water to the co-operative. The complexities of these networks made them difficult to manage and expensive to construct and maintain. New rice strains required efficient water control; chemical fertiliser and pesticide production was dependent on imports, which inevitably resulted in shortages. As far as irrigation and drainage was concerned, because the Communist state was often unable to fulfil its half of the hydraulic bargain, at times, during the 1960s and 1970s, co-operatives were forced to remain largely self-reliant. This subject I address further in Chapters 7, 8 and 9.

The state and large-scale irrigation: Theoretical considerations

State investment has been critical to the development of large-scale irrigation and drainage systems in northern Vietnam. This was the case during the pre-colonial, colonial and communist periods. At first glance, the Vietnamese Communist Party's approach to constructing and managing large-scale hydraulic infrastructure in northern Vietnam is best described as bureaucratic. Such management models are top-down and take little consideration of local norms and customs concerning water allocation. Bureaucratic management institutions have not been limited to socialist political economies, such as Vietnam and China, but also appeared during the 1970s in Malaysia (Halib, 1985, 243-251) and Indonesia (Bottrall, 1981, 239-245). One conclusion drawn from the experience of bureaucratic irrigation management in the 1970s was that:

> Generally speaking, the literature on the impact of state-sponsored irrigation projects suggests that without due attention paid to the well established rules, roles and groups within an irrigation system the new system can introduce allocation inefficiencies and engender conflict (Coward, 1980, 19-27).[26]

One possible solution to this problem is to privatise the entire system, allowing users both financial and managerial control over hydraulic infrastructure. In cases where irrigation systems are dependent on the construction of technologically sophisticated and capital intensive headworks, however, self-organisation and local-level operations and management is necessarily limited.[27] This has been especially true for large-scale irrigation systems in northern Vietnam, where the financial burden of constructing and managing large canal networks and pumping stations is beyond the means of individual co-operatives or water user associations.

Although there were Party cadres during the 1960s who were keen to establish centralised bureaucratic control over the design, construction and management of hydraulic infrastructure, the state was generally unwilling or unable

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[26] See also (Easter, 1986, 2) and (Levine, 1980, 51).

to shoulder the commensurate financial burden. Co-operatives covered a significant portion of labour costs for the construction of all levels of infrastructure after 1960, in addition to, after 1963, having to pay an irrigation fee in order to use the infrastructure that their members had built. This resulted in a curious situation where the Party was intent on maintaining managerial control while at the same time pushing localities to be self-reliant, and not "depend" on state-financed infrastructure. Such dependence was inevitable in the "hydro-logic" of upstream and downstream relationships that developed as small-scale and large-scale irrigation systems were integrated (Lansing, 1991, 55).

The Party either failed to recognise or ignored this fact. In the latter half of the 1950s, villages that had not constructed "independent" (*độc lập*) irrigation systems that could "keep water" were accused of subscribing to a "dependent ideology" (*tư tưởng ỷ lại*). The Vietnamese word "ỷ lại" is best translated as passive dependence. It connotes certain moral shortcomings on behalf of the individual or group that is in the dependent relationship. Throughout the 1960s and 1970s, the Party applied this label to groups that were unable to find local solutions to water control difficulties. Such criticism, however, was unwarranted for communities that had successfully constructed the tertiary canals and sluice gates required to link up with the state-financed pumping stations but lacked water because the pumping station was malfunctioning or lacked electricity.

Under these circumstances, "dependence" was transformed into "reliance" (*phụ thuộc*). The state and water users were mutually "reliant" in that co-operatives needed water from the headworks to achieve the productivity increases in paddy production that the state needed to fuel industrial development. By the late 1970s, when electricity was available for only a few hours each day, fuel supplies were severely limited, pumping stations sat idle and canals were dry, charges of *ỷ lại* directed against co-operatives unable to plant their crops and refusing to cultivate

[27] In modern political economies it is rare to find self-organised resource management systems that function independently of any external influences (Ostrom, 1999, 2).

collective fields sounded more hypocritical than ever before. At times, even the Party had to admit that co-operatives had no alternative but to rely on the state, and as a result of the state's shortcomings were facing difficulties. It was precisely because of its reliance (*phụ thuộc*) on the Văn Giang pumping station that in 1983, according to the provincial Party-controlled press, Châu Giang district was so late in planting its Spring rice crop (*Hải Hưng,* 1983d).

The management patterns of large-scale hydraulic systems that were constructed in northern Vietnam during the co-operative period were neither "bureaucratic" nor "self-organised", but were "jointly managed" by the state and water users. Access to water was greatly influenced by the efficiency of state-managed pumping stations, while co-operatives and districts were required to organise themselves to construct the secondary and tertiary canals that would lead water to the fields. When pumping stations were malfunctioning or co-operatives failed to mobilise the necessary labour to construct canals then the system as a whole broke down. Although the design and construction of large-scale irrigation systems in the Red River delta has been implemented at the behest of the Party, linking up the different levels of infrastructure and managing these systems has demanded that the Party gradually devolve financial and political control to localities. Linking canal networks at the local level with pumping stations that are constructed and managed by the province and central ministries was critical to the success of large-scale irrigation and drainage projects. The state's ability to integrate pumping stations and canal networks, however, is closely tied to mobilisational and financial constraints that have confronted the state throughout the period of this study beginning with the Nguyễn emperors.

During the 1960s and 70s, many Asian countries modernised irrigation technologies while neglecting to consider how management models ought to ensure that infrastructure was maintained and that water was allocated equitably and consistently. Research done on the Gal Oya irrigation system in Sri Lanka during the 1970s and 1980s, for example, concluded that joint management could be successful but only if the state allowed for some measure of local organisation

and control (Uphoff, 1986, 203-211). Although modern pump-based irrigation in northern Vietnam requires substantial on-going central government subsidies, the limited command area of traditional irrigation systems means that returning to self-organised irrigation would result in a drastic reduction in wet rice production. Today, large-scale irrigation is the key to food security in northern Vietnam. In the wake of decollectivisation in the late 1980s the question has become can the state and water users co-operate to find joint management solutions? It is this question that I attempt to answer in the concluding chapter of the dissertation.

Conclusion

On many levels the state in northern Vietnam since the beginning of the 19th century has appeared to be a hydraulic state, when in fact hydraulic systems in the Red River delta have generally been jointly managed by the state and water users. Although the state has played a key role in developing flood control systems such as dike networks and drainage canals, irrigation has been, historically, the responsibility of households. Because the colonial regime neglected to invest in large-scale irrigation and drainage systems in the central Red River delta, reasons for which are discussed in Chapters 5 and 6, irrigation networks remained, up until the early 1960s, as localised as they had been in the pre-colonial and colonial eras. The only significant exceptions are in some midland areas. Modernising irrigation has involved transforming traditional management patterns and eventually integrating local-level systems into larger canal networks, all of which becomes dependent on water provided by large-scale pumping stations. This process of transforming traditional patterns of hydraulic management is first discussed within the context of the Nguyễn dynasty in Chapter 3 and is central to the subject matter of Chapter 7.

From the beginning of the 19th century until the late-1950s, the state in northern Vietnam has proven either unwilling or unable to accept the full financial burden of developing large-scale hydraulic infrastructure. It has, in addition to this, been incapable of maintaining a stable hydraulic bargain with water users, which

was as important to hydraulic development in the 19th century as it was in the 1960s and 1970s. As a result of these two factors -- weak fiscal capacity and highly localised irrigation and drainage systems -- joint management of large-scale hydraulic networks has been an essential characteristic of hydraulic management patterns in northern Vietnam, as it has been in many parts of Asia. In Chapter 3, I consider the influence that limited fiscal and mobilisational state capacity had on the ability of the pre-colonial Nguyễn state to implement large-scale hydraulic projects or establish a hydraulic bargain with water users. Money shortages also constrained colonial hydraulic construction, and, as such, irrigation and drainage projects during the colonial era were centred on the water scarce midlands rather than the potentially more costly central Red River delta. It is during the post-1954 period, the subject of Chapters 7, 8 and 9, that the importance of the hydraulic bargain as a means of overcoming financial and mobilisational obstacles again comes to the fore.

Tables and figures

Table 2.1 Length of public and private dikes in northern provinces up to 1829

Location	Number of districts	Number of communes	Public dikes and sluice gates				Private dikes
			Built before the Nguyễn (length in *trượng*)	Built by the Nguyễn (length in *trượng*)	Total length of dikes (*trượng*)	Sluice gates	
Sơn Tây	8	212	45 136	13 957	59 093	16	10 393
Sơn Nam	16	287	73 683	14 679	88 363	3	
Phủ Hoài Đức	2	8	1272		1272		
Bắc Ninh	11	154	63 358	1959	65 318	31	45 705
Nam Định	12	78	19 132	5532	24 665		42 971
Hải Dương	1	3	1221		1221		75 432
Total	50	742	203 802	36 127	239 932	50	174 501

Source: (Đỗ Đức Hùng, 1997, 223)

Table 2.2 Dimensions and volume of dirt for various types of dikes

Type of Dike	Width of Top (m)	Width of Base (m)	Height (m)	Total Volume of Earth (cubic metres per *trượng*[28])
Upstream and Mid-stream dikes on largest rivers	8	28	4.8	363
Downstream dikes on largest rivers	6.1	20	4.0	214
Dikes on mid-sized rivers	4.8	16	4.0	175
Dikes on small rivers	3.8	12	3.8	114

Source: (Đỗ Đức Hùng, 1997, 158)

[28] One *trượng* = 4.25 metres

Chapter 3 Reaching beyond the limits of nature: Large-scale hydraulics in late imperial northern Vietnam

Introduction

This chapter examines the ideological transformation that took place in the 19th century whereby the twin concepts of flood control (*trị thủy*) and irrigation/drainage (*thủy nông*) were brought together in the minds of the Vietnamese intellectual elite. This transition, which is indicative of what I describe as a "proto-modernist" approach to hydraulic infrastructure, is best found in the writings of the mandarin Nguyễn Công Trứ. He argued that in order to fight flooding and improve agriculture it was necessary to implement water control projects that addressed flood control problems from the perspective of the Red River delta as a whole. From this vantage point, fighting floods needed to involve one of two things: build dikes high enough to withstand floodwaters or reduce their height and dig a network of drainage canals throughout the Red River delta. In addition to a more holistic approach to flood control, the Nguyễn were committed to improving agriculture by reducing the number of floods and increasing arable land area, in order to solve the inter-connected problems of landlessness, famine and open rebellion.

As I discuss in Chapter 2, there was a mix of state and non-state control over hydraulic infrastructure in the pre-colonial Red River delta. This conclusion, however, obscures the fact that Nguyễn emperors made attempts throughout the 19th century to centralise control over the construction and management of dikes and sluice gates. Although their achievements were limited, with regard to large-scale infrastructure construction, the Nguyễn were faced with many of the same issues that confronted central authorities during the 20th century. Mobilising the financial and labour requirements to construct large-scale infrastructure in the Red River delta has demanded that the state co-opt peasants within an ideological

vision of development or modernisation by engaging them in a hydraulic bargain. The Nguyễn, however, found it difficult to mobilise peasant labour for large-scale projects partly because they lacked the larger developmental objective that would legitimise the state's claim over peasant labour. Under these circumstances, it was difficult for the Nguyễn to establish a hydraulic bargain with peasants. As I discuss in later chapters, as peasants begin to realise the potential benefits of large-scale irrigation and drainage systems, more challenging hydraulic projects can be attempted.

In this chapter I will consider, first, the ideological changes that occurred under Emperor Minh Mệnh (1820-1841) and how he centralised and strengthened the bureaucratic structures responsible for hydraulic infrastructure. Before the 19th century, flood control infrastructure was not built to serve irrigation but was an end in itself. This began to change under Minh Mệnh when sluice gates and drainage canals competed with dikes as the main form of flood control infrastructure. These changes were symbolic of a general move away from "protective" and toward "productive" water control infrastructure. I will examine two cases where the state attempted to improve agriculture using large-scale hydraulic infrastructure. The first is the Cửu Yên canal and the second is Nguyễn Công Trứ's celebrated land reclamation project that resulted in the creation of Tiền Hải and Kim Sơn districts, in Thái Bình and Ninh Bình provinces respectively. The difficulties that the Nguyễn encountered with the construction of the Cửu Yên canal foreshadowed problems that the colonial and Communist states faced when trying to mobilise peasant labour in support of hydraulic infrastructure. In the final section I will review the history leading up to the arrival in 1886 of the French in Tonkin, highlighting the gradual disintegration of the hydraulic bureaucracy that had been put in place by Gia Long and Minh Mệnh.

Modernising water control and improving agriculture

Hydraulic bureaucracies had existed in past centuries under other dynasties, as had state and non-state dike systems. The attitude of defending against nature that had

dominated the Lý dynasty's approach to water control had shifted under the Trần and Lê dynasties to include increasing agricultural production.[1] This tendency toward productive rather than merely protective hydraulic projects was accentuated under the Nguyễn. Before investments could be made in productive infrastructure, however, it was first necessary to stabilise and reinforce the dike system. One result of the social, political and economic instability that characterised 18th century Vietnam was a badly neglected hydraulic system, which had seriously damaged the agricultural economy in the Red River delta by the time the Nguyễn arrived in 1803 (Whitmore, 1997, 678-684). The situation in the 19th century called for emergency measures to improve the agricultural economy and establish political control over areas where land had been abandoned and vagrancy was common. As a result of this, the hydraulic system, particularly the dike network, became a focus for state investment, the likes of which had never before been seen.

The dike building program that Gia Long and his successor Minh Mệnh implemented required a solid tax base and centralised administration. The Nguyễn dynasty's hydraulics program was financed using a budgetary system that had first been implemented in the early 1700s, which effectively taxed all land, public and private (Whitmore, 1997, 681). The Nguyễn emperors, moreover, actively encouraged private agents to exploit uncultivated land by providing reclaimed land as private land and attaching attractive tax concessions in order to increase cultivated area and enlarge the state's tax roles (Nguyễn Khắc Đạm, 1969, 7-8). Any uncultivated land -- known as "quốc gia công thổ", the equivalent of Crown Land -- was by definition controlled by the state, and it was, therefore, in the state's interest to exploit that land in order to increase tax revenue.

Emperor Minh Mệnh was the first sovereign to integrate flood control and irrigation works. In addition to dikes, localities often constructed sluice gates. Such undertakings involved slicing through a dike and replacing the earthen wall with a

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[1] For a discussion of Lê dynasty water control see (Phan Huy Lê, 1959, 163-166) and (Phan Khánh, 1981, 40-47). For a discussion of Trần dynasty water control see (Phan Khánh, 1981, 31-40).

gate that would allow for gravity-fed or tidal irrigation and drainage. In the 1820s and 30s, the Nguyễn court began receiving petitions requesting that the state dig drainage canals and put in such sluice gates (*cống dưới đê*) to facilitate irrigation.[2] By supporting these requests:

> Minh Mệnh was no longer recommending the simple palliatives prescribed by the Lê emperors; he was working toward finding an overall solution to the problem of water for agricultural use (Chassigneux, 1912, 89).

What Minh Mệnh began was continued by his successors Thiệu Trị and Tự Đức. During the 19th century there were a total of eighty-three public and private sluice gates constructed in the four northern provinces of Sơn Tây, Hà Nội, Bắc Ninh and Hưng Yên (Đỗ Đức Hùng, 1997, 230-231). With the advent of sluice gates, in conjunction with the flood control capacity of extended dike networks, irrigation and drainage systems gradually became more sophisticated. Sluice gates in the 19th century were being constructed of bricks and stone and were fitted with wooden gates (*cửa*), which were significant improvements to the previous designs that were simply holes in dikes with no fixed gates (Đỗ Đức Hùng, 1997, 230-232). This combination of dikes and more sophisticated sluices facilitated the reclamation of low land (*đất trũng*), which would have typically been waterlogged during the wet season and in turn expanded and intensified land use for agriculture.

The "proto-modernism" of the Nguyễn dynasty, as it was reflected in Minh Mệnh's efforts to use dikes as a platform to improve irrigation systems and expand cultivated area, was limited to "improving" and not "revolutionising" agriculture.[3] This distinction is important because it contrasts the "productivist" modernism of the French with the Nguyễn emperors' "proto-modernism". For the imperial court, the goal of improving hydraulic systems was simply to maintain a balance between population growth and agricultural production, but not to encourage economic growth for its own sake. As land became ever more scarce and population levels

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[2] Because constructing a sluice gate involves removing a portion of the dike local plans required permission from central authorities.

[3] In Chapter 5, I consider this distinction in terms of the colonial regime's choice between efforts to "improve" (*améliorer*) or "irrigate" (*irriguer*) wet-rice agriculture.

continued to increase, nature had to be confronted and overcome. New water control techniques were introduced -- such as large drainage canals (*sông thoát lũ*) -- the scale of hydraulics projects was expanded and the overall importance of dikes was reconsidered (Phan Khánh, 1981, 246, 248-249). Throughout the 19th century the Nguyễn persevered in their struggle against nature, achieving some successes but never endeavouring toward the productivist reforms envisioned by the French and implemented widely by the DRV.

Centralising water control management

From the beginning of the 19th century until 1829, dikes were built and strengthened. The Nguyễn expanded their political influence throughout the delta and centralised control over local authorities. In terms of water control infrastructure, public investment in the Red River delta reached record levels. By 1829, following the hydraulic construction boom initiated by Emperor Gia Long, the Nguyễn had constructed 36 127 *trượng* out of a total of 203 802 *trượng* of state dikes. This amounted to eighteen per cent of all state dikes that existed in 1829 in the Red River delta. Nearly one fifth of the network of state dikes in place by 1829 had been built in the previous quarter century (see Table 2.1).[4] By 1850, this total would increase to one third of all state dikes (Đỗ Đức Hùng, 1997, 224). It should be noted that these statistics do not reflect the increased rate of non-state dike construction, for which figures are unavailable, that took place under the Nguyễn as a result of tax concessions and subsidies.

In the process of constructing state dikes, Gia Long and Minh Mệnh centralised control over their design, implementation and management. Relying on

[4] Using the same figures, Alexander Woodside makes the counter argument that since more than eighty per cent of all extant dikes in northern provinces in 1829 had been constructed before 1802, there must have been effective dike management during the unrest at the end of the 18th century (Woodside, 1988, 138). What is impossible to conclude from available sources is what constituted an extant dike in 1802. In other words, how badly neglected could dikes have been when the Nguyễn came to power and still be considered to "exist"? What investments, moreover, would the Nguyễn have had to make to bring badly eroded yet "existent" dikes up to a suitable standard so that they could have survived until 1829?

newly commissioned maps, detailed comparative studies were made of the Mekong and Red River deltas.[5] Emperor Gia Long, in 1804, reintroduced the cadastral register (*địa bạ*) and cadastral surveys were undertaken throughout the country during the 19th century (Trương Hữu Quýnh, 1992, 27). How to control the natural flood patterns of the Red and Thái Bình river systems became a scientific puzzle that could be solved using brush, ink and silk cloth -- the equivalent of today's pencil and paper. In order to attack the problem, Nguyễn mandarins used maps to simplify the Red River delta's natural topographic and hydrographic complexities. Armed with this information, literati in the Huế court could then design the necessary plans that would address hydraulic problems on a delta-wide scale.

Gia Long appointed two mandarins in 1809 to take responsibility for implementing an eight-point decree designed to regulate dike construction and maintenance. The decree, for example, legislated that district officials would need to inspect dikes during the 10th lunar month and, when construction or repairs were on-going, the number of mandarins that were required to be present along each kilometre of the dike (Đỗ Đức Hùng, 1997, 155-158). In 1828, Minh Mệnh further strengthened central control over hydraulic infrastructure when he created the Bureau of Dike Management (*Nha Đê Chính*). This office included forty-five dedicated staff, significantly increasing the size of Gia Long's hydraulic bureaucracy (Đỗ Đức Hùng, 1997, 163-164).

Integrating dikes and canals

A wholesale reconsideration of the relative importance of dikes in the overall flood control debate emerged when dike breaks caused serious inundations in 1832 and 1833. the colonial administration's 1895 and 1905 dike commissions, both of which

[5] Initially, Nguyễn mandarins were unfamiliar with the dike system in the Red River delta. The southern Nguyễn lords understood the flood patterns of the Mekong and smaller deltas in the central region. They had been landlords in the Mekong delta and were adept at channelling fresh water, using canals and creeks, on to unproductive highly saline soil in order to bring it under cultivation. The Nguyễn had experience digging canals and building dams in central provinces such

are discussed in Chapter 4, reflected Minh Mệnh's aversion to dike construction as the principal means of flood control in the Red River delta. One of the most seriously affected areas in 1832-33 was Hưng Yên province. In Đông An district alone, dikes broke in sixteen places (Đỗ Đức Hùng, 1993, 44). Reports from provincial mandarins explained that, as a result of these floods, many of the dikes would either have to be heightened or rebuilt. A number of village officials and notables recommended that, because of the cost involved and uncertainty about whether repaired dikes would withstand future floods, the state should invest in widening and straightening rivers. Such a program would reduce the financial cost of flood control at the local level and spread potential floodwaters over a greater area (Đỗ Đức Hùng, 1997, 233, 235).

The Nguyễn imagined that building canals and widening rivers and creeks (*đào sông, khơi sông*), to allow for improved drainage, would lessen the burden placed on dikes constructed along major rivers. This approach was intended principally to reduce the burden on upstream dikes around Sơn Tây and Hà Nội by draining water across Hưng Yên and Hải Dương into the Thái Bình river basin. In the wake of the 1832-33 floods, plans were formulated that involved a combination of dredging canals and *removing* dikes. Large-scale drainage canals had first emerged in the 15th century with the dredging of the Thiên Đức canal (Đuống River). Their utility as flood control devices, however, was neglected until the early 18th century when the Nghĩa Trụ canal (*sông*) was constructed (Đỗ Đức Hùng, 1997, 233; Trần Đức, 1994, 40). Before the 1830s, drainage canals had never been designed to supersede dikes. The general view of those who supported the razing of dikes was that if water were allowed to flow freely, that is, if dikes did not obstruct the natural flood patterns of rivers, then sediment would settle evenly throughout the deltaic plain.[6] Over time, dikes would become redundant as the land was raised

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as Quảng Trị but, in the first years of the 19th century, the utility of dikes generally and in the Red River delta particularly was unclear to them (Đỗ Đức Hùng, 1997, 84).

[6] An analogy by the mandarin Nguyễn Đăng Giai that compared floods in the Red River delta to tea poured from a cup onto a serving tray, "chén nước đổ ra mâm", is representative of the views

above the reach of floodwaters. In order to achieve this goal, dikes would need to be replaced by extensive river and canal systems that would allow for more efficient drainage of the delta as a whole.

Before Minh Mẹnh came to power in 1820, the imperial court's water control policy entailed reacting to demands made by groups who suffered from either a lack of arable land or the negative effects of flood and drought. Mandarins such as Nguyễn Công Trứ argued that this approach would have to change. More systematic flood control solutions, which addressed problems such as siltation, were needed. Within the Nguyễn court during the 1830s, theories claiming that siltation was the root cause of flooding in the Red River delta were becoming more generally accepted.[7]

By the 1830s, the imperial court had been discussing the siltation issue for some time, although, ironically, solutions were not pursued because of the state's commitment to dike building. The 19th century siltation argument was premised on the fact that although sediment builds up along both diked and undiked rivers, dikes would, theoretically, tend to increase siltation rates since sediment would concentrate at the river's mouth instead of being spread over the breadth of a flood plain.[8] More importantly, dikes prevent rivers, once sedimentation begins to block their path to the sea, from following an alternate course. Consequently, upstream

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expressed by many of those in favour of finding less costly and more sustainable alternatives to dikes. Nguyễn Đăng Giai described his hydraulic theory in a study he presented to emperor Thiệu Tri in the mid 1840s. Nguyễn Đăng Giai's plan was premised on the idea that once dikes were removed silt would build up to provide a solid, flood resistant plateau. Like others before him, he made comparisons between the Mekong and Red River deltas, arguing that canals ought to be the focus of future water control efforts. More generally, Nguyễn Đăng Giai believed that it had been a serious mistake for the Trần emperors to extend the dike system that the Lý built to protect Thăng Long (Hanoi). For an extensive discussion of Nguyễn Đăng Giai's views and the influence they had on the Emperor see (Đỗ Đức Hùng, 1997, 103-109). For a more concise account, but one which was written at a time when research on the Nguyễn lords simplified issues in order to highlight feudal incompetence, see (Phạm Ái Phương, 1989, 25, 26).

[7] The siltation argument, which is referred to in Chapter 4 as the "siltation hypothesis", survived until the early 20th century and held much weight among many Vietnamese and some French officials. Variations on this theme formed the basis for the argument to remove dikes during both the pre-colonial and French periods, as well as most arguments for flood control solutions that did not involve dikes.

water levels increase as sedimentation occurs along the riverbed. As Nguyễn mandarins were drawn closer to these arguments, a paradigmatic change was taking place in their attitude toward dikes as the principal means of fighting floods in the Red River delta.

An example of this transformation is found in the writings of Nguyễn Công Trứ, a mandarin from Nghệ An province and a trusted advisor to Minh Mệnh, who spent most of his career working in the Red River delta. In 1835, he prepared a study for the Emperor, which was organised around two alternative approaches to future flood control projects. The first point of his 1835 treatise was an application to have dikes removed. Nguyễn Công Trứ argued this point from the perspective of the northern peasant who was being forced to spend close to six months annually either working to repair or construct dikes, or assigned to a dike protection team (*Hộ đê*) (Phạm Ái Phương, 1989, 24). The second proposed guideline involved the strengthening of dikes and plans to construct new defluents for the Red River as well as to dredge all extant tributaries (Phạm Ái Phương, 1989, 24).

Nguyễn Công Trứ's views on hydraulics, however, were difficult to implement. Moving away from the politically expedient, populist approach toward water control that had been the hallmark of Nguyễn policy until the early 1830s meant convincing the peasantry that reducing the likelihood of floods throughout the Red River delta would benefit them in the long-term. In reality, this meant that unless the peasantry shared the Nguyễn court's evolving view of the delta as an integrated environmental, socio-economic system that could be modified in ways that would significantly reduce the threat of natural disasters, it would be very difficult to mobilise the labour required to undertake the large-scale projects that mandarins like Nguyễn Công Trứ had in mind. Despite the potential obstacles, Minh Mệnh was convinced of the need to pursue efforts at providing better drainage for the delta. In 1832 and 1833, distraught over dike breaks in Hưng Yên,

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[8] This was the logic behind explanations for why Nguyễn Công Trứ's land reclamation projects were so successful. The reality is slightly more complicated and is discussed further in Chapter 4.

Bắc Ninh, Sơn Tây and Hanoi, Minh Mệnh began in earnest to dredge canals and remove dikes, or at least reduce their height (Đỗ Đức Hùng, 1997, 90, 91).[9]

The Cửu Yên canal

The flagship project for Minh Mệnh was the Cửu Yên canal (*sông Cửu Yên*)[10], which runs from Nghi Xuyên, Khóai Châu district, Hưng Yên province, on the Red River to Sĩ Quý, Phù Cừ district on the far eastern side of the province. Peasants living in areas around the future Cửu Yên canal had petitioned the Emperor following the disastrous floods of 1833 to reduce the height of state dikes. They were concerned about having access to water for irrigation during the dry season: flood water provided irrigation in the wet season, but without a dike in place to obstruct its flow, water would slowly recede during the dry season. In order to meet the peasant's demands, the Cửu Yên canal was to be combined with submersible dikes (*đê bối*) designed to keep out the high waters that accompanied the summer solstice (*nước tiểu mạn*). Such high water levels typically occur on the 21st or 22nd day of the fifth lunar month, when tides are peaking (Đỗ Đức Hùng, 1997, 95; Phạm Ái Phương, 1989, 24). With these dikes in place the Spring crop could be harvested without fear of inundation, the higher waters of the wet season would still be capable of surpassing the submersible dikes while helping to keep water on the land. This water could then be used to irrigate the following year's Spring crop.

In theory, the project had merits, but was criticised at the time for a number of reasons. Setting aside for a moment the technical difficulties involved, according to Nguyễn Công Trứ one of the drawbacks of Minh Mệnh's Cửu Yên canal was that it was designed to benefit only a handful of districts. He complained that just

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[9] Chassigneux argues that the dikes that were removed at this time were in a bad state of repair and their destruction had little impact on local or regional flood control (Chassigneux, 1912, 92 fn. 1). This does not, however, detract from the fact that by the early 1830s Minh Mệnh's hydraulic policy for the Red River delta was no longer fully committed to dike building.

[10] In Vietnamese there is a distinction made between natural (*sông*) and artificial rivers (*sông đào*), which literally translates as rivers that have been dug by hand or machine. Depending on the size of a canal and its function -- irrigation or drainage -- different terms are used. Natural creeks, or arroyo, which are used to drain and irrigate, are known as *ngòi* (Đỗ Đức Hùng, 1997, 248-249).

calculating the pros and cons for eleven districts in Hưng Yên and Hải Dương did not meet the objectives of controlling rivers (*trị hà*) in the six provinces in the Red River delta (*Bắc Thành)* (Đỗ Đức Hùng, 1997, 249-250). Looking back on the Cửu Yên project thirty years later, in 1877, as head of the *Nha Đê Chính*, Phạm Thận Duật laid blame for its shortcomings at the feet of Minh Mệnh and the peasantry. Like Nguyễn Công Trứ before him, Duật argued that the Cửu Yên project lacked a strategic plan (*sách lược*) and was far too limited in scope. Duật believed that the peasantry was unable to see the general utility of the project and would only support schemes that directly benefited their community (Đỗ Đức Hùng, 1997, 140). This is in contrast to the nationalist fervour that helped mobilise labour for hydraulic construction in the first few years after the victory in 1954.

The Cửu Yên canal was designed to channel water out of the Red River and into the Thái Bình river, just as the Thiên Đức canal (Đuống river), further north, and the Luộc river, to the south, had done for centuries. It was intended to act as a pressure valve, reducing Khóai Châu's reliance on dikes along the Red River. Instead of draining the Red River equally, however, once the project was operational more water flowed into the Cửu Yên canal because siltation had significantly diminished the drainage capacity of the two other waterways. With the larger than expected flow rates, however, the new canal proved inadequate. The new canal had been constructed with low banks, allowing for seasonal flooding. Floodwaters in 1835 breached the low dikes and flooded an immense area of Hưng Yên and Hải Dương (Đỗ Đức Hùng, 1997, 246-248). One French account described the resulting flood as creating an enormous lake that stretched from the Red River across Hưng Yên and Hải Dương and up to the banks of the Thái Bình River on the far eastern side of Hải Dương.[11]

Floods occurred annually from 1835 until the canal was dammed in 1842. Peasants petitioned the Emperor to have the entrance to the canal blocked so they

[11] See (Chassigneux, 1920), quoted in (Vesin, 1992, 83).

could once again plant an Autumn crop without the threat of flooding. These same peasants, however, had benefited substantially from increased productivity of the Spring crop, which would suffer if the Cửu Yên canal were dammed. The trade off was that in order to protect the area from flooding in the spring, and ensure a fifth month crop, peasants would have to once again rely on Red River dikes to protect their fields and accept the burden of annual dike maintenance (Vesin, 1992, 84-85). Not surprisingly, dike breaks once again became a common occurrence in Khóai Châu district. Dike breaks in this area are recorded for every year between 1871 and 1882 (Đỗ Đức Hùng, 1997, 247).

Nguyễn Công Trứ, despite his official position as director of the Cửu Yên project, had supported a more ambitious plan involving the widening of the Thiên Đức river (Đỗ Đức Hùng, 1997, 98, 249-250). For centuries the Thiên Đức River had been periodically dredged -- how exactly this was done in pre-colonial times is unclear -- but this was the first time that plans had been made to widen the main channel of the river. The Cửu Yên canal was a short-term political solution to a much broader problem. Nguyễn Công Trứ realised this and was vindicated when the Cửu Yên canal was finally dammed.

In 1837, Minh Mệnh first attempted to widen the Thiên Đức River but his efforts met with little success and the project was abandoned soon after. According to one contemporary account, the Thiên Đức project was too large, "the local people can not yet be pushed too hard, they are limited by poverty" (Đỗ Đức Hùng, 1997, 89, 90). The Cửu Yên canal had originally involved reducing the height of dikes, but following floods in 1837, even before the Cửu Yên canal was dammed, dikes along the Red River needed to be strengthened. Thus, when attention turned to the Thiên Đức canal the Nguyễn no longer had the labour or financial resources to continue. The cost of rebuilding the dikes in addition to the original costs incurred to dig the Cửu Yên canal meant that Minh Mệnh's hydraulic legacy could not include widening the Thiên Đức river (Đỗ Đức Hùng, 1997, 236-241).

Implementing Nguyễn Công Trứ's project to widen the Thiên Đức River required that the state mobilise significant amounts of peasant labour. Because of

the scale of the dredging operations being considered by Minh Mệnh, labour requirements outstripped supply in areas immediately surrounding hydraulic worksites. Under the Nguyễn, people were no longer required to work on state-managed hydraulic projects but, instead, the state contracted labour, which proved to be expensive (Phan Khánh, 1981, 63). Successful mobilisation involved moving peasants both physically and conceptually beyond the geographical confines of their village or commune. As one author described it, "by nature the northern peasantry cannot be led by the hand as one might lead a young child to do their school work" (Đỗ Đức Hùng, 1997, 54).[12]

State-sponsored land reclamation

New dike construction in the Red River delta began to tail off after 1829[13], and, at about the same time, Minh Mệnh appointed Nguyễn Công Trứ to organise the first large-scale publicly funded and managed land reclamation and migration project. This project resulted in the creation, on land reclaimed using sea dikes, of Tiền Hải and Kim Sơn districts. Nguyễn Công Trứ's success was unique in the history of water control in northern Vietnam in that

> this project was the first historically documented example of land being reclaimed from the sea where the land was below the level of a typical high tide (Gourou, 1964, 207).

The creation and settlement of Tiền Hải and Kim Sơn districts in 1829 were an important measure of the Nguyễn dynasty's capacity to control the environment and its ability to think big.[14]

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[12] "Thực ra nông dân đồng bằng Bắc Bộ không phải là được thiên nhiên hào phóng dắt tay như dắt một đứa trẻ tập đi"

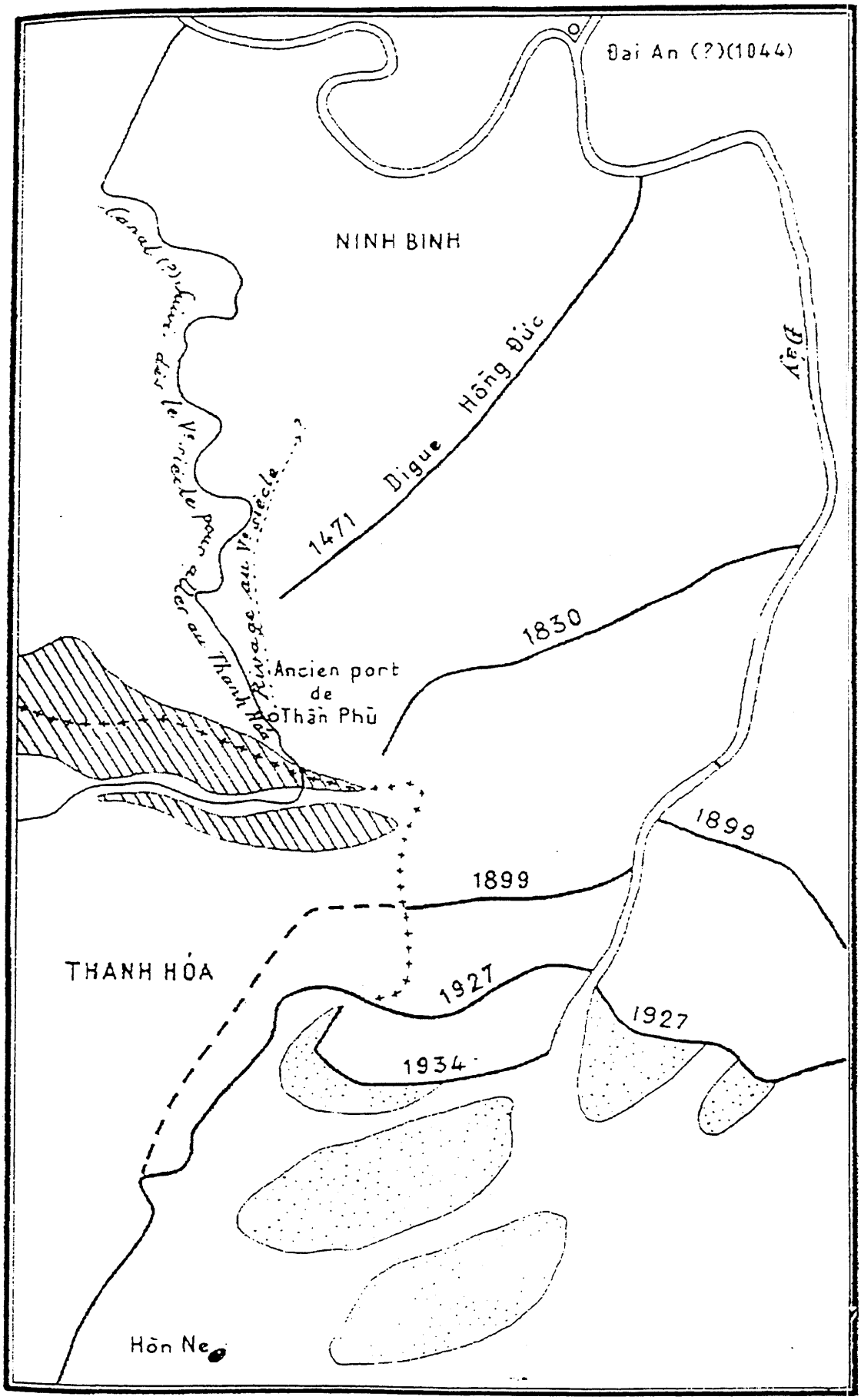
[13] Between 1803 and 1829 the average length of newly constructed and repaired dikes sat somewhere between the low of 1628 *trượng* in 1804 and 3590 *trượng* in 1828. Although not every year is recorded in the available data, dike construction in the years after 1828 until 1869 never rose above 700 *trượng* (Đỗ Đức Hùng, 1979, 47; Phạm Ái Phương, 1989, 22).

[14] Nguyễn Công Trứ also initiated land reclamation projects in Nam Định and Hà Nam. Not all his land reclamation projects reclaimed land at the same rate. In fact, in some cases the sea eventually reclaimed the land (Gourou, 1964, 207).

Land reclamation in the Red River delta began well before the nineteenth century and was an important outcome of both large and small-scale dike construction throughout the Red River delta. Gourou argues that without small-scale dike building, designed to reclaim small portions of low land, the delta would never have been colonised by the Việt people. From this he concludes that dikes must have existed well before the 11th century, despite there being little documentary evidence to support this claim (Gourou, 1964, 83) (See also Sakurai Yumio, Undated, Ch. 1). Expanding cultivable land area has coincided with increasing population pressures and advances in wet-rice cultivation techniques.

Land reclamation, as it has taken place along the seacoast of the Red River delta, involves two processes. The first step is to build sea and river dikes, and the second requirement is a set of sluice gates, in both sets of dikes, to allow fresh water to irrigate and desalinate the soil and eventually drain into the sea. In order to cultivate newly reclaimed land it is necessary to flush the soil with fresh water. Therefore, any successful reclamation project requires a supply of non-stagnant fresh water. It is due to a lack of fresh water that many areas around Hải Phòng and Đồ Sơn that would appear to be easily reclaimed were left as brackish tidal flats until at least the mid-1930s (Gourou, 1964, 40-41, 206). Further down the coast from Đồ Sơn, one finds the Hồng Đức dike, dating from 1471, which was the first sea dike to be constructed in the Tiền Hải-Kim Sơn area. A series of heavy storms encouraged its construction. It was not designed to reclaim land but rather as a means of saving low lying crop land (Đỗ Đức Hùng, 1997, 52). In 1830, a parallel dike called "đê Hồng Ân" was constructed eight kilometres from Hồng Đức (See Figure 3.1 and Table 3.1).

Figure 3.1 Map of land reclamation in Ninh Bình province



Source: (Gourou, 1964, 38).

Considering Nguyễn Công Trứ's immediate success in Kim Sơn and Tiền Hải, why had it taken so long for such a project to be implemented? One reason was that individual communities lacked the resources to reclaim land on such a large scale (Phan Đại Doãn, 1978, 26, 27). Nguyễn Công Trứ's land reclamation program reflects the evolving worldview that was moving the Nguyễn toward more financially demanding projects designed to assist in maintaining a balance between food production and population. In the late 1820s, the Nguyễn were faced with a number of interconnected crises. Social unrest in areas with high levels of vagrancy and a series of natural disasters had caused a large amount of land to be abandoned (Trương Hữu Quýnh, 1992, 26). Banditry, furthermore, one result of the vagrancy that accompanied abandoned land, had become a problem in the area around Kim Sơn and Tiền Hải. In 1827, the chief provincial mandarin (*trấn thủ*) was killed by followers of the "insurgent leader" (*nghiã quân*) Phan Bá Vành (Phan Đại Doãn, 1978, 25).[15] Reclaimed land provided resettlement opportunities for people who were displaced by natural disasters and rural unrest, and it helped bring political stability to the southern edge of the Red River delta, not to mention an increase in cultivable acreage.

Land reclamation, however, is of little consequence if there are no migrants to take advantage of the newly available land. Like other large-scale hydraulic projects, the key to success was convincing farmers that it was in their interest to participate. As the Cửu Yên and Thiên Đức river projects highlight, peasants in the Red River Delta have in the past reacted differently to water control projects designed to improve circumstances generally throughout the delta and those projects that prove to have immediate local benefits. In one light, the peasantry appears recalcitrant, while under different circumstances peasants prove to be dynamic organisers willing to co-operate to achieve collective goals. This issue emerges during the colonial and post-colonial periods in much the same fashion. There are three factors, however, that have helped the state to overcome peasant

[15] For a detailed account of Phan Bá Vành and the rebellion he led see (Shiraishi, 1984).

parochialism: nationalism, material means and an ideological commitment to national developmental objectives. All of these factors came together, eventually, under the Communist Party state.

Nguyễn Công Trứ does not appear to have had any difficulties attracting settlers to the newly reclaimed land in Tiền Hải and Kim Sơn. Direct responsibility for organising migrants into villages or sub-village units fell to a "recruitment manager" (*người quản mộ*), himself a recruit, who would gather people into groups of fifty for a village, thirty for a "hamlet" (*ấp*), and ten or twenty for a "farm" (*trại*) or "sub-hamlet" (*giáp*) (Gourou, 1964, 208). New villagers were responsible for constructing the various dikes and the necessary drainage and irrigation canals. In return they received agricultural and residential land, as well as cash to build a house, buy food for the first six months, as well as purchase a buffalo and farming implements (Gourou, 1964, 208).[16]

Support from an interventionist hydraulic bureaucracy, imbued with a vision of expanding agricultural production through more effective water control, while exhibiting a willingness to subsidise the exploitation of unsettled land, was critical to the success of the project. Without both the ideological vision of controlling nature and the financial means to implement their world view it is unlikely that the Nguyễn would have even attempted such an undertaking, let alone succeeded. In their expanding conception of the Red River delta as an integrated socio-economic system that could be manipulated to their political and economic advantage, the Nguyễn foreshadowed the French colonial approach to flood control and hydraulic agriculture. The creation of Tiền Hải and Kim Sơn underscores what is possible when the state establishes a stable, albeit geographically limited, hydraulic bargain with the peasantry.[17]

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[16] This is the first time that the Vietnamese state had provided financial incentives for settlers to bring virgin land under cultivation (Đoàn Đình Thi, 2000, 130).

[17] Kim Sơn was settled largely by Catholic migrants who suffered such serious persecution under the Nguyễn that it threatened the sustainability of the newly created district (Gourou, 1964, 210).

The dénouement of the imperial hydraulic program

Beginning with the damming of the Cửa Yên canal in the early 1840s, the literati soon came to accept that dikes in the Red River delta were a historical reality that would have to be maintained in future. Before the French arrived, however, the Nguyễn continued efforts to limit the impact of what was becoming a chronic pattern of dike breaks and inundations. By the time Emperor Tự Đức came to power in 1848, standard flood control measures, such as strengthening dikes and dredging rivers and canals, had not proven successful over the long-term. Alternative solutions, such as reforestation to limit monsoon run-off and erosion, solutions which would reappear when French colonial bureaucrats and engineers debated these same issues, were first addressed under emperor Tự Đức (Đỗ Đức Hùng, 1997, 110). In the latter half of the 19th century, Nguyễn mandarins, such as Nguyễn Văn Siêu and Nguyễn Trường Tộ, argued that dikes were an essential component of a flood control system in the Red River delta. Dikes needed to be complemented with but not replaced by drainage canals. Mandarins whose opinions were most heavily influenced by European and Chinese experiences were also the most strongly in favour of using dikes as the primary means of flood control in the Red River delta (Chương Thâu, 1978, 76, 77; Đỗ Đức Hùng, 1997, 113-114). By the mid-1850s, many of the theoretical approaches that would appear within the French colonial discourse concerning the "flood control question" had already emerged.

Like his predecessors, the amount of peasant labour and financial resources that Emperor Tự Đức could mobilise limited the range of water control projects that he could undertake. In 1859, Tự Đức initiated his largest public works program when he began dredging and widening the Thiên Đức canal, a project that had been attempted previously by Minh Mệnh but had failed due to a lack of peasant co-operation and financial means. Tự Đức, however, did manage to mobilise peasants from twenty-five districts. Whether he was capable, both financially and politically, of maintaining the long-term support of his peasant labour force became a moot point as conflict with the French in the southern provinces

overshadowed water control in the Red River delta (Đỗ Đức Hùng, 1997, 126; Tsuboi, 1987, 224-231). In 1862 all work on the Thiên Đức canal came to a halt.

Tự Đức's inability to defend adequately the fields and settlements of the Red River delta against floods resulted in the eventual disintegration of the centralised flood control bureaucracy that had been under the direction of the *Nha Đê Chính*. When efforts to dredge the Thiên Đức canal concluded in 1862, responsibility for managing flood control projects in the Red River delta, central authorities at the Nguyễn court in Huế transferred responsibility for managing flood control projects to provinces and districts (Đỗ Đức Hùng, 1997, 126, 149).[18] Dike breaks and flooding, during the 1890s, were an annual concern for rural producers in the Red River delta, despite the substantial investments the Nguyễn dynasty had made in hydraulic infrastructure. Due in part to the serious floods that occurred in the mid-1890s, French colonial engineers were drawn into the dike debate almost immediately.

Conclusion

Under Emperor Minh Mệnh, flood control and irrigation infrastructure were combined in order to help the Nguyễn court ensure stable food production and establish political control throughout the Red River delta. Two projects highlighted the integration of protective and productive hydraulic infrastructure: the Cửu Yên canal and the creation, through land reclamation, of Tiền Hải and Kim Sơn districts. These two undertakings also represented a tendency on behalf of the Nguyễn leaders to attempt large-scale projects. Largely because they lacked mechanical earthmoving equipment and engineering skills, the Nguyễn found that by the latter half of the 19th century the dikes that they had constructed in the previous decades had become increasingly prone to disintegrating. The floods that

[18] The *Nha Đê Chính* was resurrected in 1876 in the wake of an 1874 trade agreement signed between Tự Dức and the French. The agency continued to function until 1883 insofar as court records concerning flood control were maintained until that date. However, the head of the central Dike Agency, Phạm Thận Duật, had been recalled to Huế in 1878 (Đỗ Đức Hùng, 1997, 28).

ensued and the uprisings that accompanied them initiated a period of great rural unrest. By the mid-1890s, with the French in control of Tonkin, rural disorder and flood control had again become a pressing concern.

In his study of the moral economy and peasant rebellion in Southeast Asia, James Scott notes that flood or drought was a contributing factor in many of the subsistence crises and peasant protests that took place in pre-colonial and colonial Southeast Asia (Scott, 1976, 1, 128, 140-142). Scott also discusses the claims made by the state on peasants in the form of taxes and corvée duties (Scott, 1976, see Ch. 4). To a lesser degree he outlines positive contributions a state can make toward improving the welfare of peasant producers (Scott, 1976, 28-29). I would argue that state obligations in the realm of water control form an important component of what Scott describes as the subsistence ethic. By the end of the 19th century, peasant agriculture in northern and central Vietnam was still largely at the mercy of unpredictable weather patterns. At the same time, however, it was also subject to the impact of floods caused by dike breaks. How many of the floods mentioned by Scott that contributed to subsistence crises or rebellions were the result of neglected or poorly constructed dikes? Or, dikes that pooled water in fields because they had not been equipped with sluice gates? What was the peasantry's response to a state that had promised effective water control and failed to deliver? These questions are salient insofar as they get to the heart of the hydraulic bargain, and its role in influencing broader political and economic processes.

The 19th century was a turbulent era. As the population in the Red River delta expanded and land became scarcer, increasing cultivated land area and intensifying agricultural production became essential. Hydraulics played an important role in helping Nguyễn lords achieve their proto-modernist goals of expanding the limits of nature in order to establish economic and political stability throughout the Red River delta. To do this, the Nguyễn emperors relied on elements of the hydraulic bargain, which would gradually become more sophisticated during the colonial and post-colonial eras. As the Nguyễn realised, in addition to the political capital required, battling against nature also involves a

combination of technical and financial investments, which can prove to be very costly. As the next three chapters will consider, the cost -- both financial and political -- of constructing hydraulic infrastructure was an enormous concern for the colonial administration. The evolution of large-scale hydraulic infrastructure during the 19th century catalysed colonial era debates over irrigation, drainage and flood control. In Chapter 4, I consider how the decision to dike the Red River delta was a watershed in the history of hydraulic modernisation. With dikes in place the French, and later the Communists, began planning for a delta irrigated and drained using canals, sluice gates and, eventually, large pumping stations.

Tables and figures

Table 3.1 Rate of land reclamation in Ninh Bình province 1471-1959

Year and name of dike	Years reclaiming land	Distance from last dike constructed (km)
Hồng Đức (1471) -- Hồng Ân (1830)	369	8
Hồng Ân (1830) -- Hoành Trực (1927)	93	7.5
Hoành Trực (1927) -- Binh Mình I (1959)	32	7.5

Sources: (Diệp Đình Hoa, 2000, 203, 204; Đỗ Đức Hùng, 1997, 55; Phan Đại Doãn, 1978, 25).

Chapter 4 Diking the Red River delta: "Science" overcomes the "siltation hypothesis"

Introduction

When the French arrived in Tonkin in 1884 they faced a situation where dike breaks were occurring almost annually and flooding was a major threat to economic and political stability.[1] As one journalistic account concluded:

> This flood control regime is eminently defective, so much so that it endangers the lives of a large proportion of the population in the Red River delta and the midland region of Tonkin (Morice, 1913, 1).

One of the first French analyses of the flood control situation in Tonkin concluded that erosion was gradually weakening dikes and siltation was heightening the river beds of diked rivers, gradually raising water levels above the height of the protective dikes (Janet, 1886, 318). The second part of Janet's assessment is what I refer to as the "siltation hypothesis".

The colonial hydraulic bureaucracy was unable to counter the siltation hypothesis until 1913. In that year, enough scientific data was available to French engineers to prove that water levels in the Red River delta were increasing because dikes were slowly being strengthened, leading to a decrease in the number of upstream dike breaks, not because riverbeds were silting up. Before 1913, the "siltation hypothesis" had dominated the flood control debate, and led the Protectorate of Tonkin between 1896 and 1926 to work at reducing water levels in the Red River rather than battling them using dikes. If the siltation hypothesis were true, dikes would be of little use, as they would need to be heightened *ad infinitum* as siltation caused water levels to rise ever higher. The decision to dike the Red

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[1] Of the ninety-four years between 1806 and 1900 dike breaks were recorded in Hưng Yên Province during twenty-six of them. Although most of these dike breaks occurred during the last quarter of the 19th century, on average, during the whole of the 19th century, one in four Autumn crops in Hưng Yên were lost due to flooding (Gourou, 1964, 87; Đỗ Đức Hùng, 1997, 73-79).

River delta was not reached, however, until 1923 when dikes proved capable of battling waters that would have caused serious flooding in previous years.

This chapter considers how hydraulic bureaucrats in Tonkin, reliant on their faith in the scientific method, in awe of the power and unpredictability of the Red River and constrained in their ability to take financial risks, eventually concluded that dikes were the most efficacious means of controlling floodwaters throughout the Red River delta. This decision impacted on the future of hydraulic agriculture and, in the early 1920s, ushered in a distinctly modern attitude toward irrigation and drainage. Because dikes obstructed the creeks that would have both irrigated and drained rainwater, paddy fields became more susceptible to waterlogging and drought. Hence, with dikes in place, irrigation canals and sluice gates were necessary next steps in the process of hydraulic modernisation. What follows is an examination of how the colonial authorities eventually reached the conclusion to dike the Red River delta.

The first section of this chapter sets the scene by considering the human cost of flooding; it describes the suffering that came with floods as well as the burden of maintaining dikes. In the second section, I examine the "flood control question" in terms of the 1895 Dike Commission and the impact that the "siltation hypothesis" had on the decision to construct the Vĩnh Yên overflow reservoir. This project consisted of several independently manoeuvrable gates designed to drain water from the Red River into the Thái Bình watershed on the eastern edge of the Red River delta. Thirdly, I consider the widespread impact that the "siltation hypothesis" had on hydraulic bureaucrats and how French engineers applied scientific findings to disprove the "siltation hypothesis". In the fourth section, I explain how the colonial regime's decision to abandon the Vĩnh Yên floodgates and the gradual strengthening of the dike system eventually led the Protectorate to rely on dikes to the exclusion of other flood control means.

The human cost of flooding

Flood control efforts were closely linked to the colonial regime's economic development policy of *mise en valeur*. As Gourou wrote in the mid-1930s:

> It is necessary to dike the Red River if one wants to develop the economy of the Delta [*mettre le Delta en valeur*].... Wet rice agriculture is only possible if the Red River is diked.... (Gourou, 1964, 83).

Increasing the productivity of wet-rice agriculture was the basis for the colonial vision of agricultural development and modernisation. Improved productivity depended upon effective water control. To this end, flood control was viewed as the first step toward a delta-wide irrigation and drainage system.[2] The need to reduce the human and social costs of annual large-scale flooding also could not be ignored. Both disaster prevention and increasing agricultural productivity coexisted as rationales for investing in hydraulic infrastructure. In the early stages of French rule in Tonkin, the most pressing flood control concern was the safety of cities, where the majority of French colonials resided. Dikes were strengthened around Hanoi and Nam Định, and in areas where important roads were located (Phan Khánh et al, 1995, 99-100).

In rural areas, fighting floods was the concern of every peasant household, and it was difficult work. Entire communes and districts would be mobilised when water levels began to rise. Thousands of people would line dikes, handing clumps of earth to one another, with mandarins shouting orders and gongs and drums beating in the background. In a fictional account of such a scene, Nguyễn Công Hoan describes the sense of foreboding that permeated worksites.

> In the evening the weather became ominously sultry. Indeed at rest time, when the workers were taking their meal, squatting on the flanks of the dike, a storm came. Heavy waves lapped against the earth wall. The sun was hidden behind black clouds. Then the rain fell in torrents. All ran for cover. But an order was shouted and rattan sticks rained blows on those who continued to run. Then terrible rumours spread from unknown sources: some said the dike sections at Đông Sơn had collapsed, others had heard

[2] The relationship between economic development and hydraulic infrastructure, within the colonial context, is addressed further in Chapters 5 and 6.

> that the Phương Hoang section was breaking up. Everyone was seized with fear at the thought of flooded fields (Nguyễn Công Hoan, 1963 (1938)).

During the rainy season, peasants lived with the incessant threat that the crops they had worked so hard to plant and tend could be destroyed in a matter of moments if a weakened section of a dike were to give way.

Not everyone in rural areas, however, was directly threatened by floods. Corrupt officials took the opportunity to benefit from high water levels. Nguyễn Công Hoan describes how an official charged with accounting for lengths of bamboo contributed by villages could turn a profit. Bamboo was used to reinforce dikes, and villages that were protected by dikes were required to provide a certain quota to worksites. In, *Impasse*, a village mayor (*lý trư□ng*) arrives at the worksite with the required 100 lengths of bamboo and presents them to the overseer. Only sixty-five were deemed usable. The mayor was faced with a dilemma: return to his village and collect more bamboo or buy thirty-five more lengths from the overseer at forty centimes each. He decides to buy the bamboo in return for a receipt for 100 lengths. The official then offers to buy the thirty-five pieces of unsuitable bamboo for ten centimes each, to which the mayor agrees. Turning to a watchman nearby, the mayor remarks, "So the thirty-five inadequate bamboos [sic] have become adequate and may be sold to another man. Clever deal!". Referring to the overseer the watchman replies, "This dike building must bring him a lot of money" (Nguyễn Công Hoan, 1963 (1938), 203-204).

Undoubtedly, the misery caused by annual floods was apparent to anyone who went into the countryside during the summer months. Floods, as well as drought, set people moving, searching for any means to avoid famine. Flood victims often had no savings to reinvest in their land and in many cases were forced to migrate to find paid labour in coalmines or as plantation labourers.

> When the dike breaks, when the water is high, the dead float by, they sit below the surface of the water, and then they sink. Who knows how many boats and ferryboats are sunk? Those people who have survived, if they have a house they take refuge as high up as they can; those that have nothing head for the mines, to the forests, any place not affected by the floods...(Đ.-N., 1927, 232).

It was common for parents to transport their children in baskets when the family was travelling.

> The father moved his pole [*gánh*] to the other shoulder. Under the bamboo pole which seemed harder and colder than iron, he felt an acute pain at the place where the pole had rested, as if his shoulders had been skinned. The two baskets were swinging with a regular rhythm. In one of them was a baby fast asleep and in the other an older child who looked round listlessly.[3]

For those too poor, weak or ill to leave their inundated villages and find opportunities elsewhere, floods were often followed by hunger.

A period of famine would normally last from January until the end of April, when the Spring crop would be harvested. During this time, the price of rice and potatoes would shoot up as stocks began to dwindle.

> In market towns it is rather easy to live hand to mouth [*lần hồi*], but go down to the village and the number of people starving increases tremendously.... Few households can manage two meals of rice. On average people eat a meal of rice gruel with a meal of rice mixed with corn or potato. When there are serious shortages then it's only one meal of roasted corn or rice gruel (Đ.-N., 1927, 233)!

As evacuees would make their way past cultivated fields they would pillage what they could in the dark, pulling up potatoes and turning the earth "as if a horde of wild boar had passed by".[4] Corpses would line the roads once famine began to set in. Nguyễn Hồng describes the bodies littering towns and villages during the 1945 famine:

> They died on the side of roads, on the grass, on the fields, in front of the shops and no one would bury them or weep for them. They died everywhere and lay like mowed down stubble (Nguyễn Hồng, 1964, 189).

Such accounts portray the severity of flood-related devastation and how floods could tear apart the social and economic fabric of village communities in the Red River delta. Gourou's account of the 1915 flood highlights the geographical scale of devastation caused by a serious flood. "Paths, streams, depressions,

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[3] Excerpt taken from a collection of short stories entitled *Hell and furnace* by Nguyễn Hồng and quoted in (Nguyễn Hồng, 1964, 188).

everything was levelled out, and on these vast desolate spaces there was not a tree, a piece of grass, a tomb, no indication of life whatsoever". The relief of the countryside was so radically altered by the flood in 1915 that the 1/25 000 map of the region had to be redrawn (Gourou, 1964, 87). Despite the devastation wrought by inundations, colonial flood control efforts outside the immediate vicinity of the Red River lacked resolve until the mid-1920s.

The "flood control question"

As I travelled throughout the Red River delta in the late 1990s it was difficult to believe that there was ever a question in the minds of French bureaucrats and engineers about the utility of dikes. By the end of the 20th century, every major waterway in the Red River delta had been completely diked.[5] And yet, between 1896 and 1926 there was uncertainty and debate about whether dikes ought to be heightened or lowered, or whether there were effective flood control mechanisms that did not involve dikes.[6] The "flood control question" (*question des digues*) consisted primarily of solutions that were framed within the rubric of the "siltation hypothesis" and the problems that "science" had refuting it.

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[4] From the colonial newspaper *Avenir du Tonkin*, 22 April 1887, quoted in (Le Grauclaude, 1933, 8).

[5] Even in the 1940s, dikes were an important part of the landscape. In a geography lesson produced in the magazine, *Thanh Nghị*, students were given an assignment to travel to the Trầm pagoda in Hà Đông province. Along the way, the assignment explained, they would encounter certain geographical features. Principal among them was dikes and related features such as village sluice gates. Along the way to Chùa Trầm the students were instructed to travel along the dike, descend into a village, cross a field and then climb back up on top of the dike to travel to the next point on the itinerary (Nguyễn Thiệu Lâu, 1943, 22-26). The dikes were not only the central geographical objects of the lesson, they were also the means by which urbane young scholars could make their way out into the countryside. However, in the central delta well away from urban centres such as Hanoi, before 1930, there were very few dikes. For example, on the eastern, Thái Bình River, or the western, Kinh Thày River, sides of Nam Sách district, Hải Dương province, an alluvial dike (*đê bối*) provided the only protective embankment (Mai Văn Hai & Bùi Xuân Đính, 1997, 50). Mai Văn Hai and Bùi Xuân Đính, however, argue that in Nam Sách such levees could hardly be called dikes. They were, in fact, small roads that were only two metres higher than the surrounding paddy land (Mai Văn Hai & Bùi Xuân Đính, 1997, 52).

[6] For example, in 1900, a two-part article was published outlining both schools of thought, lowering versus heightening dikes, equal consideration before concluding that in the short term improvements had to be made to the dike system (Giret, 1900).

Some writers have argued that a resolution to the dike debate had an air of inevitability. In his study of the human geography of the Red River delta, Pierre Gourou argued that the dike debate was a purely theoretical exercise since it was always obvious that diking the delta was the only way to solve the flood control issue. He wrote that to speculate on the utility of dikes diverts attention from the real challenges that were facing the Tonkinese peasantry (Gourou, 1964, 90). Gourou was not the only person to take this view. In 1931, A.A. Pouyanne, the former head of Public Works, and overseer of the 1926 dike building program wrote:

> All the studies of the dike question have led to the same conclusion. The most practical and efficacious means of increasing the capacity of the Red River to drain the Tonkin delta, and the one most amenable to the Tonkinese peasant, has consisted of heightening and reinforcing dikes in whatever way has been possible at the time (Pouyanne, 1931, 22).

Pouyanne's opinion was echoed by Robequain in 1938 when he described the views of those who believed that dikes could be removed as "utopian" (Robequain, 1944, 223). Gourou, Pouyanne and Robequain, however, had the benefit of hindsight, after several years when dikes had proven capable of preventing even the highest waters in the Red River from flooding the surrounding countryside.

For engineers in the Department of Public Works, between 1896 and 1926, there were no *a priori* solutions to the flood control issue. Referring to the use of dikes to the exclusion of all other flood control measures, the French engineer Normandin wrote:

> Such an undertaking would be too risky considering the *uncertainty* of the results, and it is preferable to study other means of battling or at the very least reducing as much as possible the dangers of the very high flood waters in the Red River (Normandin, 1914, 27).

The debate, as Gourou suggested, was theoretical -- or, more accurately, largely financial -- only after 1913, when Normandin concluded that fewer dike breaks resulting from stronger dikes was causing water levels in the Red River to gradually increase. Until then, and for nearly another decade, dike construction advocates were faced with the difficult task of convincing the many supporters of the

"siltation hypothesis" that dikes were the most economical means of controlling floods along the Red River.

The 1895 Dike Commission

At the end of June 1895 the Governor General of Indochina created the first *Commission Supérieure des Digues*.[7] At an initial meeting in early July, the various committee members concluded that they would need further information from the various territorial Commandants and provincial Residents. A questionnaire containing seven sets of questions was circulated to the various regions in Tonkin. The range of concerns was broad:

1. In your province what type of dikes exist and what specific problem do the dikes address? For this question a map with all dikes clearly marked is required.
2. How are the construction procedures used and why are dikes built where they are?
3. Where have there been dike breaks? Why did they occur and how were they fixed?
4. What is your opinion concerning the dikes system and do you think it can be improved?
5. As all construction is presently done by corvée labour, can you see advantages in paying labour in the future? Are there dikes in your region that are so important that the state ought to pay for their up-keep? If so, which ones are they?
6. Are there experiences in your province with partial or total suppression of dikes? What were the results?[8]

The information contained in the replies to these questions was the raw material on which the Commission based its conclusions.

The Provincial Governor (*Tổng đốc*) of Sơn Tây provided one of the more elaborate survey responses. In his report, he addressed each question individually, providing an extensive history of the dike system in Sơn Tây going as far back as the Trần dynasty (1225-1400). One of the answers concerned corruption and the role that dike construction played in enriching Vietnamese labourers, mandarins and their colonial patrons:

> There are overseers who side with the workers in order to extract as much tax [*imposition*] as possible from those on the village register as well as the

[7] Between 1895 and 1915, the French established three different commissions designed to examine how best flooding could be controlled in the Red River delta. Each of these commissions was set up in the wake of a serious flood: 1894, 1904 and 1915. Although the first two commissions had the word "dike" in their title the discussions that took place considered a broad range of issues and did not limit themselves to evaluating the effectiveness of dikes.

[8] (VNA1/RST 57105, 1895).

> poorer unregistered peasants, who lived in and around the area where the dike was being built. These overseers consider dike construction to be a means for enriching oneself while it ruins everyone else. These abuses are so common that they are impossible to prevent. Instead, they have to be forbidden officially. Whoever fails to correct their old way of doing business ought to be punished immediately.[9]

In the late 19th century, a mandarin who wanted to build a dike required a colonial patron such as a French entrepreneur. Sections of a proposed dike would be open for tender and the two would establish a consortium and bid for the right to construct one portion of the dike. The contract between the successful bidder and the provincial authorities lacked detailed construction plans, nor was there a timetable for how long the newly constructed dike ought to resist floodwaters. In some cases where dikes under construction were submerged by floodwaters, local peasants were forced to pay the reconstruction costs.[10]

In an annex to his report, the provincial Governor of Sơn Tây went into much greater detail concerning the relationship between the hydrology of the delta and human settlement. He made a strong case for reducing the height of dikes in combination with dredging the Thái Bình and Red River estuaries in the lower delta. If dikes were to be lowered, waterways would have to disperse floodwaters more efficiently in order to avoid massive flooding and crop losses.[11] Moreover, the Governor made the argument that dikes constrained floodwaters, forcing sediment to be deposited along riverbeds, raising the height of floodwaters and resulting in the need to constantly increase the height of dikes.

> In the past, the water would only reach an ordinary flood level, and it would flow into the rice paddies through holes in the riverbank. But recently, it has been surmounting the dikes, which never happened in the past.[12]

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[9] (Report provided by the Provincial Governor of Sơn Tây relating to the dike question, 18 August 1895, VNA1/RST 57105, 1895).

[10] *Ibid.*

[11] This argument mirrored the views of the 19th century mandarin Nguyễn Công Trứ. See Chapter 3.

[12] (Report provided by the Provincial Governor of Sơn Tây relating to the dike question, 18 August 1895, VNA1/RST 57105, 1895).

How credible was this assessment of flood patterns in the Red River delta during the 19th century? This was a question asked by many within the hydraulic bureaucracy.

The "siltation hypothesis"

Underlying the Governor's argument was the claim that peak flood waters in the Red River had been steadily rising since the beginning of the 19th century and that they would continue to rise due to rapid siltation of river beds, forcing dikes to be built ever higher. Although engineers within the French hydraulic bureaucracy did not generally support this argument, until 1913 they provided no alternative explanation for why water levels in the Red River appeared to be rising. Faced with this dilemma, the French focussed their attention on methods to reduce water levels and, in turn, make the delta less dependent on dikes. This was not unlike the situation Emperor Minh Mệnh had faced in the early 1830s. Following the hydraulic construction boom of the first two decades of the 19th century, dikes that had been newly constructed or strengthened in previous decades would have helped increase floodwater levels. Likewise, after two decades these dikes were also beginning to weaken and would have begun to break more often. Under the circumstances, it is easy to see how a causal relationship between heightened water levels and an increase in the number of dike breaks could develop. However, as Normandin would discover in 1913, siltation was not causing water levels to rise. Instead, whenever dikes were strengthened or a river had been recently diked, water levels increased as the number of upstream dike breaks were reduced.

French engineers resented the fact that they were saddled with a theory devised largely by Vietnamese intellectuals. Vietnamese mandarins based their hydrological theories on the historical trends that they and their ancestors had noted. Hydraulic engineers in the colonial administration, however, chose to depend on survey measurements and the reports produced by provincial functionaries. Until scientific data could compete with Vietnamese local knowledge the "siltation hypothesis" would remain unassailable. In an atmosphere charged with resentment and mistrust of Vietnamese methods, one can understand why the

Commission marginalised the views of Vietnamese advisors. In the published report of the 1896 Dike Commission three short paragraphs were devoted to the Sơn Tây provincial governor's comments on flood control. No mention was made of the relationship between dikes and corruption, nor was the relationship between more severe flooding and the need to heighten dikes continually. In fact, the commission reported that:

> The Governor of Sơn Tây doesn't explain why dikes have been heightened little by little, which according to him is a rather bad thing. He advises that the present dikes be strengthened, and that banana trees be planted at the base and reeds planted on the top. He does not reach any categorical conclusions concerning the removal of dikes (Resident Supérieur au Tonkin, 1896, 11).

Considering that in its recommendations for future study, the conclusions of the 1895 Commission targeted Sơn Tây as an important part of the flood control puzzle, one might expect to find a more balanced and considered assessment of the provincial governor's counsel.

Other Vietnamese participants repeated the Governor of Sơn Tây's conclusions regarding what appeared to be a gradual increase in the height of riverbeds in the Red River delta. The French colonial elite in Tonkin, however, never generally accepted this position. Nevertheless, it would be incorrect to argue that the debate was split along colonial and indigenous lines. The French Résident in Hưng Yên, for instance, was a strong advocate of the siltation hypothesis. His response to enquiries made by the 1895 Commission was printed in full in the publicly released official recommendations (Résident Supérieur au Tonkin, 1896, 15-21). It was in reply to the Hưng Yên Résident's proposal to decrease the height of dikes that the commission outlined its arguments against such a proposal.

One of the key elements of the argument to remove dikes was that sedimentation would fertilise and generally raise the level of the land, thus improving its fertility while at the same time making it less susceptible to flooding. The Report to the Commission, however, concluded that estimates concerning the annual increase in elevation caused by sedimentation varied from four to fifty

centimetres.[13] It was uncertainty surrounding the short-term consequences of removing dikes that led the 1895 Commission to conclude:

> Removing dikes has had and continues to have many supporters; but we believe that no one among them would take the responsibility for ordering their removal. We could not advise the commission to accept such responsibility. To decide that one will jump into the unknown, a decision that would instigate a disturbance for the colonial and indigenous regimes so serious that, in our opinion, it would lead to even more serious consequences (Résident Supérieur au Tonkin, 1896, 22).

Despite the 1895 Commission having expressed grave doubts about the possibility of realising immediate benefits from removing dikes the, debate over keeping or removing dikes in the Red River delta was only beginning.

The draft recommendations for future flood control efforts presented to the 1895 Dike Commission focussed on how tributaries and manmade reservoirs could be used to reduce upstream water levels along the Red River. What follows are the four recommendations provided to the Commission, the flavour of which would define how flood control would be pursued over the next two decades.

1. Re-open the entrance to the Đáy River.[14]
2. Establish, in Sơn Tây province, by reducing the height of the dikes on the left bank of the Red River, a vast water reservoir.
3. If, after careful study, this second solution does not appear to be practical, construct in its place an overflow area that will channel floodwater from the Red River to the Cầu River.
4. Construct two overflow areas: one on the Red River either upstream or across from Hanoi; the other on the Canal des Rapides[15] in order to transfer some of the flood water from the Red River and the Canal des Rapides to the Thái Bình River upstream from Sept Pagodes[16] (Résident Supérieur au Tonkin, 1896, 34).

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[13] Gourou calculated that it would take 500 years to raise the level of the delta one metre, but in the lower Red River delta, where sedimentation is more pronounced, this same level could be reached in two to three hundred years (Gourou, 1964, 108 fn.1).

[14] The Đáy river can either drain the area of the western delta through which it flows or it can be used to channel water away from the Red River and as a result help to lower water levels around Hanoi and further downstream. Therefore, by opening the Đáy river dam the result would be potentially more flooding in Sơn Tây but less chance of flooding further downstream on the Red River.

[15] Under the Nguyễn the Canal des Rapides was known as the Thiên Đức River. Presently, it is known as the Đuống River.

[16] Sept Pagodes is near Phả Lại, Chí Linh district, Hải Dương province, where the Thái Bình river begins.

These proposed projects charted a middle course between dikes and no dikes. Option two reflects arguments set out by those who would have removed dikes altogether. It left the door open, at least theoretically, for a future policy that could involve reducing the height of dikes. The dike debate, however, was highly nuanced. The range of opinion between the two extremes of, on the one hand, focusing all technical and financial resources toward strengthening and improving the dike system, and, on the other, simply removing all dikes, was vast.

Reducing water levels in the Red River, as opposed to combating floodwaters using dikes as the primary weapon, remained the focus of the colonial flood control policy until 1918. Because the only viable explanation for continued flooding was the "unscientific" siltation hypothesis, which French engineers in particular were reluctant to accept outright, anything that could reasonably be argued to have contributed to heightened water levels in the Red River would have to be considered.[17] Thus, the 1895 Commission's final report called for studies to be carried out on the viability of a wide range of flood control measures (Résident Supérieur au Tonkin, 1896, 26-34). The 1895 Commission decided to construct a set of floodgates in southern Vĩnh Yên province upstream from Hanoi on the left bank of the Red River.[18] For the next two decades this solution would remain at the forefront of colonial efforts to lower peak water levels in the Red River and safeguard Hanoi.

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[17] Deforestation, for example, was touted as being an important cause of higher water levels. Engineers in the Department of Public Works disagreed, and refuted this argument in several publications. See (Normandin, 1914, 38; Peytavin, 1916, 338-340; Rouen, 1915, 12). Normandin's article was critiqued by a forest ranger named Verdaguer who was employed in the colonial administration. He argued that studies in France, Russia, Germany, the Americas and India all proved that deforestation contributes to high water levels. In his article, Normandin had claimed that brush was as effective as forests in limiting runoff, to which Verdaguer replied, "this is nothing more than a scientific heresy condemned by experience (Verdaguer, 1914, 243)."

[18] In assessing the 1895 commission's conclusions, almost a decade after they had been published, Normandin still concurred with the integrated approach to flood control. He argued that extensive dike systems were now out of favour in France and Holland. European dike systems were now being complemented with large reservoirs like the one in place at Vĩnh Yên (Normandin, 1914, 35).

The Vĩnh Yên solution

The colonial regime took steps toward constructing an overflow reservoir in Vĩnh Yên soon after the 1895 Dike Commission had issued its final recommendations. Vĩnh Yên was chosen because of its location upstream from Hanoi and because the low-lying land that makes up much of the southern portion of the province made an attractive overflow basin.[19] Colonial engineers designed the Vĩnh Yên reservoir on the assumption that floodwaters would drain into the Cà Lồ River, which eventually flows into the Thái Bình River via the Cầu River nearly one hundred kilometres to the east.[20] However, studies done many years after the floodgate had been constructed found that creeks responsible for draining the Vĩnh Yên reservoir area were incapable of diverting adequate amounts of water into the Cà Lồ River. Models predicted that four out of twelve attempts to use the Vĩnh Yên overflow area would result in widespread flooding.[21]

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[19] Other areas that were considered at the time included Sơn Tây, Phú Thọ and Vĩnh Yên. Sơn Tây was rejected as it was considered too close to Hanoi. Using Phú Thọ as a reservoir was conceptually different from the overflow reservoir concept in Sơn Tây or Vĩnh Yên. In Phú Thọ the idea was to store water in a reservoir upstream before it had a chance to reach the delta. The cost and complicated technical considerations of such a plan were considered too great to make the project feasible although it was discussed during both the 1895 and 1905 dike commissions (Vesin, 1992, 74-75).

[20] Today the Cà Lồ flows into the Thái Bình delta through the Cầu River. Historically, however, the Cà Lồ when its water levels were low would flow into the Red River and in to the Cầu River when it was in flood (Janet, 1886, 310).

[21] (Minutes from Consultative Commission on Hydraulic Agriculture meeting, 6-7 June 1916 VNA1/RST 20551, 1915-1916).

Figure 4.1 and Figure 4.2 Diagrams of Vĩnh Yên floodgate

A. Cửa áp -- Pressure gate
B. Sườn dê xây bằng xi mo -- Concrete-lined sluice channel
C. Cầu để người đi lại -- Bridge to let people go back and forth
D. Đường đê -- Dike road

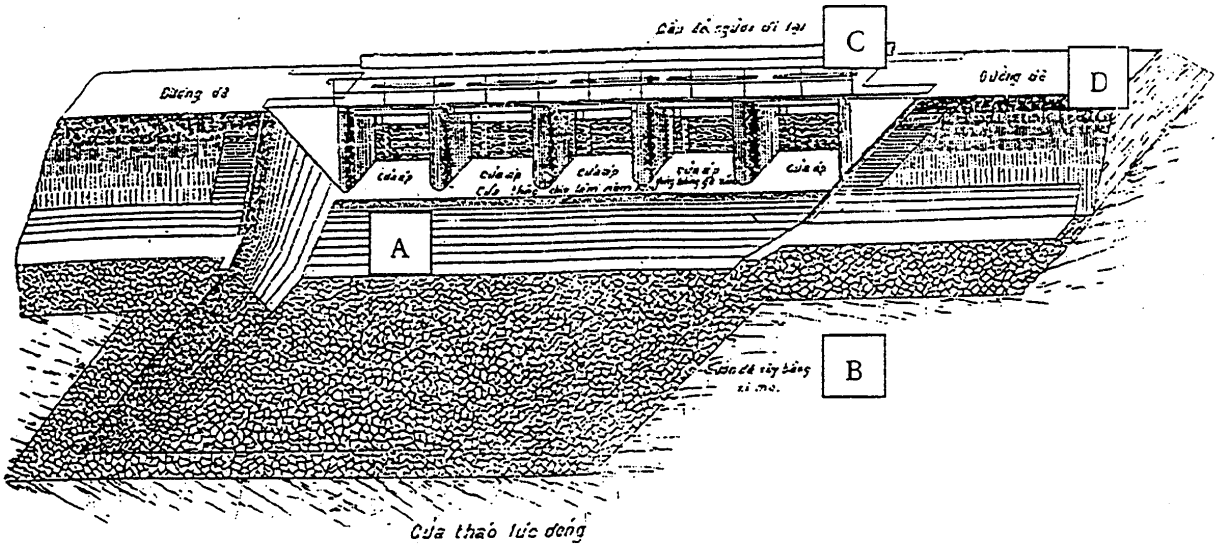
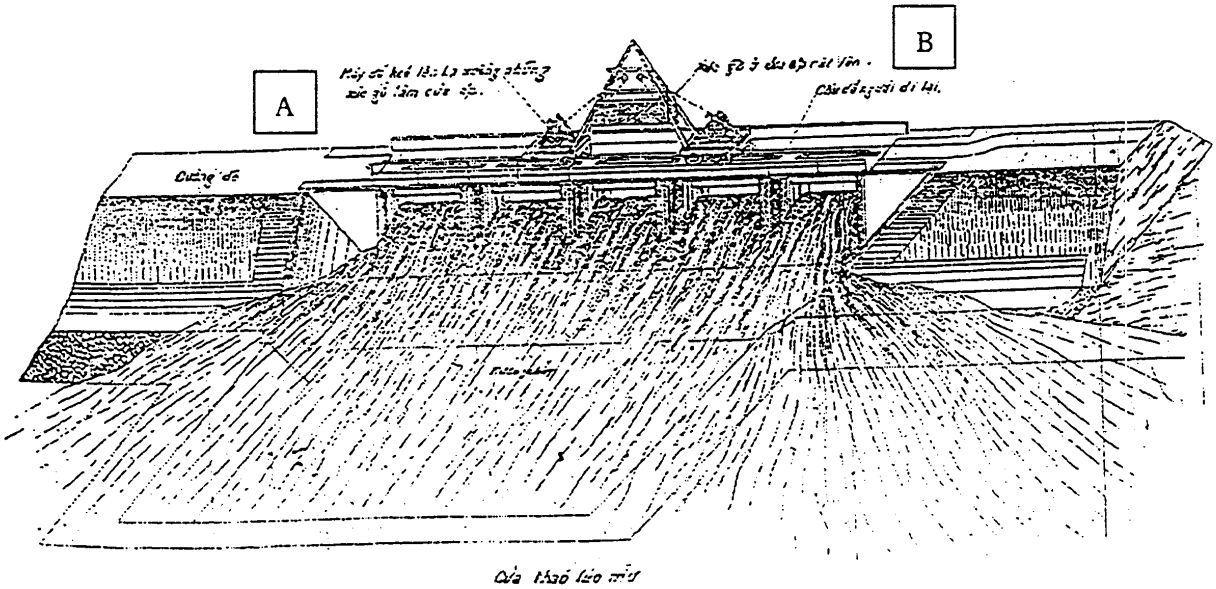


Figure 4.2 Diagram of Vĩnh Yên floodgate with gates open



A. Máy để keo lên hạ xuống những xúc gỗ làm cửa áp -- Device to lift up and put down wooden sluice gates.
B. Xúc gỗ ở cửa áp rất lên -- Sluice gate in fully open position.

Source: (Ngô Kỳ Ngư, 1918, 7-8).

Vĩnh Yên was an extremely poor region where banditry had just been eradicated. The few peasants living in the area at the end of the 19th century, and who agreed to the construction of the Vĩnh Yên floodgates, were hoping that the nutrient-rich waters of the Red River would help fertilise their land (Vesin, 1992, 76). According to one account, however, local peasants had agreed to the construction of reservoirs while under the impression that dikes were to be removed en masse throughout the delta (Normandin, 1914, 28). Support for such an approach to flood control is reminiscent of Nguyễn Đăng Giai's tea cup and tray analogy (see Chapter 3). Nevertheless, the French colonial administration had no intention of lowering dikes around Vĩnh Yên. Unfortunately for peasants in the area, the colonial administration had decided to use the overflow reservoir only in "extreme circumstances", which at the time would have been close to every other year. This was in direct contrast with the belief held by peasants in southern Vĩnh Yên that modest flooding would occur annually.

The Vĩnh Yên floodgates were completed in 1896. Once they were in place, the Vietnamese built small dikes in order to keep water out of their fields. The system was first put to the test in 1899. Only half of the eighteen gates actually functioned and some of these were kept open even after floodwaters began to recede, causing unnecessary flooding. The gates were used again in 1904 when the area was already flooded. In 1905, however, there were complaints when diverted floodwaters damaged a healthy Autumn rice crop. But, in both cases, the colonial authorities concluded that the floodgates had proven effective, as calculations showed that they helped reduce floodwaters around Hanoi (Normandin, 1914, 30-31).

In 1900, a dam had been built on the Cà Lồ River, thus separating it from the Red River, which allowed the Cà Lồ to drain more easily the water that collected in the overflow reservoir. An added benefit of this dam was that it reduced water levels on the Cà Lồ River, in as much as water from the Red River no longer flowed into it, which lessened the likelihood of flooding. Under these circumstances the overflow gates became even less acceptable, heightening the local peasants'

aversion to the idea of being inundated in order to save downstream areas. Consequently, peasants constantly interfered with the operation of the reservoir and its floodgates.

> Wanting nothing more than to make the reservoir unworkable, it was useless to try to make them understand that flooding their land was in the interest of reducing water levels downstream, and in particular around Hanoi (Normandin, 1914, 29).

Despite the obvious difficulties that the Vĩnh Yên reservoir posed, without an alternative to the "siltation hypothesis" the colonial regime had no choice but to continue to flood Vĩnh Yên. By 1905, at the inauguration of the next dike commission, the flood control debate was just as lively as it had been in 1895.

Round two: The Duranton Report and the 1905 Dike Commission

In November 1904, ten years after the first dike commission had been established and less than one year before the second Commission would meet for the first time, the French Resident in Hà Đông province, Duranton, tabled a report to the Resident Superior in Tonkin (RST). His report and the responses that it elicited from his fellow Residents reflected widespread support for arguments to have dikes lowered.[22] On the eve of the first meeting of the new dike commission, the Resident Superior in Tonkin found the Duranton report compelling enough to circulate it among the provincial Residents. Attached to the document was a set of questions concerning dikes and flood control that was very similar to the one sent to provincial Residents in 1895.[23]

Duranton based his report on surveys by other French functionaries and village leaders in Hà Đông province. What he found was that representatives from only sixteen of ninety-two cantons were in favour of keeping dikes. Ironically, these sixteen were located in the highest part of the province, an area prone to drought,

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[22] (The Duranton Report, VNA1/RST 57106, 1895-1896).

[23] (RST Circulaire No. 27, 25 July 1905, VNA1/RST 57106, 1895-1896).

not floods.[24] At least in Hà Đông province, peasants in higher regions preferred to keep dikes since they benefited from their protective qualities without having to endure the costs of constructing, maintaining and monitoring them. Peasants in low-lying areas, however, were willing to risk the possibility of losing an Autumn crop to flooding if it meant they were no longer burdened with the cost of maintaining the dikes. With lower dikes it would be possible most years to cultivate a Spring crop and perhaps even an Autumn crop, while reducing the burden of taxation and corruption that larger dikes imposed. And, more frequent flooding would allow the sediment laden water to fertilise their fields. They knew, too, that if the dikes stayed in place, a dike break would occasion widespread devastation.

By the end of August 1905, the responses generated from the circulation of the Duranton Report began to filter in from around the Delta. The Resident in Vĩnh Yên likened the suppression of dikes to the choice between an armed peace or total disarmament. All regions must decide to remove their dikes at the same time; no half measures would do.[25] The Resident in Hải Dương agreed with Duranton that dikes should be removed.[26] A dissenting voice came from the Resident in Nam Định who argued that decisions needed to be based on scientific analysis, not on the views of local inhabitants:

> All the other projects dealt with, until now, have been undertaken without criticism. It seems that the opinion of Residents ought to be canvassed only for projects that have already been studied and planning done by a capable government Department. In this way projects would be free from the local interests that inevitably influence the opinions of provincial leaders.[27]

The problem was that in 1906 French engineers were unable to provide a scientific solution to the flood control problem, let alone dispel the siltation hypothesis. As such, planners would continue to rely on local opinions and, as I discuss in Chapter 6, the hydraulic policy, to which the resident in Nam Định alluded, never materialised.

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[24] (Duranton Report, 10 November 1904, VNA1/RST 57106, 1895-1896).
[25] (Response to Circulaire No. 27, Resident Vĩnh Yên, 28 August 1905, VNA1/RST 57106, 1895-1896).
[26] (Response to Circulaire No. 27, Resident Hải Dương, undated, VNA1/RST 57106, 1895-1896).

On 27 January 1906, members of the 1905 Dike Commission met for the last time. Duranton "expressed some doubts" about the validity of some of the objections directed against his proposals. The principal argument against Duranton was that any dike that was submerged during floods must also be subjected to erosion and, therefore, its solidity would be compromised. Duranton argued that allowing water to flow over a dike would have practically no ill effect.[28] Desbos, an engineer with the Department of Public Works, agreed that over a short period there would be little impact; if a dike were submerged for several days, however, which experience had shown to be possible, it would be damaged. And with that the discussion was finished. The dikes would be maintained and further studies would be made into the continued viability of the overflow reservoir in Vĩnh Yên.[29]

Solving the siltation mystery

Duranton was not alone in advocating the gradual removal of dikes. In fact, there were, reportedly, a majority of delegates at both the 1895 and 1905 Dike Commissions that agreed with him.

> But, no one dared to provide such an opinion officially and above all there was never an indication of what means would be necessary in order to achieve the desired results without the risk of instigating terrible floods, at least in the beginning, and above all else without risking the Autumn crop for a large part of the Delta, which could lead to a serious famine, one for which the French would need to prepare (Morice, 1913, 178).

What this suggests is that the siltation hypothesis was having a powerful effect on both Vietnamese and French officials involved in the flood control debate. From 1896 until 1913 there were effectively only two accepted positions: either have dikes removed or find areas to flood that would reduce water levels in the Red River. In both cases the underlying logic was to remove both the water and the sediment

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[27] (Response to Circulaire No. 27, Resident Nam Định, 26 August 1905 VNA1/RST 57106, 1895-1896).

[28] Gourou agreed with the commission's findings. He felt that "une digue de terre submergée est une digue détruite": once an earthen dike is submerged it becomes useless (Gourou, 1964, 88, 90 fn 5).

[29] (Tonkin dike commission, Minutes from a meeting held 27 January 1906, VNA1/RST 57106, 1895-1896)

from the Red River and allow the silt-laden water to spread out over more of the delta. By 1914, a third option began appearing: battle flood waters using dikes.

The floods of 1913 brought French hydraulic bureaucrats closer to the conclusion that more investment was needed to reinforce dikes if the flood control issue was ever going to be resolved. Addressing the view that dikes actually increased siltation rates and raised water levels in rivers, Normandin argued in 1914 that it was not silt that was raising water levels but stronger dikes. His statistical surveys showed that floodwaters near Hanoi had steadily been rising according to measurements taken between 1884 and 1913.[30] Normandin argued that a decrease in the number of dike breaks that resulted from marginally stronger dikes, and not an increase in siltation rates, was the reason behind rising water levels in the Red River (Normandin, 1914, 17-21).[31] Despite this "scientific" realisation, Normandin was still not convinced that dikes alone could solve the flood control issue in the Red River delta. To counter the highest conceivable water levels in the Red River, dikes would have to be heightened to at least fourteen metres, which was two to three metres higher than the dikes that already existed in the upper and middle delta. Such an undertaking, according to Normandin, would not be cost effective (Normandin, 1914, 26).

A year after Normandin's account of the impact that stronger dikes were having on water levels in the Red River, fellow engineers within the colonial Department of Public Works began to attack the siltation hypothesis publicly. For example, in a 1915 issue of the *BEI*, an exchange took place between Hoàng Cao

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[30] Although imperial record keepers kept track of the number of dikes breaks and where they occurred, they did not have measurements of water levels or flow rates that would have helped French engineers to determine the overall effectiveness of dikes during the 19th century.

[31] During this time, the Department of Public Works had made some improvements to the upstream dike systems. As a result of the 1913 floods 200 000 piastres were invested in strengthening the weakest dikes. Normandin concluded that this work had seen good results (Normandin, 1914, 26). Despite these improvements, until 1917, most dike reinforcement and repair work was the responsibility of riverain villages. Before 1924, the Department of Public Works did not record village contributions to dike repairs. Therefore, calculating the colonial state's investment in dikes before 1917 was impossible (Pouyanne, 1931, 27-28). See Table 4.1 for investment figures between 1917 and 1929.

Khái, the former Viceroy (*Kinh lược*) of Tonkin, and the principal engineer and head of the Hydraulic Service in Tonkin, Rouen. This article juxtaposes what Rouen claimed was the historically determined Vietnamese position and the scientific French approach to flood control. Rouen began the exchange by outlining the obstacles hydraulic bureaucrats faced in reaching scientific solutions to the flood control issue. They lacked documents that could describe for them precisely how dikes had been constructed in the past. Likewise, it was impossible to reach accurate conclusions concerning the various geographical transformations that had taken place in the delta during the previous 700 years. Without this information, the best the French could do was to come up with *hypothèses* (Rouen, 1915, 8, 11).

Rouen noted that as dikes forced rivers into one main channel, wide as it might be, the smaller channels, ponds and tiny lakes sitting between the two dikes, which would have normally acted as reservoirs, slowly silted up, forcing the river to flow in an ever-narrowing channel. Eventually, diked rivers would burst their banks, leading to calls for higher dikes (Rouen, 1915, 11). Similarily, Hoàng Cao Khái's views followed closely those of his predecessor Nguyễn Văn Giai, who had advised Emperor Tư Đức to remove dikes. Hoàng Cao Khái stuck closely to the "siltation hypothesis" by arguing that as the sedimentation of the river bed led to dikes needing to be built higher and stronger, the river bed would eventually be higher than the surrounding plains (Hoàng Cao Khái, 1915, 2). Hoàng Cao Khái's solution was to remove dikes gradually, beginning with those in higher regions while maintaining those in lower areas. A combination of low dikes and sluice gates would allow sediment-laden water onto the fields and, within thirty years, according to his estimations, could be removed without any trouble (Hoàng Cao Khái, 1915, 4,5).

The difference between French and Vietnamese officials was, in reality, methodological. Rouen attacked Hoàng Cao Khái and other Vietnamese thinkers for being awed by nature and unable, either technically or psychologically, to deal with the hydraulic problems that they faced in the Red River delta. During the 19th century, the Vietnamese, Rouen argued, lacked the requisite technical knowledge to

build dikes high enough to control what were, in fact, normal flood levels. Rouen asked: "How could it have been possible for them to have known, when even today in Europe specialist engineers are often uncertain" about these matters (Rouen, 1915, 11)?[32] Lacking a scientific methodology, Rouen continued, the Vietnamese depended on eyeballing things. It was impossible for them to measure the flow rates during large floods; and, Rouen continued, once the dike system was in place, how could they have possibly measured the volume of water that flowed through the various breaks in the dikes? He then disingenuously remarked that "if they had known, it is probable that they would have been frightened by the reality of it and would not have been able to construct the necessary dikes" (Rouen, 1915, 11).

Hoàng Cao Khái's argument was built on a shaky foundation. In accordance with other Vietnamese theories that attempted to explain the increasing frequency and severity of floods in the 19th century, Hoàng Cao Khái centred his argument on the creation of the Kim Sơn and Tiền Hải districts in the late 1820s. He believed that the creation of these two districts reflected a general increase in siltation rates throughout the delta, which, in turn, caused an increase in upstream water levels as discharge rates dropped. However, he neglected to consider that although rates of land reclamation were quite high in Kim Sơn, they were much lower in Tiền Hải. In fact, in many areas of the delta there were cases where land was reclaimed and then taken back by the sea (Gourou, 1964, 39-40, 213). Rouen argued that in fact the delta was not advancing at a faster rate, but that population densities were forcing lowland areas to be diked in order to accommodate expanding populations.

> For these reasons, it is more than probable that the bottom of the Red River was not heightening rapidly, although many people in Tonkin are convinced of this. This increase is not apparent and if it does exist, it is so minimal and so slow that it would be absolutely impossible to determine what effect it has (Rouen, 1915, 12).

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[32] There was no corps of hydraulic engineers within the Nguyễn court. Dikes were constructed and maintained based on designs either drawn by literati or borrowed from other countries (Gourou, 1964, 85).

The real problem, according to Rouen, was that the general height of dikes in the Red River delta continued to be at least two metres too low. This, Rouen explained, is why dikes have had to be heightened little by little, since they had never been built to a sufficient height. Viceroy Khái's conclusion, that the dikes in the Red River delta were too low by only one metre, according to Rouen, proved that the Vietnamese could only be influenced by what was in front of them and lacked foresight (Rouen, 1915, 14).

Abandoning Vĩnh Yên and (re)diking the delta

Normandin's conclusions concerning the influence dikes were having on water levels along the Red River in addition to peasant dissatisfaction with the Vĩnh Yên floodgates were two important factors in nudging the colonial administration toward a flood control program based on dikes. Financial constraints, however, kept the administration from moving forward with a plan to rely solely on dikes to solve the flood control question in Tonkin. It was the job of the Consultative Commission on Hydraulic Agriculture, which was created in 1915 as a forum to discuss matters concerning hydraulic agriculture, and, in particular, ways to guard against flooding, to consider alternatives to the floodgates at Vĩnh Yên. The colonial administration had become so desperate to find a new overflow reservoir that the Commission, without first consulting the provincial French Resident, decided Sơn Tây would be the next candidate. The Resident was informed of the decision, by chance, through a newspaper article.[33]

Dikes, at the time, were still secondary to floodgates in the hierarchy of flood control infrastructure. According to frustrated colonial officials, overflow reservoirs would prove highly effective if only peasants in Vĩnh Yên would act on the warnings that were issued by the Department of Public Works to abandon their property once the floodgates had been opened. Instead, the French were realising

[33] (Minutes from Consultative Commission on Hydraulic Agriculture meeting 6, 7 June 1916, VNA1/RST 20551, 1915-1916).

that Vietnamese peasants "would only venture away from their residences when it was absolutely necessary". This was the case during the delta-wide floods in 1911, 1913 and 1915 when villagers left their houses at the last possible moment. They preferred waiting out the floods on sections of roofs that remained above water, in trees or stands of bamboo, rather than moving immediately to the closest point of refuge.[34]

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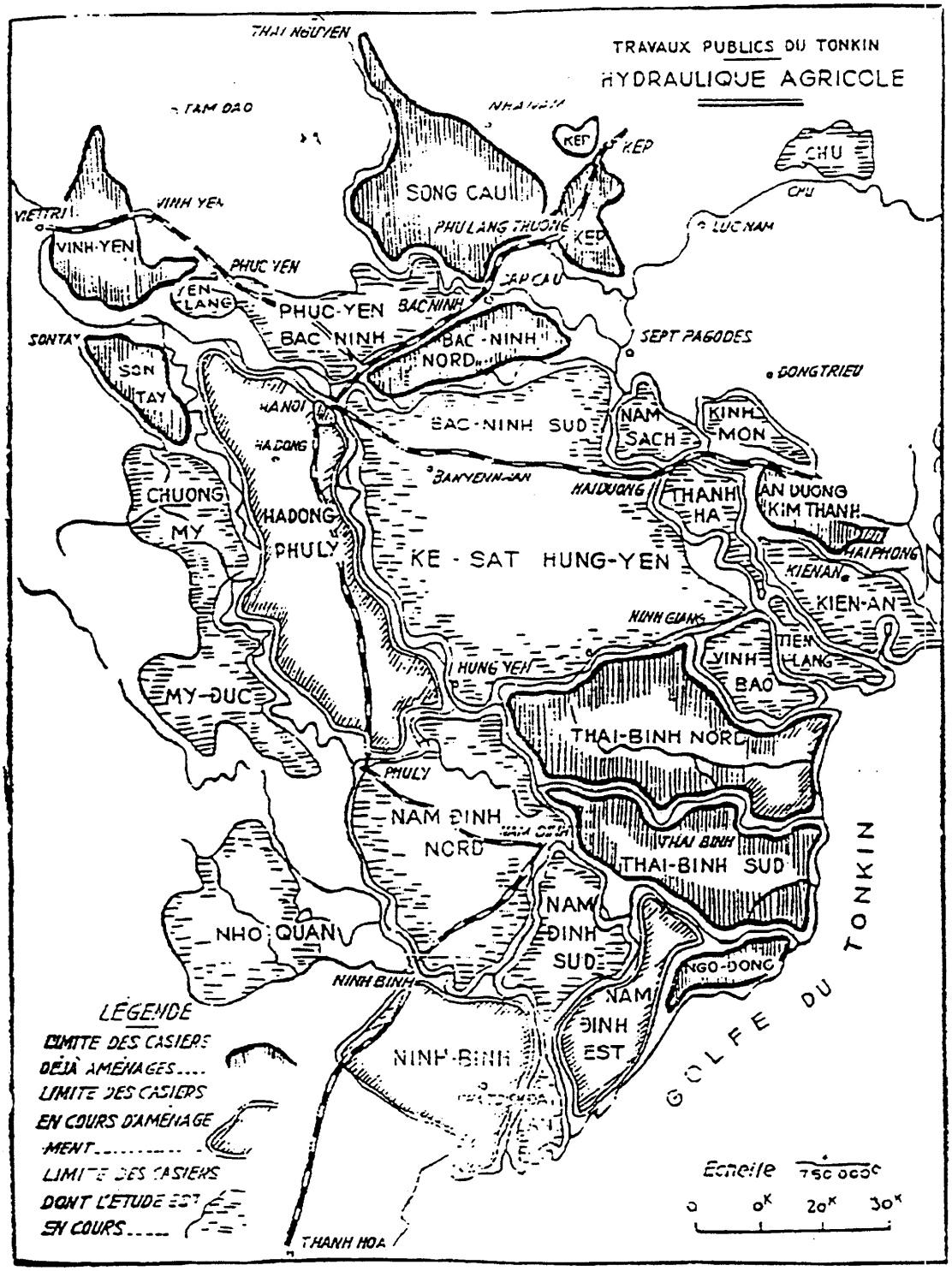
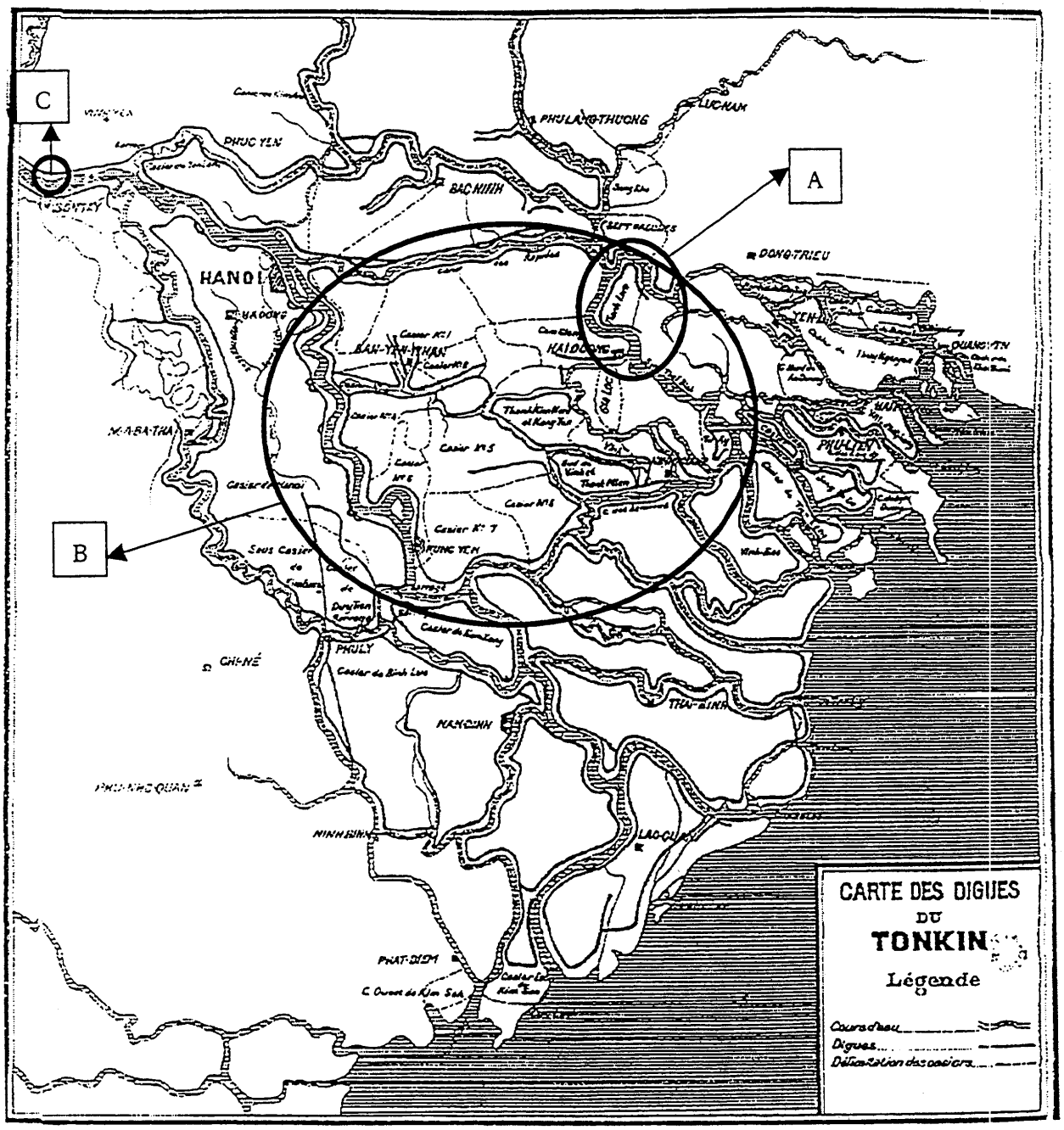
[34] *Ibid.*

Figure 4.3 Map of polders in Tonkin



Source: (X, 1943).

Figure 4.4 Map of major river dikes in Tonkin (c. 1918)



Source: (Constantin, 1918).

Adding to the inherent difficulties that accompanied man-made floods in Vĩnh Yên were poor design features. Because the floodgates were too light, there was concern that once opened they would be washed away, causing a rupture in the dike and uncontrollable flooding. Even if the floodgates held, it was impossible to close them until the level of the river fell below the base of the floodgate (Normandin, 1925, 226). In order to improve the floodgates at Vĩnh Yên, a proposal was made in 1916 to construct a set of concrete culverts that would lead water directly into the Cà Lồ River.[35] Another proposal was made in 1919 to construct a dam with manoeuvrable gates, replacing the floodgates that had been in place since 1896. None of these improvements, however, were ever fully implemented (Normandin, 1914, 31; Normandin, 1925, 227). One reason for this was the reportedly high cost per cubic metre of water drained. However, there was a second more significant reason why efforts to improve the overflow system were discontinued.

So serious was the threat of peasant unrest in Vĩnh Yên that it had become politically untenable to continue operating the overflow reservoir.

> Confronted with protests by an increasing number of peasants in Vĩnh Yên, opposition that was threatening to take on even more violent forms, the administration of the Protectorate of Tonkin had to reject completely any further use of the overflow reservoir after 1918 (Pouyanne, 1931, 22).

As I noted earlier in this chapter, Vĩnh Yên, as late as the 1890s, had been a frontier area prone to banditry and lawlessness. The Thái Nguyên prison uprising in 1917, furthermore, had proven that anti-colonial sentiment could transform itself into broad-based political rebellion under the right conditions (Zinoman, 2000, 57-59, 75-85). Considering peasants' negative response to the use of the floodgates in the past, colonial authorities believed that there was a risk of more co-ordinated protests if the floodgates were to be used in the present atmosphere. The decision to scrap the overflow scheme threw flood control policy into a state of flux.

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[35] (Note to cabinet, 11 June 1916, VNA1/RST 20551, 1915-1916). Concrete culverts were constructed in 1917, which were designed to move water directly from the Red River into the Cà Lồ River, but

Although there was by 1918 the evidence presented by Normandin in 1914, which engineers in the Department of Public Works had accepted, that better river dikes were causing water levels to rise, the colonial administration was not yet willing to take the financial or technical risks involved in depending on dikes alone.

Considering the pride of place that the Vĩnh Yên overflow reservoir had maintained within the pantheon of colonial flood control options, fear among many colonial bureaucrats concerning the broader political implications of increasingly violent peasant protests must have been considerable. Consequently, more politically benign methods of reducing water levels in the Red River were sought out. Attention shifted toward studying ways of using the Đuống and Đáy rivers to channel water out of the Red River basin. At around the same time, in 1917, the Protectorate implemented its first delta-wide dike reinforcement project. This work continued until 1923. Interest in continuing the dike building program was increased when no dike breaks were recorded along the Red River during the 1923 floods. It was the first time in French-ruled Tonkin that the dikes had held under such circumstances (Normandin, 1925, 236).

The success of the 1917 dike reinforcement program led people to believe that dikes alone could solve the flood control problem in Tonkin. Further investments designed to strengthen and construct new dikes were made in 1924, with the 1926 dike building program lasting until 1930. In fact, almost half -- twenty-four million cubic metres -- of the total amount of earth used to reinforce dikes -- fifty million cubic metres -- from 1885 to 1930, was moved during the period 1927-30. A further five million cubic metres was moved between 1930 and 1933.[36] By the time the massive flood waters of 1937 appeared, the Red River delta had been undergoing a dike (re)construction campaign, one with no historical precedent, for more than ten years. Between 1927 and 1935, not a single dike break was recorded, never before had flood control measures in the Red River delta

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subsequent floods destroyed them in 1918 before they could be used (Vesin, 1992, 77).

[36] 1885-1915 -- twelve million cubic metres; 1915-26 -- sixteen cubic metres (Pouyanne, 1931, 26).

proved to be so effective (Gourou, 1964, 92). The colonial authorities brought in steamrollers, which allowed the ground to be compacted to a degree that had never before been possible.[37] New dike surveillance regulations were put in place that also decreased the chances of accidental dike breaks. As the French engineers were fond of reminding people, no flood control measures are perfect.[38] The 1937 flood again brought this fact to light.

> It must be understood that this effective remedy is not an absolutely certain remedy: dike breaks are still a possibility. But they have become less probable.... In Indochina the risk will have to be accepted. This is the case for any country that relies on dikes when (and this is the case for Indochina) it is no longer possible to imagine anything other than dikes as a means of completely resolving the flood control issue (Simonet, 1937, 7).

Conclusion

French science was cautious. Without empirical evidence that could counter the siltation hypothesis, colonial engineers were unwilling to make rash decisions concerning the exclusive use of dikes to control floods in the Tonkin delta. With a scientific alternative to the "siltation hypothesis" remaining elusive until 1914, French engineers became frustrated. Their aggravation stemmed from their inability to determine a highly effective yet economically sustainable flood control alternative to dikes. The Vĩnh Yên overflow reservoir could not fulfil this role and, if it were abandoned, engineers feared that annual floods would have to become a

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[37] They began with three steamrollers in 1924, which increased to fifty-three by 1931. With heavy machinery the French were able to work on the dikes year round (Pouyanne, 1931,25).

[38] French engineers had cultivated a fatalistic attitude to preventing natural disasters. This same sentiment was expressed by Normandin in 1914 when he wrote:

> People must realise that floods will happen. Do people build dikes against ocean tides or to divert lava flows -- why should attempts be made to struggle against water when its destructive power and sheer mass surpass our limited capabilities to control it (Normandin, 1914, 40-41)?

The irony of this statement is apparent by the mid-1920s when Normandin had become one of the strongest proponents of dike construction. Normandin's despondent tone was echoed by Peytavin, another engineer with Public Works, who wrote in 1915 that the overflow channels in Vĩnh Yên, even if they had worked properly, could not have saved other parts of the delta from the impact of the 1915 flood. He concluded by writing, "The floods were thus inevitable no matter what we had done and we have to focus on limiting the damage caused by the 1915 flood (Peytavin, 1916, 365)."

fact of life. Their concerns were finally assuaged when Normandin provided a convincing justification for (re)constructing and heightening the dike system.

In Chapters 5 and 6, I leave behind the issue of flood control and focus on irrigation and its relationship to *mise-en-valeur*. I consider the implications of the French authorities' decision to concentrate their large-scale irrigation and drainage projects in the midlands of the Red River delta while neglecting the central delta. As was the case with colonial reluctance to invest in (re)constructing dikes, one of the most salient reasons was the financial constraints under which hydraulic planners had to work. Colonial authorities, in the late 1890s, believed that irrigation and drainage could be provided for a profit. When commercial water sales proved to be unprofitable, the colonial authorities found themselves faced with no choice but to use tax receipts or loans to finance large-scale irrigation projects. In Chapter 5, I examine the failure of Bédat's irrigation venture in Hà Đông province from the perspective that peasants did not immediately share the colonial objective of increasing the area of double-cropped land. As such, it was apparent to colonial authorities that irrigation might not be profitable and, consequently, irrigating the central delta would be more costly than expected.

Tables and figures

Table 4.1 Yearly investment in dike construction and strengthening 1917-29

Year	Investment (piastres)
1917	22 000
1918	174 000
1919	133 000
1920	407 000
1921	278 000
1922	119 000
1923	155 000
1924	384 000
1925	552 000
1926	1 101 000
1927	3 103 000
1928	2 293 000
1929	1 820 000

Source: (Pouyanne, 1931, 28)

Chapter 5 Modern irrigation confronts local knowledge: The saliency of the hydraulic bargain

Introduction

Hydraulic development during the Nguyễn dynasty involved combining simple gravity-fed irrigation techniques with flood control infrastructure, in order to increase cultivated land area and establish a balance between food production and population growth. When the French arrived in Tonkin they shared the Nguyễn dynasty's approach to controlling nature but added a "productivist" component. Large-scale hydraulic "tools" (*outils*) were the basis on which the French would "develop" (*mise en valeur*) hydraulic agriculture by increasing paddy productivity. The tension between productivism and local knowledge concerning cropping patterns and traditional irrigation practices helped stymie efforts in the early 20th century to develop large-scale irrigation infrastructure. In particular, I will examine, in this chapter, how a failure to recognise the specific hydrological conditions at Bazan, in addition to the importance of the peasantry's traditional subsistence cropping patterns, led Bédat to abandon his water concession.

This chapter is designed to contrast the productivist qualities that informed the colonial regime's modernist approach to economic development with the subsistence-oriented production patterns of peasants in the Red River delta. When these two worldviews came in contact around the issue of large-scale irrigation, as they did when Bédat attempted to sell irrigation in Hà Đông province, the absence of a hydraulic bargain was apparent. Once the potential economic benefits of modern irrigation were made clear to peasants, establishing a hydraulic bargain and moving forward with large-scale irrigation and drainage systems in the central delta became a possibility. This was a moot point, however, as far as the colonial regime was concerned, as it was never financially or politically committed to irrigating and draining the central delta, and, thus, inherently unwilling to pursue a highly integrated hydraulic bargain. When the benefits of large-scale irrigation and

drainage are not apparent to peasants, are too costly or are non-existent, the chances of establishing a stable hydraulic bargain diminish greatly. This was true in the 19th century when Minh Mệnh attempted to dredge the Thiên Đức canal, and was obvious once again in the 1970s as the VWP attempted to re-establish the hydraulic bargain that had atrophied during the war.

The colonial regime promoted irrigated agriculture within the context of an economic development framework that assumed peasants would naturally accept productivist attitudes toward double-cropped paddy. One theme of this chapter, as well as Chapter 6, is the process by which peasants make the transition from subsistence to multiple-crop paddy production. This chapter examines how Bédat attempted to sell irrigation in a region where drainage was in greater demand. Bédat's commercial failure highlights how, without a hydraulic bargain between water users and the state, selling irrigation in the Red River delta will prove to be difficult. In other words, unless peasants are willing to accept a productivist approach to paddy production, and the state is committed to financing headworks, establishing a hydraulic bargain is a difficult task. Generating demand for irrigation, during the colonial and post-colonial periods, has involved incorporating local knowledge into infrastructure projects and building an understanding among peasants that large-scale irrigation and drainage can increase incomes.

In the first section of this chapter, I examine the role that large-scale irrigation infrastructure was meant to play in the larger colonial "economic development" program. This program was geared toward increasing paddy production, in large part to facilitate greater rice exports, a fact which led colonial bureaucrats to stress rice production over other food crops and encourage peasants to double crop paddy whenever possible. In the second section, I consider the importance of double-cropped paddy to French development efforts in relation to traditional patterns of inter-cropping paddy (*lúa*) and secondary crops (*màu*). In the first decade of the 20th century colonial functionaries simply assumed that peasants would welcome canal irrigation and immediately begin double-cropping paddy. Eventually, those relatively few peasants who cultivated canal-irrigated land

during the colonial period did begin producing two crops of paddy. The time lag, however, between resistance and acceptance, as well as the relative abundance of water, were important factors that led Bédat, a French entrepreneur who was contracted in 1900 to irrigate much of the central Red River delta, to abandon his water concession after only two years. In the third section, I provide examples of how colonial officials attempted to implement hydraulic projects without considering local conditions. My goal is to highlight some of the reasons why Bédat's attempt to sell water at Bazan failed so convincingly, and the underlying importance of hydraulic bargaining when implementing large-scale projects.

Development and hydraulic agriculture

At times, the colonial regime focussed its efforts on draining waterlogged land in order to eliminate mosquito breeding grounds and help control malaria.[1] Irrigating areas of midland provinces such as Vĩnh Yên, Thái Nguyên and Bắc Giang had the political goal of depriving bandit leaders, such as Đề Thám, of the vagrants that supported his insurgency.[2] But above all else, irrigation and drainage were proposed as ways of mitigating the negative effects of droughts and floods on agricultural production. Improving agricultural productivity would help establish food security and support the larger industrial and developmental goals that the colonial regime began to express for Tonkin at the beginning of the 20th century. These two complementary objectives can be conceptualised as the "protective" and "productive" aspects, respectively, of hydraulics in Tonkin. It is the symbiosis between drought, famine, overpopulation, food security and economic

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[1] Malaria was a serious concern for the colonial regime and apart from quinine there were very few ways to combat the disease. Plantations suffered low levels of labour productivity when workers came down with malaria. Drainage was seen as an effective complement to prophylactic measures (See Morin & Robin, 1933).

[2] Such efforts resonate with Nguyễn Công Trứ's 19th century land reclamation projects designed partly to thwart the Phan Bà Vành rebellion. One author refers to French gravity-fed irrigation systems in the midlands of Tonkin as *l'eau colonisatrice*, "the colonising waters". They encouraged migration to areas that had once been controlled by bandit lords such as Đề Thám or those who were at the centre of uprisings such as the 1917 rebellion in Thái Nguyên (Le Grauclaude, 1933, 43-44).

development that defined the political economic history of hydraulic agriculture as it was played out during the pre-colonial, colonial and communist periods.

Large-scale irrigation was integral to the colonial administration's vision of *mise en valeur*. This term is often translated as *development* or *economic development*, and refers to how economic value can be added to something. For the French statistician, development was measured in very stark economic terms: annual increases in the real value of economic production (Leurence, 1925, 127). The key to development in Tonkin was increasing the productivity of wet-rice agriculture at a high enough rate to offset population growth and allow for exports. At the end of the first decade of the twentieth century, the Director of the French Civil Service in Indochina wrote with reference to rice:

> It seems to be the only asset upon which rapid development can be based at this time and it is to this end that the general budget must wait for additional resources which it requires if it is to confront its increasing expenses (Daroussin, 1909, XII).

By 1909, with capital transfers from France in decline, rice was becoming a strategically vital commodity in Indochina. It was the staple foodstuff of the Indochinese peasant, it was the colonies' primary export and it supported the largely Chinese-owned milling industry. The financial prosperity of Indochina was "intimately linked" to rice production (Daroussin, 1909, II).[3]

In order to achieve the broader industrialisation goals that were at the heart of *mise en valeur* the French had to expand "hydraulic agriculture" (*hydraulique agricole*). There were four principal goals of hydraulic agriculture:

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[3] The integration of Southeast Asian rice into the international grain trade began in the late 18th century. It resulted from a number of factors having to do with the American Revolution and the Napoleonic wars which completely cut off American rice, produced in South Carolina and Georgia, from European markets. Under the circumstances alternative import markets were required (Coclanis, 1993, 1057, 1059). Rice exporting industries in Indochina, Siam and Burma all began around the same time with French records of rice exports from Cochinchina dating from 1860 (Bulletin Economique de l'Indochine, 1928; Latham & Neal, 1983, 262). Indochinese exports were of low quality compared to Burma and tended to supply markets such as the Philippines and countries further east such as Japan (Latham & Neal, 1983, 232). I have found statistics for rice exports from Tonkin as early as 1895 (Bulletin Economique de l'Indochine, 1900). Tonkinese exports peaked in 1908 at 258 000 tonnes and by 1932 had declined to 48 721 tonnes (Brenier, 1917, 48; Bulletin Economique de l'Indochine, 1933).

1. Drain areas that are flooded by rain, which is kept in by dikes, or when high water levels make it impossible for water to escape through sluice gates.
2. Protection against salt water intrusion.
3. Protection and drainage of land flooded by creeks that are not diked.
4. Irrigate polders in the lower delta using tidal irrigation methods (Langon, 1913, 44).

For engineers in the Department of Public Works, these four principles were embedded in a modernist vision that was translated into large-scale irrigation schemes coupled with rural electrification, co-operative production methods and scientifically perfected inputs such as fast growing rice and chemical fertilisers.[4] Implementing the colonial vision of hydraulic agriculture would require fundamental changes to the rural economy: shifts in production techniques, cropping patterns and labour allocation. In combination, *mise en valeur* and *hydraulique agricole* were a revolutionary portrayal of the political and economic future of Tonkinese agriculture. According to colonial authorities, improved productivity would provide an agricultural surplus that could then lead to industrialisation. Improved yields, and the income this would generate, would turn peasants into capitalist farmers capable of absorbing both metropolitan and indigenous industrial production (Murray, 1980, 469).

In the late 19th century, Governor General Paul Doumer (1897-1902) concluded that Indochina lacked the necessary infrastructure to "develop". Vietnamese intellectuals were, at the same time, also expressing this view. An 1897 report by the Vietnamese Viceroy (*Kinh lược*) in Tonkin argued that the most important issue for the administration was not banditry but agriculture. By improving basic hydraulic infrastructure and thus improving agricultural productivity, he argued, the colonial administration would not only be able to collect more taxes but good crop yields would show off the prosperity of the

[4] The French were not the only European colonial power in Asia that expressed a belief in the modernising power of water control. "Imperial science" or the "science of empire" are terms used by one author to define the political system that existed in colonial India. Such a system linked the British and indigenous elites with the local population using the promise of "improved living conditions that the control of nature offered" (Gilmartin, 1994, 1128).

country.[5] French engineers and bureaucrats categorised the economic benefits of infrastructure as either direct or indirect. Direct benefits were those investments that led to an immediate economic return, of which hydraulic infrastructure was the only example in French Indochina. Furthermore, increased yields resulting from improved hydraulic infrastructure were intended to garner indirect economic benefits including increased tax and export revenues (Bernard, 1937a, 402; Pouyanne, 1925, 13-14). Roads, canals, railways and ports, could only provide indirect economic benefits (Pouyanne, 1925, 514).

Considering the direct returns that investments in hydraulic agriculture could bring to the colonial economy, Paul Bernard lamented the fact that public funding for railways in Indochina between 1900-37 was double the figure for hydraulic agriculture (Bernard, 1937a, 396) (See Figure 5.2). Bernard believed that many of the problems of overpopulation and economic growth that he discusses in *Nouveau aspects du problème économique Indochinois*, could have been avoided if more public investments had been directed at hydraulic agriculture. He felt that hydraulic agriculture had been neglected in favour of more *political* or *touristic* investments in roads and railways. As a truly *economic* investment, hydraulic infrastructure, he argued, ought to surpass all other forms of public infrastructure spending (Bernard, 1937b, 397).

In support of his view, Bernard explained that investments in hydraulic agriculture by 1937 had been able to increase paddy yields enough to keep up with population growth but had been incapable of actually increasing wealth in rural areas (Bernard, 1937a, 403-413; Bernard, 1937b, 416). At the time, overpopulation was forcing the colonial administration to make difficult choices concerning economic development and public expenditure in Tonkin. Although the colonial

[5] The Viceroy developed his opinions after being struck by the sight of 500-700 *mẫu* of agricultural land around Hanoi that was annually left fallow because creeks had been allowed to silt up. Without these waterways, during periods of drought there was no way to transfer water to the fields and during periods of heavy rainfall, with no means of drainage, fields would become flooded. If peasants were to be saved from famine it was the state's responsibility to reopen the waterways and

regime realised that industrial growth would increase urbanisation rates and help to release some of the economic and political pressure that had been building in the countryside, colonial authorities were still faced with a dilemma.

> Briefly, the development of an indigenous industrial proletariat, they say, would result in undermining social order and make it more difficult to maintain French sovereignty in Indochina (Khérian, 1938, 657).

Faced with a choice between a "famished" countryside or factories full of workers, the French sided with the former (Khérian, 1938, 658). This attitude toward development interfered with the establishment of a stable hydraulic bargain. Because hydraulic bargains are founded on developmental ideologies, they have to be supported by a state that implements large-scale irrigation and drainage projects within a policy framework designed to improve peasant living standards.

Double cropping, the Bédat affair and local knowledge

Double-cropped paddy production based on large-scale canal irrigation was the key to French development policy. However, as Virginia Thompson wrote in 1937: "It is a mistake to think that irrigation could or should assure a double rice crop" (Thompson, 1937, 218). Many colonial officials assumed that once provided with irrigation, peasants would gladly embrace double cropping. The problem, however, was that double cropping meant accepting the productivist mentality of French planners and engineers. At the beginning of the 20th Century, instead of depending on two annual paddy crops, peasants in northern Vietnam would reduce risk by alternating between cultivating paddy and secondary crops depending on the hydrological characteristics of the land. [6]

Declining dependence on paddy production in the Red River delta was facilitated by the introduction of New World food crops such as maize and potatoes

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construct canal networks. (Letter from Viceroy of Tonkin to the Director of Civil Affairs, 9 March 1897, VNA1/RST 72837, 1897).

[6] Spring paddy was normally cultivated on lower land that had access to water during the dry winter season. Conversely, higher land tended to support Autumn paddy as it would have been dependent on summer rains and less likely to become waterlogged, as was often the case for lower land.

from China. These crops were first introduced into China during the 17th and 18th centuries (Li, 1982, 690-692). Maize was originally brought from Spanish colonies in South America via the Philippines to China. It made its way to Vietnam near the end of the 17th century when Trần Thế Vinh, a resident of Sơn Tây province, returned from an ambassadorial mission to China with maize seeds. Remarking on the impact of maize at the time, Trần Thế Vinh wrote, "Thanks to maize, throughout Sơn Tây there is a food that can replace rice" (Đường Hồng Dật, 1994).[7] Crops such as maize, potatoes and beans are much less dependent on water than wet-rice, and they can be cultivated at higher elevations, making them less prone to both flood and drought. As these new, more adaptable crops were introduced, land that had been left fallow because it was too dry could be brought under cultivation.

Despite the influence of New World crops, in pre-colonial Tonkin, paddy was grown whenever it was reasonable to do so.

> In the life of the Tonkinese peasant rice occupies a position of paramount importance. It is the basis for their diet, although peasants are often obliged to their great regret to replace it with potatoes or taro (Gourou, 1964, 394).

The willingness of peasants in the Red River delta to alternate (*xen kẽ*) rice and secondary crop production in order to reduce economic risk was not immediately apparent to some of the high-level colonial bureaucrats within the Department of Public Works. What many French functionaries failed to recognise was that under circumstances where irrigation and drainage were at best rudimentary it made sense to cultivate crops based on the hydrological qualities of the land.

> One of the more serious errors that has been committed in Tonkin has been to consider double-cropped land to be the best land and to tax it as such" (Chassigneux, 1912, 40).

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[7] "*Nhờ đó suốt cả hạt Sơn Tây có thức ăn thay gạo*". In another account of the transfer of New World crops to Vietnam, the Confucian scholar Lê Quý Đôn wrote that with the arrival of maize Sơn Tây province had taken to replacing rice with maize everywhere (Woodside, 1997, 256). According to Alexander Woodside:

> Of the new crops, maize and sweet potatoes had both become crucial by the 1700s in solving the food needs of peasants in the Red River delta and north central Vietnam (Woodside, 1997, 255).

Today, Sơn Tây, which is now part of the larger province of Hà Tây, remains an important corn growing area and is home to the National Maize Institute.

Land that could produce a single crop of rice and a crop of potatoes or maize was often as valuable as land that produced two crops of rice (Bui Quang Chieu, 1906, 833-834). Furthermore, two crops of paddy--without substantial increases in fertiliser use--did not double production.

For example, most colonial-era calculations settled on, at best, a one third increase in rice production, assuming chemical fertilisers are not applied, when moving from single to double-cropped paddy. Secondary crops such as maize would help aerate the soil after an Autumn paddy crop. Where a Spring paddy crop replaces a dry, secondary crop, however, this benefit will be lost and consequently the Autumn crop yield will generally decline. This was the case in Vĩnh Yên province in 1933, where irrigation led to dry crops being abandoned in favour of a Spring paddy crop. In Thương Đạt village, Lập Thạch district, before regular irrigation was available annual paddy production from one Autumn crop was forty-five baskets (a basket was equivalent to approximately twenty kilograms) per *mẫu*. Once the village began cultivating two irrigated paddy crops, the Autumn crop fell to thirty baskets. Added to these thirty baskets were twenty-five to thirty baskets of Spring paddy for a total increase of a mere fifteen baskets of paddy. In Vân Hội village, Tam Dương district, also in Vĩnh Yên province, similar results were recorded in terms of increased paddy production, but by cultivating a Spring paddy crop the village gave up sixty to 100 baskets of taro, sixty to eighty baskets of potatoes and ten baskets of beans. (Gourou, 1964, fn 2, 106).

The Bédat affair

In terms of household calculations, rotating wet rice and secondary crops normally led to higher overall food production. For the colonial authorities, who were concerned primarily with increasing rice exports, a thirty per cent increase in paddy production, brought about by canal irrigation and double cropping, would have

been considered a successful transformation.[8] And peasants who voluntarily cultivated two crops of irrigated paddy in the midlands of Tonkin would have agreed with them. Peasants who were not familiar with irrigated land, however, were not initially inclined to cultivate two crops of paddy. The problem facing Bédat in 1899 was how to go beyond the nexus between irrigated agriculture and traditional cropping patterns.

As a prelude to Bédat's water concession, the Department of Public Works, in 1898, decided that large-scale irrigation and drainage systems were required in order to safeguard the Red River delta from future flood and drought. Engineers within the Department of Public Works at the time felt that the 1895 Dike Commission had been too passive in its approach to hydraulic issues in the Red River delta.

> The Commission's report only addresses measures to be taken in order to avoid accidents resulting from dike breaks. But it does not in any way conceptualise the problem of controlling water in the delta.[9]

The Department's criticisms spawned the Godard Project, which consisted of a dam across the Red River designed to raise water levels nearly four metres and allow for gravity-fed irrigation throughout the delta (Vesin, 1992, 127) (See Figure 5.1). Two additional dams on the Đáy and Cà Lồ rivers were proposed, in combination with a network of canals to criss-cross the delta and provide irrigation throughout the year. Godard's gravity-fed irrigation scheme, however, was short-lived. Studies showed that the subsoil of the central delta was incapable of supporting the various dams that were being considered (Chassigneux, 1912, 55, 56). Overall, authorities concluded that the Red River dam project presented "enormous difficulties and

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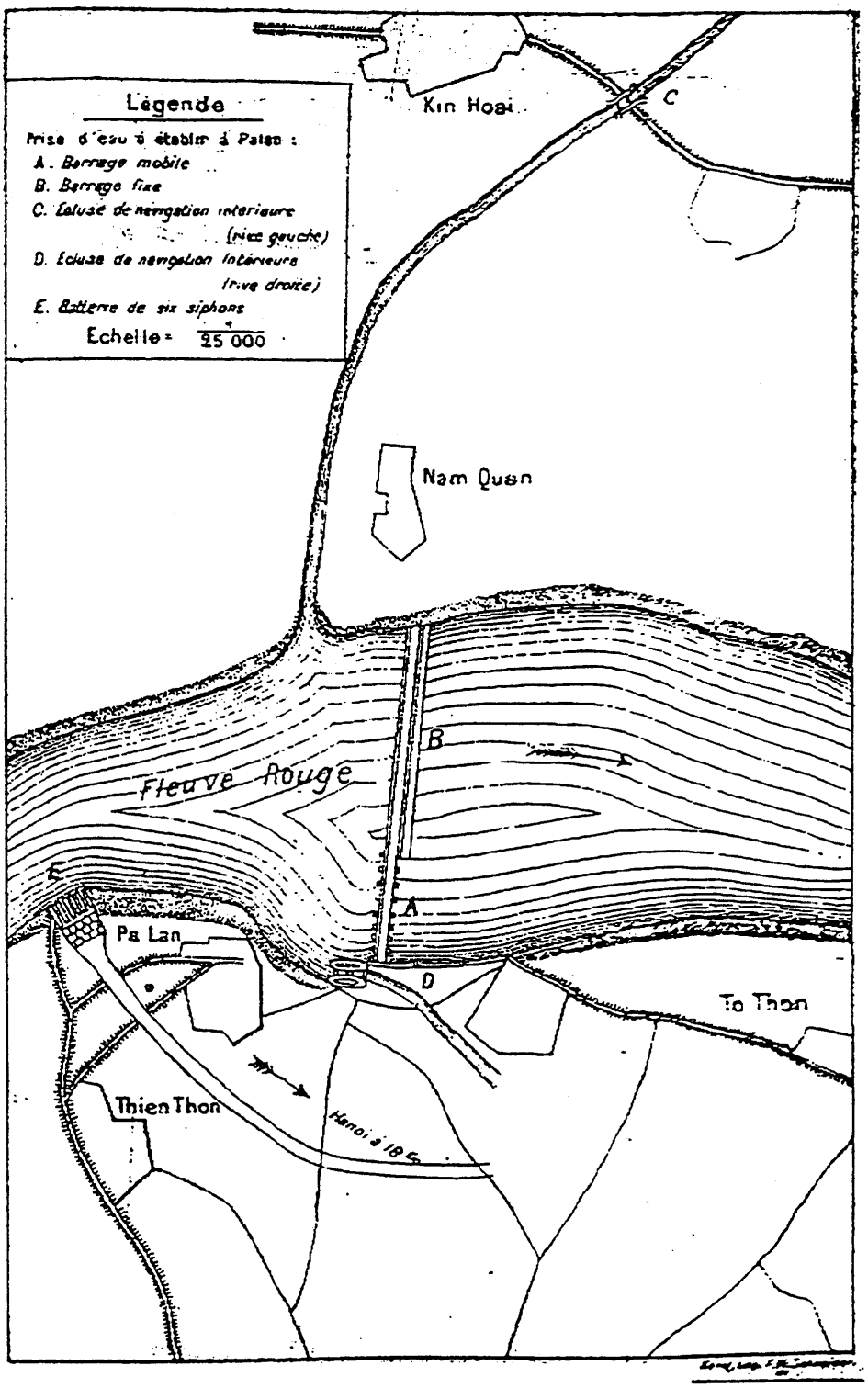
[8] The colonial authorities de-emphasised secondary crop production in favour of paddy, although the importance of secondary crops was asserted in the 1930s when chronic poverty was threatening French political control in Indochina (Robequain, 1944, 238).

[9] Godard, "Analysis and criticism of the report of the dike commission", 10 July 1897, as quoted in (Vesin, 1992, 125).

many hazards" and suffered from the fact that there could be no return on capital investments until the entire project was underway.[10] As an alternative to

[10] (Letter from the Director General of Public Works to the GGI, 28 January 1906, VNA1/RST 80021, 1898-1906).

Figure 5.1 Map of Godard's plan to dam the Red River



Legend:

A -- Movable dam

B -- Fixed dam

C -- Navigation lock (Left bank)

D -- Navigation lock (Right bank)

E -- Six siphons

Source: (Giret, 1900, 471)

large-scale gravity irrigation, Godard wanted to construct pumping stations at several points along the Red River; this could be done in sections, which would reduce the financial risks involved.

The then head of Public Works, Mr. Renaud, accepted neither of Godard's two proposals. Conservative politicians, who were more likely to support railway and port construction, did not support Godard's vision of expensive and technically demanding hydraulic mega-projects (Vesin, 1992, 129). Hydraulic agriculture schemes, according to Renaud, would be implemented using both public and private capital, and on a much smaller scale than Godard had proposed. It was under these circumstances that Governor General Doumer entered into a contract on 9 March 1900 with the obscure French entrepreneur Bédat and his newly incorporated firm, *Société Général d'irrigation pour le développement de l'agriculture en Indo-Chine.* The first phase of the project required Bédat to construct a pumping station and sluice gate in Hà Đông province, and, in Phase II, to irrigate Hanoi, Bắc Ninh and Hưng Yên provinces using pumps. The first phase followed on from an earlier publicly financed project, which began in 1898, to build an irrigation canal at Bazan, an area located on the southern bank of the Red River near the mouth of the Đáy River in Hà Đông province.[11] Along with Bédat's pumping station, the project required the colony to construct a series of canals capable of irrigating a total area of 3000 hectares. Since this was a commercial venture, the Department of Public Works authorised Bédat to charge a water fee of no more than forty kilograms of paddy per *mẫu*, or, according to colonial officials, about one third of an average crop.[12]

Between 1900 and 1901, using a pump that rested on a barge in the Red River, Bédat irrigated Bazan. By December 1900, however, according to one witness,

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[11] According to Gourou, Bazan was in fact the French equivalent of Bá Dương in Thượng Trì commune, Hoài Đức district, Hà Đông province (Gourou, 1964, 106). However, on a recent visit to the area local residents referred to the French-built sluice gate and canal as Bá Giang. Presently, what remains of the canal lies in Hồng Hà commune, Đan Phượng district, Hà Tây province. It is worth noting that the French-built canal and sluice gate have been abandoned and replaced by a new, larger hydraulic works that has been constructed only 200 metres from the old one.

there was little hope for the commercial success of the venture. A French administrator in the town of Can Do concluded that "the Bazan company is moving toward a failure which, there is no doubt, will oblige the Protectorate to come to Bédat's assistance."[13] The French official was alluding to the fact that there was little intrinsic demand among peasants for irrigation and, as such, the viability of Bédat's project was seriously jeopardised. In order to combat this, Bédat employed district mandarins to force villagers to sign contracts with his firm. Such measures resulted in protests against Bédat in the villages of Thương Hội and Vinh Kỳ. Upon investigation, the Department of Public Works concluded that the inhabitants were justified in their actions, since canal irrigation at Bazan was "absolutely optional".[14]

The details of the incident, described by the French Administrator in Can Đo, Mr. de la Noi, contradicted the Department's report. De la Noi argued that peasants were in fact entering into agreements willingly. Concerning Vinh Kỳ, de la Noi wrote that 180 *mẫu* were irrigated, but that peasants were refusing to pay for any more than 100 *mẫu*. Bédat was trying to collect 500 piastres for the water used but de la Noi had negotiated a reduction of 400 piastres.[15] The Resident Superior in Tonkin eventually ordered villagers in Vinh Kỳ to pay Bédat the reduced amount of 100 piastres. In their defence, the village notables argued that peasants had not, in fact, irrigated their land using Bédat's "fountain" but instead during the last big rain had "kept water" (*giữ nước*), using a dike to obstruct runoff and create an irrigation reservoir. Villagers felt they were victims of a cruel injustice and like the year before were being forced to pay for water they had not used.[16]

Under such circumstances, it became almost impossible for Bédat to realise a return on his investment. With neither the commercial demand nor the ability to obligate peasants to enter into long-term purchase agreements Bédat was forced to

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[12] (Letter from the Director General of Public Works to the GGI, VNA1/RST 80021, 1898-1906).

[13] (Letter from the Administrator, French Resident in Can Đo to the RST, 29 December 1900, VNA1/RST 72838, 1901).

[14] (Report by the Departmental Manager, Department of Public Works, 8 February 1901, VNA1/RST 72838, 1901).

[15] (Letter from the Administrator in Can Đo to the RST, 5 February 1901, VNA1/RST 72838, 1901).

renegotiate the contract he had signed with the Governor General. Early in 1901, Bédat requested that, in addition to providing winter irrigation for the Spring crop, the Governor General allow him to fill the canals during the summer months to deal with the unlikely event of a rainy season drought. Summer irrigation for the Autumn crop would be provided at no cost but only under the proviso that summer users pay for winter irrigation. Because summer irrigation was not included in the original agreement the Governor General refused to allow it.[17] By the end of 1901 Bédat was desperate to have the colony take on the financial burden of managing both Bazan and Phase II. In a radical reversal from his first attempt to renegotiate the 1900 contract, Bédat argued that the state should take over responsibility for running large-scale irrigation systems. Under this new regime, peasants in irrigated areas would have free access to irrigation, during both the Spring and Autumn crops. Bédat's firm would renounce its right to exploit irrigation works in Tonkin and would restrict itself to installing, managing and maintaining the various pumping stations that had yet to be constructed. Bédat's company would provide water free to the state in return for an annual payment covering the management costs and the depreciation on fixed capital investments.[18] As with Bédat's first attempt, the Governor General refused to renegotiate the original contract.

Following the first two failed attempts, Bédat made a further offer, in January 1902, to manage the Bazan system if the colony agreed to construct the pumping station. One year later, in February 1903, Bédat, using the Bank of Indochina as an intermediary, retreated to his first counter-proposal: he would construct and manage the pumping station for an annual fee. The Governor General, in a letter dated 18 April 1903, refused to agree to any alterations to the contract signed in March 1900 and demanded to know if Bédat was prepared to move forward with work on the canal system for the northern portion of the Hanoi polder. Finally, in early 1904 Bédat agreed to abide by the original contract if the

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[16] (Letter from various village notables in Vinh Kỳ to the RST, 24 January 1901, VNA1/RST 72838, 1901).
[17] (Letter from Director General Public Works to GGI, 28 January 1906, VNA1/RST 80021, 1898-1906).

colony compensated him for his losses at Bazan during the years 1900 and 1901 and reimbursed the administrative costs of incorporating his management company. It is not clear how the Governor General responded to this offer but by 1906 there was still no work being done at either Bazan or in provinces covered by Phase II: Bắc Ninh, Hưng Yên and Hanoi.[19]

By reneging on the initial contract, Bédat put the Protectorate in a difficult position. If the Protectorate would not agree to exploit irrigation networks because selling water was unprofitable, how could it then expect another private firm to agree to take the risk? And yet, if the Protectorate did not step into the breech there was a very real danger that the proposed irrigation systems would never be built. So, in 1906, the Protectorate of Tonkin began preparations to continue work at Bazan and extend irrigation infrastructure into Phase II provinces. The Protectorate's decision to move forward using public funds voided Bédat's water monopoly, which the Governor General had ceded to Bédat in the original 1900 contract.[20] However, from this point forward the Protectorate would have to design its construction and management budgets using only public funds. Bédat's short-lived water monopoly proved to be the last such joint venture between French entrepreneurs and the Governor General or Protectorate.[21]

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[18] *Ibid.*

[19] *Ibid.*

[20] The colonial administration in Tonkin argued that it was not bound by the March 1900 contract since it had been signed by the Governor General and not the Resident Superior in Tonkin.

[21] There were, however, examples of individuals employing pumps for use on their own land. One example of landlord initiative was the request made by Trân Viêt Soan, an absentee landlord with large landholdings in Xuân Lanh District, Vĩnh Yên Province. In 1919 he contacted the provincial Resident in Vĩnh Yên requesting the use of the pump that had been put in place at the Phù Xa experimental station in Hà Đông. The intended beneficiaries were tenants whose land was too high to irrigate without using some type of mechanical lifting mechanism. Since the request was made in September in the middle of the Autumn crop, the landlord assumed that the experimental station would, at the time, have no need for the pump. The Resident in Hà Đông, however, denied the request for two reasons. The first was logistical: due to low water levels in the Phủ Lý canal, the pump would not have fit through the locks. The second hinged on the issue of inter-provincial rivalries. If Vĩnh Yên could borrow the pump this would potentially make other provinces jealous. (Letter from the Resident in Vĩnh Yên to the Resident Superior in Hanoi, 20 September 1919, and Letter from Resident in Hà Đông to the Resident Superior in Hanoi, 25 September 1919, in VNA1/RST 57133, 1906-1919). Due to the relatively high cost of drainage in the Red River delta, examples of private citizens investing in pumps were rare in the first decades of the 20th century

In the aftermath of Bédat's venture, the Protectorate was unsure as to how it would face the challenge of modernising irrigation and drainage systems in the Red River delta. Without the support of the private sector the colonial administration was obligated to finance future projects using either local tax revenues or capital borrowed from the Metropole. The 1906 budget proposal for the Bazan project, compiled by the Director General of the Department of Public Works, Guillemoto, included 1.2 million francs for the construction of the pumping station and a further 1.4 million francs for the construction of the irrigation canals. He estimated that 280 000 francs, to come from local budgetary resources, would be required annually for operation and maintenance.[22] Guillemoto's letter initiated a chain reaction that eventually led the Resident Superior in Tonkin to write to the Governor General complaining that the Protectorate's annual budget could not possibly cover the proposed operation and maintenance costs of 260 000 francs [sic]. The Resident Superior in Tonkin concluded that Tonkin was now burdened with the costs of operating a pump-based irrigation system, thanks to the Governor General's decision not to honour his contractual obligations with Bédat.[23]

Further attempts by the Protectorate of Tonkin to contract private investors to construct and manage irrigation and drainage systems proved unworkable. Bédat had not been alone in signing contracts with the colonial regime to construct irrigation systems and sell water to cover the cost of their investment. In May 1899, the Protectorate of Tonkin contracted Felix Dessolier to provide year-round irrigation to 7000 hectares in Sơn Tây. The plan called for a floating pump to service 3000 hectares at Hoa Toc, and a reservoir at Vo Khuy to irrigate another 4000 hectares. Dessolier's successor, Eugène Leroy, established the *Société d'irrigation au Tonkin et en Annam*, which after two years had done little to meet

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although there were examples in the Mekong delta (Normandin, 1920, 417-418). Nevertheless, by the late 1920s large landowners were installing pumping stations in the Red River delta in order to serve several hundred hectares. Rarely were these stations ever constructed by entrepreneurs or irrigation co-operatives, and the economic crisis in the early 1930s quickly brought the construction of private pumping stations to an end (Dumont, 1935, 85).

[22] (Letter from Director General Public Works to GGI, 28 January 1906, VNA1/RST 80021, 1898-1906).

its contractual obligations. Another product of Doumer's public works program was a 1900 project to irrigate Vĩnh Yên province.[24] In 1909, the Governor General presented two more commercial irrigation projects to the Resident Superior in Tonkin. The first was a scheme to provide electricity to a network of pumping stations, pumps that presumably the Protectorate would construct. In addition to this project, the Governor General tabled a plan to outfit major rivers in the Red River delta with pumps mounted on barges that could be moved to areas in need of irrigation or drainage. After surveying provincial Residents the Deuxième Bureau concluded that no one was in favour of either proposal.[25] This was especially true in Hà Đông, home of the Bazan canal.

Confronting traditional irrigation

Why did Bédat's venture fail? There were two main reasons. The first factor was financial. As history would show, peasants in the Red River delta are not averse to using canal irrigation to produce two annual paddy crops.

> At first, irrigation canals were regarded with scepticism by the people who distrusted the transformations so suddenly imposed on their native land. The peasant had to be completely won over before he could be induced to use the valuable resources which the new facilities placed at his disposal (Robequain, 1944, 226).

Robequain's understanding of the situation reflected years of experimentation, and in any case it was already too late for Bédat. The initial obstacle for Bédat and other irrigation projects was convincing peasants of the utility of canal irrigation. The colonial regime's rationale, however, and I would include Bédat in this category, for supplying water to peasants, "was not to reduce the peasantry's labours ... but to make the return on this labour greater and more regular (Gourou, 1964, 103)."

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[23] (Letter from the RST to the GGI, May 1906, VNA1/RST 80021, 1898-1906).

[24] For details concerning both projects as well as an overview of the Bédat contract see (Godard, 1901). In both Sơn Tây and Vĩnh Yên, publicly financed projects were eventually implemented, which suggests that neither privately funded project turned out to be commercially viable.

[25] (Note for the RST from the Head of the 2ième Bureau, 10 December 1909, VNA1/RST 79169, 1909-1910).

Instead of presenting canal irrigation as a convenient alternative to creek and pond irrigation Bédat sold water as if it were another French tax. One of the criticisms peasants levelled against Bédat was that he charged too much for his water. But, how much was too much? As noted above, Bédat was limited by his contract with the colony to charge a "license fee" of no more than forty kilograms/*mẫu* (approximately twenty "pots" (*nồi*) of paddy).[26] Regardless of the rate, in addition to the weight of other colonial taxes Bédat's water fee would not have been welcomed.

The second reason for Bédat's failure to sell irrigation was that, in the area around Bazan, drainage was in greater demand than irrigation. In a letter sent to the Resident Superior in Tonkin a retired local mandarin explained how the hydraulic conditions in Bazan had led peasants to refuse to pay for water. According to him, there had always been enough water for the peasants to cultivate two rice crops on low land. On higher land, the Autumn crop was followed by a dry crop of potatoes or manioc during the Spring crop. Drought, he recalled, had been a problem approximately once every decade, but even then lowland areas remained cultivable. According to the letter, peasants were concerned with avoiding payment of land or water taxes but were equally concerned by the potential loss -- which would result from the need to cultivate paddy in order to pay the water fee -- of dry season crops such as beans and root vegetables. Under no condition, he concluded, would the peasants agree to the purchase of irrigation water, even at a reduced rate.[27]

In 1906, soon after Bédat's water monopoly had been revoked, the Resident Superior in Tonkin canvassed his provincial Residents concerning how to move forward with plans to irrigate Hà Đông, Bắc Ninh and Hưng Yên. He asked each of them to calculate the minimum irrigated area that would be required in order to

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[26] (Letter from M. Guillemoto to GGI, 28 January 1906, VNA1/RST 80021, 1898-1906) and (Chassigneux, 1912, 76).

[27] (Letter from Nguyễn Trong Hiêp, retired mandarin, to the RST, 6 December 1901, VNA1/RST 72838, 1901).

keep their province safe from famine caused by drought.[28] Answers to the Resident Superior's query reflected the unique character of each province. The responses highlighted the fact that there was no simple solution to flooding or drought, nor was there one single way to increase agricultural productivity. In his reply to the Resident Superior, the Resident in Hà Đông claimed that irrigation was pointless in his province without some means of draining rainwater. The Resident noted, echoing the views of the retired mandarin quoted above, that it was this fact that had been the "principal cause" of Bédat's failure at "Ba-zan". Furthermore, the Resident continued, dikes needed to be constructed along the Đáy River. Only after the twin issues of drainage and flood control were properly addressed could irrigation be considered.[29] In the coastal province of Kiên An drought was not considered to be a threat to agricultural production. More importantly, the province required dikes in order to limit salt-water intrusion.[30] Conversely, in Bắc Ninh irrigation would help ensure a second crop on a large proportion of the province's cultivated land area. A single Autumn crop was being cultivated on 44 925 hectares, while, because of a lack of water, two paddy crops were being produced on only 6545 hectares, out of a total cultivated area of 50 725 hectares.[31]

Only the Resident in Thái Bình addressed the issue of whether peasants were actually in favour of moving toward double-cropped paddy. The Resident admitted that it would be impossible to construct an irrigation system that would deal with both drought and famine. As far as Thái Bình was concerned, the Resident felt all the necessary canals were already in place and that nothing more could be done. He did concede, however, that improved irrigation would help areas where a Spring crop was doubtful. "But", he wrote, "the peasants have not requested this. They prefer a good rice crop followed by a good crop of vegetables to two average rice crops. They can hardly be blamed for this and to try to change

[28] (Telegram from RST to French Residents in Tonkin, 21 May 1906, VNA1/RST 57133, 1906-1919).
[29] (Letter from French Resident in Hà Đông to the RST, 23 May 1906, VNA1/RST 57133, 1906-1919).
[30] (Telegram from French resident in Kiên An to RST, 23 May 1906, VNA1/RST 57133, 1906-1919).
[31] (Letter from French Resident in Bắc Ninh to RST, 25 May 1906, VNA1/RST 57133, 1906-1919).

their way of doing things would be to impose our interests above theirs."[32] According to one account, following a good crop of potatoes or beans, for example, peasants would consume the non-rice crop and sell the paddy. Alternatively, paddy stocks would decline when secondary crops failed and producers were forced to eat rice.[33]

The French Resident in Thái Bình raised a normative issue about whether colonial bureaucrats should have attempted to transform traditional cropping patterns in the interest of colonial development policy. This is a salient point, but only insofar as peasants actively resisted attempts to double-crop paddy. There were examples of this but there were also cases of accommodation, where peasants willingly cultivated two paddy crops when irrigation became available. I would argue that what was ostensibly resistance to double cropping was in fact a conflict between French attempts to impose unfamiliar irrigation technologies on traditional irrigation systems. In short, Bédat failed to understand that peasants in the vicinity of the Bazan canal were far more concerned about drainage than irrigation. In addition to the issue of double cropping, colonial administrators failed to understand the cultural and regional peculiarities that helped determine how and where waterwheels and canals were made use of.

In 1902, Mr. Duchemin, President of the *Chambre d'Agriculture* in Tonkin, proposed to the Resident Superior in Tonkin that waterwheels be used to lift water from rivers in order to combat a drought that had been threatening crops in the central Red River delta. Although common in many other areas of Indochina, waterwheels historically had been used in only select provinces in Tonkin. Duchemin suggested recruiting experts from Thanh Hóa and Vĩnh Yên to construct waterwheels in deltaic provinces.[34] Having just toured the district of Nam Sách and finding no evidence of waterwheels, the French Resident in Hải Dương gladly

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[32] (Letter from French Resident in Thái Bình to the RST, 26 May 1906, VNA1/RST 57133, 1906-1919)

[33] (Letter from GGI to Office for Economic Affairs, 26 June 1925, VNA1/RST 41952, 1925).

[34] (Letter from the President of the Chamber of Agriculture in Tonkin to the RST, 23 September 1902, VNA1/RST 38941, 1902).

accepted the Resident Superior's offer of ten waterwheel experts.[35] Soon after arriving in Hải Dương, however, the Vietnamese experts realised that waterwheels would have been inoperable because the river from which the water was to be pulled lacked sufficient current. Moreover, because the region was so close to the seacoast, its rivers were susceptible to salt water intrusion when water levels were low. The possibility of high salinity levels during the drought made using waterwheels a very risky venture.[36] As the French Resident in Thái Bình, Mr. Thureau, wrote in his response to the Resident Superior's offer of assistance:

> We should not ignore the fact that the Vietnamese, as with the Chinese, have been practising the art of irrigation as long as they have cultivated rice. Waterwheels are no secret to them, and generally they employ them wherever it is possible. The Vietnamese are not sitting and waiting for Western advice in order to do what they and their ancestors have been practising since time immemorial.[37]

Thureau was familiar with Vietnamese water-lifting technologies. While in Thanh Hóa he had carried out research into the use of livestock to power waterwheels that he hoped could be used by peasants in Sơn Tây. In 1899, he had applied for funding from the local budget to implement his findings but left Sơn Tây before he received an answer. Thureau felt that it should have been possible for local industry to design a simple low cost waterwheel that could succeed where Vietnamese designs failed.[38]

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[35] (Telegram from French Resident in Hải Dương to RST, 26 September 1902, VNA1/RST 38941, 1902).

[36] *Ibid.*

[37] (Letter from French Resident in Thái Bình to RST, 1 October 1902, VNA1/RST 38941, 1902). During a fieldtrip to Quốc Tuấn commune, Nam Sách district, a retired farmer explained to me that under the co-operative system in the 1960s, pedal waterwheels (*guồng nước đạp bằng chân*) replaced buckets (*khau*). These "bicycle norias" were introduced from Thái Bình province, which is Hải Dương's neighbour to the south. With the much larger collectivised fields (*vùng, thửa*) these water-lifting devices all of a sudden became practical. However, now that land has been balkanised by household cultivation and fields are much smaller the bicycle norias have lost their utility and are no longer found in Quốc Tuấn, although "baskets" (*gầu*) are ubiquitous (Interview Quốc Tuấn commune, Nam Sách district, 16 May 2000).

[38] (Letter from French Resident in Thái Bình to RST, 1 October 1902, VNA1/RST 38941, 1902). An example of local ingenuity appeared in 1917 when an earnest young Forest Ranger from Bại Thương, Thanh Hóa, Jean Gille Emileau approached the Governor General with a plan to construct a floating waterwheel. Coincidentally, Bại Thương was the location where construction had recently begun on a large gravity-fed irrigation system. Emileau was well connected and, in 1912, had received a verbal agreement from the Governor General based on a recommendation from the then

Peasants initially resisted the construction of canals, which were the basis for any modern irrigation system in the Red River delta. Overcoming this reluctance was an important objective of collectivising agricultural land in the 1960s. During the colonial period, land was so densely cultivated and intricately apportioned in the Red River delta that, according to one estimate, between two and three per cent of its total area was taken up by field dikes (Gourou, 1940, 228). The density of cultivation meant that land used for a canal displaced agricultural land. Local notables would do whatever they could to ensure that canals were dug through neighbouring villages. This eventually led to conflicts. Canals, moreover, were put to best use in areas where there was higher land. Unfortunately, these areas contained tombs and pagodas, as well as the majority of residences. Peasants were reluctant to dig canals through gravesites lest they "damage the dragon's veins" that ran underground. Such an offence, peasants believed, would be met with a death sentence imposed from the heavens.[39]

Equally important was the relationship between dikes and canals. Dikes blocked creeks (*ngòi*) that would have led water from rivers into irrigation ponds or drained paddy fields after heavy rainstorms. In order to solve this problem sluice gates were constructed to allow water to pass through dikes and regulate water flows in order to facilitate either irrigation or drainage. However, where dikes had proven effective at keeping river water out of fields, there was little incentive for peasants to contribute labour to construct canals to drain rainwater. As a result of this, new canals were not built and old canals would be left to silt up.[40] In order to overcome the tendency to strengthen dikes and neglect canals, the result of which

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Minister of Colonies, Gaston Doumerque, that the colony would buy his water-lifting machine. In the interim, he had decided to redesign his waterwheel in order to reduce its cost, but in order to do so he required a grant of 400 piastres for further research. Realising that Emileau's location offered an opportunity to combine large-scale irrigation with a potentially very cost effective improvement to traditional irrigation, Henri Normandin, the chief Public Works engineer in Tonkin at the time, approved the project in principal. However, by 1917, the colony was moving forcefully down the path toward large-scale irrigation and Emileau's request was eventually denied (Various letters, July 1917 - June 1918, VNA1/GGI 7384, 1917).

[39] (Letter from Viceroy of Tonkin to the RST, 9 March 1897, VNA1/RST 72837, 1897).

[40] *Ibid.*

was to make land more susceptible to drought, the Viceroy of Tonkin suggested that peasants be encouraged to undertake a widespread canal-building program. Without villagers investing directly in a project they, according to the Viceroy, could not properly understand how they might benefit from canals. The Viceroy suggested that the state construct demonstration canals in several districts. The effect of this would be to encourage individuals who had waterlogged land to then invest in their own canals.[41]

Conclusion

In this chapter I have focussed on Bédat's irrigation venture, examined where it fitted in the larger colonial development project and the reasons behind its failure. I have also considered how attempts to modernise irrigation without understanding local conditions reflected a more general contradiction between local knowledge and productivist attitudes. I have tried to contextualise the relationship between large-scale irrigation and drainage, hydraulic agriculture and the colonial development policy of *mise en valeur*. It was the productivist subtext of French development policy in Tonkin that set the colonial regime apart from the Nguyễn dynasty's approach to hydraulic modernisation. Despite the colonial regime's developmental vision, if it, when implemented, were to result in improved living standards and potentially destabilising political movements, then, according to many colonials, poverty and backwardness were preferable. The colonial regime also lacked the financial resolve, as far as the construction of large-scale hydraulic infrastructure was concerned, to implement its developmental vision and relied, initially, on the assumption that selling irrigation was a viable commercial venture. Following Bédat's failure the regime found itself without an overall plan for the development of canal irrigation in the Red River delta.

In Chapter 6, I will consider how Bédat's commercial venture influenced where and what type of large-scale hydraulic infrastructure the colonial regime

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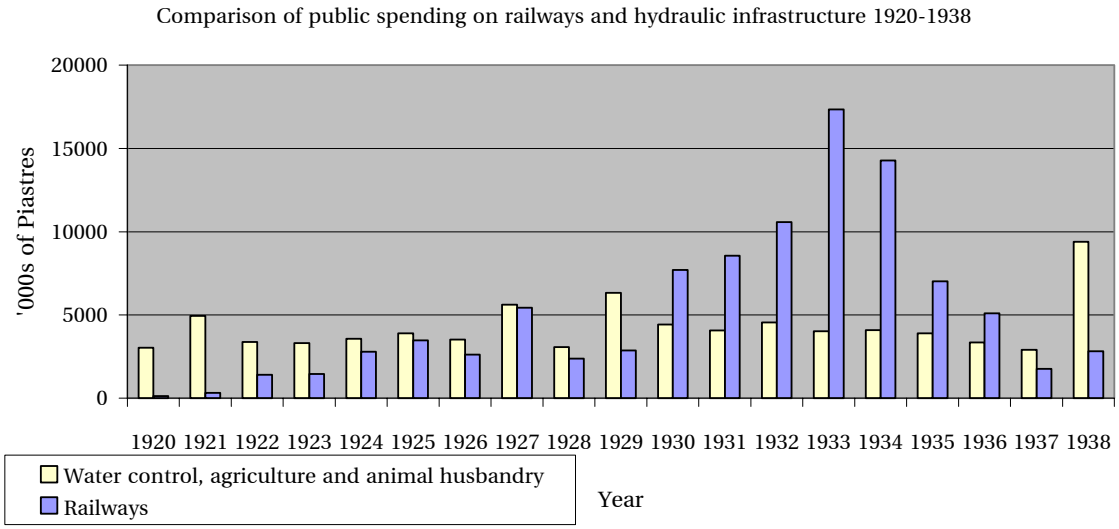
[41] *Ibid.*

would develop. The colonial regime's failed attempt to irrigate Bazan proved to many bureaucrats and business people in Tonkin that investing in hydraulic agriculture was the state's responsibility. As such, the issue of financing hydraulic infrastructure using public funds became an on going concern for hydraulic bureaucrats. Because colonial officials lacked baseline production figures and accurate population statistics, calculating the economic return on investments in irrigation infrastructure was difficult. What the colonial regime did not recognise was that without a hydraulic bargain in place, between the state and water users, demonstrable demand for irrigation would never be great enough to justify public investments on a cost-recovery basis.

Tables and figures

Figure 5.2 Comparison of public works spending in Indochina, 1920-38



Source: (Brocheux & Hemery, 1995, Appendix II)

Chapter 6 Bédat's legacy: The politics of hydraulic expediency

Introduction

Virginia Thompson believed that the colonial administration failed to improve Tonkinese agriculture because it lacked an overall plan and the means to co-ordinate activities (Thompson, 1937, 126-127). An important explanation for this, at least in terms of hydraulic infrastructure, rests with Bédat's failure to turn a profit selling irrigation. In order to establish clear policies the colonial administration ostensibly required two things: reliable statistics concerning the impact of canal irrigation and drainage on paddy productivity as well as broad agreement among policy makers concerning the role public funds should play in constructing and managing large-scale hydraulic infrastructure. Reflected in the colonial administration's fixation with statistics was a lack of conviction concerning the development of large-scale hydraulic infrastructure. As the Communist Party would prove, in the late 1950s, large-scale hydraulic infrastructure, especially in the central delta, is not profitable, and yet, guided by its developmental convictions, the Party pushed forward with its irrigation modernisation program.

As I discuss in Chapter 5, increased agricultural productivity, within the context of *mise en valeur*, was geared toward double cropping and exports. In 1909, the French Resident in Sơn Tây wrote that the only benefit from large-scale irrigation could be large and regular rice exports. "However," he wrote, "an increase in population will likely absorb any economic benefits."[1] The complexities of agricultural systems and a lack of baseline data made calculating the added value of irrigation a difficult task, and, therefore, made it difficult to assess the possible surplus that would be available for export. Only by the late 1930s did the realities of

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[1] (Note to the RST from the Head of the 2ième Bureau, 10 December 1909, VNA1/RST 79169, 1909-1910).

overpopulation and political instability in Indochina compel colonial authorities to see past the endless debate that had grown up around the economics of hydraulics and begin to suggest that improving irrigation for the sake of ensuring peasant livelihoods was an important goal.

There was, however, one group within the colonial administration, engineers at the Department of Public works, that was not beholden to financial concerns when it came to planning large-scale hydraulic infrastructure projects. Many of them believed that, regardless of the cost, pump-based irrigation in the central delta was the key to achieving both economic development and addressing problems surrounding overpopulation. They pursued technological visions while fellow bureaucrats in the Agriculture Service debated, for example, the cost per hectare of pump versus gravity-fed irrigation. Ignoring the economic realities of using pumps to irrigate and drain, for instance, the Kẻ Sặt polder, French engineers in the Department of Public works foreshadowed the efforts of the VWP in the 1960s and 1970s.

In the first section of this chapter, I will consider the three large-scale gravity-fed systems built by the French between 1906 and 1928, in the context of a colonial policy of hydraulic expediency. I will examine the reasons why the French chose to build irrigation systems in the midlands, and by extension why they ignored the possibility of working in the central Red River delta. Political and economic factors were behind the construction of gravity-fed systems in the midlands. The colonial regime was not constrained by statistical uncertainties that ostensibly kept hydraulic investments from flowing into the central delta. Following this, in the second section, I will explore some of the difficulties that confronted an understaffed and ill-informed colonial bureaucracy that was responsible for collecting statistical data. Without proper maps or cadastral information, and unable to establish, with any confidence, accurate paddy production and population figures, policymakers lacked the raw data on which policy design depended. It was partly for these reasons that an irrigation policy was never pronounced during the colonial period. Finally, in the third section, I will consider

attempts by engineers in the Department of Public Works to convince bureaucrats and politicians to support what was originally Godard's vision of pump irrigation in the central Red River delta.

Gravity-fed irrigation: Financial and hydraulic expediency

When the French did invest in large-scale hydraulic networks, they chose to implement relatively cheap gravity-fed irrigation projects, which were likely to realise a greater economic return than technically demanding and costly pump-based schemes in the central Red River delta. This approach to irrigation reflected a belief that was widely held in Tonkin at the time: "The colony is expensive, but at least it should pay for itself" (Robequain, 1944, 128). Thus, constructing large-scale irrigation systems tended to coincide with periods when the regime was flush with capital from France. This was especially so under the Doumer Program (1899-1909), in the period immediately following the end of the First World War and again in the early 1930s. When these funds dried up, working with chemical fertilisers and experimenting with different seed varieties became the focus of efforts to "improve" agricultural production.[2] Economic planners, bureaucrats and politicians generally agreed that rice yields should be increased. They often disagreed, however, about how to achieve this objective.

After nearly a decade of stable investment in economic infrastructure a significant decrease in spending on public works occurred in 1908 (Leurence, 1925, 137) (See Figure 6.2). Consequently, pump-based irrigation networks that had been envisioned under the Doumer Program were replaced by less expensive gravity-fed irrigation schemes. Between 1909 and 1929, French engineers brought into

[2] Phù Xa, in Hà Đông province upstream from Hanoi along the Red River, was a research station set up by the French in 1909. It included forty hectares of land controlled by the Department of Public Works but cultivated by Vietnamese peasants. Land at the research station was irrigated using a pumping station and a canal network. By 1910 the station was producing a variety of different rice strains under the careful scrutiny of the Chief Engineer of Public Works in Tonkin (Vesin, 1992, 139-141). During the Japanese occupation, for example, Vietnamese peasants were encouraged to plant a variety of Taiwanese rice called "Horai". The Ministry of Economics (*Bộ Kinh tế*), at the time, promised that this strain would improve paddy yields by seventy per cent (Bộ Kinh Tế, 1945).

operation three large-scale gravity-fed irrigation projects in the northern midlands of the Red River delta. The first system at Kép was completed in 1909, followed by the Vĩnh Yên system, where construction started in 1914 and was completed in 1923. The final gravity-fed system, on the Cầu River, was inaugurated in 1929. Although each of the three gravity-fed systems involved a diversion dam and canal networks, they were all constructed for politically and economically expedient reasons.

The first large-scale gravity-fed irrigation network was built in northern Bắc Giang in a region known to the French as the Kép plain. It consisted of a dam -- built at Cầu Sơn on the Thương River (*Sông Thương*) seven kilometres north of the Kép railway station -- and an array of irrigation canals. The original motives for irrigating the area had little to do with economic development. In 1897, "for policy reasons or rather for reasons of politics", the colonial regime decided to begin without delay the construction of an irrigation system on the Kép plain (Rouen, 1914, 517).

> We were well aware that there existed somewhere an area of flat land that was to be irrigated, but we neglected the issues surrounding how and on which basis we would be able to distribute [*répandre*] the water (Rouen, 1914, 517).

The engineers responsible for implementing the proposed irrigation system lacked accurate maps, basic hydrological data and even a general plan.[3] This is in stark contrast to the central delta, which I discuss later in the chapter, where colonial bureaucrats pushed for concrete data on the utility of pump-based irrigation systems before any work could begin. Despite its inauspicious beginnings the Kép

[3] Even in 2001, it was not easy to find the Cầu Sơn dam. After enquiring in several shops around Kép there was no consensus concerning either the location of the old French dam, or its name. Past a recently built cement plant I followed a dirt track for several kilometres before the dam appeared before me. With a backdrop of green uncultivated hills it was easy to imagine standing in the same place a century ago admiring what remains an impressive piece of engineering. According to one official at Cầu Sơn, the French bombed the dam but it suffered little damage. During the rainy season, when I visited, an arc of white water hid the leaks that belie the dam's age. (Observation, Cầu Sơn dam, Bắc Giang, October 2001).

project after twelve years of start and stop construction finally began, in 1909, to provide water to 2000 hectares of dry Bắc Giang plain.

At Kép, as had been the case at Bazan, irrigation canals were initially met with what was described in colonial terms as the "ironic pride" of the "Annamite". Throughout the Kép system, in 1909, when water was first available, risk averse peasants did not prepare rice seedlings since they did not believe that water would appear in the canals (Valette, 1909, 341).[4] Taking on the voice of a Tonkinese peasant, one French author wrote:

> What neither our ancestors nor we -- who understand our country better than anyone else -- have not undertaken is either of no interest to us, or it is impossible. Foreigners will fail, or spend a lot of money without achieving anything much in return (Le Grauclaude, 1933, 28).

According to one account, peasants living on the Kép plain in 1909 were convinced that irrigation would only make it impossible to drain their flooded paddy fields, and, consequently, they sold their land rather than become the hapless victims of a French plot. To their detriment, however, once the Kép system was eventually functioning the land immediately increased in value from nine piastres per hectare to 360 piastres (Le Grauclaude, 1933, 31-33).

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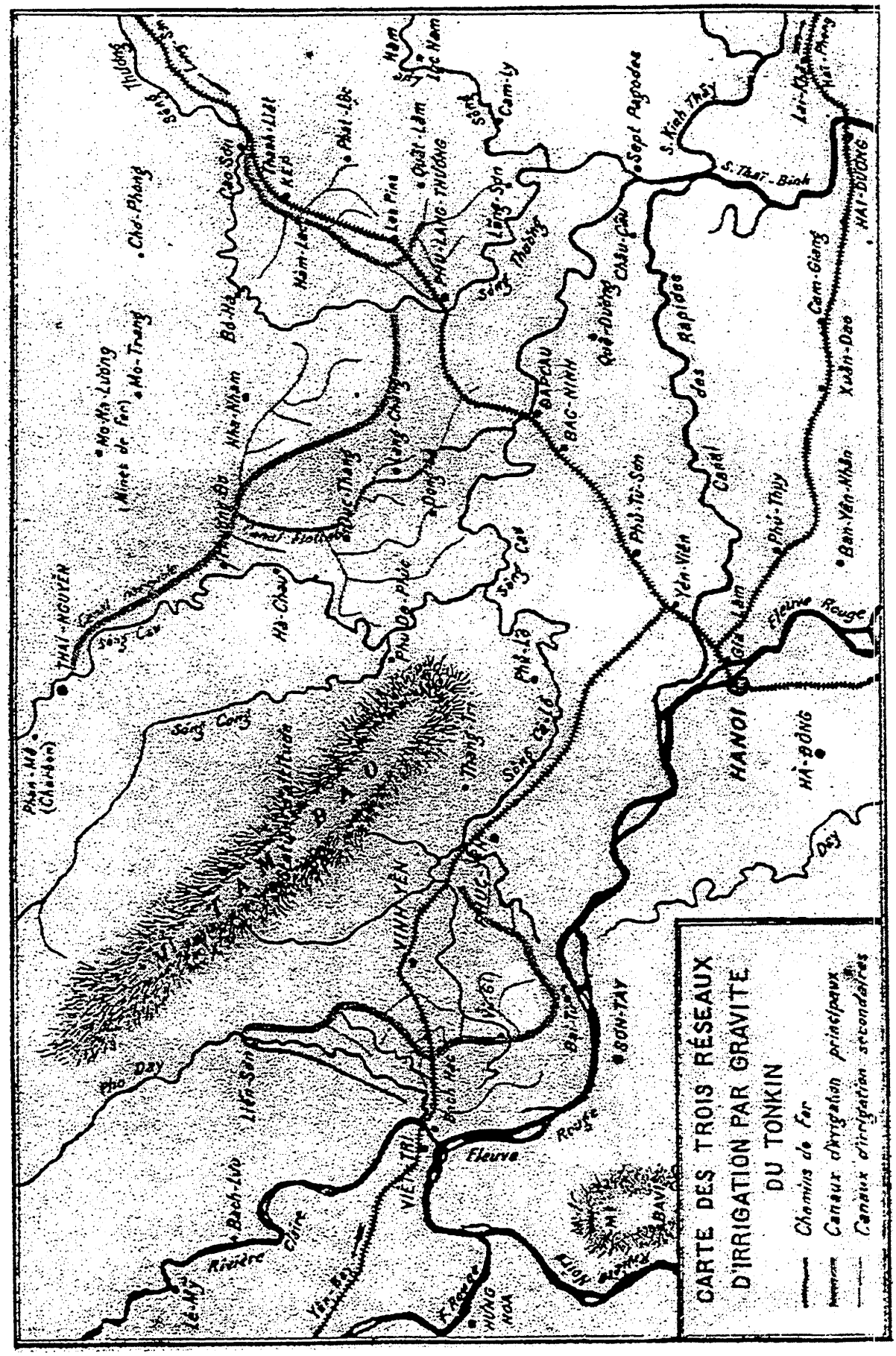
[4] Despite the earlier examples of Kép and Vĩnh Yên, similar stories appeared in 1933 in some areas of the Cầu River irrigation system. As a village notable recounted at the time:

> We were told that we would have water this season but we didn't believe it. We weren't prepared. Now the water is here but we don't have the rice seedlings [*mạ*] to transplant. We have looked into buying some from neighbouring provinces but they are so expensive that we would end up planting them at a loss. Even with a good yield. Thus, we won't have a Spring crop this season. But we're not concerned, we'll be ready for the next one. We'll try to make up the difference with some "three moon rice" (Le Grauclaude, 1933, 47).

Yumio Sakurai explains that three-month rice, or "three moon rice", was one of three potential paddy crops in the Red River delta. In addition to the *lúa mùa* and *lúa chiêm*, three-month rice was planted on alluvial flood plains, and harvested in three months with very low yields (Sakurai Yumio, 1997, fn. 2).

Figure 6.1 Map of gravity-fed systems in the midlands of the Red River delta



(Source: Unknown)

Despite peasants' initial reluctance to accept canal irrigation, by the middle of 1909, the Provincial Resident in Bắc Giang was besieged with requests from unirrigated villages that wanted canals extended to their fields.[5] This highlights the fact that a hydraulic bargain was possible between the colonial regime and potential water users, if only the colonial authorities had been politically and economically committed to the idea. This was bolstered by the fact that three years after water began flowing in the Kép canals there were signs that peasants had even grown to depend on summer irrigation. Heavy rains in September 1912 eventually led to the loss of 150 to 200 *mẫu* of paddy in the upper part of the Kép system. The local engineer who had directed repairs on the rain-damaged canals and sluice gates was impressed that, despite having just been flooded out, peasants were demanding that the canal system begin providing irrigation as soon as possible.[6] For Tonkinese peasants who were unacquainted with canal irrigation, demanding summer irrigation would have been the equivalent of turning nature on its head, as the uninitiated believed that it could only lead to greater flooding and disaster (Le Grauclaude, 1933, 31). The fact that peasants began demanding irrigation so quickly highlights the fact that traditional attitudes toward canals and irrigation could evolve quickly. This is important to keep in mind as I discuss in the next chapter the relative speed with which peasants became "dependent" upon large-scale hydraulic infrastructure in the late 1950s and early 1960s.

The last large-scale irrigation system built by the French, the Cầu River project, irrigated the left bank of the Cầu River between Thái Nguyên and Phủ Lang Thượng. The main canal linked the rich mining area in Thái Nguyên to the port at Hải Phòng. The original engineering studies were undertaken in 1905 but construction was delayed until 1922 due to a lack of funds (GGI, 1929, 5-6). When work finally began on the Cầu River project, thousands of settlers migrated to Thái Nguyên. In Phủ Binh, for example, by 1932, the population had risen from 13 000 to

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[5] (Report on the economic situation in Tonkin (Third Quarter, 1909), 29 October 1909, VNA1/GGI 4010, 1909).

19 000 inhabitants, an increase of almost fifty per cent (Le Grauclaude, 1933, 44-47). As Le Grauclaude described it:

> I saw along the edge of the irrigation canals entire villages, which from the appearance and colour of their residences I could tell had been very recently constructed. I saw near the smaller secondary canals, which had recently been filled with water, peasants [*nhà quê*] digging tertiary canals which will lead water to their dry fields (Le Grauclaude, 1933, 47).

The Cầu River irrigation system, more than Kép or Vĩnh Yên, symbolised "colonial interests". Of the 28 000 hectares to be irrigated, 15 525 hectares were controlled by two French concessionaires. The remaining land was owned by a handful of Vietnamese and French landlords. It was the landlords' responsibility, not the village leaders or government representatives, to hire the labour needed to construct the secondary and tertiary canals (Phan Khánh, 1981, 222, 224).

Both chronologically and conceptually the Vĩnh Yên system fit somewhere between the Cầu River and Kép irrigation networks. The Vĩnh Yên scheme was not built to achieve any overt political objectives nor was it designed to satisfy the demands of colonial settlers or Vietnamese landlords. Instead, it reflected an atmosphere of post-World War I euphoria and high levels of metropolitan investment. By the time it was completed in 1923 the Vĩnh Yên scheme had become the centrepiece of the French economic development project. The official opening of the Vĩnh Yên irrigation system coincided with the arrival of a parliamentary delegation in Hanoi, on a mission to examine progress toward *mise en valeur* in Indochina.[7] Early on the morning of 24 February, at the Hanoi Railway station, a private train awaited the parliamentary dignitaries and their colonial counterparts. By eight o'clock that same morning the delegation arrived at Vĩnh Yên station where they were met by a motorcade and the French Resident in Vĩnh Yên. The delegates were quickly ushered into waiting vehicles and whisked onward to the Liên Sơn dam. Constructed upstream from Việt Trì on the Phó Đáy river the

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[6] (Engineer's Report, Repairs to eroded areas caused by rain, 1 October 1912, VNA1/RST 79044, 1912).

[7] Unless otherwise noted the description that follows is taken from (VNA1/GGI 37088, 1923) and (GGI, 1923, 23-34).

Liên Sơn dam was designed to provide irrigation for 18 000 hectares of paddy. While the procession of dignitaries stood admiring the dam a team of Vietnamese "coolies" opened the sluice gates, freeing the water, sending it gushing into the canal network. The delegates then retreated to their vehicles and set off for the next scheduled stop: Vũ-Gi. The French had constructed a culvert at Vũ-Gi to allow water from the Vĩnh Yên system to pass under the Vĩnh Yên River. It was a technically demanding project, the construction of which was made more difficult due to a lack of experienced labour.

After a quick look around the worksite at Vũ-Gi, the procession of government sedans departed for Phù Vĩnh. It was here that Governor General Baudoin officially inaugurated the Vĩnh Yên irrigation network.[8] A covered platform had been constructed for the dignitaries, who were clad in overcoats, some wearing fedora's, others donning pith helmets or peaked military caps. Directly opposite were 10 000 Vietnamese, neatly aligned, with the local notables in the front row enrobed in their official vestments. It would have presented an eerie contrast of East and West, oppressed and oppressor. Right on cue, the entire gathering of Vietnamese bowed in unison, three times with hands crossed on their chests, to the colonial master. From here, the ceremony continued with a mix of Vietnamese and European rites. Offerings were presented to the water gods, incense was burned, and of course there were the obligatory speeches, the tone of which was one of pride in and thanksgiving for the colonial modernisation project. For example, Governor General Baudoin began his speech by asking with respect to the parliamentary mission:

> Does their presence not represent the guiding role played by the technical expertise of French engineers and scientists, the patient efforts of the administration and the driving spirit of the French race, at the service of another race that is also hard working and making efforts toward progress, but still economically backward?[9]

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[8] (VNA1/GGI 37088, 1923).

[9] *Ibid.*

For Baudoin, the Vĩnh Yên irrigation project epitomised the role that science could play in the economic development of Tonkin and the modernisation of its economy and society.

Baudoin's address was designed to convince the parliamentary delegates that the Vĩnh Yên system was only one piece of a larger colonial development project. The then Minister for Colonies, Albert Sarraut, two-time Governor General of Indochina, championed the colonial policy of *mise en valeur*. In 1923, Sarraut laid out his vision for the economic development of French colonies in, *La mise en valeur des colonies françaises* (Sarraut, 1923). For him, hydraulic agriculture was an essential component of *mise en valeur* in Indochina and, as such, Baudoin, Sarraut's representative in Indochina, took the liberty of providing the Parliamentarians with an extended discourse on the three branches of the "plan". As Baudoin described it, hydraulic agriculture policy consisted of fighting floods, draining land prone to waterlogging and irrigating higher ground. Despite this, using Baudoin, Sarraut intended to construct for the parliamentary delegation the image of an integrated program of hydraulic agriculture. Baudoin was supporting Sarraut's efforts back in Paris to present a *"programme complet"* to Parliament and the French public. Sarraut believed that if he created the outward illusion of such a program then neither the Metropolitan politicians nor general public opinion could continue with either its negative attitude or passive indifference (Siger, 1904, 279).

In reality, however, there was no "plan", it had disappeared in the wake of Bédat's failure at Bazan. After Bazan, the colonial administration was never fully committed to building the large-scale irrigation and drainage infrastructure that would serve its developmental goals. Investments in hydraulic infrastructure were not guided by long-term planning and policymaking, but were responses to natural disasters or political vagaries.

> From time to time, as a reaction to immediate events, the political authorities made use of their decision making powers to impose certain

> projects that were of a "social" nature, like what was constructed in Hà Tĩnh; but the danger passes, the Administration gives way once again to the technicians.[10]

According to the French Resident Superior who penned the above quote, everything was done in a fragmentary manner. Conversely, Virginia Thompson argued that technicians were, in fact, beholden to bureaucrats as well as the inevitable policy changes that came with the high turnover among colonial administrators (Thompson, 1937, 126-127). Bureaucrats accused engineers of being preoccupied with technical designs and engineers criticised decision-makers for their lack of vision.[11] Disagreements between factions within the colonial administration, remained unresolved throughout the colonial period because there was never agreement on the potential economic returns that hydraulic infrastructure could provide the to the state. This fact only proved to obscure the colonial administration's lack of financial and political resolve to fully implement *mis en valeur*.

Accounting for irrigation

In 1905, the colonial regime determined the basic economic equation that would dictate the direction of future colonial investments in irrigation: construction of a canal should be undertaken only if the total cost of the project including the depreciation on fixed capital was less than the "utility" of the infrastructure. Utility was defined as the maximum taxation that could be brought to bear on production increases due to irrigation. At the time, this was assumed to be about one third of the added value of an irrigated crop. This conclusion was pure guesswork, however, based entirely on patterns of French agriculture because in 1905 there was still no

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[10] (Letter from RSA to GGI, 9 November 1935, VNA1/RST 75645, 1936).

[11] Often projects were lauded as much for their size and technical sophistication as for the potential economic impact they might have. An example of this was the press coverage accorded the Đáy River dam, which focussed not on the benefits it would bring to peasants but on the fact that it was the largest "covered dam" in the world (Vesin, 1992, 291). For an example of this see (X, 1943, 10).

functioning French-funded irrigation system in Tonkin.[12] Even after the colonial regime had constructed canal networks, statisticians and engineers battled for years trying to determine the net return on past as well as future investments. Debates centred on conflicting accounts of the impact canal irrigation had on paddy production. In areas that lacked baseline, pre-irrigation production data, the net effect of irrigation was difficult if not impossible to calculate.[13] In addition to a shortage of historical data, the two biggest obstacles confronting colonial policymakers and statisticians were poor maps and ineffective survey methodologies.

Mapping

The first step in calculating paddy production in the Red River delta involved determining the area of single and double-cropped paddy land. A lack of cadastral information made this difficult. For example, in July 1897, at the request of the Tonkin Agriculture Committee, the Resident Superior in Tonkin issued a circular demanding that all provincial Residents in Tonkin survey local paddy production. Provincial residents were asked to note increases in paddy yields in areas where better drainage had led to an Autumn crop in low areas, and where new irrigation works provided for a Spring crop on higher ground. Residents were also asked to assess the value of losses caused by drought and flooding.[14]

The results of the survey were enlightening, not only for the statistical information provided, but also because they underscored the complexity and variety of agricultural production patterns found in the Red River delta. Each provincial Resident was required to produce maps that detailed the total cultivated area of communes, cantons, and districts. This information was to be overlaid with maps detailing cropping patterns. Paddy production was to be classified according

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[12] (VNA1/RST 79189, 1905).

[13] An exception to this was the two years of baseline data that was collected around Kép before the irrigation system began functioning in 1909.

[14] (VNA1/RST 81995, 1897).

to the total number of crops. Maps were to be produced with green indicating double-cropped, blue for low land with one Spring crop and yellow for high land with one Autumn crop.[15] The Resident Superior in Tonkin envisioned a countryside that could be easily colour-coded based on cropping patterns and land quality. However, minute changes in land quality, and, therefore, cropping patterns, could not be represented on available maps.

In response to the Resident Superior's survey, the Resident in Hưng Yên reported that the province had been destabilised of late by peasant rebellions and had lost a large proportion of its village rolls. Villages had been abandoned and only since the middle of July 1897 had the province begun the process of collecting cadastral data from villages. However, according to the Resident, the accuracy of this information was highly suspect: "We are now receiving declarations from villagers who lie relentlessly in order to avoid too large a tax increase."[16] The provincial Resident added that the Resident Superior's proposed land classification system, which implied that double-cropped was superior to single-cropped paddy land, did not reflect attitudes in Hưng Yên. In fact, the Vietnamese land classification system in Hưng Yên was the exact opposite. Relatively high land that could produce a Spring secondary crop, rice seedlings and an Autumn paddy crop was considered superior to double-cropped lower land. The provincial Resident in Hưng Yên concluded that under the circumstances any commune, canton or district-level data provided to the Resident Superior would be of the "fanciful" variety.[17] In Hải Dương the Resident went one step further: "Let's imagine that I do have the cadastral information and the maps, you have still set out an impossible task." The resident continued, "basically, what is being requested is a complete provincial-level cadastral survey. Gathering the required data would require up to

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[15] *Ibid.*

[16] (M. Miribel, Resident in Hưng Yên Province to Resident Superior in Tonkin, 5 August 1897, VNA1/RST 81995, 1897).

[17] *Ibid.*

two and a half years."[18] By the time the Hải Dương Resident replied to the Resident Superior in Hanoi there was barely two and a half weeks left before the 1 September deadline mentioned in the original circular.

There was a further complication in Hải Dương and elsewhere: data was to be collected and classified not according to topographical or hydrological details, both of which influenced the number and type of crops cultivated annually. Instead, information was to be gathered according to administrative unit. In Hải Dương this became a problem since cropping areas were organised into "localities" (*xứ*), not according to communes. Each "xứ" would often contain different types of crops, both secondary and paddy, which were neither determined nor confined by administrative boundaries. Using the cadastral maps available to provincial officials in Hải Dương, it was impossible to reproduce the individual areas cultivated with each crop using the Resident Superior's colour-coding scheme.[19] Furthermore, the information that the Resident Superior had requested, according to the provincial Resident in Hưng Yên, could not be used in designing large-scale hydraulic infrastructure. Irrigation systems would need to be constructed not on the basis of communal, canton or district borders, but according to hydrological conditions.[20] In summary, the Resident Superior was requesting information that was either not available, would require extended in-depth research or, as far as large-scale irrigation was concerned, was irrelevant.

Statistical data: methodological issues

Gradually, mapping improved as more cadastral data became available. Collecting statistical data, however, proved to be problematic throughout the colonial period. The colonial regime required accurate production statistics in order to calculate the potential economic impact that investments in irrigation and drainage would have

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[18] (M. Robineau, Resident in Hải Dương Province to Resident Superior in Tonkin, 5 August 1897, VNA1/RST 81995, 1897).

[19] *Ibid.*

on agriculture production. After years of debate, by the late 1930s there was a broad consensus among colonial officials that, regardless of the economic costs, investing in large-scale irrigation infrastructure was required simply to feed Tonkin's mushrooming population.

The central problem with collecting paddy production figures was that village notables would "systematically underestimate" production figures in order for the village to appear to be poorer than it was.[21] Village-level figures would then be transmitted through a chain of indigenous officials up to the province. A colonial statistician working in the Office of Economic affairs, Mr. Leurence, found that as statistical information flowed upward, figures were modified downwards. Leurence discovered that in Quảng Trị province, for example, paddy production data collected directly from the phủ level, what would roughly equate to a present-day district, proved to be twenty-five per cent less than the figures that were supplied by their constituent cantons. In Tonkin, Annam, Cochinchina and Cambodia, production figures were under-reported by thirty per cent and by as much as fifty per cent in some places. This led Leurence to conclude that agricultural statistics had "almost no value".[22]

In order to rely less on local officials, colonial functionaries in the 1920s began modifying the colonial regime's statistical research methodologies. G. Bournier, attached to the Office of Economic Affairs, proposed the use of indirect means to calculate paddy production.[23] Like Leurence, Bournier found that there were large gaps between his findings and official agricultural production figures. Rather than taking village figures for granted, Bournier measured total paddy

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[20] (M. Miribel, Resident in Hưng Yên Province to Resident Superior in Tonkin, 5 August 1897, VNA1/RST 81995, 1897).

[21] (Report from the Head of the Statistics Branch at the Office of Economic Affairs concerning the organisation of rice production statistics in Indochina, 14 June 1925, VNA1/RST 41952, 1925).

[22] *Ibid.* In order to account for inaccuracies, multipliers were normally included in calculations (Smolski, 1942, 112-113). Thus, depending on the multiplier that one was applying, statistical data could vary substantially from one source to another.

[23] Indirect data collection involved inferring from an individual's behaviour the activities of an entire population. Indirect data collection was also used to determine population based on average individual salt consumption rates (Smolski, 1942, 114).

production by multiplying per capita daily consumption rates and total population. Rice was fed to livestock as well as people, it was used to produce alcohol, it was exported and a portion of every crop was kept as seed for the following crop. All of these uses were included in Bournier's per capita consumption rate.

Bournier's research led him to conclude that the colonial regime had been underestimating paddy production by a significant amount. For the period 1920 to 1924, Bournier argued that official production estimates for Tonkin, 19.1 million tonnes, were 8.6 million tonnes lower than his figure of 27.6 million tonnes of rice actually consumed. This meant that official paddy production figures were being underestimated by forty-five per cent (Bournier, 1925, 427-433). Despite Bournier's surprising results they were open to criticism as they relied on official population figures. Villages tended to under-report village inhabitants in order to avoid taxes and, therefore, one always assumed that actual population was higher than official figures. Smolski reported that the actual number of village *inscrit* was four times the official figure. Others argued that it was closer to seven or eight times (Smolski, 1942, 113). As Bournier wrote in his own defence, if his consumption rates had tended to be too high, they would be compensated by the fact that his population figures were likely too low (Bournier, 1925, 432-433).

Unlike Bournier, Leurence decided to pursue more direct data collection methodologies, which would allow bureaucrats to "predict" the amount of paddy that would be available for export. According to Leurence, it was important to come as close as possible to recording the "individual declaration" of each peasant producer. He went so far as to design a questionnaire that each village mayor (*lý trưởng*) would complete. In the report, the mayor would have to record paddy yields for each "xứ" in the village. Leurence argued that his "mayoral survey" was a realistic alternative to questioning every villager or group of farmers individually.[24] As a precaution intended to limit data falsification, Leurence recommended that

[24] (Report from the Head of the Statistics Branch at the Office of Economic Affairs concerning the organisation of rice production statistics in Indochina, 14 June 1925, VNA1/RST 41952, 1925).

ten per cent of all villages be "verified". Village leaders, according to Leurence, would then be reluctant to lie if there was a chance that their village might be chosen for closer inspection. Even if only ten per cent of villages were "verified", this would still be an enormous task, as the Resident Superior recorded in the margins of Leurence's report.[25]

Leurence's "verification" program was never widely implemented. In addition to its inherent logistical problems, the Resident Superior in Tonkin feared that, if enacted, Leurence's program would breach the "bamboo hedge" and have negative political consequences for the colonial regime.[26] Thus, in the instructions that were to be provided to mayors, Leurence hoped to assuage their fears by assuring them that the information they were providing would not be used to increase taxes. Providing answers to the questionnaire would only help establish the size of local surpluses, which would ensure, Leurence argued, that producers would get the best price possible for their product.[27] To this, the Resident Superior responded caustically: "Wanting to persuade local authorities that a survey as detailed as this does not have any fiscal goals is illusory."[28] Furthermore, verification would require door to door surveys in selected villages. Surely an enquiry of such magnitude, carried out for every crop and involving an army of verifiers, could never be ensured of solving the problem of "dissimilitude".

> On the one hand, to tell the population that we are only looking to help you out and, on the other hand, to carry out the inspections using representatives of the *garde indigène* who are specially charged with maintaining order and wiping out fraud and crime is an anomaly. As such, this could have serious political repercussions by creating confusion between the indigenous population and us.[29]

The colonial administration could live with inaccurate statistics if the alternative threatened to cause political unrest. Such attitudes also had implications for a

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[25] *Ibid.*

[26] *Ibid.* Bamboo hedges were built around villages and in metaphorical as well as physical terms they represented the boundary between the village and state authority.

[27] *Ibid.*

[28] (Letter from RST to Office of Economic Affairs, 25 June 1925, VNA1/RST 41952, 1925).

[29] *Ibid.*

potential hydraulic bargain. As I discuss in Chapter 5, as far as the colonial administration was concerned, development was a double-edged sword, one which could both undercut as well as support French sovereignty in Tonkin.

Bournier and Leurence's efforts to rethink statistical methodologies did not significantly influence how the colonial regime collected statistics. The next major attempt to improve data collection in Tonkin coincided with the 1931 loan for the *exécution de grand travaux*. The colonial administration created a joint Public Works and Agriculture Commission to assess the added value that irrigation and drainage would have on agricultural production in areas where irrigation systems were planned. [30] After two years of mediocre results, the Resident Superior in Tonkin, who was hoping to implement a water tax, was frustrated that the Commission had been unable to improve the accuracy of paddy production statistics.

> Some people think that the irrigation systems that have been in place for several years have considerably increased land values by improving crop yields. Others deny that crop yields have improved as a result of irrigation. Still others think that in certain cases the land has been improved greatly, and moderately in other areas. Some people argue that the added value of irrigation is diminished in cases where a secondary crop had been cultivated before the introduction of irrigation.[31]

The Resident Superior, Mr. Pagé, was describing the complexity of the agricultural and hydrological systems in Tonkin. Some areas benefited from irrigation more than others, while others depended on drainage to increase productivity. There were no simple technological or political solutions that could be applied throughout the delta.

Nevertheless, the Resident Superior pushed forward with his surveys. The 1933 methodology involved calculating yields on irrigated land and comparing these findings with yields from unirrigated neighbouring plots. One of the difficulties with this approach was that yields within the same village would often

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[30] (Decree of the RST, 28 January 1931, VNA1/RST 57148, 1931).
[31] (Letter from RST to GGI, 15 June 1933, VNA1/RST 75808, 1933).

vary by between twenty-five and fifty per cent.[32] Unlike previous surveys, European researchers would have to remain at the survey site throughout the Autumn crop. There was, however, throughout the colonial period a shortage of qualified staff available to the Department of Public Works. Some staff could be trained in Indochina but others had to be trained overseas. The deficit of engineers and worksite managers that had appeared before the First World War became a serious issue following its conclusion. Many professionals in the Department of Public Works had returned to Europe during the war and chose to stay in France once it finished (Normandin, 1920, 432-433). Despite this, the statistical information gathered using the 1933 survey techniques proved to be some of the most reliable. And yet, the French were still unable to answer the question: what economic value added could irrigation provide the colonial regime?

Mr. Bigorgne, a successor to Normandin as head of Public Works in Tonkin, summed up the futility of the debate over the economic impact of irrigation. After examining the survey data generated between 1933 and 1936, and asking himself the question that concludes the above paragraph, he wrote:

> There is no answer. In effect, if paddy fields are not supplied with enough water, or if enough excess water is not removed -- and this is the goal of work to improve water control -- yields could fall to zero. It is a question of amount and timing. But what is certain is that work to improve water control by "assuring" a crop on land that would otherwise not be cultivated has an obvious value added (Bigorgne, 1938, 27).

By the late 1930s, reasons for investing in irrigation and drainage infrastructure had shifted away from increased productivity and toward alleviating overpopulation and food shortages.[33] Writing at about the same time as Bigorgne, Paul Bernard

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[32] (An analysis (undated) of Report by Bridges and Road Works Engineer, Head of Division, Public Works, 18 May 1933, VNA1/RST 75808, 1933).

[33] Leurence, writing in 1925, identified the lack of fully developed infrastructure, in combination with an exploding population, as the key obstacles to economic development in Indochina (Leurence, 1925, 132-138). By 1937, these views were widespread among colonial officials. Bigorgne concluded that any new investments in irrigation and flood control would have to make reducing population densities in Tonkin their first priority (Bigorgne, 1938, Ch. 4). Bigorgne's conclusions reflected a growing number of neo-Malthusian analyses of the overpopulation situation in Tonkin. For a detailed account of colonial thinking with regard to overpopulation see (Hardy, 1998, 82-92). For

concluded that agriculture alone could not raise the average income of the entire peasant population in the Red River delta enough to justify a water tax.

> The real cost price is represented, in effect, not by the total value of effective labour days that would be required to cultivate one hectare, but by the sum cost of the basic needs of the population who live on the land and from which they derive their subsistence (Bernard, 1937b, 35).

If the peasantry's "basic needs" were not being met then it was senseless to attempt to calculate the economic benefit of hydraulic infrastructure according to labour days invested in production. Bernard argued that "tax revenues" or "industrial growth", within the context of peasant agriculture in Tonkin, were only theoretical concepts. As long as people were chronically underfed it would be "generally impossible" to extract through taxation any surplus revenue resulting from production increases (Bernard, 1937b, 38).[34]

Financing irrigation infrastructure: The role of the modern state

The dichotomy between "protection", and its moral economy qualities, and "production", and its commercial overtones, was evident in debates over irrigation policy. One of the difficulties of designing an irrigation policy in Tonkin was the disagreements among colonial bureaucrats and politicians concerning the appropriate role of the state in financing irrigation infrastructure. There were those who believed that if the state provided irrigation then it would have to be a cost recoverable venture. If the goal was rural development and industrialisation, however, then hydraulic infrastructure would best be provided as infrastructural

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example, George Khérian, in, *Le problème démographique en Indochine*, described how the population in Tonkin, at the time, was chronically underfed, underemployed, and living on too little land, and that there was little that could be done to improve the situation (Khérian, 1937, 20-26). Khérian's was only one voice among many who were retreating into "late-colonial pessimism" (Hardy, 1998, 89).

[34] Bernard was convinced that underemployment posed one of the most critical obstacles to economic development in the colony. Bernard wrote that what appears to be unemployment in the Tonkin delta is really underemployment. For one hectare, two crops of paddy ought to require not more than 200 labour days. By his estimates there were four times more people than necessary to cultivate the entire Tonkin delta. (Bernard's 200 days is the official figure while others such as Gourou put the figure at closer to 440 labour days (Bernard, 1937a, 427).) Bernard then asks, is it

prerequisites. These two arguments were articulated very clearly in an exchange between the Resident Superior in Annam, Maurice Graffeuil, and the Resident Superior in Tonkin, Mr. Tholance.

In a 1935 report to the Governor General of Indochina, Grauffeil proposed that the colonial administration create an Indochina-wide Office of Hydraulic Agriculture.[35] This agency would be responsible for managing future metropolitan loans earmarked for developing hydraulic agriculture, and would function under the rubric of an irrigation policy. Any policy, he wrote, would have to encompass broader economic policies dealing with the role hydraulic agriculture would need to play in increasing paddy productivity, and furthering the principals of *mise en valeur*. Such a policy would have to focus on rice exports from Tonkin and Annam -- which, he believed, could provide a windfall for the public purse -- and on how to reduce the risk of future famines.[36] According to Graffeuil, the Office for Hydraulic Agriculture would be a commercial enterprise founded on government capital and run by government functionaries. It would construct and operate irrigation networks based on the principals of private commerce and industry. As such it would need to concentrate on ensuring that water users covered operational costs and that profits were being generated in order to allow for the gradual extension of

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correct to conclude that there are three unemployed to every one worker? Of course not, is the reply, and this he believed explained why there was "systemic poverty" among peasants in Tonkin.

[35] In 1926, the Office for Studies in Hydraulic Agriculture had been established. Although it was designed to be a collaborative project between the Departments of Agriculture and Public Works it focussed primarily on understanding how water could best be distributed using extant irrigation systems, and as a secondary concern, the possibility of extending these systems. It did not solve the problem of integrating agricultural work with infrastructure development. The Department of Public Works was, during most of the colonial period, the only government department responsible for hydraulic infrastructure. The Department of Agriculture was neither organised nor staffed to support rural development directly. It had more tangential concerns such as managing the botanical gardens, raising industrial crops, silk production and the agricultural museum. (VNA1/GGI 4052, 1909; Instructions for the Office of Hydraulic Agriculture, by Yves Henry, 23 December 1926, VNA1/RST 40472, 1927).

[36] (Letter from RSA to GGI, 9 November 1935, VNA1/RST 75645, 1936). It should be noted that an overall decline in rice production is not necessarily the principal cause of famine. David Marr points out that with regard to the 1945 famine in Tonkin the real problem was not aggregate rice production within Vietnam but rather a question of timely distribution. During the height of the famine there were significant amounts of rice available in French and Japanese storehouses and farmers in the Mekong delta were experiencing a bumper harvest (see Marr, 1995, 96-107).

irrigation works.[37] The Governor General forwarded Graffeuil's recommendations to the Resident Superior in Tonkin, Tholance, in early 1936.

Tholance focussed on the moral ambiguities of commercial water sales in Tonkin. He began his response to Graffeuil with a description of what role he believed a "modern" state should play in the process of economic development.

> The state is not, despite certain analogies, an industrial or commercial profit-making enterprise. It does not have shareholders that it has to satisfy. It consists of the mass of taxpayers; it exists only for those who provide it with income in the form of taxes. Theorists hardly ever discuss these principles. It is commonly acknowledged today that taxes can not be considered the price paid for services rendered as much as they pay for public works undertaken by the state, which could not otherwise be financed by users.[38]

Tholance argued that the state was morally responsible to provide public infrastructure. His criticism of Graffeuil stemmed as much from his basic theoretical objections as from an understanding of the tax burden borne by rural water users.

More generally, however, Tholance was describing a dilemma faced by the colonial regime as well as by the Vietnam Workers' Party after 1945, and that was the degree to which public funds ought to subsidise hydraulic infrastructure. The French colonial regime was of two minds in this regard. On the one hand, irrigation and drainage were considered to be profitable services that could be provided by either the government or by private enterprise. The colonial administration reconsidered this approach following Bédat's failure, but Graffeuil was resurrecting it. In his view, water was a commodity like any other and its larger role in expanding and intensifying paddy production was a tangential benefit. On the other hand, the enormous financial costs involved in constructing and maintaining irrigation and drainage infrastructure necessitated the use of public funds. Irrigation ought to be a public service, went Tholance's argument, and the required

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[37] (Letter from RST to GGI, 17 January 1936, VNA1/RST 75645, 1936).
[38] *Ibid.*

infrastructure should be constructed with the understanding that investment costs need not be recovered by the colonial administration through water sales.

Tholance advocated the continued subsidisation of water. He believed that the colony ought to concern itself with the plight of peasants in Tonkin. In his response to Graffeuil, Tholance asked whether the distribution of water ought to be considered an essential service in the same vein as other public infrastructure such as roads, canals and bridges. His reply was that water in the Red River delta was as necessary to Tonkinese peasants as canals are to the inhabitants of northern France. "Without water the rice dies, the crop is poor and often it is lost completely, and yet, the paddy field is the foundation for wealth and happiness in Tonkin." According to Tholance, paddy formed the basis of the Tonkinese economy: either paddy needed to be exported in order to earn foreign exchange or, if other products were exported, paddy needed to be saved and used to feed the population. Without rice, people die of starvation or they find themselves without the means to cover their "financial responsibilities".[39] According to Tholance, Graffeuil's proposal was based on a principle of inequality that did not adequately consider the "general interest" or the harsh reality that peasants faced. More specifically, Tholance wrote:

> There is a basic contradiction in wanting the population to participate in the construction of irrigation networks by either giving up land or through corvée labour [*prestations volontaires*] and to then force them, in effect, in the form of taxes, to reimburse the capital costs invested in these projects.[40]

This irony was not confined to the colonial period and it reappeared during the post-colonial era in the context of the socialist hydraulic bargain and the production-construction dichotomy. Both of these issues are considered more thoroughly in Chapters 8 and 9.

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[39] *Ibid.*

[40] Tholance reserved a final criticism for Grauffeuil's plan to introduce rice storehouses as a means of ensuring water users would cover the operating costs of irrigation systems. This idea, Tholance believed, "was completely unacceptable (*tout à fait condemnable*)". *Ibid.*

Similarly strong criticism of commercially oriented irrigation schemes came from the well-known colonial agronomist, René Dumont. Dumont divided irrigation projects into two categories: "protection work" and "production work". By the mid-1930s, once the "production work" was complete, in particular the gravity schemes at Kép and on the Cầu River, it was the Protectorate's responsibility to undertake "protection work" designed to avert famine.

> It will assure that the delta's population has enough to eat; it is not a profit-making investment. The Colony would be justified in not looking to recover either interest or depreciation, and considering it money lost (Dumont, 1935, 89).

Instead of using a tax to cover maintenance fees, irrigation systems could be managed by the village in the same way that peasants were obligated to provide a certain number of labour days each year to repair, strengthen and monitor dikes. The caveat to this, however, was that such an approach, Dumont argued, could not realistically be applied to pump-based irrigation (Dumont, 1935, 89).

Pump irrigation and the central Red River delta

Partially removed from the debates over how best to measure the net economic benefit of irrigation projects and whether hydraulic infrastructure should pay for itself, was a corps of engineers who, for many years, had been advocating the installation of pump irrigation systems in the central Red River delta. Despite the lessons learned at Bazan, Public Works engineers campaigned throughout the colonial period for pump-based systems. According to engineers such as Godard, Dussaix, Normandin and Pouyanne, pump irrigation was the only way to irrigate and drain the large expanse of the central Delta. The cost effectiveness of gravity-fed irrigation notwithstanding, according to engineers in the Department of Public Works, such systems would only ever have a limited impact on the total irrigated area of the Red River delta. Eventually, if hydraulic agriculture and economic development were to be properly integrated, if the Tonkinese economy were to be industrialised, irrigating the central delta was essential.

But Normandin and other engineers were confronted not only by a lack of political and financial will, on behalf of many people within the colonial administration, but also the impact that pump irrigation would have on the rural labour force. Pond and creek irrigation helped to perpetuate the crisis of underemployment in the delta. Why would one choose to use a water pump when scooping water by hand (*tát nước*) employed millions of peasants (Bernard, 1937a, 427)? Réné Dumont echoed this conclusion when he wrote:

> *The unavoidable truth in Tonkin is that manpower is too cheap, which encourages working methods that are routine* (italics in original) (Dumont, 1930, 282).

Dumont, like Bernard, lamented the difficulties that overpopulation posed for increasing economic efficiencies and labour productivity. With such ingrained *routines* how could the benefits of scientific progress ever be realised?

Normandin's modernism

One of the most influential supporters of pump irrigation and drainage was Henri Normandin, who spent many years in Tonkin working for the Department of Public Works. He believed that technological solutions could be found for the chronic economic and social problems that plagued the Indochinese peasantry. Any improvement in paddy yields would have to see "primitive" irrigation by scoop or basket replaced by "modern" methods introduced by Europeans that would conform to the "facts of western science" (Normandin, 1913a, 784-785).

A mission to the Dutch East Indies and British India in 1913-14 greatly influenced Normandin's views on large-scale irrigation and drainage. In his mission report published in the *BEI*, Normandin expressed equal measures of admiration and moral indignation over the direction that irrigation and drainage projects had taken in colonial India. From an engineering perspective, British infrastructure was very impressive. However, British systems, according to Normandin, were not designed to improve local living conditions. The largest British project, for instance, was undertaken in the Punjabi desert where demand for water was high but population densities were relatively low. In Normandin's opinion, large-scale

British projects were humanitarian in appearance but had been constructed in areas that guaranteed a high return on investment capital. Normandin concluded his report by wondering how long Indians would allow the Raj to ignore needy deltaic areas threatened by famine (Normandin, 1913b, 741-743).[41] This remark is ironic, considering that the Protectorate of Tonkin constructed the majority of its irrigation systems in the water-scarce and under-populated midlands of the Red River delta.

Comparing the situation in Indochina to his findings from Java and British India, Normandin concluded that the future of modern irrigation in Tonkin rested with the construction of electrically powered pumping stations. His program resembled the Dussaix Project that had received support from the *Chambre de commerce et d'agriculture du Tonkin et du Nord-Annam* in 1911.[42] Dussaix, who was, at the time, the Chief Engineer of Public Works in Tonkin, and Normandin's predecessor, lobbied the Colonial Ministry in Paris for a large electrical generation plant that would power a series of pumping stations. These stations would lift water to a height that would provide areas in the central and western delta, too low or flat for gravity-fed systems, the benefits of irrigation and drainage. The entire plan was outlined in a report written by Dussaix dated 24 August 1910, and entitled "Work to be undertaken as a result of the eventual approval of a loan for 100 million [currency is not specified]" (Quoted in Chassigneux, 1912, 115). In support of this plan, Edmund Chassigneux wrote that the "gigantic" public works programme envisioned by the French would completely transform agriculture in the Red River delta as well as the lives of its inhabitants. He then expanded Dussaix's plan to include the creation of state-controlled "collectives" to manage this modern agriculture.[43]

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[41] René Dumont openly criticised the British in India for being too preoccupied with the profitability of irrigation and for neglecting the general well-being of those people who could benefit from improved water control (Dumont, 1935, 88).

[42] (See Chambre de Commerce de Hanoi et du Nord-Annam, 1911).

[43] See (Chassigneux, 1912, 118-121) and a review of his work in (Brenier, 1913, 132) where Chassigneux's prescriptions for agricultural modernisation are described facetiously "as a little bold"

Like Dussaix, Normandin's proposal called for the construction of a 3-4000 kilowatt generator. Such a plant would be responsible for powering a series of pumps that would in total be capable of draining the lower Red River delta and irrigating two 20 000 hectare polders located in the central delta. Normandin's economic analysis was based on the direct benefits that could be generated from water sales or increases to the land tax. Of the two revenue earners, Normandin was partial to an increase in the land tax. This was, first, because water in Indochina, unlike in the deserts of northern India, is not in great demand and is not an intrinsically valuable commodity. Secondly, he argued that the Tonkinese peasant would more readily accept an increase to an existing tax rather than the imposition of an additional tax (Normandin, 1913a, 795). Increases to the land tax, according to Normandin, would need to be a fraction of the total net benefit of irrigating paddy, but they would need to cover the interest on the initial investment as well as maintenance costs. Normandin had no illusions, however, about the possible economic returns that would flow from large-scale irrigation in the central Red River delta. Water would have to be provided for free during the first ten to fifteen years of a system's operations and only then could land taxes be increased, which would be made over two or three stages in order to determine "the financial limits of the Tonkinese peasant". Although Normandin was sceptical about the eventual success one might have selling water, he did not rule out the possibility of generating some income from water sales. Referring to Tonkin, Normandin wrote, "*irrigation will never prove to be a financial enterprise of any great profitability* (Normandin, 1913a, 798)" (Italics in the original).

Normandin, like Dussaix, found that the cost of pump irrigation was making it difficult to convince politicians to support such schemes. By 1918, Normandin estimated that covering the cost of pump-based irrigation and drainage would

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(*un peu hardi*). Unlike Normandin's proposals, Dussaix's plan lacked credibility as it was not accompanied by a serious economic analysis of the possible costs and returns to investment, although it did introduce a vision of modern irrigation and agricultural organisation that was to

require a four to five times increase in the land tax (Normandin, 1920, 417). Although Normandin believed that the colonial administration would eventually need to make pump irrigation a priority, he felt that in 1918 the financial costs were too high. In 1919, Normandin found an ally in the Resident Superior in Tonkin, Bournier. In order to reduce the cost of pump irrigation, Saint Chaffray devised a novel approach to pumps and how they could be integrated into a form of agro-industry.

The goal of Saint Chaffray's project was to increase rice production as a means of expanding exports. The key to achieving this involved two complementary processes. First, in order to expand cultivated area in the Red River delta, the total area of double-cropped paddy land would need to be increased. This, he concluded, could only be achieved with "an expanded pumping program". Second, yields could be improved by applying cyanamide, a chemical derivative of ammonia used as fertiliser, to paddy fields. Saint Chaffray quoted Japanese studies that claimed to have achieved yields of four tonnes of paddy per hectare using cyanamide-based fertilisers.[44] Furthermore, pumps could be designed to run on hydroelectric power.[45] The pumps would only be required for four months of the

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shape all irrigation and drainage development to follow. Chassigneux's use of "collective" is ambiguous.

[44] (Letter from the RST to the GGI, 22 March 1919, VNA1/RST 80025, 1920).

[45] French companies lobbied the colonial administration to invest in hydropower plants, and electrification generally. There was growing expertise in France, as electrification had become an answer to labour shortages in the French countryside. This was not a concern in Tonkin, although this did not stop lobbyists. Saint Chaffray's integrated chemical production and electrical generation scheme was described in one brochure as "electro-culture" (Brochure, "Hydroelectric power and agriculture" sent from President of the Union of Electricity Companies, Paris, to GGI, VNA1/GGI 3365, 1914-1917). The benefits of electricity became more apparent to the colonial regime over time. In November 1930, the Governor General agreed to purchase 15 000 shares at 1000 francs each of the *Société Indochinoise d'Életricité* to promote the electrification of the Tonkin delta (VNA1/GGI 344, 1930-1937). This coincided with discussions to begin introducing pump irrigation and drainage in the central delta using a large loan destined for new public works construction that was approved in 1931. By 1933, however, very little electricity was finding its way into rural areas of Tonkin. There was a single hydroelectric power station in Indochina and that was found at the colonial hill station of Sapa. More than half of all power was being produced in Cochinchina and five large companies produced ninety-five percent of all power throughout Indochina, which was in turn used largely in urban centres and hill stations. In Tonkin, this included Hanoi, Hải Phòng, Tam Đảo, Sapa, Nam Định and Bắc Ninh (Chevry, 1933, 905-909).

year and would be capable of irrigating 200 000 hectares of dry season paddy. During the remaining eight months the power station would produce 24 000 tonnes of cyanamide. Based on the results of research carried out at the Phù Xa experimental station in 1912, up to 12 000 kilograms of cyanamide could be applied per hectare of paddy. At that rate, one paddy crop would use the total amount of cyanamide produced during one eight-month period.[46]

Saint Chaffray's plan proved to be slightly too ambitious, yet it did breathe new life into lobbying efforts directed at securing funds from France to construct several new pump-based irrigation and drainage systems. Above all else, this was likely Saint Chaffray's intention. His vision of large-scale irrigation, supported by huge electric pumps and a modern chemically enhanced agriculture, was articulated in response to a speech by the Minister of Colonies to the French Senate in February 1920. During this speech, the Minister had spoken of the possibility of a large loan to the colonies directed at improving economic infrastructure.[47] This would be the first such loan since the Doumer Programme had faltered in 1908, and Saint Chaffray provided a potential blueprint for how it could be spent.

By the end of 1920, Normandin had prepared a report for Saint Chaffray, outlining the areas in which the Department of Public Works was considering further research pending the issuance of the loan. Under the category of hydraulic agriculture, Normandin presented the broad strokes of the irrigation program that Bédat had undertaken twenty years earlier and which had proven to be a commercial failure. A central generating station powered by thermal energy, not a hydro station as Saint Chaffray had suggested, would provide irrigation to the provinces of Bắc Ninh, Hải Dương, Hưng Yên and Sơn Tây. The total area to be irrigated was 231 000 hectares. In addition to pump irrigation, Normandin included a gravity-fed project that would eventually irrigate the left bank of the Cầu River. The total value of the hydraulic agriculture program was 10.8 million piastres: 7.8

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[46] (Letter from the RST to the GGI, 22 March 1919, VNA1/RST 80025, 1920).
[47] *Ibid.*

million for pump irrigation and 3.0 million for irrigation by gravity. Cleverly, Normandin presented the pump irrigation projects as costing half as much per hectare as the gravity-fed system.[48]

In his 1920 report to the Resident Superior in Tonkin, Normandin had proposed that three areas be irrigated using electric pumping stations. However, he only gained approval for a pump-based irrigation network in Sơn Tây, the smallest of the three proposed projects. Normandin was disappointed with the metropolis' continuing disregard for the central delta. He blamed the decision to largely abandon pump-based irrigation, which he described as "a very big mistake", on the conclusions reached by officials in the Agriculture Service who had doubled his estimated cost per hectare of pump-irrigated land.[49] Normandin felt the Service was too pessimistic, considering the potential impact that irrigation could have on increasing yields. In an attempt to convince the Inspector General of Public Works to expand large-scale pump irrigation into the central delta, Normandin reported that the cost of constructing the proposed pumping station in Gia Lâm for the Kẻ Sặt system had been reduced by half of the figure that had been tendered in late 1920.[50] Regardless of these savings, the decision not to invest in pump irrigation remained.

The 1931 loan

Normandin's hopes were revived in 1931, when the Governor General made an application to the Metropolitan government for a new loan worth 48 240 000 piastres.[51] The Department of Public Works had been directing its efforts for some time toward the 1931 loan and designing projects based on rumours that it would likely focus on "irrigations par pompages". Considering the unpopularity of pump

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[48] (Letter from the Chief Engineer for Tonkin to the RST, 23 December 1920, VNA1/RST 80025, 1920).

[49] (Letter from the Chief Engineer for Tonkin, Public Works, to the Inspector General, Public Works, 17 June 1922, VNA1/RST 79176, 1922).

[50] *Ibid*. The difference in cost was brought about by an economic crisis in Europe, which meant the cost of materials was being drastically discounted.

schemes outside of the Department of Public Works in the early 1920s, the Inspector General of Public Works, A. A. Pouyanne, planned to group Tonkinese peasants into water user co-operatives. He hoped that if peasants could be convinced that it was in their interest to do so, they would pool capital in order to construct small pumping stations, and thus, lessen the state's financial responsibilities.[52]

In response to Pouyanne's proposal, Dumont wrote that it was impossible to expect a poor country such as Tonkin to cover the cost of electrification and constructing pumping stations. Such a plan, if it were implemented, would obligate the regime to export rice, which was needed for domestic consumption, in order to pay for imported materials or to cover interest costs. Instead, Dumont argued, most paddy fields in the central delta could be irrigated using gravity. His advice was to make use of traditional labour-intensive lifting devices and to plant dry crops in areas too high to be reached using scoops. In time, Dumont argued, researchers would discover rice strains that could be grown under a wider variety of aquatic conditions. In the future, pump drainage would become obsolete as improved rice varieties adapted to the conditions in areas that could not be completely drained by gravity (Dumont, 1935, 88-89). The engineers who predominated in the Department of Public Works did not embrace Dumont's vision of modern agriculture. Nevertheless, once the loan was approved and projects were developed very little was ever done with regard to pump irrigation. As such, the Kẻ Sặt polder, by 1937, had received relatively little attention.[53]

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[51] The law that authorised the Governor General to contract the loan was passed on 22 February 1931 (VNA1/GGI 344, 1930-1937) and (Bernard, 1937a, 397).

[52] See Chapter 8 for a discussion of colonial efforts to establish rural co-operatives in Indochina. (Letter from Inspector General of Public Works in Indochina to the RST, 3 July 1930, VNA1/RST 80019, 1930). How the Department of Public Work's intended to apportion the 1931 loan with regard to hydraulic agriculture was set out in (Pouyanne, 1931).

[53] The Kẻ Sặt polder was the most hydrologically complex area within the central delta, as well as being one of the largest polders in the Red River delta. This region included all of Hưng Yên, southern Bắc Ninh and western Hải Dương. It was bounded on the north by the Canal des Rapides (Sông Đuống), the Red River on the east, the Thái Bình River on the west and the Canal des Bambous (Sông Luộc) on the south. It contains the Cửu Yên canal (See Chapter 3) and was finally

Pouyanne's plan to establish water-user co-operatives proved to be overly ambitious under the political conditions of the 1930s. It would have involved an extension of the limited hydraulic bargain that already existed in the midlands throughout the central delta. Co-operatives and large-scale hydraulic investments would have raised hydraulic and economic expectations among peasants in the central delta beyond the level to which the colonial regime was willing to commit. Originally, co-operativisation would have involved separating one thousand villages into groups of two to ten. The "individualism" of the "Annamites", however, made the colonial regime reconsider this formulation and conclude that it would be better to enforce groupings of six. These co-operatives would then, through a water tax, have to reimburse the Inspection General of Public Works for the cost of installing irrigation pumps. By 1938, having failed to source pumps from either the water user co-operatives or the metropolitan government, the colonial administration was still working to supply Hưng Yên, part of Hải Dương and southern Bắc Ninh with canal irrigation and drainage infrastructure.[54] As it turned out, peasants in these regions would have to wait another twenty years, until the construction of the Bắc-Hưng-Hải irrigation and drainage system, before they would see any significant progress in terms of large-scale irrigation and drainage.

The Brévié Plan

In the wake of the 1930-31 Nghệ-Tĩnh uprisings and a series of tax revolts, the United Front government in Paris was forced to acknowledge that political instability in Indochina was inevitable unless the life of the Vietnamese peasant improved. By the late 1930s, the relationship between hydraulic agriculture and larger developmental goals had waned considerably since the opening of the Vĩnh Yên irrigation network in 1923. In 1938, the Governor General of Indochina at the

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irrigated by the DRV beginning in 1958 (See Chapter 7). The area is now known as the Bắc-Hưng-Hải polder.

[54] (Letter from Inspector General of Public Works in Indochina to the RST, 3 July 1930, VNA1/RST 80019, 1930).

time was Jules Brévié. He argued that although the French-constructed hydraulic works had already improved agricultural productivity in the Tonkin delta, the colonial administration was obligated to do even more to address "the present demographic problems that have reached a degree of extreme seriousness" (Brévié, 1938, 719).

Brévié's plan involved constructing hydraulic infrastructure capable of irrigating 500 000 hectares throughout the Red River delta, which would result in an increase of 500 000 to 600 000 tonnes of rice. Such an increase would have been sufficient to feed the current population in the Red River delta (Brévié, 1938, 720). Presumably, any further surplus population would be encouraged to migrate.[55] With anti-colonial movements threatening French sovereignty in Indochina and war looming in Europe, Brévié went so far as to suggest that peasants be provided with special grants to buy land back from landlords (Brévié, 1938, 721-722). Brévié's plan received critical attention from Trường Chinh and Võ Nguyên Giáp in their consideration of the "Peasant Question" in Vietnam. They argued that Brévié's policy, which included, among other things, irrigation, migration, co-operatives and low interest loans did not address landlord rent oppression, the seizure of peasant land, and high taxes. Acolytes within the Indochinese Communist Party, Trường Chính and Võ Nguyên Giáp felt that the deficiencies in Brévié's plan proved that "the experienced colonialists have not yet grasped the key to the peasant problem (Trường Chinh & Võ Nguyên Giáp, 1974 (originally published 1937), 13-14)".

Brévié's plan for irrigating the Red River delta was as ambitious as any that had come before. It differed, however, from previous programs in that it was not designed to address directly the negative impact of drought and flood or contribute to economic development. Instead, by 1938, the colonial authorities were ridding themselves of their productivist pretences and using irrigation and modern agricultural techniques in order to establish food security and maintain political

control. Late-colonial thinking, therefore, with regard to hydraulic infrastructure, had reverted to the "proto-modernism" exemplified by the Nguyễn emperors. Despite Brévié's pronouncements, by 1937 the bulk of French investments in irrigation and drainage were still concentrated in the midlands of Tonkin where water was in demand and where expensive pumps were not required. The vast central and southern portions of the delta, where gravitational irrigation and drainage was ineffective, remained largely untouched.[56] Articulated in the twilight of French rule in Indochina, the Brévié Plan was just one more example of how the French recognised what ought to be done but failed to act accordingly.

Conclusion

This chapter has highlighted the legacy of Bédat's failure to commodify irrigation at Bazan. One result was that the bulk of colonial investments in irrigation infrastructure were made in the midlands of Tonkin where it was conceivable that an economic return on investment could be realised. Because the colonial officials had not established a hydraulic bargain with water users, peasants approached large-scale irrigation systems with scepticism. Their doubts, however, soon faded once the benefits of irrigation were made apparent and land, irrigated by the three main French-built gravity-fed irrigation systems, began producing two relatively stable paddy crops. Demand for irrigation was growing among peasants near Kép and Liên Sơn (Vĩnh Yên), for example, and the potential for a more widespread hydraulic bargain that would have included the central delta began to emerge by the beginning of the 1930s. The political implications of hydraulic development, as it was linked to economic growth and industrialisation, concerned many people within the colonial regime. Colonial engineers, however, were committed to

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[55] In the 1930s there were a number of different government-sponsored migration plans. One of them involved the creation of a "Casier tonkinois" in the Mekong delta where northern peasants could recreate their lost "homeland" (Hardy, 1998, 92-95).

[56] In 1940, Gourou concluded that only 60 000 hectares were being irrigated out of a possible 500 000 hectares in those areas where peasants were unable to provide irrigation for themselves (Gourou, 1940, 225).

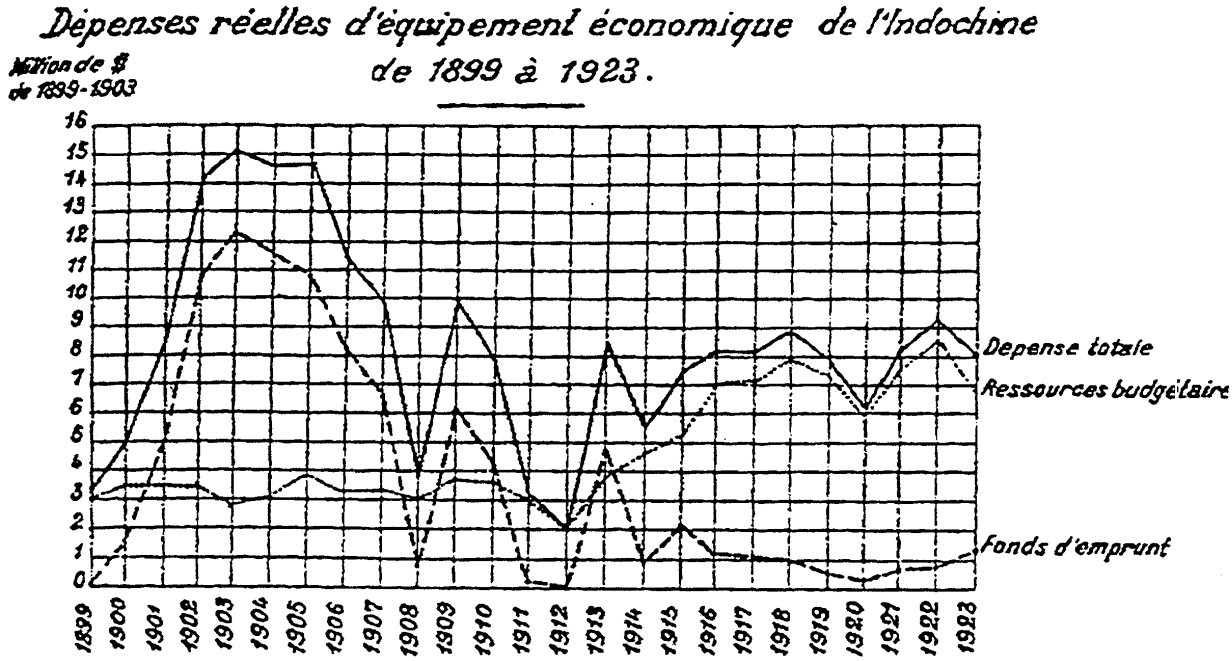
expanding the hydraulic bargain beyond the midlands and into the central delta, and Normandin's lobbying was not constrained by a shortage of statistical data or concerns of potential political upheaval.

At the end of the colonial era, large-scale canal irrigation in the Red River delta was not yet common. This would begin to change in 1954 as the new Communist Party state resolved to modernise irrigation and redesign, both physically and politically, the northern Vietnamese landscape. They did not let a lack of statistical data stop them from investing in large-scale hydraulic infrastructure and foreign aid from the Soviet Union and China helped overcome financial and material constraints. Chapter 7 examines how the hydraulic bargain evolved during the years 1954-61. This embryonic bargain was modified further as co-operativisation and irrigation modernisation became dual pursuits of the Party in the 1960s. This is the subject of Chapter 8. Eventually the demands of war and collectivisation lead to the disintegration of the hydraulic bargain, which had widespread implications for future of the centrally planned rural economy in the Red River delta.

Tables and figures

Figure 6.2 Public works expenditures 1899-1923 in millions of piastres

The top line represents total expenditure (*dépense totale*); the middle line represents funds from the colonial budget (*ressources budgétaire*); and the last line represents funds on loan (*fonds d'emprunt*).



Source: (Leurence, 1925, 137).

Table 6.1 Large-scale irrigation infrastructure in Tonkin up to 1937

Area concerned	Type of work	Duration of construction	Affected area ('000 ha)	Total expected expenditure ('000 piastre)	Actual of expected increase in paddy (tonnes)
Kép	Gravity-fed irrigation	1906-14	7.7	675	19 000
Vĩnh Yên	Gravity-fed irrigation	1914-22	17	1400	20 000
Sơn Tây	Pump irrigation	1928-32	10	1400	28 000
Thái Bình South/North	Dike building and drainage	1931-36	113	1700	100 000
Sông Cầu	Gravity-fed irrigation	1922-38	28	3100	25 000
Hà Đông-Phủ Lý	Drainage and gravity-fed irrigation	1933-39	50	6000	90 000
Miscellaneous			25	100	20 000
Total			250.7	14 375	302 000

Source: (Bernard, 1937a, 404)

Table 6.2 Irrigation systems built in Tonkin using the 1931 loan

Type of Work	Amount authorised under program (million piastre)	Total expenditure end of 1937 (million piastre)
Reinforcing dikes	9.6	9.6
Kẻ Sặt -- Hưng Yên -- Bắc Ninh South network	1.765	1.044
Nam Định North and Hà Đông Phu Ly network	6.030	5.288
Thái Bình network	1.68	1.404
Completion of Sông Tây network	1.4	1.381
Completion of Sông Cầu network	2.395	2.248
Total	22.870	20.965
Grand Total	42.062	36.421

Source: (Bernard, 1937a, 398)

Chapter 7 Marshalling "guerrilla peasants": Hydraulic management, 1954-61

Introduction

The DRV quickly realised that modern irrigation systems consisting of canals and sluice gates were not readily managed using traditional hydraulic management structures. As I discussed in Chapter 2, pond and creek irrigation was "a matter for the individual" or, at most, a village (Gourou, 1931, 112). This resonates with Alexander Woodside's argument that compared to China and Japan, pre-1954 Vietnam "suffered from an unusually low level of organized collaboration in agricultural change." In other words, DRV agricultural policy generally, and specifically with regard to irrigation modernisation, established a tension between state planning and a tradition of "decentralized guerrilla agriculture" (Woodside, 1970, 708). This tension was most apparent under drought conditions when water was in short supply. It was manifest in local-level conflicts over limited irrigation resources, in farmers with little or no experience with irrigation "systems" doing nothing to fight drought and in loud and protracted complaints levelled against local cadres. In order for the state to overcome traditional hydraulic management patterns, a hydraulic bargain with water users was essential.

This chapter considers the tensions between state planning and the "guerrilla peasant" during the period 1954-61, and the impact that an embryonic hydraulic bargain had on the VWP's decision in the late 1950s to shift its focus away from small-scale and toward large-scale hydraulic infrastructure. Almost immediately after the DRV began to modernise irrigation and drainage infrastructure, water users were becoming dependent on large-scale canals and pumps. This was especially true in Thanh Hóa province where French-built systems were already in place. In Hải Dương province, however, communes and villages were forced to find local solutions to irrigation and drainage problems. By the end of the 1950s, as the overall focus of hydraulic development settled on large-scale

infrastructure, the demands placed on water users and the VWP helped establish a highly sophisticated hydraulic bargain. Mutual expectations and obligations have been the basis for the hydraulic bargain, and, in the late 1950s and early 1960s, the Party and villagers were fulfilling their respective halves of the bargain to a degree that would not be repeated during the rest of the 1960s and 1970s. In the present chapter I will explore the development of the hydraulic bargain within the context of a shift in Party policy away from hydraulic modernisation in order to establish food security and toward a policy of large-scale socialist industrialisation. It is out of this transition that the prototypical Vietnamese developmental state begins to emerge, and, within the framework of the Party's developmental vision, the ideological foundation on which to build the hydraulic bargain.

In the first section of this chapter, I consider the fate of hydraulic infrastructure during the war against the French. I then examine, in the second section, the early stages of the hydraulic bargain, and how it emerged as VWP priorities moved from stabilising food production and toward increased agricultural productivity in order to support large-scale industrialisation. The third section looks at how the state's role in modernising hydraulic infrastructure in the second half of the 1950s was constrained by a shortage of qualified technical personnel. Without technical staff that could support the Party's hydraulic development policies, it was difficult for the state to maintain its half of the hydraulic bargain. The fourth section of the chapter provides explanations for the DRV's decision to reduce its reliance on small-scale infrastructure and focus on large-scale hydraulic systems.

War and hydraulic infrastructure: 1945-54

By 1945 hydraulic infrastructure in the Red River was in many areas far superior to what had existed in the late 19th century. Dikes along the Red River had been heightened and strengthened, while some areas in the hilly midlands had benefited from the construction of large-scale gravity-fed irrigation schemes. By 1954, however, as a result of bombing and sabotage campaigns by the French military, a large number of dams, sluice gates and canals had been seriously damaged or

destroyed. This resulted in hundreds of thousands of hectares of land being left fallow, which left many people suffering from malnutrition or famine.[1] The situation became so dire that in 1955 approximately 155 000 tonnes of Burmese rice had to be imported under a Soviet-financed aid package so as to avert widespread famine (Fall, 1964, 153; Post, 1989, 264).

Once the VWP had gained full control of the northern half of Vietnam in 1954, it was faced with many of the same difficulties that had confronted the Nguyễn rulers at the beginning of the 19th century: weakened hydraulic infrastructure, abandoned land and food shortages. It was imperative to strengthen and expand the flood control network in the Red River delta. Despite the significant improvements that the French had made to the Red River delta dike system, many areas had remained neglected. One of the major shortcomings of the French hydraulic construction program was that it had largely ignored dike building along smaller river systems, like the Thái Bình and its tributaries such as the Cầu, Đuống and Thương Rivers, in favour of the Red River. The dangers of such neglect became apparent in 1937 when dikes broke in two dozen places within the Thái Bình watershed, which caused flooding on 120 000 hectares in Bắc Giang, Bắc Ninh and Hải Dương province (Phan Khánh, 1981, 127). When a single dike break occurred along the Đuống River after a decade of stable flood control in 1936, the French were forewarned that flooding along secondary river systems was a possibility. The colonial administration, however, took little notice (Simonet, 1937, 3).

The failure of French-constructed hydraulic infrastructure provided a potent anti-colonial symbol for the Việt Minh. From the perspective of hydraulic infrastructure, the 1945 flood underscored the vulnerability of French colonial power. Impressive examples of engineering such as the Vũ Gi siphon at the southern end of the Liên Sơn (Vĩnh Yên) irrigation system and the sight of rollers

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[1] (Responsibilities of the hydraulics branch in the economic restoration phase, undated, c. 1955, VNA3/NTL 1 VV, undated, c. 1955). Land was also left fallow in "white zones", where the French had a shoot on sight policy. In these areas peasants would abandon land out of fear. The total area of

and bulldozers dedicated to dike construction must have inspired awe among the Vietnamese.[2] Equally remarkable was the Đáy river dam that was built over a four-year period between 1934 and 1937. The dam was designed as the entrance to a spillway (*đập tràn*) that would use the Đáy River basin as a means of diverting excess water in the Red River away from Hanoi and downstream provinces. As I mention in Chapter 4, the Đáy had been periodically blocked in the earlier part of the century as a way of reducing floodwaters around Sơn Tây province and the area south of the Red River. This newly constructed dam was ostensibly the height of engineering sophistication (see Chapter 6).

The Đáy River dam consisted of a series of seven gates, each approximately thirty-four metres wide. Each gate could be opened in order to allow floodwaters from the Red River to flow southward into the Đáy River. The dam was first used in August 1940 but the gates had to be closed before they could be fully opened due to a malfunction when one of the gates threatened to break free of the dam. The next time the dam was used was during the August floods of 1945, which again proved disastrous. The same gate that had collapsed in 1940 did so again. Why the French failed to solve the problem is unclear. One reason could have been that colonial authorities had been trying to conceal the 1940 failure in order to avoid

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abandoned land in 1954 is estimated to have been between 138 000 and 143 000 hectares, approximately seven per cent of total cultivated land in the DRV (Post, 1989, 262).

[2] While constructing the Liên Sơn irrigation project of 1923, the French needed to find a way for the main canal to traverse a small river in the southern part of Vĩnh Yên. The river was temporarily dammed so a concrete pipe about four metres in diameter could be placed under the riverbed. This pipe acted as a siphon pulling water in and then pushing it out on the opposite side of the river. Each year there were incidents where people and livestock would fall into the canal and get sucked into the siphon. They would spin around inside for a couple of minutes until they were shot out the other side. When we arrived at the site in November 2001, the French siphon had been abandoned and an aqueduct had recently been constructed to replace it. A middle-aged woman yelled out from the other side of the canal that the aqueduct was new but poorly constructed. It was Vietnamese, she explained, as she walked toward us. "Look", she showed us cracks in the concrete, "it is only a year and a half old and it is already leaking." "The siphon", she said, "had been built very well by the French." For nearly eighty years the water of the Liên Sơn system would have run incessantly through the underground pipe. Despite the harsh rule of the French their engineering standards were very high, which meant that at least with regard to quality construction they were capable of fulfilling their half of the hydraulic bargain. This fact was respected by people who would have depended on the water that the canal provided (Interview Vũ Gi, Vĩnh Phúc province, November 2001).

criticism from the metropolis (Phan Khánh, 1981, 133). This, however, would have been a difficult task considering the pride of place of the Đáy River dam among large-scale hydraulic infrastructure in Tonkin. It is more likely that the colonial regime had invested as little as possible on the repairs, which is a logical conclusion considering that cost savings were the reason for choosing the original technical design.[3] Coupled with the famine and flooding of 1945, the Đáy River dam failure, caused largely by the parsimony of the colonial regime, would have fuelled anti-colonial sentiment.

During the resistance war against the French, hydraulic infrastructure suffered serious damage. According to Vietnamese sources, the French targeted hydraulic infrastructure as a means of obstructing the Vietnamese war effort. "The more the French suffered defeat the more they exposed their savagery," is the way two Vietnamese authors have summed up the French attacks against hydraulic infrastructure (Phan Khánh, 1997, 27; Nguyễn Hoài, 1965, 60). The French military's principal aim was to destroy dikes in order to flood paddy land. This began in 1949 with the bombing of a dike in Bắc Ninh province and attacks against a dike repair crew (*hộ đê*) in Vĩnh Phú (Vĩnh Phúc) province. By 1951 dikes had become a common target for French saboteurs and bombers (Phan Khánh, 1997, 27-28).

In addition to dikes and sluice gates, French-built irrigation projects were also targeted. Using a secret decree 48/ZN -- presumably captured by the Việt Minh -- dated 11 January 1952, Phan Khánh quotes French General Vullemey as follows:

> In the 1952 campaign, during the "rice war" (*chiến tranh lúa gạo*), destroying Việt Minh crops was a necessary military action. As such, we must destroy dams and the means to irrigate paddy fields (Phan Khánh, 1997, 33; Phan Khánh et al, 1995, 155).

In June 1952, the Thác Huống dam was bombed and in the same month the Vạn Gìa sluice gate was destroyed causing serious problems for 9180 hectares of paddy along the Cầu River irrigation system. The Cầu Sơn dam (Kép) was also bombed

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[3] The design specifications were contained in a report entitled *Rapport de mission de Monsieur Bigorgne*, which was housed at the Ministry of Hydraulics archive (Phan Khánh, 1981, 130).

(Phan Khánh, 1997, 33, 35; Viện Kinh Tế, 1966, 152). It is difficult, however, using available sources, to measure the true extent of the damage caused by French bombing campaigns, as Phan Khánh refers to the dams being "phá đập", which could mean either that the dams were destroyed or that they were damaged so as to cause them to leak.

On the one hand, the Bái Thượng dam on the Chu River in Thanh Hóa province was, in fact, destroyed. I have seen photographs of the remnants of the dam taken in 1954 and read documents referring to aid requests made to the Soviet Union for construction materials to repair the damage. One account based on archival materials gathered from the Ministry of Agriculture notes that the French used eighty-nine bombing passes over five days to destroy the Bái Thượng dam (Nguyễn Hoài, 1965, 60). On the other hand, the manager of the Cầu Sơn dam, in Bắc Giang province, when asked about war damage, claimed that the French bombed the Cầu Sơn dam but it did not receive a direct hit. The bombs exploded just downstream but close enough to have caused some damage.[4]

Regardless of the cause -- either due to neglect or malice -- of the dismal state of hydraulic infrastructure, significant investments in hydraulic infrastructure were desperately required by the time peace was established in 1954.[5] This was true not only for the Red River delta but also throughout the DRV.[6] Priority was given to those areas that had already or were scheduled to undergo land reform and where destruction had been most serious. The repairs were often done quickly with little attention to quality. An example of this was the Bái Thượng dam, which had been repaired throughout the 1950s. Despite this, the dam was described in 1963 as follows:

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[4] (Interview Cầu Sơn dam, Bắc Giang Province, September 2001). Presently the dam has several leaks and is due to be repaired using loan money from the World Bank and the Asian Development Bank.

[5] As a result of damaged large-scale infrastructure, the proportion of irrigated land serviced by small-scale infrastructure rose steadily between 1946 and 1954. (See Figure 7.3).

[6] The French attacked not only hydraulic systems in the hope of disrupting agricultural production but also targeted draught power such as buffalo and cattle. The French military is noted to have considered "the death of one buffalo equal to the death of two Vietnamese guerrilla fighters" (*bắn một con trâu bằng giết hai người du kích*) (Viện Kinh Tế, 1966, 152).

> Each rock in the headworks of the Bái Thượng dam has been weathered [*phong hóa*], the concrete on the face of the dam is rotting -- there are places that are only sand and gravel. The dam has serious leaks and every year the lower section of the dam crumbles away due to erosion.[7]

The work that was done in the 1950s would have brought the French-built systems up to a reasonable standard but this was in fact only designed to "patch them up" (*chắp vá*). Irrigation canals and dikes were also restored. Local farmers were assigned to work in their own areas and were required to contribute labour, cash and rice -- what the government described as an "irrigation tax" (*thủy lợi phí*). All of this was to be done under the motto "people with lots of paddy fields contribute lots, people with a little contribute a little."[8]

In 1955, the VWP was hoping to mobilise twenty-six million labour days (*nhật công*), which meant on average each province was responsible for providing 5000 workers for a total of six months.[9] The scheduled period in which the work was to be done set out a nearly impossible task.[10] All work was to be completed before the 1955 Autumn crop in order to be in place to irrigate the 1956 Spring crop. Such demanding labour targets have been the hallmark of the Communist Party's approach to hydraulic construction work, and were instrumental in defining the terms of the socialist hydraulic bargain. Although targets were difficult to attain, the VWP proved that it was possible to move peasants beyond the confines of their village in order to work on projects that were of provincial or even national interest. This is in contrast to the difficulties that Minh Mệnh and other Nguyễn emperors had mobilising labour for large-scale projects. One explanation for this difference is the development, in the context of anti-colonial movements, of a national ethos among Vietnamese peasants that was less pronounced in the 19th century.

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[7] (Minutes of meeting to consider and approve responsibilities for the overhaul design of the Chu River canal system in Thanh Hóa province, 21 November 1963, VNA3/BTL 46 VV, 1963).

[8] "người nhiều ruộng gốp nhiều, người ít ruộng gốp ít".

[9] (1955 Responsibilities for the Hydraulics Branch, undated, c. 1955, VNA3/NTL 1 VV, undated, c. 1955).

[10] The fact that work on many of the systems targeted in the 1954-55 restoration program continued on for many years suggests that the VWP failed to meet its labour mobilisation targets.

Food insecurity and traditional irrigation management

The food shortages that characterised the terrible state of the rural economy in the Red River delta following the restoration of peace in 1954 formed the basis for what was known as the "cereals problem" (*vấn đề lương thực*). This crisis was the impetus behind efforts to restore and improve hydraulic infrastructure in the 1950s. If the VWP were to re-establish minimal food security in the DRV, it was imperative that everything from local irrigation systems to the dikes along the Red and other river systems in the DRV be improved. Canals would have to be dug creating irrigation networks that cut across village boundaries and which required new and more sophisticated management practices. What the DRV discovered in the 1950s, however, was that traditional irrigation management models were not intended to control large quantities of labour, design sophisticated irrigation networks or finance on going maintenance.

As the VWP's irrigation modernisation program gained momentum, one of the first tasks was to construct sluice gates through dikes (*cống dưới đê*).[11] The same dikes that made large-scale irrigation possible often undermined the viability of pond and creek irrigation. In Nam Sách district in 1958, the appearance of sluice gates had an almost immediate impact on villagers' attitudes toward modern irrigation infrastructure. Cadres within the Ministry of Transportation, which was at the time responsible for managing hydraulic infrastructure, complained that peasants were neglecting to improve local irrigation systems and were already beginning to "depend" on capital intensive infrastructure.

> As dikes have fought waterlogging for areas in Nam Sách and Chí Lình [the commune that borders Nam Sách to the north], residents have become

[11] Dikes first appeared along the Kinh Thày River in Nam Sách district, Hải Dương province, in the first decades of the 20th century. One of the first dikes on the Kinh Thày was built by the French and Vietnamese landlords. It began with a sluice gate at Hàn Liễu. From there a dike was built as far as Cầu Lai using private capital. Before this dike and sluice gate system was constructed, during the rainy season (*vụ mùa*), water would flow in from the Kinh Thày River and flood villages in Quốc Tuấn commune (Interview, Quốc Tuấn commune, 16 May 2001/1).

> concerned above all else about sluices to drain water and are rarely concerned with "keeping water".[12]

As was the case in other areas, the prospect of large-scale hydraulic systems providing an endless supply of water to stave off drought sent many communes clambering for mechanical pumps. Hence, they neglected to mobilise the labour necessary to implement traditional irrigation methods such as land terracing.[13] Neglecting to "keep" rainwater while relying on expensive and scarce pumps were, by the late 1950s, early signs of a growing local dependence on state- subsidised infrastructure. This dependence would eventually translate into pressure from below for the Party to channel investment into the large-scale headworks that would bring water to the local canal networks that villagers had been constructing.

Drought and dependency[14]

The VWP's efforts to modernise irrigation were tested wherever and whenever drought appeared. By 1958, a movement to "eliminate drought in three years"[15] was implemented, but, despite these efforts, drought between 1960 and 1963 equalled the worst years of the late 1950s (see Figure 7.2). Coupled with the "eliminate drought" campaign, a hydraulics conference for deltaic provinces in the DRV was convened in November 1958. This conference, which was held in Hải Dương province, concluded that although large-scale irrigation projects would continue to move forward, small-scale irrigation would be paramount, and that keeping water would be the foundation of small-scale irrigation schemes.[16] Because the state had yet to construct the large-scale irrigation systems that the Party believed would ensure irrigation supplies, "the People" would need to take control of their local situations in order to fight drought.

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[12] (VNA3/BTL 7 VV, 1958).

[13] *Ibid.*

[14] See Chapter 2 for a discussion of the term dependency as it refers to large-scale hydraulic development in post-1954 northern Vietnam.

[15] "diệt hạn 3 năm".

The provinces of Thanh Hóa and Hải Dương were important testing grounds for the VWP. Thanh Hóa was a province with a colonial-era canal network built to distribute water from the Bái Thượng dam on the Chu River. In Hải Dương, located in the central Red River delta, however, there were few canal systems and fighting drought meant digging new canals. One would expect that by the end of the 1950s, with the recent repairs to its canal network, Thanh Hóa would prove to be much more capable of fighting drought than Hải Dương. The reality, however, was that where canals already existed peasants were reluctant to construct infrastructure to "keep water" and instead, as I explain below, relied on the large-scale canal systems to their own detriment.

In March 1959, Thanh Hóa province was suffering through its second consecutive drought-affected Spring crop. Problems had begun the previous autumn in Hậu Lộc and Lộc Tân districts, two of the most severely affected districts. As autumn turned to winter and it had still not rained, drought began to take hold and the people became "imbued with pessimism and negativity; and there was still no resolve to overcome difficulties."[17] Just under one third of the total cultivated area of the province was experiencing drought conditions. The reasons for the drought could not be chalked up to a lack of rain, reported a team of investigators sent to examine the situation. Generally speaking there was no lack of water in Thanh Hóa although no rain had fallen since the previous September. According to the research team investigating the situation, even the driest districts

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[16] (Report by Comrade Tran Hữu Đức member of the Party Central Committee and Chairman of the Party's Rural Development (công tác nông thôn) Committee, November 1958, VNA3/BTL 1 VV, 1958).

[17] (Report No. 1, 3 March 1959, VNA3/BTL 31 VV, 1959). The water control situation in these two districts continued to be dismal for several more years. Productivity remained low and co-operatives were dependent on rainwater for irrigation. In 1963, the Minister of Hydraulics, Hà Kê Tấn approved the construction of a pumping station to serve Hậu Lộc and Hoàng Hóa. The Ministry insisted that the locality take responsibility for constructing the smallest canals in the system, those that had a flow rate of less than one cubic metre per second. The Ministry stressed the importance of this, because without the local canal systems in place the pumping station would serve no purpose for the locality. (Minutes from the meeting to consider and approve the design responsibilities for the system of electrical pumping stations in Hoàng Hóa, Hậu Lộc districts, Thanh Hóa province, 8 June 1963, VNA3/BTL 46 VV, 1963).

had access to both river and well water -- although the authors of the report never elaborated on how peasants might get this water into their fields. Despite a recent outbreak of flu (*bệnh cúm*), the investigative team reported that there were more than enough healthy villagers among the 1.5 million people affected by the drought to overcome the difficulties they were facing.[18] The team also believed that despite the lack of rain there were obvious ways that the drought could be overcome.

During the 1959 drought, people pulled water (*tát nước*) for days at a time and still did not have enough water to plant seedlings.[19] Other communities put their faith in accessing the supply of twenty-one pumps owned by the province. An unspecified number of pumps, however, were being repaired at the height of the drought during the first few months of 1959. In many places people were beginning to go hungry (*thiếu ăn*).[20] Despite the Party's longstanding conviction that digging canals and pulling water could overcome a lack of rainfall, even those districts that already had canals were not immune to the effects of drought. By the time the Central Committee research team returned for their follow-up visit at the end of March, there were still several districts that, although they had canal networks (*nông giang*), were unable to plant their entire arable areas. In Yên Định district, for example, 1500 hectares out of 2000 were planted and villagers there were running

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[18] (Report No. 1, 3 March 1959, VNA3/BTL 31 VV, 1959).

[19] Irrigation canals that flow right to the edge of the paddy fields have not solved the problem of having to pull water. In order for water to flow directly into fields, merely by manipulating a small sluice gate, water in the canal must be higher than the water in the field. In areas where water is scarce this type of system can be easily implemented. However, in areas of the Red River delta where drainage is imperative, whenever possible the water in the irrigation canals is kept below that in the paddy fields. Floating canals or *canal haut* as they are known in French, are substituted for sunken canals or *canals bas*, which allow a paddy field that is already filled to escape being flooded by a big rainstorm (Gourou, 1964, 106). In Vietnamese, sunken canals are called *kênh mương chìm* and floating varieties are *kênh mương nổi*. The Chinese preferred to construct floating canals and as such Vietnamese hydrologists that were trained in Nanjing in the 1960s were instructed in how to build floating canals. Such canals, however, are best built using concrete and because of wartime shortages there was little choice but to continue constructing earthen, sunken canals (Interview Diệp Đình Hoa, 21 April, 2000).

[20] (Minutes from the meeting to consider and approve the design responsibilities for the system of electrical pumping stations in Hoàng Hóa, Hậu Lộc districts, Thanh Hóa province, 8 June 1963, VNA3/BTL 46 VV, 1963).

out of water.[21] This situation was not unique to Thanh Hóa or the Chu River system. The French-built gravity systems in the northern midlands -- Liên Sơn, Sông Cầu, Cầu Sơn -- were notorious for running low on water during the Spring crop, but because most years rainfall could augment canal irrigation, work to "keep" water was often neglected.[22]

Drought in areas where canals provided the bulk of irrigation inevitably led to water theft. Communes at the end of the Chu River canal network could not depend on water in the canals being divided evenly. Upstream communes were known to cut through (*đào xẻ*) the canal embankments and allow water to flow into their fields. This strategy, if not combined with some method to limit the flow of water from high ground to low ground, would result in low land being waterlogged, with high land and downstream communes continuing to suffer from drought.[23] The result was a situation where irrigation supplies reached only one third of demand, leading people to complain bitterly (*oan trách*) to the cadres who were in charge of managing canals. Even in areas at the beginning of the canal system where water was relatively plentiful, fights (*ẩu đả*) would break out with communes destroying canal embankments to take water (*phá bờ lấy nước*), all of which provoked feelings of "disunity".[24]

Disunity was a euphemistic description of the situation. The Central Committee research team blamed the seriousness of the drought on local cadres, who, it was claimed, failed to mobilise people to "keep water".

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[21] (Report No. 2, 23 March 1959, VNA3/BTL 31 VV, 1959).

[22] (Report on investigations of experimental work done on irrigating paddy, undated, VNA3/BTL 11 VV, 1959).

[23] (Investigation findings: Hydraulic planning committee for eight communes at the end of arterial canal 8/KN in the Chu River system (Thanh Hóa), undated, VNA3/BTL 11 VV, 1959).

[24] *Ibid.* To what extent water theft was a problem during the colonial period is unclear. Further research is needed in this area. However, it is safe to say that potential water conflicts along the Chu River canal network would have been exacerbated by the damage done to the Bái Thượng dam and neglected canal networks.

> Assessing the good points and the shortcomings proves that in order to have a drought of this magnitude leadership must lack resolve, control [*chủ quản*] and a concrete plan.[25]

These conclusions only rationalised the problems that local-level irrigation systems were facing in the late 1950s, while neglecting that the vagaries of nature were the main cause of the drought. Although keeping water was the basis for pond and creek irrigation in deltaic regions of the DRV, "evacuating water" (*tháo nước*) was an equally important part of the twin processes of irrigation and drainage. In hindsight, once an area was facing a drought it is easy to conclude that the water used in the Autumn crop ought to have been left in the fields. However, for the peasant, unable to predict the future, a field full of water can appear as likely to lead to waterlogging as it would a hedge against drought.

The Thanh Hóa example proved that canals alone could not overcome water shortages. In some cases the fact that communes were relying exclusively on canals for irrigation, especially communes near the end of the canal network, was actually helping to create drought conditions for peasants.[26] One suggestion for overcoming drought was to convince water users that "keeping water" by terracing fields ought to be the primary means of irrigation, with canals acting as a secondary water source.[27] In theory this was a sensible proposition, but it would have meant digging ponds as well as erecting field dikes and dams, all of this on top of the investments that villagers would have made earlier in the decade to repair war-damaged canal

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[25] (Report No. 1, 3 March 1959, VNA3/BTL 31 VV, 1959).

[26] The "tailenders'" situation is a common problem found in canal irrigation systems. Tailenders tend to suffer at the hand of the "narrowly selfish headenders", who ignore the scarcity that their water use practices encourage. In return, the tailenders have little incentive to participate in the on-going maintenance of the system (Ostrom & Gardner, 1993, 96).

[27] (Investigation findings: Hydraulic planning committee for eight communes at the end of arterial canal 8/KN in the Chu River system (Thanh Hóa), undated, VNA3/BTL 11 VV, 1959). This was also the conclusion of the Vĩnh Phúc Provincial Hydraulic Service (*Ty*), which was responsible for managing the Liên Sơn irrigation system. In their 1959 summary report, the Service described in glowing terms a commune Chairman who claimed, "my commune doesn't need canal irrigation." In reality his commune had limited canal-water use to only twenty per cent of cultivated area, with the rest presumably irrigated using traditional water keeping techniques. The province concluded, "canals are only for assistance". (Report on work to manage canals from when peace was first established until 1959, Vĩnh Phúc Hydraulics Service, 6 March 1958, VNA3/BTL 22 VV, 1959-1960).

networks. There is little wonder, therefore, that during the late 1950s, an "ideology of dependence" had been built up around canals along the Chu River irrigation system.[28]

The difficulties in Thanh Hóa are in contrast to the relative success of local-level irrigation and drainage work between 1957 and 1959 in Hải Dương province. As part of a 1957 drought alleviation program, Hải Dương province reported that among a number of local irrigation methods such as dams, field dikes and sluice gates designed to "keep water" in ponds, fields or creeks, two new arroyo (*ngòi*) were dug while fifty-seven were dredged.[29] By 1959, another drought ridden year for Hải Dương when it failed to rain in January or February, the province claimed to have dug 349 new and dredged 1145 old arroyos.[30] The Party explained that Hải Dương was able to mobilise labour and construct and dredge canals because of the confidence that the 1958 Hải Dương Hydraulics Conference had given local cadres.[31] Although this is possible, a more likely explanation would be that, without large-scale infrastructure on which to rely, peasants in Hải Dương were left with no option but to construct local irrigation and drainage networks.

At the 1958 Hydraulics Conference, Central Committee member Trần Hữu Đức in his report to the delegates admitted that as he visited different districts and communes in Hải Dương, he forgot about rumours that Hải Dương was not "keeping" water. Instead, he praised the authorities for mobilising and organising the people to work on irrigation and drainage projects. This work, he said, had helped to reduce the impact of natural disasters and reduced the costs borne by the state.[32] Despite the accolades and the impressive array of hydraulic statistics, the

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[28] (Investigation findings: Hydraulic planning committee for eight communes at the end of arterial canal 8/KN in the Chu River system (Thanh Hóa), undated, VNA3/BTL 11 VV, 1959).

[29] (The situation and work done to fight drought to prepare for the 1958 Spring crop, VNA3/BTL 5 VV, 1958).

[30] (Summary report of hydraulic work in 1959, Hải Dương Hydraulics Office, 2 January 1960, VNA3/BTL 22 VV, 1959-1960).

[31] *Ibid.*

[32] (Report by Comrade Tran Hữu Đức member of the Party Central Committee and chairman of the Party Committee on Rural Development, undated, VNA3/BTL 1 VV, 1958).

Hải Dương provincial authorities continued to complain that local hydraulic projects were too limited,

> They only pay attention to work which leads water [*dẫn nước*], that drains water through arroyos or sluices. They build embankments to enclose fields, all those things that are in front of their face [*trước mặt*]. They still lack the sense of the big picture [*tòan diện*] in order to serve the long term.[33]

These are the same criticisms that Phạm Thận Duật and colonial bureaucrats levelled against peasants in the 19th and early 20th centuries (See Chapters 3 and 6). But, considering the degree to which peasants were mobilising to construct hydraulic works in the mid-1950s, is this a fair assessment of peasant attitudes? Peasants were often caught at one extreme or the other. On the one hand, if they relied on large-scale systems they were upbraided for their "dependence". On the other hand, when localities participated in constructing a district-level project, while neglecting their responsibilities at a large-scale work site, they were criticised for being shortsighted.

Although rates of labour mobilisation in the early years of the DRV improved significantly when compared to the colonial and Nguyễn eras, it was difficult to generalise about the state of hydraulic infrastructure in the late 1950s. Apart from Hải Dương, in Thanh Hóa, where there were difficulties getting communes to co-operate in order to share water, the Party criticised the peasantry's faith in large-scale canal networks as dependency. In Bắc Ninh province there were neither the large-scale systems on which peasants could rely nor any progress encouraging peasants to find local solutions to combat drought. There were many localities in Bắc Ninh that "refused" (*không chịu*) to "keep water". Likewise, there were people pursuing "individual benefits" (*lợi ích cá nhân*), in other words, stealing water whenever possible. The Bắc Ninh provincial authorities concluded, not surprisingly,

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[33] (Summary report of hydraulic work in 1959, Hải Dương Hydraulics Office, 2 January 1960, VNA3/BTL 22 VV, 1959-1960). Such complaints continued to appear into the 1970s. There is even a saying describing what the Party considered to be the shortsightedness of the masses: "tham bát, bỏ mâm" (greedy for the bowl, unconcerned about the tray). It was a pejorative description of "the small producer ideology" (*Hải Hưng,* 1978a).

that peasants suffered from a pervasive ideology of dependence on both the state and nature.[34]

The problems the VWP faced with regard to fighting drought stemmed from a general perception at the higher levels of the Party that village and commune authorities could easily manage local-level canal systems. What this attitude failed to recognise, however, was that traditional patterns of irrigation management involved *individual* irrigators, who, in the past, had never been well organised on a commune or perhaps even a village level. Formal management of pond and creek irrigation in the central Red River delta rarely took place above the family or multiple household level. In fact, many people, before the VWP began encouraging local-level irrigation systems, had not been actively irrigating their fields. They depended instead -- a measure of peasant passivity according to the VWP -- on rainwater for irrigation, a technique, which, for the most part, would have required little if any co-operation with other peasants.

In this context, it was counterproductive, for example, for the state to criticise peasants for depending on, "ỷ lại", an irrigation system in Thanh Hóa or Vĩnh Yên that had only recently, following the damage caused by French bombing, been reconstructed using the labour resources of those same peasants. The fact that peasants came to rely on, "phụ thuộc", an irrigation system that was incapable of meeting their demands, and which the state had only recently pressed them into repairing, is hardly blameworthy. The Party encouraged peasants to "keep water" by terracing fields, digging ponds and ditches, but these projects would often involve village level organisation, something that, as far as irrigation management was concerned, was a rarity. Therefore, when local-level systems were constructed they were often inefficient and poorly managed. Over the long-term, more revolutionary solutions would be required. By late 1959, mutual aid teams were becoming more common as the VWP prepared the way for widespread co-

[34] (Summary report of hydraulic work in 1959, Bắc Ninh Hydraulic Office, 2 January 1960, VNA3/BTL 22 VV, 1959-1960).

operativisation (*hợp tác hóa*). An important responsibility of co-operatives (*hợp tác xã*) was mobilising peasants and arbitrating conflicts within irrigation systems, which went a long way to helping the state to institutionalise the hydraulic bargain.

The state's role in hydraulic modernisation

Just as the state is paramount in Wittfogel's theory of oriental despotism, it is equally vital to the establishment of a hydraulic bargain. Implicit in the movement to collectivise the rural economy and organise peasant farmers into agricultural co-operatives was the capacity of the state to support, both financially and technically, these organisations as well as the hydraulic infrastructure for which they would be responsible. Successful co-operative management of large-scale hydraulic infrastructure involved creating a network of technical staff that could be deployed from the Ministry down to the commune. This corps of cadres required a breadth of knowledge that would have included constructing and managing everything from multi-pump pumping stations to co-operative field dikes. Unfortunately, this was going to be difficult to achieve, especially in the short term.

Bureaucratic capacity: The colonial legacy

The colonial hydraulic bureaucracy in Tonkin, at its height in the 1930s, consisted primarily of the Department of Public Works, which was responsible not only for hydraulic infrastructure but also the construction of roads, railways, seaports and public buildings. The vast majority of technical staff within this agency was French. In fact, as I mention in Chapter 6, the Department suffered a severe shortage of qualified building site managers and engineers when many of them returned to France to fight in the First World War. Although, at the time, there was not yet a school in place to train Vietnamese engineers or scientists, in 1902 the Governor General of Indochina, Le Myre Devillers, established a classification system for indigenous staff of the Public Works department. Eventually, schools did appear where Vietnamese received training in science, although the number of graduates was small.

> With a limited quantity of trained recruits -- around thirty people in all of Indochina -- having graduated from one field of science, students would then proceed to enrol in another. Moreover, because of the very demanding recruitment procedures only those children of mandarins or from wealthy families would have the means to study. Out of those who did graduate the majority would go to work on the railways, mines or in architecture. Very few people would move into hydraulic work (Phan Khánh, 1981, 237).

What the French constructed was a small well-trained indigenous scientific elite with very little interest in hydraulics. For the most part, however, the French considered the Vietnamese to be the brawn, not the brains, behind colonial public works schemes.

This is underscored in a 1925 overview of the operations of the Department of Public Works. In the section concerning Vietnamese labour, Pouyanne, who was at the time the Inspector General for Public Works in Indochina, describes how to recruit and manage indigenous workers. "Vietnamese labourers are easy to employ; they are skilful and obedient", was Pouyanne's conclusion concerning the qualities of his indigenous workforce. One of the most serious concerns for the Department of Public Works was that local overseers often exploited indigenous labour recruited by Vietnamese contractors; although, as far as Pouyanne was concerned, resolving this matter was out of the hands of colonial administrators. Pouyanne's report provided tips regarding the Lunar New Year (*Tết*), noting that, during the celebration, overseers should expect that nothing will be accomplished for between eight and fifteen days. And, above all else, workers want to be able to return easily to their villages (Pouyanne, 1926, 488-494). Thus, building hydraulic infrastructure was dependent on having a reasonable road network to transport conscripted labour.

As the overall transportation infrastructure improved in Tonkin moving labourers between worksites and their villages became easier, broadening the range

of possible hydraulic construction projects.[35] This also increased demand for skilled labour. Beginning in September 1940, French cadres were unable to move easily between France and Indochina, and a lack of properly trained Vietnamese staff meant that indigenous cadres were unable to pick up the slack. Consequently, the French regime in Indochina issued an *arrêté* in August 1944. This decree called for the creation of a training school for public works cadres designed to increase the technical skills of indigenous staff, while not training them as full engineers (Phan Khánh, 1981, 238).[36] The shortage of well-trained Vietnamese technical cadres in the mid-1940s led directly to the lack of skilled labour in the DRV in the mid-1950s.[37] Following the end of the War of Resistance the vast majority of French engineers had already returned to France while those who remained were looked upon with suspicion and were rarely given serious responsibilities. Likewise, Soviet and Chinese technicians were never available in sufficient numbers to fill the yawning gap that existed between the DRV's technical needs and capacity.

> Until the first graduating class of 633 engineers left Hanoi Polytechnic Institute in December 1961, the 12 000 textile workers at Nam Định had *no* engineers at all (the French had employed forty-seven engineers or supervisors), while the Hôn Gay coal mine complex was under the supervision of *two* "technicians" where the French had used 150 engineers and supervisors to control the operations of 11 000 miners (Fall, 1964, 139).[38]

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[35] An elderly gentleman I interviewed in Vĩnh Phúc province told me that in the 1920s and 1930s he had travelled well away from his home to work at colonial hydraulic worksites (*chantiers*) in Bắc Giang and Thái Nguyên provinces (Interview Vũ Gi, Vĩnh Yên province, November 2001).

[36] The French had been considering opening an indigenous school to teach science for many years. In July 1938, an editorial in the Vietnamese-language weekly "Ngày Nay" (Today), refers to a government committee that was to look into opening a "School to teach practical science" (*Trường dạy khoa học thực hành*). The author welcomed such a school, but added that what was really needed was a Science University, to complement the Law and Medical Universities that were already in place (Hoàng Đạo, 1938). By 1944, only the pressure of a global crisis convinced the French to begin construction on a science training school.

[37] During the resistance war the Hydraulics Bureau in the Ministry of Transportation consisted of only six cadres at the central level who had both political and technical responsibilities. (Investigation into leadership organisation, personnel, work style and routine of the Ministry over the past three years, 30 August 1958, VNA3/BTL 168 VV, 1959).

[38] Fall's account of engineering graduates from the Hanoi Polytechnic Institute (*Trường đại học bách khoa*) is substantially higher than the 1958 Ministry of Hydraulics' estimates. In 1959, the Polytechnic was to graduate ninety engineers and a further seventy in 1960. In the years to follow,

It was not only posts vacated by French engineers that left the DRV reeling, but also the loss of many trained personnel who went south in 1954. One estimate puts the figure at 7300 civil servants who migrated southward, with the bulk of the new civil service made up of political cadres unqualified to organise the rehabilitation of the DRV economy (Post, 1989, 261).

In the immediate post-1954 period, hydraulic infrastructure was the responsibility of the Bureau of Hydraulics (*Nha Thủy lợi*), within the Ministry of Transportation and Public Works (*Bộ Giao thông Công chính*). This ministry was organised according to the structure of the Colonial Department of Public Works. Early documents were even filed in folders leftover from the colonial period. Being able to at least read and write French, would have been an important skill for hydraulic cadres. Technical designs that were needed for the reconstruction of hydraulic infrastructure were all written in French; and French appears to have been the language through which hydraulic bureaucrats communicated with their Soviet allies when making requests for material and technical assistance.[39]

However, French-speaking cadres normally had suspect class backgrounds, while holding the best technical qualifications. This was a dilemma the Ministry of Transportation faced in 1954, when deciding whom to appoint as the Vice-Director of the Hydraulics Bureau. Among the four reasons why one individual in particular ought to be appointed, two had nothing to do with his technical ability. First, although he had been an official in the French administration, he was still considered to be relatively trustworthy. Second, he had previously worked for the Việt Minh administration as the Director of Public Works for the northern area (*Bắc Bộ*). In 1947, however, he was captured by French paratroopers in Bắc Kạn province and taken back to Hanoi. Although his dossier (*lý lịch*) was not strictly revolutionary, he could counter his experience working for the French with his time

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thirty to forty engineering graduates were expected. (A plan to eliminate drought in the North, 17 April 1958, VNA3/BTL 64 VV, 1958).

[39] These conclusions have been gleaned from documents I read from 1956-57 at the Vietnam National Archives, Centre No. 3 (*Lưu trữ Quốc gia Việt nam, Trung tâm số 3*).

spent with the Việt Minh. How many qualified technicians would not have been so fortunate?

The DRV's hydraulic bureaucracy

Over the years, the central government office responsible for hydraulics has had many different incarnations. Before 1954, a nebulous hydraulics "branch" (*ngành*) existed. The term "branch" refers to a general area of responsibility rather than a specific office and consisted of groups of people working on hydraulic infrastructure but in separate bureaux or ministries. In the period immediately following the signing of the Geneva Accords, responsibility for hydraulic infrastructure was centralised within the Hydraulics Bureau (*Nha Thủy lợi*) in the Ministry of Transportation and Public Works (*Bộ Giao thông Công chính*). In 1954, the Hydraulics Bureau consisted of forty people with the majority of them being technical staff.[40]

By the end of the war there was no bureaucratic organisation responsible for hydraulics below the provincial level. During the war against the French, Việt Minh-controlled Inter-zones (*Liên khu*), multi-province administrative units, maintained some control over hydraulic infrastructure. In some French-held areas provincial management organisations were non-existent but work on hydraulic systems continued under the direction of the central level "Resistance Administrative Committee" (*Ủy ban Kháng chiến Hành chính*) (UBKCHC). Wherever there was some type of office dedicated to managing hydraulic systems it was invariably short of staff.[41] The administrative structure of the hydraulics branch, by 1954, had extended itself down to the provincial level but was not yet concerned with district-level management. Before working at the district level, the Hydraulics Bureau first

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[40] (Report "Arranging new civil servants and staff", 8 November 1954 VNA3/NTL 3 VV, 1955). Another report claims that in 1955 the DRV's contingent of hydraulics experts consisted of 196 technical staff, which included ten university-trained cadres, forty-one mid-level cadres and 145 low-level cadres. Note that the vast majority of these staff were low-level cadres who would have had very little training. (VNA3/BTL 38 VV, 1963).

wanted to consolidate its control over French-built canal systems by establishing a management "group" (*hạt*) for each system.[42]

Strengthening managerial control over French-built irrigation systems was the main priority of central-level hydraulic planners immediately after 1954. The need for local level schemes, however, would eventually force the Hydraulics Bureau to shift resources down to the district and commune levels. Even before local-level systems were given priority in 1958 at the Hải Dương Hydraulics Conference, there was pressure from local cadres to see qualified staff transferred from the central ministry out to provincial offices. For instance, the Hà Đông-Sơn Tây provincial hydraulics office requested as early as 1955 that those staff who had previously worked at the French pumping station in Sơn Tây be transferred back to their office. Hand written, in the margins of a secret staffing report, a central government civil servant agreed to this request, but would not give them up immediately.[43] Moreover, there were few central-level bureaucrats who were willing to leave Hanoi for the countryside. This is not surprising if one considers that the French would have trained urban Vietnamese who, after the war against the French was over, would have naturally gravitated back to government offices in Hanoi and, if they were transferred, they would lose the allowances they received in the capital.[44]

The Hydraulics Bureau in the Ministry of Transportation and Public Works determined in 1955 that a lack of qualified cadres was the single biggest impediment to achieving its hydraulic construction and reconstruction goals.

> Presently, the bureaucratic apparatus is very weak. There is a lack of both political and specialised cadres. The issue of organising cadres must be dealt with appropriately [*tích đánh*], and if it is not, then moving the construction program forward will prove to have no benefit since there will not be the

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[41] (Draft document on constructing and organising the hydraulics branch, 6 October 1954, VNA3/NTL 1 VV, undated, c. 1955).

[42] *Ibid*. These "groups" were eventually transformed in the 1960s into management "companies" (*công ty*).

[43] (Report "Arranging new civil servants and staff", 8 November 1954, VNA3/NTL 3 VV, 1955)

[44] *Ibid*.

people or a bureaucratic apparatus of sufficient strength to implement the program.[45]

The dearth of cadres was even more pronounced in rural areas. In an attempt to address this issue, one of the Bureau's first operational tasks was to send research teams to areas where cadres were few and the demand for hydraulic infrastructure was significant. Investigators were armed with French designs but were instructed not to be constrained by them. They were told to use their own initiative and find solutions that suited the new regime.[46] Any potential projects would need to be designed based on the experience of local people, but cadres were to be careful not to make any promises regarding work that the state would do in local areas.[47] In this way, the Bureau would appear to be taking account of the needs of peasants and solidify the Party's political influence in areas such as Interzone 3 and 4, the Việt Bắc region and the Left Bank (*tả ngạn*) of the Red River, where demand for hydraulic infrastructure was significant.[48]

Regardless of the diligence of central-level bureaucrats, in order for local projects to move forward, qualified local cadres would have to be found. Inevitably, the demands of managing what were becoming more sophisticated hydraulic systems stretched the abilities of locally appointed officials. An example of this can be found in the management of experimental stations (*trạm thí nghiệm*), which were constructed in the late 1950s throughout northern Vietnam. Like the French experimental farm in Phù Xa, near Sơn Tây, the DRV's experimental stations were intended to establish the proper water levels, land preparation techniques, seed varieties and fertiliser usage that would result in the highest yields for a specific area. The first stations appeared during the 1956 Spring crop in Thái Bình province and spread to areas where French systems already existed -- the Cầu River, Vĩnh Phúc and the Chu River in Thanh Hóa -- in time for the Autumn crop of that same

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[45] (1955 Responsibilities for the Hydraulics Branch, undated, c. 1955 VNA3/NTL 1 VV, undated, c. 1955).

[46] (Hydraulic work in 1955, Research and investigation plan, c. 1955, VNA3/NTL 2 VV, 1955).

[47] *Ibid.*

[48] *Ibid.*

year. In 1957, experimental stations were added in Hưng Yên, Hải Dương and Sơn Tây province.[49]

Problems arose almost immediately. The Thái Bình experimental station, which had been set up in an area of low land prone to waterlogging, was abandoned in 1957.[50] All stations were to be equipped with instruments to measure humidity and evaporation rates, in addition to basic materials such as thermometers and wind gauges. These items were supposed to arrive via China and the Soviet Union in 1956 but failed to turn up until the beginning of 1959.

> Presently, we still lack all sorts of measuring devices. Things don't work, things are broken, and things get lost: the 1959-60 application for aid will not come through. Therefore, our future, if we fail to keep our equipment in good order, will be a lack of tools.[51]

Despite these concerns, there were even more troubling prospects if the hydraulics branch was unable to staff the stations effectively. An example of this was the case of the Chu River station, where in 1956 local authorities appointed an illiterate station director. He proved incapable of any complex experimentation and was limited in the information that he could collect. Consequently, data recorded during his tenure was of no use to anyone.[52]

A ministerial report covering the period 1955-58 examined the staffing problems encountered by the hydraulics branch in the latter half of the 1950s and arrived at two conclusions. The first was that the hydraulics branch had failed to support the broader policy objectives of strengthening small-scale hydraulic systems. By 1958 there were still no hydraulic cadres working at the district or commune level. Responsibility for hydraulic management was divided between the Ministry, the zones (*khu*) and the provinces. As a result, "the People" were wasting their energy working on small-scale systems.[53] The report emphasised that

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[49] (Report on investigations of experimental work done on irrigating paddy, undated, VNA3/BTL 11 VV, 1959).
[50] *Ibid.*
[51] *Ibid.*
[52] *Ibid.*
[53] "lãng phí sức lực của dân".

constructing the systems themselves was not a waste, but that once local canal networks were in place, if there were no headworks to supply water to these canals, then constructing small-scale networks would be wasted effort. Secondly, the report claimed that the hydraulics branch had been constructing infrastructure that was too technically sophisticated, while neglecting (*xem nhẹ*) to training technical cadres. Most importantly, the Branch failed to train worksite managers.[54] A fact which had a direct impact on the quality of workmanship at many sites and was a serious issue when it came to building technically demanding large-scale infrastructure. The impact that these shortages had on the quality of large-scale infrastructure and the corruption that accompanied poor co-ordination within the Ministry of Hydraulics and among the various bureaucratic levels, is discussed further in Chapter 8. I will first examine, in the following sections, why the DRV came to emphasise large-scale hydraulic infrastructure at almost the same time as it had given priority, in 1958, to small-scale infrastructure.

Bigger is better: "Fast, many, good and economical"[55]

Reports from the 1950s tend to conclude that not only was *local-level* infrastructure effective when it was managed properly, but that *large-scale* projects implemented in the late 1950s were proving to be ineffective. One report in particular, produced in 1958, complained that the state had wasted capital (*bỏ vốn*) on complicated technology, while failing to focus on mass mobilisation. It went on to say that despite heavy state investment in a total of seven projects, there were few positive results to show for the expense. One of the projects, the Mai Lâm sluice gate on the

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[54] (Report on an investigation into personnel leadership and organisation, style of work, and work routine of the Ministry in the past three years, VNA3/BTL 8 VV, 1958).

[55] "Nhanh nhiều tốt rẻ". This was a common saying in the hydraulics branch in the 1950s and 60s and relates to the construction style, number, and cost of large-scale hydraulic infrastructure that were to be built. It was also likely that the VWP borrowed the slogan from the Chinese Communist Party, as variations of it were appearing at infrastructure worksites throughout China during the same period (Shapiro, 2001, Ch. 2).

Đuống River, was not functioning at all and the other six were still unfinished.[56] These projects, the report complained, did not reflect the natural conditions in which they were being built. They failed to take into account local knowledge concerning water control, the demands of local agriculture and the capabilities of government cadres.[57]

As a result of these problems, the report concluded, the large-scale projects that were being initiated were not yet required. In order to construct a functioning network of integrated small, medium and large-scale irrigation and drainage systems, it was necessary to work from the bottom up. A modernised irrigation and drainage network would have to be based on small-scale systems constructed and financed by local communities. By 1958 there was still a long way to go. In some areas local people were solving their own problems but the hydraulics branch was accused of not sharing successful examples. In other cases, small-scale schemes lacked direction and leadership and, therefore, they were slow to expand beyond the confines of a sub-village or village command area. Where investments had been made during the 1956 and 1957 droughts there was often little improvement in local-level water control. Of the 130 000 wells that were sunk in 1956 involving 1.2 million workers, two-thirds of them were dry in 1958.[58]

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[56] A fault in the Mai Lâm sluice gate caused an enormous flood in July 1957. Blame was accorded to cadres who were acting "irresponsibly in their bureaucratic work style, and were undemocratic due to their conservative ideology". (A three-year summary report of hydraulic work (1955-1957) designed to serve the economic recovery plan, undated, VNA3/BTL 64 VV, 1958). This conclusion is misleading, as the design and construction faults of the gate were evident as early as May 1957, soon after the gate became operational. One account reported that water was bubbling up through the foundations of the sluice gate, a situation that was immediately reported to the province and the Ministry (Phan Khánh, 1997, 55). Meetings were held to discuss how the situation could be remedied. In the end, however, there was nothing anybody could do. The DRV lacked the experience and the materials necessary to rebuild the gate, and thus, on 11 July 1957, the gate and the dike gave way, flooding six districts in Bắc Ninh province including Bắc Ninh town. More than 10 000 hectares of rice were lost. The breech in the dike was finally repaired by the middle of August, but only after 3 billion *đồng* (the equivalent at the time of 10 000 tonnes of rice) was spent on the repairs. This does not include the several million labour days put in by soldiers and farmers or the damages in terms of lost property incurred by the People or the State. Most embarrassing of all, it was the lowest recorded water level ever to have caused a dike break in northern Vietnam (Phan Khánh, 1997, 55).

[57] (VNA3/BTL 7 VV, 1958).

[58] *Ibid.*

Marshalling "guerrilla peasants"

In the first years of the DRV regime it would have been impossible to embark on a course of large-scale hydraulic infrastructure construction. The state did not have the technical or material capacity to do so.[59] Nevertheless, within the VWP and the Ministry of Hydraulics there were those who were confident that large-scale irrigation and drainage would solve the chronic problems associated with flood and drought. Even at the 1958 Hải Dương Conference, when small-scale infrastructure had taken centre stage, there was some discussion concerning the future necessity of "keeping water" considering the potential of large-scale infrastructure. Advocates of large-scale infrastructure were making exaggerated claims that 300 000 hectares was already being irrigated by large-scale systems and that the Bắc-Hưng-Hải project, construction of which was presently underway, would add to this figure.[60]

Keeping rainwater, argued a background paper for the Hải Dương conference, was important but it was not of primary importance because large-scale irrigation and drainage could *guarantee* water. According to the author of the report, keeping water would only be necessary in cases where river levels dropped too far and pumps would be unable to move water into canal systems.[61] Such optimism denied the possibility of mechanical failures, silted canals or electricity shortages. In fact, large-scale hydraulic projects, particularly the Mai Lâm sluice gate and the BHH system, were unable, even in the late 1950s, to either serve or protect production. Quoting a 1960 Ministry report, Phan Khánh writes that the

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[59] This was admitted in a ministerial report written in 1957 concerning how drought could be avoided in the future. Dams were suggested as a means of raising water levels in creeks and rivers. The report, however, noted that, "in the first three years after peace was re-established, we could not yet think about constructing dams on large rivers, this is because we were not yet capable." (A Plan to eliminate drought in the North, 17 April 1958, VNA3/BTL 64 VV, 1958)

[60] According to figures from 1959, the total area irrigated with the assistance of large-scale infrastructure was 363 877 hectares. Of this figure, 295 983 hectares were irrigated by French-built infrastructure. As the discussion at the beginning of the chapter has highlighted, French-built infrastructure was irrigating inefficiently in the 1950s and would not have been able to reach its potential irrigated area as it was recorded. (1959 Irrigation statistics report, VNA3/BTL 19 VV, 1959-1960).

[61] (Some issues concerning irrigation and drainage work to be raised and debated, undated, VNA3/BTL 1 VV, 1958).

trend toward large-scale irrigation was a "mistake" (*sai lầm*) that would influence all facets of the Ministry's work for year's to come. The main problem with moving toward large-scale systems, the report argued, was that system management was left up to localities, a fact that led to increasing inefficiencies leaving some places in a situation where water control was "worse than at any time during the colonial period" (Phan Khánh, 1997, 71-72).

Although centralised control would not have solved the problems that local systems were facing, the hydraulic bargain required the state to take an active role in subsidising, constructing or managing critical components of what was becoming a modern, large-scale canal irrigation and drainage system. Without state involvement the command area of water control systems in the central delta would shrink back to colonial levels. This was a problem, too, during the period 1965-72, when the Ministry of Hydraulics and provinces gave over much of their responsibility for irrigation and drainage to local cadres. This fact had grave consequences for the hydraulic bargain, which is discussed further in Chapters 8 and 9.

Large-scale infrastructure and hydraulic hubris

What was driving the DRV's passion for and overconfidence in large-scale irrigation and drainage infrastructure? One source was a belief within the VWP that an independent Vietnam ought to surpass the engineering feats produced by the colonial regime. Impressive hydraulic infrastructure would bring prestige to the Party, albeit engineering failures also risked economic difficulties and a loss of political legitimacy. This became apparent with the malfunction of the Mai Lâm sluice gate in 1957. The flood that had occurred as a result of the gate's failure would have impacted the fledgling DRV administration in ways similar to the French disgrace on the Đáy River in the 1940s. The timing of the Mai Lâm dike break could not have been worse, as it occurred in the middle of the Rectification of Errors campaign, a political low point for the VWP. Generally speaking, the excessive violence of the land reform campaign, in the eyes of many peasants, marred the legitimacy of the Party. Consequently, the land reform errors impaired

the Party's ability to mobilise rural labour to construct hydraulic infrastructure. The Mai Lâm sluice gate failure would have further tarnished the Party's image. A secret Ministry of Hydraulics draft report reviewing the period 1954-64 considered the Mai Lâm dike break to have been the most serious problem, both politically and economically, for the hydraulics branch during the period 1955-57.[62]

Whether it was a result of the Mai Lâm dike break, the excesses of the land reform campaign, or the inefficiencies of local level hydraulic systems, by 1958 peasants were disillusioned and frustrated with the pace of hydraulic reform. Pressure from below is a second reason why the Party turned its attention toward large-scale irrigation and drainage infrastructure in the late 1950s. Without large-scale headworks, the small-scale canal networks that peasants were constructing were of little use.

> The people were starting to sense the arduous difficulties and inefficiencies of the program of "small-scale irrigation above all else" and "keep water above all else" (Phan Khánh, 1997, 69).

This encouraged the Ministry, but also the provinces, to favour large and medium-scale projects over local irrigation networks. Once the Party accepted that it would have to invest the necessary capital in large-scale infrastructure, it was taking an important step toward solidifying the hydraulic bargain between itself and the peasantry. With larger systems in place the Party felt that the efficiency of small-scale schemes would improve. Provincial cadres began working on their own to build medium and large-scale irrigation and drainage systems, in an effort to "synchronise" the local systems, which had already been built, with large-scale headworks. In Hà Tĩnh province, the Khe Lang reservoir was built to irrigate 800 hectares, Nghệ An province built the Khe Đá reservoir and in Sơn Tây it was the province that began work on the Suối Hai reservoir (Phan Khánh, 1997, 69). Despite heavy investments in large-scale headworks in the late 1950s and early 1960s, the Party would eventually realise that small-scale systems could not be ignored.

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[62] (VNA3/BTL 53 VV, 1964).

The third and, arguably, the most important factor influencing the DRV to make large-scale systems a priority were the modernist views of efficiency and economies of scale shared by high level Party cadres and government bureaucrats. Chinese and Soviet advisors, sent to assist the Ministry with planning and constructing hydraulics-related projects, helped perpetuate these attitudes. In China, Mao, who had a strong influence in the late 1950s over Lê Duẩn -- who in 1958 became the acting Secretary General of the VWP -- was beginning to implement his Great Leap Forward, which, among other things, involved constructing massive hydraulic works.[63] Maoist China greatly influenced many of the VWP's attitudes toward science and technology. Mao pronounced that nature was to be overcome, to be attacked and subdued.

> A "war against nature" was propagandized in explicitly military terms. The first important campaign, begun in the spring of 1958, was the "battle" to build irrigation and large hydropower projects (Shapiro, 2001, 71).

Militaristic slogans were appearing in the DRV around the same time. A 1958 hydraulics campaign was determined to "kill drought" (*diệt hạn*). Such propaganda has survived to the present day. An example of this was a slogan I saw painted on a dike protection station along the right bank of the Red River that said, "prevent and fight flooding as if you were killing American soldiers" (*phóng chống lũ lụt như diệt Mỹ*).

As Shapiro argues, Maoist science was not methodologically scientific. It did not apply scientific laws to solve problems. Instead, it set objectives that were to be achieved by applying a revolutionary zeal coupled with "labour-intensive interventionism" (Shapiro, 2001, 79). Nature and the obstacles it presented to China's desire to "catch up" to the west could be overcome not because "scientific" solutions involving technological improvements had been found but because Chairman Mao said so. Labourers were worked to exhaustion in order to achieve

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[63] The Chinese Communist Party claimed that during the construction of the Red Flag canal "twelve times more earth was moved in the single week beginning 12 December 1959, than was moved to build the whole Panama Canal (Shapiro, 2001, 70)".

Mao's goals. In a similar vein, Vietnamese co-operative members, by the beginning of the 1960s, faced the arduous task of constructing modern irrigation systems while at the same time working in the collective fields, volunteering for military service in the South or defending the "Fatherland" from American bombers. Revolutionary objectives in both China and the DRV were to be achieved in an atmosphere of extreme urgency. In the late 1950s Maoist factions within the Chinese Communist Party were arguing that China was entering a period where "a day equals twenty years" (Shapiro, 2001, 73).

In its initial stages, Mao's Great Leap Forward was popular with poor Chinese peasants, as it promised better living conditions (Shapiro, 2001, 80-81). The same can be said for co-operative members in the DRV who welcomed improvements to irrigation and drainage systems for their "convenience" (*thuận tiện*). However, there was debate within the VWP over the type of "science" that ought to inform Vietnam's agricultural revolution. Should the VWP apply scientific solutions that involved expanding the limits of nature, or should it attack nature as Mao was doing? It was the former approach that the VWP eventually adopted. The author of a 1959 report argued that there were two types of science: "old science", which was to be left behind, and the science of the Party. Old cultivation techniques would have to be changed in order to meet the production demands of the Party's economic objectives. The science of the Party had two possible paths: a theoretical science as espoused by Mao or a more empirical science such as the French had applied to the flood control question, and which I discuss in Chapter 4. One of the main conclusions of the report was that,

> Experimental programs have focussed on water elements exclusively -- neglecting cultivation techniques -- this is a vision of pure technology [*kỹ thuật đơn thuần*] and is removed from reality. A science that cuts its links with reality is no longer a science.[64]

The author of this report was advocating a decidedly un-Maoist view of science, which, when coupled with the VWP's shift in policy toward large-scale hydraulic

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[64] (Report on the investigation into work on paddy irrigation experiments, VNA3/BTL 11 VV, 1959).

infrastructure, proved it was possible for the VWP to think big and still maintain realistic objectives. This is especially true if the material means for large-scale hydraulic construction were available as foreign aid.

Communist internationalism: the importance of foreign assistance

Foreign advisors assisted the DRV with hydraulic infrastructure almost as soon as peace was re-established. Under an agreement signed in 1954, the hydraulics branch of the DRV accepted two Chinese "experts" (*chuyên gia*) and two engineers. The following year, in the spring of 1955, a trade delegation sent to Beijing made a much broader request for technical assistance. In addition to the four technicians that arrived in 1954, five more engineers were requested in order to design and lead work on hydraulics projects involving sluice gates, mechanical pumps, and digging canals. Two more flood control experts, who would eventually produce a study of the Red River and other large river systems in the northern and central regions, were included in the same request.[65] A variety of other professionals rounded out the 1955 technical assistance application. They included five divers, five drillers, ten concrete specialists and five steel specialists.[66]

In addition to technical expertise, Chinese specialists transferred Chinese ideas and experiences of large-scale hydraulic systems to Vietnamese planners. They helped to expand the range of hydraulic projects and water lifting devices beyond traditional techniques.[67] Although DRV hydraulic policy was originally intended to establish food security, by the early 1960s it was closely allied with collective agriculture and industrial development. In this way, the DRV's

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[65] (Report on the hydraulics branch, prepared by the Hydraulics Group of the Trade Delegation to Beijing, 13 April 1955, VNA3/NTL 4 VV, 1955).

[66] *Ibid.*

[67] In China there were movements not just to introduce water pumps but also to improve more traditional implements (Corin, 1963, 167). One such advance was the development of an iron "S55 Liberation" waterwheel (Framji et al, 1981, 227). In 1959, there were reports of a "liberation" (*giải phóng*) water-lifting device appearing in Hải Dương. As waterwheels were uncommon in Hải Dương prior to collectivisation, it is likely that these new devices were modelled after the Chinese liberation waterwheel and had been introduced in the recent past. (Summary report on hydraulic work in 1959 by the Hải Dương Hydraulic Office, 2 January 1960, VNA3/BTL 22 VV, 1959-1960).

collectivised hydraulic management model was comparable to the Chinese Communist Party's belief that a large-scale collectivised agriculture was to be founded on modern irrigation systems (Corin, 1963, 1-3). Improved water control was an important objective of the VWP's co-operativisation program, especially in the minds of economic planners intent on raising agricultural productivity. The link between co-operativisation and irrigation modernisation is discussed further in Chapter 8.

The DRV actively sought out Chinese hydraulic expertise. The Minister responsible for hydraulics at the time, Trần Đăng Khoa, attended a conference on Hydraulic Science in Socialist Countries held in Beijing in 1956 (Phan Khánh, 1997, fn. 1, 42). Chinese experts participated actively in the 1958 Hải Dương conference.[68] They were involved in designing and constructing the Bắc-Hưng-Hải irrigation and drainage project, and were on-site guiding the first phase of its construction. As electricity was an important component of the DRV's plans for modernising irrigation and drainage schemes it was imperative that power supplies were fortified as soon as possible. Here, both Chinese and Soviet experts were indispensable.

In 1957, a delegation arrived from the Soviet Agricultural Electrification Design Institute (*Viện Thiết kế điện khí hóa nông nghiệp*). They reported back to the VWP and the government on the viability of various hydroelectric projects in the DRV (Phan Khánh, 1997, 47).[69] At the time, electricity supplies were so limited

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[68] In a speech at the 1958 Hải Dương Conference a Central Committee member acknowledged the contributions made by the Chinese delegates. (Report by Comrade Tran Hữu Đức member of the Party Central Committee and Chairman of the Party's Rural Development (công tác nông thôn) Committee, November 1958, VNA3/BTL 1 VV, 1958). Additionally, among the Vietnamese reports and speeches in this same dossier were hand-written Chinese documents, which could be of interest to someone more linguistically skilled than me.

[69] This Institute continued to work in the DRV during the 1960s. In 1963, representatives produced reports on the Na Han hydroelectric station, while a Hungarian team was doing design work for the Bach Hach pumping station in Vĩnh Phúc province (VNA3/BTL 44 VV, 1963). These efforts were based on an earlier long-term strategy published in August 1962 entitled "Scheme to develop a unified electricity grid in northern Vietnam". This study, carried out by the "Lotep" and "Bakidep" institutes in the Soviet Union, was part of a bilateral assistance package. (Minutes of meeting to consider and approve responsibilities for the overhaul design of the Chu River canal system in

that the three pump-based irrigation projects located in the Red River delta -- in Sơn Tây, Nam Định and Hưng Yên -- were forced to use electricity from the Hanoi electrical generation plant.[70] In the early 1960s, construction had begun on the Uông Bí and Thái Nguyên electrical generation plants. These two projects employed numerous Soviet and Chinese experts respectively. The Soviets were involved in everything from constructing power lines to designing and assembling the plant itself. More than forty Soviet and twelve Chinese experts were transferred from the Hydraulics Ministry to the Ministry for Heavy Industry in 1963. Attached to the experts were forty-two Russian and four Chinese translators.[71]

Expertise on its own was not enough for the DRV to build large-scale hydraulic infrastructure. Without material assistance, the VWP's vision of countryside criss-crossed with canals filled using massive pumps could never have been realised. From 1955 to 1958, the DRV invested 82 billion *đồng* in the construction of irrigation, drainage and dike systems with 11 billion of that provided as assistance from communist allies, primarily the Soviet Union and China.[72] The bulk of the DRV's expenditures went to pay for labour and the administrative costs of running the Bureau, with machinery, petroleum and technical materials supplied as international aid.

Thanh Hóa province, 21 November 1963, VNA3/BTL 46 VV, 1963). The Soviets, however, were the logical choice for assistance in the power sector. Lenin's definition of Communism as "Soviet power plus electrification" was taken to heart by his successors. In the early 1960s, the Soviet Union was producing more electricity than any country other than the United States. It was heavily involved in constructing electric power infrastructure throughout Eastern Europe. In 1962, the Dobrotvor-Tisza transmission line was commissioned to provide power to Hungary, Czechoslovakia, Poland and East Germany via the Ukraine. This line was to be extended in 1964 to include Romania and Bulgaria in the grid (Michel & Klain, 1964, 206).

[70] (Responsibilities of the hydraulics branch during the economic restoration phase, undated, VNA3/NTL 1 VV, undated, c. 1955). Before the Sơn Tây system was connected to the Hanoi electricity grid it, and the French pumps in the central province of Nghệ An, depended on fuel provided under requests from the Soviets and Chinese. Plans for assistance in 1955 include a request for 500 000 litres of fuel designated solely for running these pumps in 1955 and 1956. (1955 Assistance plan, 21 January 1955, VNA3/NTL 4 VV, 1955).

[71] (Minutes of meeting to discuss the transfer of thermal energy experts and translators from the Ministry of Hydraulics to the Ministry for Heavy Industry, 7-8 February 1963, VNA3/BTL 35 VV, 1963).

[72] (VNA3/BTL 7 VV, 1958). Aid as a share of the total state budget between 1955-57, was estimated at forty per cent (White, 1985, 98).

A 1955 request for assistance from the Soviet Union and China outlines how, for one year, the DRV provisioned the hydraulics branch. In a document outlining the Ministry's material requirements for 1955, items were to be purchased, manufactured domestically or provided as international assistance. Included among the "purchased" items were twenty-five tonnes of cement, five tonnes each of copper and pig iron, in addition to fifty motorcycles and seventy bicycles. Domestically manufactured items were mainly hand tools such as spades, hoes, hammers, stone chisels and bamboo baskets. The bulk of the equipment was to come from international assistance. Trucks, boats, drills, pumps, all manner of surveying devices, electrical generators, electrical wires, fuel of all kinds, were only some of the items requested from "friendly nations" in 1955.[73] Additionally, the Bureau made an urgent request for materials that were required before the 1955 Autumn crop. These items included telephones and telephone wire, several tonnes of steel beams and sheets of corrugated iron.[74]

The 1955 request was taken to Beijing in April as part of a DRV Trade Delegation, with a special Hydraulics Group (*Nhóm Thủy lợi*) responsible for negotiating for the Hydraulics Bureau. The Hydraulics Group reported back to Hanoi, requesting that certain changes be made to the original request in order to provide materials that were presently in short supply in Vietnam. These included incongruous items such as telephone switchboards and fifty tonne jacks. Other amendments to the plan involved removing equipment that was already being requested from the Soviet Union -- trucks, all fuel and surveying equipment -- as well as items that had already been received in the 1954 aid request from the Chinese. The Hydraulics Group would add technical manuals and films to the request. In concluding his report, the leader of the Hydraulics Group wrote that he had convinced the head of the Delegation that, because of the pressing demands on hydraulic work in Vietnam, the Hydraulics Group would negotiate first. The

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[73] (Hydraulic work 1955, Equipment estimates, January 1955, VNA3/NTL 4 VV, 1955).

Delegation was scheduled to continue on to the Soviet Union and the head of the Hydraulics Group intended to return to Hanoi in one month.[75]

Aid requirements for 1956 and 1957 were very similar to the 1955 request. In fact, aid requests for irrigation and drainage systems in northern Vietnam for 1956-57 were prepared in February 1955. At the top of the list were more than 150 pumps with a capacity of between fifty and 300 cubic metres per hour, which were significantly larger than the seven cubic metre per hour pumps included in the 1955 request.[76] An undated application for assistance from the Soviet Union for the year 1956 included an additional 111 even larger electrical pumps ranging from 360 to 1850 cubic metres per hour, which were destined for the French-built irrigation system in southern Nghệ An province in north central Vietnam.[77] By 1959, requests for materials, this time to be purchased, were sent to Poland (200 pumps), and thirty-nine different pumps were requested from Hungary, the Soviets and Romania.[78] From 1954 until 1959, aid applications and purchases by the DRV, for pumps and construction materials, showed an increasing tendency toward large-scale hydraulic projects.[79]

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[74] (List of assistance items for 1955 that need to be sent to Vietnam very quickly in order to be on time for work being done before the Autumn crop, VNA3/NTL 4 VV, 1955).

[75] (Report to hydraulic branch from the Hydraulic Group of Vietnam Trade Delegation in Beijing, 13 April 1955, VNA3/NTL 4 VV, 1955).

[76] (1956-1957 Assistance plan, 12 February 1955, VNA3/NTL 4 VV, 1955).

[77] (Equipment plan for two years (1955-1956) (Requested as aid from the Soviet Union), (in French), undated, VNA3/NTL 4 VV, 1955). At the time, Soviet equipment was being routed through a Vietnamese import-export company in Bằng Thượng, Quang Tây (Guangxi) province, China. *Ibid*.

[78] (Lecture given by Minister of Hydraulics concerning correcting and editing the basic construction budget and the 1959 financial income and expenditure plan for the Hydraulics Ministry, 24 July 1959, VNA3/BTL 17 VV, 1959)

[79] The Ministry of Hydraulics was not the only government department requesting pumps from the Soviets and Chinese. State farms were also importing pumps as one of many items that were to support the VWP's efforts to mechanise agriculture. (General list of mechanical items, fuel and fertiliser requested for 1961 (items requested from the Soviet Union), 13 November 1960, VNA3/BNTQD 148 TT, 1961).

The Bắc-Hưng-Hải system

> *Who goes there dear gentleman?*
> *October first, do you remember what that day is about?*
> *That's the day the hoes come down and construction begins*
> *Opening the way for the Bắc-Hải-Hưng system on our land* (Hoàng Nam, 1958, 2).[80]

These are the opening lines of a Vietnamese opera in traditional form (*chèo*) written to commemorate the groundbreaking of the Bắc-Hưng-Hải (BHH) irrigation and drainage project. When it was built in the late 1950s, it was the largest hydraulic construction project ever attempted in Vietnam. The BHH project included improvements to the Cửu Yên canal that emperor Minh Mệnh constructed in the 1830s (See Chapter 3). It was designed to irrigate, using canals and pumps, one of the areas that the French had enlisted Mr. Bédat to assist with in 1899. Later, in the 1930s, the French developed an irrigation and drainage scheme for what they called the Kẻ Sặt *casier*. Like the Cửu Yên canal and the Kẻ Sặt scheme, the BHH system was designed to solve the age old problem of "the Spring crop burning up from drought and the waterlogged Autumn crop rotting in the fields", which was typical of hydraulic conditions in the area.[81]

With the assistance of Chinese experts and relying on French plans, the DRV inaugurated a feasibility study in June 1956. The French had considered three possible options for the area. The first plan involved constructing a host of very large pumping stations that would bring water from the Đuống River, which formed the northern border of the command area. A second option involved building a hydroelectric dam on the Đà River in order to supply the necessary electricity for

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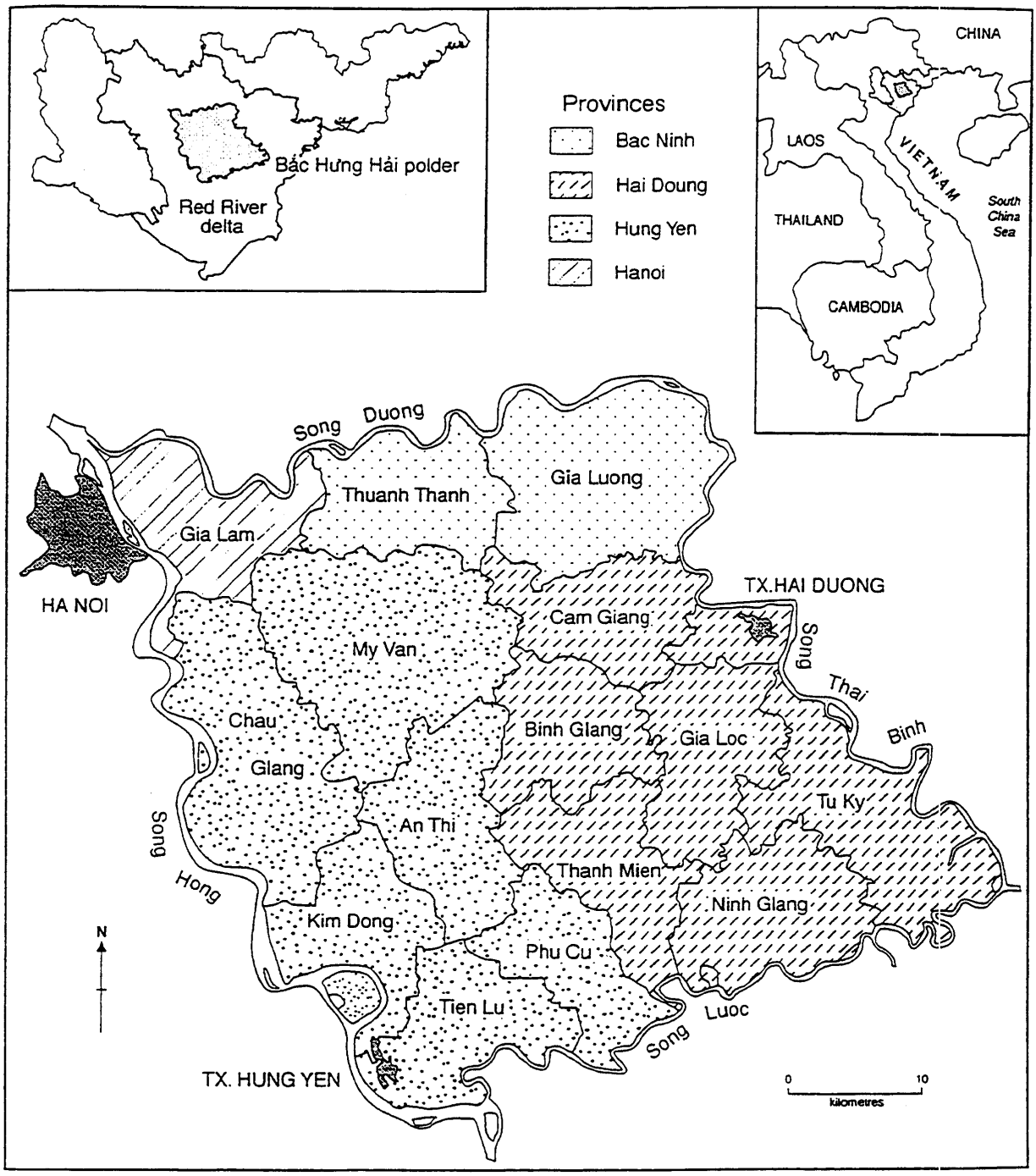
[80] "Ai đi đâu đấy hỡi ai?, Tháng 10, mùng 1, nhớ ngày gì không?, Là ngày hạ cuốc kh□i công, M□ đầu hệ thống Bắc-Hải-Hưng đất nhà". The opera these lines are taken from was to be performed by the "arts and literature comrades" of each commune and village at the beginning of every party evening (*tối liên hoan*) organised by the commune or village. This was to continue until May 1959 when the first phase of the construction of the Bắc-Hưng-Hải system was to be completed. It was also to be sung at meetings, cultural events and by the various labour units at worksites (Hoàng Nam, 1958, 2, 8).

[81] "chiêm khê, mùa thối"

the first option. The DRV study focused on a third scheme, which was based on constructing a large sluice gate on the Red River from where irrigation would flow through an extensive canal network using gravity whenever possible (Phan Khánh, 1997, 59).

Figure 7.1 Map of Bắc-Hưng-Hải polder



Source: (Fontenelle et al, 2000, 17)

On 23 June 1958, construction of the BHH system was approved. The first stage of the project was to be completed during the dry season of 1958 and 1959. In general terms, the project was designed to channel water from the northwest to the southeast of the rectangular area enclosed by the Đuống and Luộc rivers on the north and south, and the Red and Thái Bình rivers on the west and east, respectively. It would use sluice gates, canals, dams and pumps to move water into and out of a network of canals. At its head was the Xuân Quan sluice gate, built several hundred metres south of the well-known pottery village of Bát Trang located on the left bank of the Red River, opposite Hanoi and just south of Gia Lâm. This gate was designed to bring water into the main channel, which would wend its way towards the southwest, eventually exiting the system through the An Thổ sluice gate. In total, the BHH system was designed, in 1958, to irrigate approximately 150 000 hectares, or around twenty per cent of the cultivated land in the Red River delta (Ban Tuyên Huấn Tỉnh Hải Dương (Hải Dương Province Propaganda Committee), 1958, 5).

The first phase of the project involved the construction of the Xuân Quan sluice gate. From there water was meant to follow the natural sloping topography through extant river systems, which would need to be dredged and widened to act as primary canals. In the second phase, scheduled to run from October 1959 to May 1960, the An Thổ drainage gate on the Tứ Kỳ river was to be built. With these two key pieces of infrastructure in place, "the People" were responsible for digging medium and small-scale irrigation and drainage systems.[82] The third phase involved the construction of the Nghi Xuyên sluice gate located south of Xuân Quan but still on the Red River, as well as a gradual process of digging drainage canals, constructing sluice gates as well as fixed and mobile pumping stations. The eventual result, according to the original design, would be a hydraulic system capable of irrigating mechanically without the need to pull water by hand.[83]

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[82] (Ban Tuyên Huấn Tỉnh Hải Dương (Hải Dương Province Propaganda Committee), 1958, 11).
[83] *Ibid.*

The scope of the project was guided by a Chinese irrigation equation. Based on Chinese examples, designers concluded that the BHH system would serve ninety per cent of the total area of the three provinces enclosed by the BHH polder. The total area was calculated to be 210 900 hectares with 185 600 hectares within the protective perimeter of the dike system. It was ninety per cent of the second figure, which totalled 167 000 hectares, that was the project's stated goal. Of the 185 600 hectares, eighty-four per cent produced rice and around 3000 hectares were annually left fallow; the remaining area was planted with secondary crops. Before construction began on the system, annual water shortages meant that only around 77 000 hectares were planted in the Spring season, and only 30 000 ha of that total had an assured water supply. As far as the Autumn crop was concerned, 132 000 hectares was cultivable but on average 33 600 hectares would have to be abandoned due to water logging. This left an average Autumn crop area of just under 100 000 hectares.[84]

The Chinese-determined objectives called for an increase in assured irrigated area for the Spring crop of more than 5.5 times pre-project levels and a fifty per cent increase in Autumn crop areas. These were enormous projected increases compared with the steady but limited improvements made using small-scale infrastructure. It was important, from the perspective of Ministry and Communist Party officials who supported large-scale infrastructure construction, that the pace of hydraulic development between 1954 and 1958 be perceived to have been too slow.

> Hydraulic systems that are presently in place [1958] that have been developed since peace was re-established [1954] consisting of several sluice gates, canals and wells have only been able to deal with a small area.[85]

Impatience was a contributing factor in explaining why large-scale systems generally and the BHH system in particular were gaining support over small-scale

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[84] (The Bắc-Hưng-Hải large-scale irrigation and drainage project, 9 September 1958 VNA3/BTL 70 VV, 1958).

[85] *Ibid.*

systems. Impatience was justified, at least from a political point of view. A lack of "enthusiasm" (*nhiệt tình*) for irrigation work among villagers during the latter half of the 1950s has been attributed to the Party's violent excesses that took place during the land reform campaign (See Moise, 1983, Ch. 11). Although the degree to which the Party engaged in violent acts during the land reform is debatable, the Party did believe that the "excesses" were having an effect on mobilisation rates. For example, according to one report, the dike reconstruction plan for 1957 called for 3.8 million cubic metres of earth to be moved, but the total only reached 2.2 million cubic metres. This was well short of the 1956 figure of 17.8 million cubic metres of total earth moved, a figure that had surpassed the 1956 plan by more than 2.5 million cubic metres. The reason given for the shortfall in 1957 was the negative effect that the land reform campaign had on peasant "consciousness".[86]

The BHH system was touted as being able to deliver two or even three crops to peasants in the area. It was to have banished the saying "shrieking like peasants in Phủ Khoái who are begging for soya".[87] Phủ Khoái is the present day district of Châu Giang (Khoái Châu), which borders the Red River in the extreme west of Hưng Yên province. It is an area of low land that was susceptible to flooding. Consequently, the Spring crop was the principal rice crop and if it were to fail, with the Autumn crop being on average very unlikely, peasants would resort to begging (*hành khất*), wandering in search of food (*tha phương cầu thực*) or starving. With the projected increase in multi-cropped land it was hoped that the BHH project would raise annual per capita paddy production in poorer areas such as Khoái Châu from 270 to 350 kilograms, and then 500 kilograms and beyond.[88]

The results from the initial phase of construction were mixed. By 1959, the BHH system was reportedly irrigating only 40 000 hectares, about one quarter of

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[86] (VNA3/BTL 7 VV, 1958).

[87] "Oai oái như Phủ Khoái xin tương". Alternatively, the saying can be "...begging for rice"/"...xin cơm". This saying came from the hardships that the district and the entire province of Hưng Yên encountered in the 19th century because of the flooding caused by the Văn Giang dike breaking eighteen years in a row (Đỗ Đức Hùng, 1993, 42).

the projected irrigable area, and most of that, 33 000 hectares, was in Hưng Yên province.[89] Constructing the Xuân Quan sluice gate was more complicated than expected. It had to be rebuilt at least once because of leaks in the original structure.[90] Although the first phase was completed on schedule, one of the project's biggest challenges was assembling enough skilled labour. Chinese experts could not fill all the technical positions, especially in terms of tradespeople. In addition to the overall lack of labour, the Ministry was critical of cases where cadres failed to prevent pilfering and where fires were caused by a lack of fire prevention training. There were cases of industrial accidents, with one worker being electrocuted and another losing three fingers.[91] Nevertheless, considering the scale of the undertaking and the skill level of most of the participants, it is surprising there were not more injuries. With the experience gained at the Xuân Quan site, the Ministry was able to establish its first Public Works Brigade (*Đội công trình*), which consisted of experienced cadres, both political and technical. This brigade and others that appeared later were posted at large-scale worksites in order to guide work and to ensure that materials were dispatched to where they were required.[92] The experience gained at the Xuân Quan site proved invaluable for workers as well as managers, despite the initial waste caused by inexperienced labour.

As would become apparent, constructing the headworks of large-scale hydraulic projects was relatively trouble-free compared to the work required to connect large, medium and small-scale systems. The demands for labour that large-

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[88] (The Bắc Hưng Hải large-scale irrigation and drainage project, 9 September 1958, VNA3/BTL 70 VV, 1958).

[89] (1959 Irrigation statistics report, VNA3/BTL 19 VV, 1959-1960).

[90] (VNA3/BTL 7 VV, 1958). This, however, is not a surprise considering that of the 107 sluice gates that had been constructed in the DRV by 1957, eighty-seven were either not working, too small or cracked, allowing water to leak into the mouth of the gate. *Ibid*.

[91] (1959 Report on the construction situation at project sites, 12 January 1960, VNA3/BTL 84 VV, 1959).

[92] (Summary report of work undertaken in 1959 by the Public Works Bureau (*Cục*) of the Ministry of Hydraulics, 4 March 1960, VNA3/BTL 84 VV, 1959). Of the approximately 1000 technical workers that worked on the BHH system many went directly to work on state farms or in other areas of the government. Only one concrete, one steel and one woodworking brigade worked on the construction of the Bàn Thạch hydroelectric station (The Bắc-Hưng-Hải large-scale irrigation and drainage project, September 1958, VNA3/BTL 70 VV, 1958).

scale systems put on the average peasant/co-operative member involved not just the labour days to construct the headworks, but also the seemingly endless task of digging the necessary canals to connect the headworks with the district and commune level systems.

> A widespread shortcoming that exists with large-scale hydraulics projects is that there is no positive leadership to construct the canal systems that must be done in conjunction with the completion of the headworks.[93]

Even in 1958 and 1959, where canals had been constructed along the BHH system, there were reports of water theft as people illegally diverted water by building dams across the width of canals.[94] Here is an early example of the difficulties the Party would have, throughout the 1960s and 1970s, trying to synchronise large and small-scale infrastructure.

Water theft was a symptom of low water levels in canals throughout the BHH system. Soon after the Xuân Quan gate began operating, a lack of water in tertiary canals meant that water levels along the main canals would need to be raised to a point where people could easily pull water. Orders came from the Ministry during the Spring crop of 1959-60 that the responsible provinces would need to construct three dams in order to push up water levels in the BHH system.[95] With dams in place, irrigation was much improved.

> In the past, arroyos would have to be dug to a depth of three metres. From there, people would pull water up in three stages and four stages in some places. But, with the dams this year, the water has just flowed onto 20 000

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[93] (Report: Investigation into hydraulic work over the three years, 1961, 1962 and 1963, undated, VNA3/BTL 38 VV, 1963) If the BHH system was going to irrigate 150 000 hectares, then 126 large and medium-scale projects and 8000 small-scale projects would have to be built, which would involve 95 million cubic metres of earth being moved. (This is the rough equivalent of 95 million labour days.) On top of this, by 1963, the Xuân Quan sluice gate required 300 000 to 400 000 cubic metres of earth to be dredged annually from its mouth and entrance canal. *Ibid.*

[94] (Summary report of the Hải Dương provincial Hydraulics Service for 1959, 2 January 1960, VNA3/BTL 22 VV, 1959-1960)

[95] *Ibid.* These dams had in the past been built in the dry season and then destroyed in the rainy season. The Neo and Bá Thủy dams were not typical dams but were more specifically "water regulators" (*cống điều tiết*). They could allow water to flow through them when necessary (Ban Tuyên Huấn Hải Dương (Hải Dương Province Propaganda Committee), 1961, 4-5).

> *mẫu* of land with no need to pull water, and where the water still did not reach, people had to pull water just a short distance.[96]

Despite the relative success of the first phase of the project, BHH's second phase was put on hold in 1959 as the Ministry's construction capacity was being overtaxed.[97] Before the decision to postpone construction of BHH, the original scheduled completion date for the An Thổ sluice was May 1961. At the time it would have been difficult to imagine that this gate would not be completed until 1978.

Conclusion

In 1954, the dire economic situation that confronted the new regime encouraged the VWP to move forward with efforts to construct irrigation networks. Because pond and creek irrigation had been traditionally a household affair, expanding irrigation and drainage networks meant that the DRV had to become more involved in financing and managing irrigation and drainage infrastructure in the central delta. Initially, the Party emphasised small-scale irrigation and drainage works in order to address the immediate food shortages that threatened the DRV. Once this was accomplished, the Party became more confident and its vision of modern irrigation expanded to include pumping stations and large-scale sluice gates. This approach was bolstered by the foreign assistance, both technical and material, that the DRV received from its communist allies. Furthermore, as the hydraulic bargain began to evolve, peasants were drawn out of their traditional hydraulic management patterns, much as they had been earlier in the 20th century in those midland regions served by French-built irrigation systems. Peasants began to accept the realities of modern irrigation, canals, sluice gates and pumps, and, by

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[96] (Summary report of the Hải Dương provincial Hydraulics Service for 1959, 2 January 1960, VNA3/BTL 22 VV, 1959-1960)

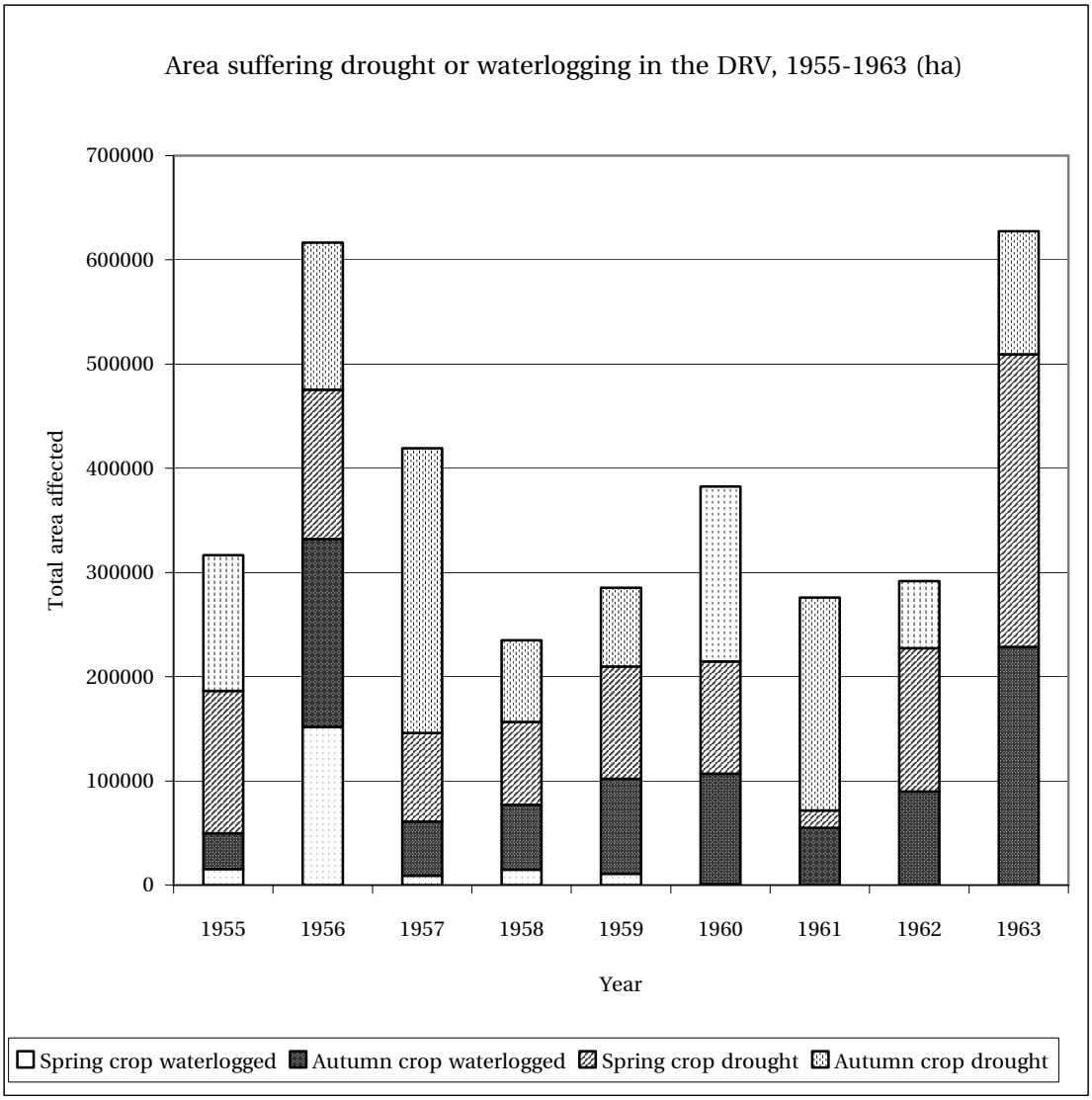
[97] Phan Khánh notes that by 1959, despite demand for large-scale projects at the local level, the Ministry had to suspend construction. This meant that the Ministries responsible for foreign trade and electric power were having to cancel carefully negotiated contracts with foreign governments and, when projects were resurrected in the future, negotiators would have to begin at square one (Phan Khánh, 1997, 68).

the late 1950s, were pushing the state to increase investments in large-scale infrastructure.

In the 1960s, it was the peasantry's turn to accept its half of the socialist hydraulic bargain. Labour was required to construct not only the local irrigation and drainage networks, but also the large-scale headworks. In addition to this, peasants had to fulfil their collective obligations by working the land. The production-construction dichotomy that emerged led in part to the creation of agricultural co-operatives and specialised hydraulic brigades. Chapter 8 examines the politics of this emergent hydraulic bargain and the relative power that co-operative members gained over the direction of the socialist rural political economy, from their position as both producers and construction workers.

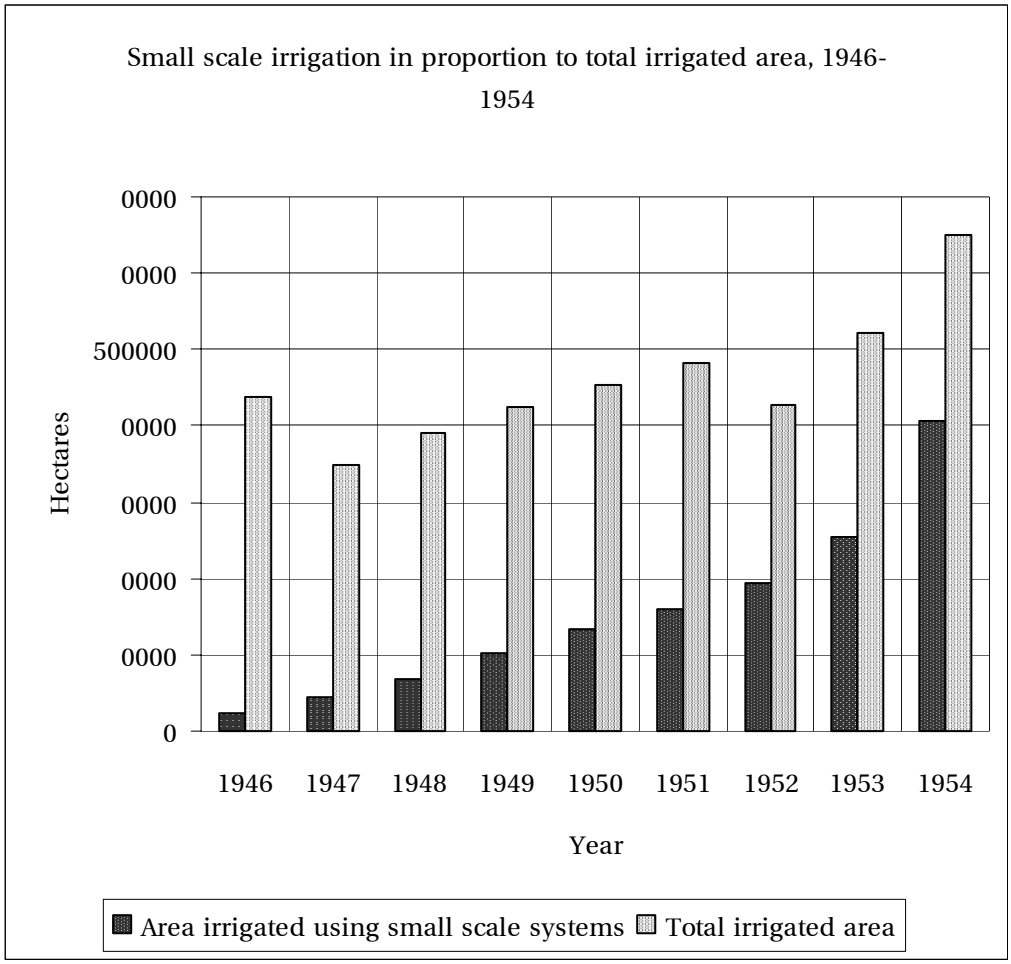
Tables and figures

Figure 7.2 Area suffering drought or waterlogging in the DRV, 1955-63



Source: (VNA3/BTL 38 VV, 1963)

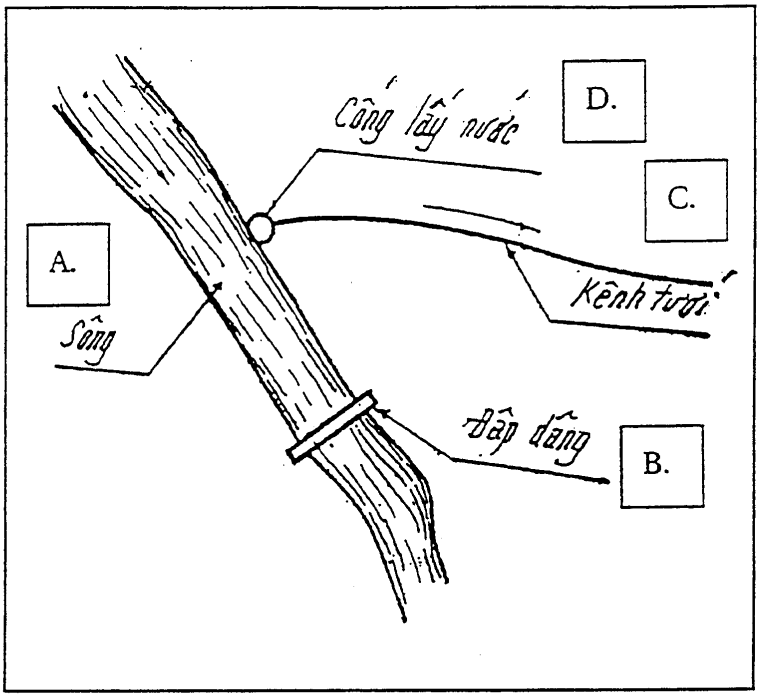
Figure 7.3 Small-scale irrigation and total irrigated area, northern Vietnam, (1946-54)



Source: (Nguyễn Ngọc Minh, 1966, 170)

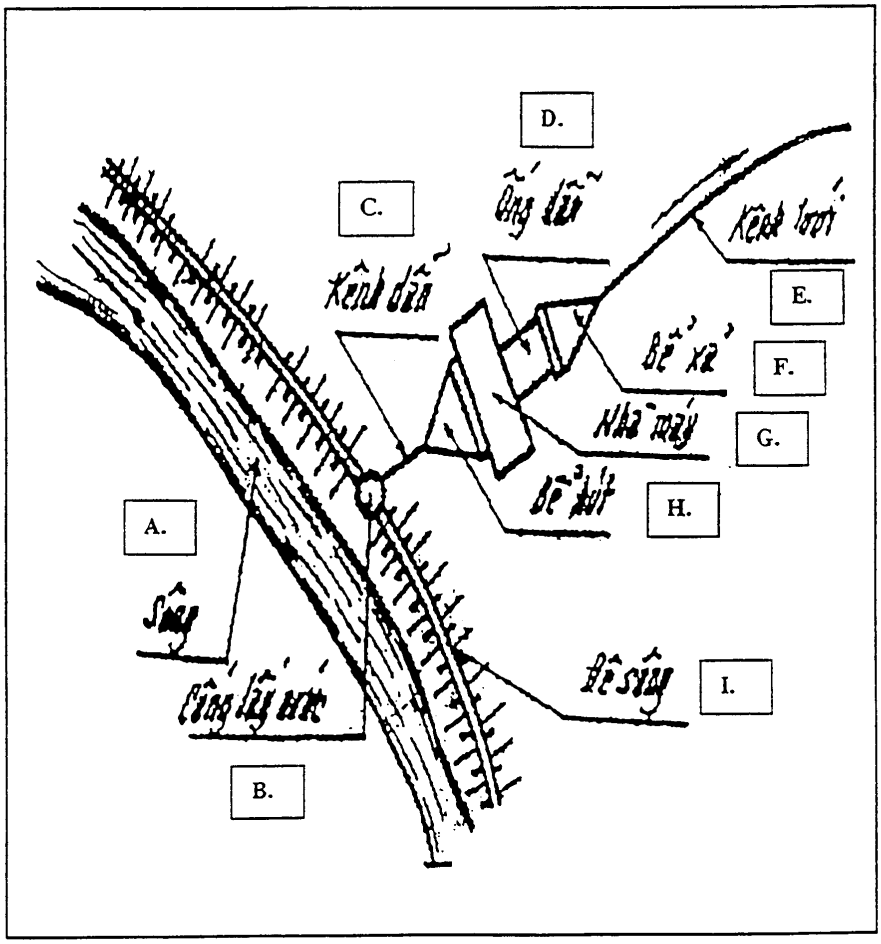
Figure 7.4 Diagram of gravity-fed and pump-based irrigation systems

1. Gravity-fed irrigation system



A. Sông -- River
B. Đập dâng -- Dam
C. Kênh tưới -- Irrigation canal
D. Cống lấy nước -- Sluice gate to take water

2. Pump-based irrigation system



A. Sông -- River
B. Cống lấy nước -- Sluice gate to take water
C. Kênh dẫn -- Canal to lead water to pump
D. Ống dẫn -- Pipe to lead water from pump
E. Kênh tưới -- irrigation canal
F. Bể xả -- Tank to hold water leaving pump
G. Nhà máy -- Pump
H. Bể hút -- Tank to hold water entering pump
I. Đê sông -- River dike

Source: (Thái Đình Hòe, 1983, 60, 61).

Chapter 8 Re-engineering the countryside: Co-operativisation and hydraulic modernisation, 1961-64

Introduction

Socialist industrialisation in the DRV was based on transforming and rationalising productive relationships, as well as modernising production techniques.

> In order to advance direct [sic] from small production to socialism, we must effect -- parallel to the revolution in production relations -- a technical revolution aimed at turning handicraft labour into mechanized labour, and building the new material and technical basis of socialist society (Lê Duẩn & Phạm Văn Đồng, 1975, 95).

Included in the technical revolution in agriculture were attempts to improve farm implements, eventually replace human labour with tractors, introduce new seed varieties that were being imported from China and elsewhere, as well as modernise irrigation and drainage systems. All of these changes were taking place at break-neck speed and, as I discuss in Chapter 7, without the technical knowledge at the co-operative level to implement them well.

By the early 1960s, peasants throughout the DRV were joining agricultural co-operatives. Although co-operatives had appeared in the Red River delta during the colonial period, it was the first time co-operative management had been combined with collective ownership of the means of production. On one hand, co-operatives were responsible for digging local canal networks, flattening fields and building roads, while, on the other hand, managers worked with the district level to mobilise workers for medium and large-scale construction sites. Local and conscripted labour duties were included in the peasantry's half of the hydraulic bargain, whereas the Party was responsible for the materiel and, to a certain degree, labour costs for large-scale infrastructure. Beginning in the late 1950s, tensions began emerging between the state and co-operatives over the terms of the hydraulic bargain. This corresponded with three broader trends: first, difficulties

mobilising rural labour; second, declining levels of state versus local investment in hydraulic infrastructure; and, third, a shortage of technical staff and difficulties co-ordinating the activities of the hydraulic bureaucracy.

The speed at which co-operatives were formed and the transformation of productive relationships that co-operativisation wrought helped create what I refer to as a construction-production dichotomy. Co-operative members were expected to tend the co-operative's fields and labour on hydraulic construction sites. A 1973 Ministry of Hydraulics report summed up the general effect that the production-construction dichotomy had, during the 1960s, on both agricultural productivity and hydraulic infrastructure:

> On the one hand, a steady increase in agricultural production must be assured. On the other hand, there must be sufficient labour to construct irrigation systems, which make up an important part of the material and technical foundation of agricultural production (Bộ Thủy lợi, 1973, 9).

Thus, without high levels of labour mobilisation for hydraulic infrastructure construction, it was difficult to increase agricultural productivity. In order to address this issue, the Party, in the early 1960s, encouraged co-operatives to establish hydraulic brigades (*đội thủy lợi*). The movement to build hydraulic brigades coincided with the 1963-64 "do hydraulic work campaign" (*phong trào làm thủy lợi*). This campaign was meant to assist with mobilisation efforts. However, in reality, corruption, poor planning, bureaucratic incompetence and a lack of building materials led to wasted labour and was leading to poorly constructed infrastructure, which would have an impact on future "synchronisation" efforts, which are discussed in Chapter 9.

The first section of this chapter examines briefly those co-operatives that appeared both at the end of the colonial period and under the direction of the DRV before collectivisation began in the late 1950s. The second section considers the VWP's ideological bases for combining irrigation modernisation and co-operativisation. In general terms, co-operativisation under the DRV reflected a modernist tradition of labour specialisation and productivist goals. In the third section, I explore three important factors, which when taken together strained the

hydraulic bargain as it had emerged in the first years of the 1960s. These three trends were a decrease in state subsidies for hydraulic infrastructure construction, poor co-ordination between responsible government agencies and the emergence of the production-construction dichotomy.

The path toward collectivisation

As a theory of rural organisation, co-operativisation has been discussed in Vietnam since the 1860s, notably by Nguyễn Trường Tộ (Marr, 2000, 776; Woodside, 1970, 706). French co-operative theories reflected a corporatist tradition that was strongly linked to the Catholic Church and 18th century, pre-French Revolution guilds (Elbow, 1953, Preface). In the 1930s and 1940s, French co-operatives began incorporating elements of Italian syndicalism and fascism, which were then promoted by the Vichy regime under Marshal Pétain. In 1942, for instance, the *Bulletin de la Chambre d'Agriculture du Tonkin* published extracts from a range of corporatist authors with the assumption that their ideas could be applied to Tonkinese agriculture (See Salleron, 1942; Valenziani, 1942).

Intellectuals writing in Vietnamese-language journals during the 1930s expounded the virtues of co-operative agriculture, while criticising the French regime for not responding to peasants who were requesting assistance from the colonial authorities to form credit co-operatives (Woodside, 1970, 706). Nevertheless, the colonial regime, at times, did promote the creation of credit and water user co-operatives. Under the Dussaix Plan, in 1912, pumping stations were to be combined with state-managed co-operatives. In 1930, René Dumont encouraged the establishment of credit co-operatives and small-scale pump-assisted irrigation systems (Dumont, 1930, 275). Additionally, as I explained in Chapter 6, the Department of Public Works, in the 1930s, advocated the creation of water user credit co-operatives in order for groups of villages to purchase pumps (Gourou, 1931, 337). Credit, irrigation and co-operative management were closely linked in the minds of colonial planners, in much the same way as they were by Party cadres in the 1960s. Addressing these same issues continues to be an

important factor in the operation of co-operatives, as decollectivisation took place in the 1980s and rural organisations were rationalised in the 1990s. I discuss this further in the Conclusion.

In 1926, the colonial regime created the *Crédit Populaire Agricole*. In Tonkin, Annam and Cambodia, it was superseded, in 1933, by provincial branches of the *Crédit Agricole Mutuel*, which were intended to help create village-level credit co-operatives (Robequain, 1944, 241). The first purchasing co-operative was created in Bắc Giang province in 1933 (Guillaume, 1938, 32). Between 1938 and 1943, the *Office Indochinois du Crédit Agricole Mutuel* published the "Co-operative times" (*Hợp tác xã Thông báo*) in Vietnamese, in order to inform peasants of the benefits of co-operating and announce the creation of new co-operatives. Colonial credit co-operatives were linked directly to provincial branches of the *Crédit Populaire Agricole* (*Crédit Agricole Mutuel*), which in 1930 had offices in Hải Dương, Hà Đông, Nam Định, Bắc Ninh, Bắc Giang and Thái Bình (Gourou, 1931, 337-338). In a village or group of villages, a "collection centre" (*centre ramassage*) would be set up. Collections and loans were managed by a local official who would send local funds to the provincial "bank" of the *Crédit Agricole Mutuel* for safe keeping (Guillaume, 1938, 44).

In reality, colonial credit co-operatives were largely sub-branches of the provincial "bank" and not independent entities.

> An orthodox "mutualiste" would likely make the following criticism: the co-operatives do not evolve from the bottom up; it is the provincial "bank" that initiates the creation of collection centres and is the nucleus of the co-operative. But, it is necessary to note that if the process were to start with villages, scattered and unconnected, badly managed and controlled, the process would inevitably fail before the individual co-operatives could be federated (Guillaume, 1938, 45).

The colonial image of independent autarchic villages, islands in a sea of paddy fields, had a strong impact on colonial micro-finance policy. This same attitude informed the VWP when it established its co-operatives in the 1960s, connecting them linearly to the administrative hierarchy running from ministries down to communes. It was through these organisations that the state intended to control

agricultural outputs and inputs -- the most important of which was, arguably, irrigation and drainage.

Symbiotic partnerships: co-operatives and irrigation modernisation[1]

Agro-industrial policy in the DRV was a hybrid of internationalist and indigenous ideologies.[2] Co-operatives reflected the Party's image of rural life defined by the corporate village and the collective spirit that bound villagers to their "homeland" (*quê hương*). For the VWP, images of an idyllic past helped establish a post-colonial identity.

> The village became a central element in this myth of rural simplicity, equality and continuity. It was natural to posit that the village system symbolic of the intrinsic strength of a much older pattern of village organisation, had forcibly resisted foreign occupation and had been reasonably successful in maintaining its own identify -- an identity which also formed the source of the national culture (Breman, 1988, 38).

Meanwhile, collectivisation and co-operative management was indicative of socialist industrialisation, as Stalin and Mao had defined it: extract economic surplus from the countryside to reinvest in heavy industry. According to Vickerman, "communist" ideology demanded that the VWP move forward with industrialisation based on large-scale hydraulic agriculture, mechanisation and scientific improvements to fertilisers and seeds (Vickerman, 1986, 118).

The VWP's decision to move irrigation modernisation policy away from combating famine and toward intensifying agricultural output brought the productivist tendencies within the Party's development ideology to the fore. Productivism had informed not only the colonial vision of development, but also Maoist and Stalinist approaches to rapid industrialisation. The small-holder

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[1] I have chosen to translate "thủy lợi hóa" as irrigation modernisation, when it should be "irrigationisation", or, more correctly, "hydraulicisation", because it is unruly in English, and because the campaign to "hydraulicise" agricultural systems in the Red River delta implies that irrigation and drainage systems were to be "modernised".

philosophy of peasants in the Red River delta would have to be replaced with the productivism that came with being a co-operative member (Vickerman, 1986, 198). The VWP's philosophy of labour management had its roots in Lenin's appropriation of Frederic Taylor's theories. In particular, Lenin was attracted to the rationality of Taylor's theory of "scientific management". Lenin believed that the "standardisation" of manual labour that Taylor prescribed for improving the efficiency of industrial capitalism was an important step in the development of socialism (Linhart, 1976, 91).

Thus, by the late 1950s and early 1960s, co-operatives and modernised irrigation systems had become critical components of the VWP's vision of agricultural and industrial development. There were many reasons why the VWP chose to co-operativise agriculture. Leaving aside the ideological rationales, co-operatives were intended to increase agricultural productivity by re-organising productive activities. They were a way for the Party to control agricultural production and to extract the taxes required to develop the industrial sector of the economy. In order to increase productivity, cultivation techniques had to be improved. This was to be accomplished through the theoretical benefits of collectivised ownership of land and draught power, and by using the co-operative as a means of channelling seeds and fertiliser to rural producers. Improved water control was an important factor in the transformation of the DRV's rural economy. In the same vein as Dussaix and Pouyanne's vision of co-operative agriculture (see Chapter 6), socialist co-operatives were designed to help finance the construction and management of small and large-scale irrigation and drainage systems. As the Party would eventually realise, the efficiency of hydraulic infrastructure was one of many factors that influenced output levels, but it was also one of the most important.

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[2] This line of argument, that Communist Party policies are often a hybrid of local and internationalist influences is borrowed from (Eisenstadt & Azmon, 1975).

In political terms, co-operatives allowed the Party to consolidate control over irrigation and drainage management at the local level, and eradicate the individualism of traditional irrigation management that had limited the expansion of canal irrigation in the late 1950s. Canals were, as I discuss in Chapter 5, initially not well received by peasants; they took up land, involved significant amounts of labour to construct and required ongoing maintenance. For example, at the end of the 1950s, in Gia Tân co-operative, Hải Dương province, canals that were intended for the use of co-operative members were being blocked by non-members who were unwilling to have canals cut up their land.[3] A similar situation was reported in Lộc Sơn commune, Thanh Hóa province, where "land difficulties" (*khó khăn về đất đai*) meant that canals had to follow a twisted winding path along the edge of paddy fields in order to avoid some fields and benefit others.[4] Collectivising land helped to eliminate such land conflicts, as the Party re-engineered the countryside in the process of "constructing fields" (*xây dựng đồng ruộng*).

Improving irrigation and drainage infrastructure, among other improvements designed to increase agricultural productivity, required capital. Credit co-operatives were the first co-operatively managed organisations to appear in the DRV countryside. In 1957, the number of credit co-operatives in the DRV totalled 220, but by 1958 the state began providing loans only to members of production co-operatives or mutual aid teams (*tổ hỗ trợ* or *tổ đổi công* (labour exchange teams)) (Post, 1989, 163). This was the general approach over the next several years: limit non-members' access to credit as one way of encouraging peasants to enter mutual aid teams and eventually co-operatives. Co-operativisation rates varied throughout the DRV, but the following is a chronology of the process in Quốc Tuấn commune, Hải Dương province. From 1958 until the end of 1959, mutual aid teams in Quốc Tuấn commune combined to form low-level

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[3] (VNA3/BTL 7 VV, 1958).
[4] *Ibid.*

co-operatives (*hợp tác xã cấp thấp*).[5] In 1965-66, the low-level village co-operatives became high level co-operatives (*hợp tác xã bậc cao*).[6] Three of the four village level co-operatives in Quốc Tuấn commune amalgamated in 1967 to form one high-level co-operative, and, in 1972, the largest single village co-operative, An Xá, joined the other three villages to form a commune-level co-operative (*hợp tác xã toàn xã*). A seventy-year old co-operative member recalled how, as the co-operatives were combined, the field dikes between them were destroyed so that the expanded co-operative could cultivate larger fields using tractors.[7]

The Party envisioned that co-operatives would rationalise labour management, making the most efficient use of human resources. Co-operative members were divided into "teams" (*tổ*), or larger "brigades" (*đội*) -- a group of more than thirty co-operative members was known as a brigade -- which were responsible for a parcel of collective land (Central Committee for Rural Work (Ban Công tác Nông thôn Trung ương), undated, 16). Labour activities were categorised according to difficulty and assigned appropriate work points (*điểm công*). Work points were the raw materials that determined the number of workdays (*ngày công*), and, in turn, an individual's salary during a cropping period.

The First Five-Year Plan

Within the discourse of the First Five-Year Plan (1961-65), co-operativisation and irrigation modernisation were officially linked. The First Five-Year Plan formalised what had been on the minds of many bureaucrats and Party members for several years. In a 1958 report the Ministry of Hydraulics was already linking the "hydraulic issue" and the organisation of Mutual Aid Teams, defining them as two of the

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[5] By 1963 only about ten per cent of villagers in Quốc Tuấn had not entered co-operatives. (Interview, Quốc Tuấn commune, Nam Sách district, 17 May 2000/1).

[6] (Interview, Quốc Tuấn commune, Nam Sách district, 24 February 2000/1).

[7] He also noted that in 1962, the year his grandmother died, when he turned over his buffaloes to the co-operative they died within the first year. (Interview, Quốc Tuấn commune, Nam Sách district, 17 May 2000/1).

biggest priorities in the countryside at the time.[8] The political report of the Third Congress of the VWP in 1960 stressed the need to construct irrigation networks that linked small-scale projects constructed by the "People" with medium and large-scale systems that would be built by the "State", alone or in partnership with the "People". If hydraulic work were done well, the report continued, it would increase agricultural output by helping to fight drought, floods, waterlogging and salt-water intrusion. Moreover, it would lead to improved transportation networks, as well as develop hydroelectric power and freshwater pisciculture (Phan Khánh, 1997, 72-73). Generally speaking, hydraulic work became political work in relation to the mutually reinforcing political and economic relationship between irrigation modernisation and co-operativisation, as they were outlined in the First FYP.

In June 1961, the Fifth Plenum of the Third VWP Congress solidified the role of hydraulic infrastructure in relation to agricultural development and co-operativisation:

> Hydraulics is the primary means of developing agriculture. Implementing hydraulic work [*công tác thủy lợi*] quickly and strongly, in conjunction with the development of co-operativisation, is the essential line drawn from the special characteristics and basic demands of northern agriculture in the present phase (Quoted in Trương Quốc Lãm, 1963, 1).

Under the First Five-Year Plan (FYP), water control was the "basic technological means" (*cơ s□ vật chất kỹ thuật*) for agricultural production. The goal by 1965 was to ensure adequate irrigation for eighty per cent of paddy fields. In terms of new hydraulic construction, thirty-five projects were to be planned and implemented over the course of the First FYP. In Thanh Hóa province, ten new projects were envisioned, while the Red River delta would get the bulk of the new infrastructure: thirty-one projects or seventy-six percent of the total.[9]

By the mid-1960s, the link between paddy productivity and irrigation was further strengthened by scientific findings that supported well-known traditional

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[8] (Hydraulic responsibilities in the Third Quarter of 1958,VNA3/BTL 64 VV, 1958)

[9] (Report: Investigations into hydraulics work for the three years, 1961, 1962, 1963, VNA3/BTL 38 VV, 1963).

production techniques. Scientists in Hải Dương had concluded, by the mid-1960s, that as far as the Spring crop was concerned,

> access to water dictates whether there will be a crop. Once you have water, fertiliser determines the quality of the crop (Rice expert team (Tổ công tác chuyên gia lúa), 1965, 23).

This, however, was already a well known fact for peasants familiar with the saying: "Ploughing a field that has been allowed to absorb water [làm ải] is more important than all the shoulder poles of fertiliser spread on the fields."[10] In the early 1960s, the Party was determined to raise production levels up to an average of five tonnes of paddy per hectare per year. This would be done by improving Spring crop yields, which had been historically less productive than the Autumn crop. Experimental farms in Hải Dương in the early 1960s were finding that combining "breaking up the soil" (*làm ải*), a necessary step when preparing fields parched by dry winter conditions, and fertilising was critical to improving yields; more so even than the addition of fast growing seed varieties (Rice expert team (Tổ công tác chuyên gia lúa), 1965, 4-5). However, "breaking up the soil" depended on timely and carefully controlled irrigation. In order to achieve these objectives the Party needed to improve irrigation infrastructure. Because chemical fertilisers were scarce between 1961 and 1981, irrigation to break up the soil (*tưới ải*), before planting the Spring crop, became even more important.

Hydraulic schemes: Building a new countryside

In order to facilitate irrigation modernisation, every commune was responsible for designing a hydraulic scheme (*quy hoạch thủy lợi*) that would help to integrate the canals and sluice gates of neighbouring village co-operatives. Between 1959 and 1964, 3400 communes (*xã*) completed their hydraulic construction schemes (*quy hoạch xây dựng thủy lợi*). This was equivalent to sixty per cent of all communes in

[10] "cày ruộng phơi ải còn hơn cả gánh phân giải ruộng".

the North.[11] The Ministry of Hydraulics was relying on communes to establish local-level irrigation and drainage networks, which could then be "synchronised" with large and medium-scale systems. Furthermore, the Party was intent on engineering the delta by homogenising complicated geographies. The following quote portrays the modernised countryside as VWP planners envisioned it.

> Co-operative land should be arranged orderly [*trật tự ngăn nắp*]. Productive areas should be divided into secondary crops, paddy, secondary crops rotated with paddy, and industrial crops. Land should be allocated to brigades that live near the fields. The co-operative's land should no longer be dispersed but lie neatly in a clearly defined area. Land from one co-operative should not encroach on the land of another. Canals and field dikes running straight and crossing at right angles, dividing the land into rectangular areas [*vùng*], sections [*khoảnh*] and plots [*thửa*] with the areas calculated in hectares. From the main canal there should be many secondary canals evenly spaced and spreading out from both banks of the canal. Leading from secondary canals, tertiary canals -- like the feet on a centipede [*chân rết*] -- will irrigate and drain each individual plot. Canals should be straight, arranged either to irrigate or drain, each one following separate irrigation and drainage networks (Nguyễn Tấn Thứ, 1967, 7-8).

Running parallel to such imaginings were the undeniable complexities of the geography of the delta and what this meant for constructing irrigation and drainage infrastructure. Although the delta appears to be flat, small variations in elevation have a significant impact on the type of hydraulic infrastructure required. There are macro-variations: a difference of perhaps two to three metres in elevation, between the tidal irrigation areas along the seacoast, in Nam Định and Thái Bình province, and creek irrigation areas in Hải Dương and Hưng Yên province. However, there are also large variations within provinces.[12] Take Hải Dương for instance.

> There are areas where the Spring crop is "burnt" [*khê*] and the Autumn crop rots; there are areas of alluvial land that become waterlogged, and high land that suffers drought; there are areas that are "half mountain and half plains"

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[11] (Report on the larger features of the "do hydraulic work" movement presented to the Standing Committee of the Council of Ministers (First quarter 1964), 2 April 1964, VNA3/BTL 48 VV, 1964).

[12] Even communes had to deal with small variations in elevation or risk waterlogging low land. For example, Tân Phong co-operative in Ninh Thanh district reportedly had twenty separate high and low land areas (*Hải Hưng,* 1979e).

> [*bán sơn địa*] that suffer erosion, where if it rains the land is waterlogged, and if it is sunny it suffers drought (Quách Đại Rong, 1965, 21).

As an exasperated irrigation and drainage brigade leader explained once when I had become confused: "Are you listening," he cajoled me, "OK...it is a delta but there are still high and low areas. It's not as flat as an airfield but, yet, when water overflows in one area it will end up flooding areas around it."[13] With these general conditions in mind, the Ministry implored co-operatives, as the construction of canal irrigation began stagnating in the mid-1960s, to design schemes based on delineating areas of high and low land (*khoanh vùng*) to "keep" water in high areas and prevent it from flowing down and waterlogging low land (Quách Đại Rong, 1965, 15-20).[14]

In 1961, Hồng Thái commune in Ninh Giang district, which is located in the southeast corner of the Bắc Hưng Hải polder, established one of the first hydraulic schemes in the DRV. The Hồng Thái scheme was based on constructing an alluvial dike (*đê bối*) with several sluice gates to allow tidal flows to push water from the Dầm River into a canal network. With this infrastructure in place the commune was able to irrigate ninety-five per cent of cultivated area with no need for pumps (Quách Đại Rong, 1965, 20-28). Establishing independent local-level irrigation systems was more easily done in areas that could take advantage of tidal forces to move water onto and off of land. Unlike Hồng Thái, where tidal irrigation predominated, Quốc Tuấn commune was reliant on the Lý Văn pumping station and was unable to irrigate effectively its higher land until the late 1970s. Thus, although Quốc Tuấn might design an adequate irrigation and drainage scheme, it would be unworkable unless it had the pumping capacity available to irrigate higher land.[15]

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[13] (Interview Hydraulics Brigade Leader, Quốc Tuấn commune, Nam Sách district, 23 February 2001).

[14] I explore further this contradiction between irrigation modernisation and the Ministry's efforts to encourage independent forms of irrigation in Chapter 9.

[15] The dependent relationship that developed between Quốc Tuấn and the Lý Văn large-scale pumping station is considered more fully in Chapter 9.

As canals were completed throughout Quốc Tuấn commune in the first years of the 1960s, land was also reconfigured in order to benefit from the new canal system. This is how the co-operative manager in An Xá village described the changes that were occurring:

> There was a canal system which was by 1963 completed and perfected [*hoàn chỉnh*], and it has remained this way up until the present. In 1963 we modified all the paddy fields, all the mounds [*mô đất*], graves [*mồ mả*] were levelled out. After that we modified the canal system, field embankments were constructed according to the "fish bone" field canal [*mương xương cá*] systems which allowed for more convenient irrigation and drainage. At the time, this work meant that we had to spend less time scooping water, we were able to equip the system with diesel pumps as we continued to work on the canal system.[16]

However, in the early 1960s Quốc Tuấn commune consisted of a series of village-level co-operatives that lacked a central authority capable of co-ordinating their various hydraulic activities. Some co-operatives would have been more inclined to dig canals and purchase pumps, while others, where hydrological conditions would have perhaps required fewer investments, could devote less labour or capital toward irrigation and drainage.

Under the circumstances, the commune (*xã*) -- which is the lowest Vietnamese administrative unit, and which contains a number of separate villages, or, by the early 1960s, co-operatives -- had to arbitrate. Commune officials had the right to transfer paddy surpluses in one co-operative to relatively poorer co-operatives, in order to deal with inequalities in production materials and capital, but it is unclear what authority it wielded in terms of hydraulic construction and labour mobilisation. Creating a single commune-level co-operative in 1972 was, for the most part, beneficial for residents of Quốc Tuấn. Fields could be grouped and terraced and canals could be extended and consolidated, which would eventually facilitate more efficient irrigation as commune-level systems were linked up with medium and large-scale infrastructure. "When you have a big co-operative then

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[16] (Interview, Quốc Tuấn commune, Nam Sách district, 17 May 2000/1). Fish-bone canals are the lowest level of field canal that bring water directly to fields.

doing these things is possible, otherwise, to stay in the small co-operatives, things are difficult. The commune-level co-operative was better, making a living was easier."[17] Even after the land was levelled and canals were constructed, Quốc Tuấn commune still faced difficulties. As a former village co-operative manager admitted, the commune had many problems managing these new systems. In terms of canal construction and irrigation and drainage management, the limitations of village co-operatives were well known to the VWP in the mid-1960s. However, the exigencies of war, after 1965, made it very difficult for the state to integrate village or commune-level irrigation and drainage systems with large-scale infrastructure. The reasons for this and the implications this had for the hydraulic bargain are considered in Chapter 9.

In addition to the impact that hydraulic infrastructure had on water availability and improved agricultural yields, it also helped to "build" the physical features of co-operatives in another important way: transportation networks. In some cases, irrigation and drainage canals doubled as transport canals, but, more important was the relationship between hydraulic infrastructure and roads. This connection began to become clear to me after a former co-operative manager, in the middle of a discussion concerning irrigation canals, turned to me and said,

> The subsidised period [thời kỳ bao cấp] was very strenuous. We had to carry on our shoulders all our rice seedlings, and it was very tiring.[18]

What did this have to do with canals, I thought? As I did some more research, I realised the two things had much in common. The co-operative leader was alluding to the fact that, without a decent road network, peasants were forced to move everything between villages and fields using bamboo poles (*gánh*) or baskets slung over their shoulders. Even if carts were available, they were of little use without roads, which appeared in conjunction with canals. Canals and roads were likened to "shadows and forms": as dirt was removed to construct the canal it would be

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[17] (Interview, Quốc Tuấn commune, Nam Sách district, 17 May 2000/1).
[18] (Interview, Quốc Tuấn commune, Nam Sách district, 17 May 2000/1).

used to build up a parallel roadway.[19] In addition to reducing the amount of labour involved with transporting, for example, newly harvested paddy to drying yards, roads allowed tractors access to co-operative fields.

One report of a road construction campaign in Ninh Giang district, Hải Hưng province, described that wherever there were paddy fields, roads and secondary canals (*mương*) would appear in tandem. Following the main canals (*mương chính*) were roads for mechanised vehicles. Along the smaller branch canals (*mương nhánh*), roads ran up to the paddy fields, to the collective pastures, or to seedling beds. Without roads, members of Hồng Phong co-operative, Ninh Giang district, were forced to haul, using bamboo shoulder poles, everything to the fields and back: fertiliser, seedlings and the harvested paddy. Once roads had been constructed, "improved vehicles" (*xe cải tiến*) (small push carts) and ox carts (*xe bò*) began appearing during planting or harvest time. Co-operative officials calculated that with these improvements reduced by sixty per cent the labour required for transporting items around the co-operative (*Hải Hưng,* 1975b).

Co-operatives helped ease the management problems that accompanied attempts to modernise irrigation systems. As co-operatives expanded to include entire communes, the opportunities to integrate hydraulic infrastructure increased. In Quốc Tuấn, at least, this led to improved working conditions for co-operative members. The first steps, however, were critical. It was important that co-operatives emerged as legitimate political entities if they were to succeed in constructing and managing modern irrigation and transportation infrastructure. The potential long-term success of co-operative hydraulic management in Quốc Tuấn would have been apparent in 1957 when canal construction began before co-operativisation took place in 1958-59.[20] As groups of interested peasants, those with the most to gain from irrigation, organised themselves to design and construct village-level canals, they were in effect creating from the bottom up the Quốc Tuấn

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[19] "kết hợp, gắn bó với nhau như bóng với hình".

[20] (Interview, Quốc Tuấn commune, Nam Sách district, 16 May 2000/1).

commune canal network. In general, however, designing and implementing hydraulic schemes was a difficult task for co-operatives and one that was not made easier by poor local management, a multitude of village co-operatives, complicated district designs or an overall lack of technical knowledge at the village/commune level.

Tensions within the hydraulic bargain

As co-operativisation moved forward during the first half of the 1960s, cracks began to appear in the hydraulic bargain. In addition to constructing local irrigation and drainage networks, and organising co-operative production brigades, co-operatives were required to mobilise labour for large-scale worksites. As local and national priorities clashed, the dichotomy between production and construction became more salient, and the state found it difficult to mobilise conscript labour. In order to overcome this problem, the state was left with little option but to pay labour at large-scale hydraulic worksites. This led to a second problem for the state, which was the tremendous cost of financing its irrigation modernisation program; consequently, by as early as 1959, it began to shift the economic burden downward. In addition to the increasing financial pressures, co-operatives were instructed to design hydraulic schemes with little or no technical assistance from district authorities. A lack of planning also typified work that was undertaken at large-scale hydraulic worksites. In this next section I consider these three trends -- difficulties mobilising labour, declining state subsidies relative to co-operative investments in hydraulic networks and weak bureaucratic infrastructure -- within the context of the 1963-64 "do hydraulic works" campaign. In combination, they helped to undermine both state planners' and co-operative members' confidence that the other side was committed to the hydraulic bargain.

By 1963, it was so difficult for the Ministry of Hydraulics to mobilise labour for headwork construction that it was forced to make a request to the State

Planning Committee (*Ủy ban Kế hoạch Nhà nước*) for additional earthmoving equipment from the Soviet Union.[21] In addition to this, the state was compelled to deal with labour shortages by paying workers at hydraulic worksites, something that the Communist authorities considered to be a feudal activity. Vietnamese writers have attributed the failure of worksite managers to mobilise labour as well as the need to pay labour to a lack of "community spirit" among workers (Phan Khánh, 1981, 268; Trần Đức, 1994). For example, in his discussion of co-operation in agriculture in Vietnam, Trần Đức asks the question:

> Why, if during the 19th century the Nguyễn lords were capable of digging [*đào*] and piling up [*đắp*] more earth in the form of canals and dikes than any previous dynasty, did they experience so many failures (Trần Đức, 1994, 46)?

He argues, and he is not alone in this belief, that one explanation for the weakness of the Nguyễn dynasty's dike network was that recruiting labour using piecework contracts destroyed the tradition that had begun under the Trần dynasty, whereby building dikes was the duty of all people in the nation (*toàn dân*) (Trần Đức, 1994, 46). Whether this is an accurate historical account is debatable. However, labour payments were not just a theoretical concern because if the state could mobilise labour without having to pay for it, the cost of constructing hydraulic infrastructure would be greatly reduced. This realisation did not escape provincial authorities, but, by the late 1950s, mobilisation rates had declined to the point that they had little choice but to begin paying conscripted labour at hydraulic worksites.

In 1959, the Bắc Ninh provincial Hydraulic Department recognised that "because of the labour demands that construction projects put on individuals" it

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[21] (Report concerning the plan to import Soviet equipment, 1964, April 1963, VNA3/BTL 87 VV, 1963). This report was responding to the difficulties that were being presented to worksite managers faced with a shortage of labour (*nhân lực*). One solution to the problem was to mechanise earthmoving as much as possible. This was reflected in a Resolution passed at the Eighth Plenum of Party's Third Congress which stated that mechanical diggers and dredgers need to be repaired as quickly as possible in order to expand mechanised work on headworks and main canals. (Report on the plan to mechanise work of the hydraulics branch, 18 July 1963, VNA3/BTL 87 VV, 1963).

would be necessary to pay conscripted labour at state-financed dike projects.[22] In Hải Dương, the Department of Hydraulics felt that paying conscripted labour eroded the "patriotic will of the People", but accepted it as a necessary evil. An important drawback to the decision to pay conscripted labour was that districts would often fail to transfer funds to the commune, and, instead, spent the money on cadre salaries or organising film nights.[23] In the vicinity of Hanoi, where there were many urban projects such as parks and large boulevards that demanded the use of conscripted labour, mobilising labour was equally difficult.[24] In general, people disregarded duty rosters (*cắt phiên gọi lượt*), which meant erratic numbers of volunteers and worksites being unable to operate throughout the year. The state criticised conscripted labourers for being "lazy" (*lười biếng*) and unconcerned with the quality of their work. To help overcome these difficulties, labour "contests" (*thi đua*) were held to encourage more productive work but were often met with disparaging comments from workers.[25]

The Ministry of Hydraulics, by 1959, realised that it would have difficulties subsidising the entire cost of constructing and maintaining a large-scale hydraulic system -- despite international assistance and following a revised budget that saw a reduction in the Ministry's material requests for that year. In the revised budget, the Ministry of Hydraulics reduced its request for concrete for construction of the Bắc Hưng Hải system, the Bàn Thạch hydroelectric project, and the southern Nghệ An irrigation system. The original budget was based on plans to construct thirteen new large-scale projects in 1959, but this was scaled back, which meant that pumps

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[22] (Summary report of the Bắc Ninh Department of Hydraulics on work done on dikes in 1959, 12 October 1959, VNA3/BTL 29 VV, 1959).

[23] (Summary report of the Hải Dương Department of Hydraulics on work done on dikes, embankments and sluice gates in 1958-1959, 15 October 1959, VNA3/BTL 29 VV, 1959).

[24] The Hanoi dike construction report for 1959 argues that because rural labour was in such short supply it was difficult to substitute rural labour when there were shortages of urban labour. In 1959, peasants were being encouraged to strengthen mutual aid teams, construct co-operatives and commune hydraulic schemes, implement production plans for the Spring crop and meet military obligations. (Summary report of work done on dikes and embankments in 1959 (Hanoi), 10 June 1959, VNA3/BTL 29 VV, 1959).

[25] *Ibid.*

from various eastern European allies had to be stored.[26] Of the 28.8 million *đồng* budgeted for hydraulic infrastructure in 1959, more than eighty per cent -- 23.1 million *đồng* -- went toward labour costs as opposed to equipment. The Ministry of Hydraulics was expecting revenues of only 805 715 *đồng*, which revealed an enormous annual deficit.[27]

In order to reduce the percentage of the state budget for hydraulics devoted to labour costs, in 1960, gross ministerial transfers to provinces were reduced. In that year, before hydraulic brigades began to appear, the Ministry of Hydraulics was responsible for paying conscripted labour at large-scale hydraulic worksites 0.5 *đồng* for one cubic metre of "difficult" earth or 0.4 *đồng* for one cubic metre of "easy" earth (Thủ tướng Chính phủ (Prime Minister), 1960). This worked out to roughly 0.5 *đồng* or 0.4 *đồng* per day using the standard rate of one cubic metre of earth moved per person per day. This was a reduction from the previous rate of 1.10 *đồng* per cubic metre. Under the 1960 legislation, provinces were responsible for increasing their contributions from 0.26 to 0.40 *đồng* per cubic metre. In areas where the people "lacked basic necessities" they would receive an extra 0.40 to 0.50 *đồng* per cubic metre.

On medium and small-scale irrigation and drainage projects, however, the full cost would have to be borne by districts and co-operatives.[28] Although the Ministry of Hydraulics regularly transferred funds to co-operatives via provinces and districts, as capital flowed downward through the hierarchy, lower levels suffered as higher administrative levels pilfered or misdirected funds.[29] For example, in the early 1960s, transfers between provinces and districts were formalised at an annual conference. Provinces would provide co-operative's with between 2000 and 5000 *đồng* for hydraulic work during the Spring crop. In addition

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[26] (A lecture regarding correcting and editing the 1959 Ministry of Hydraulics' budget for basic construction and financial income and expenditures plan, 24 July 1959, VNA3/BTL 17 VV, 1959).

[27] (1959 Basic construction budget (Amended chart attached to financial income and expenditure plan, 24 July 1959, VNA3/BTL 17 VV, 1959).

[28] (Summary report of hydraulic work in 1959 prepared by the Hải Dương Department of Hydraulics, 2 January 1960, VNA3/BTL 22 VV, 1959-1960)

to this, 1000 to 3000 *đồng* would be provided as an incentive for co-operative members to contribute to small-scale projects. These funds, however, were not always spent on paying conscripted labour or buying new tools. In 1959, one district chose instead to spend 1000 *đồng* on a cinema and taking photographs.[30]

Between 1961 and 1963, state investment relative to local expenditures (*kinh phí*) on small-scale irrigation systems declined from seventy-nine per cent to fifty per cent. One important reason for this was that with the creation of hydraulic brigades in 1961, hydraulic brigade members were paid directly by their co-operatives (Trương Quốc Lãm, 1963, 15-16). The state's financial difficulties were highlighted when, within the first six months of 1963, after exhausting its entire annual budget, the Ministry had to "request" (*xin*) additional funds from the "People".[31] In order to help avert future shortfalls the government introduced an irrigation fee (*thủy lợi phí*) in June 1962, which the co-operative paid to central authorities as part of its tax obligations.[32] Fees were to be reinvested in operational and maintenance costs, with the remainder going directly into the state budget. By charging co-operatives an irrigation fee the state was in effect forcing localities to pay for the construction of headworks. However, by extracting taxes to cover the cost of headwork construction the state was making it difficult for localities to build small-scale systems at the same rate as large-scale systems. This would eventually have serious consequences for the "synchronisation" process.

Throughout the 1960s, independent small-scale (*tiểu thủy nông đọc lập*) systems survived and continued to irrigate a substantial portion of the DRV. The

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[29] *Ibid.*

[30] *Ibid.*

[31] (Report: Investigations into hydraulics work for the three years, 1961, 1962, 1963, VNA3/BTL 38 VV, 1963).

[32] The fee did not apply to all forms of irrigation. Fees were paid to irrigate only the two main Spring and Autumn crops, as a way of encouraging a Winter crop (*vụ đông*). Furthermore, the fee only applied to "scientific" irrigation in so far as there was no fee collected where water had to be scooped higher than 1.5 metres (Hội đồng Chính phủ (Council of Ministers), 1962). Fees were also designed to make sure that the "masses" (*quần chúng*) understood that water taken from canal systems was not a gift from the heavens (*của trời cho*) and to encourage them to conserve water (Phan Khánh, 1997, 84).

war, which began in 1965, forced co-operatives to rely on their own small-scale hydraulic infrastructure. This pattern, however, was already well established. In the early 1960s, nearly half of all irrigation systems were considered to be "independent" (*độc lập*), and not yet "synchronised" -- headworks connected to fields through canal systems -- with larger pumping stations and main canals.[33] The remaining fifty to sixty per cent was ostensibly served by large-scale systems. However, the 1962 efficiency rate for large-scale irrigation and drainage systems was approximately fifty percent, which meant that only between twenty-five and thirty per cent of total cultivated area in the DRV was being irrigated by large-scale networks.[34] It should be noted that these figures are likely an overestimation of irrigated area because official statistics were often based on irrigated capacity, which measures the potential irrigated area according to the number of large-scale pumps available. Such figures do not necessarily consider whether canals are in place to guide water from pumping stations to fields.[35] Despite inaccuracies, these statistics underscore both the difficulties that the DRV was having synchronising large-scale and small-scale hydraulic systems, and the importance of "independent" irrigation and drainage systems during the period leading up to the American war.

One reason why paid labour was anathema to Vietnamese academics and government officials was because they believed that it subverted honest unpaid labour. Under wartime conditions, for example, this argument could be substantiated. However, evidence from 1960 onward, even during wartime, suggests that relying on a patriotic or community spirit was no substitute for material incentives. Patriotism could not overcome the simple fact that hydraulic construction work competed directly with production work in the fields, except

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[33] (A commentary on the second irrigation plan, 2 June 1963, VNA3/BTL 85 VV, 1965). As I discuss in Chapter 9 this figure remained relatively constant for the next two years until the American war began in 1965.

[34] *Ibid.*

during a two to three-month period from November to January, when seedlings for the Spring crop were being prepared or just being transplanted. However, when a winter Crop was cultivated, this window of opportunity narrowed considerably. Neither patriotism nor material incentives could completely eliminate the tension between construction and production. It was in this atmosphere of low levels of labour mobilisation and increasing financial pressures for co-operatives that the first "do hydraulic work" campaign (*phong trào làm thủy lợi*) was undertaken.

The 1963-64 hydraulics mobilisation campaign

The Ministry of Hydraulics introduced a two-year mobilisation campaign in 1963 in order to focus attention on the VWP's hydraulic goals, as set out in the First FYP. The objectives of the "do hydraulic work" campaign were, firstly, to ensure that there was infrastructure in place to provide assured irrigation for eighty per cent of cultivated area. Second, drainage systems were to stabilise production of the Autumn crop in areas of low land. Third, dikes and embankments were to be consolidated in order to fight against "the worst floods ever recorded". In order to accomplish these goals, work would have to be done on small, medium and large-scale irrigation systems as well as dike networks. To further complicate matters, the "do hydraulic work" program was implemented in conjunction with two other movements. In addition to constructing hydraulic systems and training technical cadres, the VWP was hoping to reform co-operative management and production technology while mobilising for the "three constructions and three things to fight against"[36] campaign (Hà Kế Tấn, 1966, 3-4).

Besides the management goals, the earth-moving targets alone were overly ambitious. Between 1963-64, 308 million cubic metres of earth for small-scale

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[35] This becomes an important issue in the 1970s when the state begins actively to link up large and small-scale irrigation and drainage networks, a process known as "completing and perfecting". This is discussed further in Chapter 9.

[36] "3 xây, 3 chống". The three "constructions" were: build management systems, ownership systems, and new people. The three "preventions" were: fight corruption, waste and bureaucratic red tape (Nguyễn Hữu Đoan, 1993, 41).

systems, excluding stone and concrete, and a further 97 million cubic metres, for medium and large-scale systems, would need to be moved. In total, more than 400 million cubic metres of earth were to be moved in two years (Hà Kế Tấn, 1966, 3-4). This is sixteen times the earth that was to be moved in 1957, when targets were missed (see Chapter 7). The earth moving target of this "do hydraulic work campaign"[37] was more than four times the 75 million cubic metres of earth moved during the construction of the Suez Canal. Of the 75 million cubic metres of earth moved at Suez, fifteen million cubic metres were moved by hand, with the remaining 60 million moved almost entirely using mechanical means: steam dredges and so on.

> The excavation of 75 million cubic metres by hand would have taken 75 million man-days. With an average *corvée* of 20 000 men working 300 days a year, this would have taken 12.5 years for excavation alone, without taking into account the necessities of port construction etc. (Marlowe, 1964, 240).

These estimates are based on one cubic metre per person per day which, although the French used the same labour rate in Indochina, Marlowe admits were slightly exaggerated.[38] In this light, the DRV's hydraulics campaign objective of 400 million cubic metres of earth moved in two years would have been a very difficult task indeed. The DRV would need to mobilise 2.2 million labour days everyday for at least three months of each year to achieve such targets.

Not surprisingly, given the task at hand, after the first year of the "do hydraulic work" campaign, the Ministry concluded that work was being implemented too slowly. The Ministry was critical of what it believed was an overall bias toward construction of new systems, while strengthening management practices at existing systems was being neglected.[39] The Ministry believed that

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[37] There was a second "do hydraulic work campaign" that began in 1966.

[38] Ministry estimates of cubic metres of earth moved per person per day in 1959 came to 1.3. (Reference document: Conference to exchange experiences concerning constructing schemes in areas that have canal networks, undated, VNA3/BTL 11 VV, 1959).

[39] Provinces such as Nghệ An, Hà Đông and Hà Bắc were accused of being more interested in getting ministerial support for large-scale hydraulic systems and failed to take seriously mass mobilisation for small-scale projects. In Sơn Tây, the Ministry applauded the province for organising a mobilisation conference that raised "ideological awareness" (*nhận thức tư tưởng*). According to

completing and implementing commune and co-operative hydraulic schemes should take precedence over constructing large-scale systems. In order to facilitate this process, provinces were responsible for sending technical cadres down to communes, who would then assist with the technical aspects of the scheme. Local-level planning was relatively successful in Hưng Yên, Hải Dương and Vĩnh Phúc. Local planning efforts, according to ministerial officials, were intended to establish "scientific" (*khoa học*) and "technical" (*kỹ thuật*) hydraulic systems that moved beyond the "simplistic" forms of the past.[40] Such attitudes toward science and local knowledge are reminiscent of the colonial era debates over the validity of the "siltation hypothesis". There was lip service paid to local innovation, such as the example in Chapter 7 when central cadres sent to rural areas were to design schemes according to local needs, however, plans that were considered to be "unscientific" were unacceptable to the Ministry.

Under the circumstances, trained cadres should have been the backbone of the campaign, a necessary prerequisite before the campaign even began, but, instead, they were being trained while "scientific" schemes were being designed and implemented.[41] The Ministry reported that over the course of the two-year "do hydraulic work" campaign, tens of thousands of local level cadres were trained (Hà Kế Tấn, 1966, 4). In addition to local officials, between 1963-65, there were 205 graduates from the Hydraulics University, with annual graduates estimated for the following three years hovering around 130, until 1969, when 440 graduates were

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officials, however, the provincial scheme that resulted from the meeting was weak and not being implemented quickly enough. (Report on the larger features of the "do hydraulic work" movement presented to the Standing Committee of the Council of Ministers (First quarter 1964), 2 April 1964, VNA3/BTL 48 VV, 1964).

[40] (Report on the larger features of the "do hydraulic work" movement presented to the Standing Committee of the Council of Ministers (First quarter 1964), 2 April 1964, VNA3/BTL 48 VV, 1964).

[41] Not everyone in the VWP shared a belief in the paramountcy of science over local knowledge. Hydraulic schemes, according to Nguyễn Chí Thanh, were necessary for knowing, for example, how much cement was required to construct some type of infrastructure. However, infrastructure need not be complicated. He encouraged co-operatives not to rely on high technology but make the best use of what was at hand. At a conference in October 1963 concerning the "do hydraulic work" Campaign (1963-64) Nguyễn Chí Thanh provided a number of examples of co-operatives in Nam

expected.[42] Added to shortages of local-level technical staff were problems with planning and co-ordination within the Ministry of Hydraulics.

> The labour plans that are made in the Planning Office of the Design Institute [*Viện thiết kế*] and in the Office for Organisation in the Project Section [*Tổng độ Công trình*] are not co-ordinated which shows that the relationships that exist within the Ministry have difficulties. Moreover, the relationship between the two offices in terms of project design is lacking and not yet very close.[43]

Without the ability to assess reliably the needs of worksites and co-operatives the Ministry had a difficult time matching technical requirements with skilled labour, and that is assuming the labour was available. The 1963-64 campaign highlighted the obstacles that the Ministry of Hydraulics was facing in terms of constructing and managing modernised irrigation systems. Not only did worksite management need to rely on a well-functioning hierarchy running from the Ministry of Hydraulics down to co-operatives, but also horizontal co-ordination between ministries, and mass organisations.

Cadre shortages limited the state's capacity to transfer technical knowledge to co-operatives. Consequently, co-operatives found themselves under-resourced while still being asked to provide labour for large-scale hydraulics worksites. The state was proving in the early 1960s that it would have problems fulfilling its half of the hydraulic bargain. From the perspective of co-operative members, the state's shortcomings between 1961 and 1963 would have been apparent in terms of the degree to which localities were forced to remain dependent on small-scale infrastructure. From the state's perspective, hydraulic construction relied on large amounts of conscripted labour, and it was the co-operative that was responsible for working with district officials to mobilise the necessary number of workers. As a means of delineating productive and construction labour, in the hopes of

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Định and Quảng Bình where field dikes and small reservoirs managed to increase cultivated land by several tens of hectares (Nguyễn Chí Thanh, 1969, 356-358).

[42] (Report on plan to train provincial cadres according to schools managed by the Ministry's Hydraulic University, undated, VNA3/BTL 161 VV, 1964).

[43] (1963 Summary report on the recruitment, use and work assignments of official workers in productive areas, 9 April 1964, VNA3/BTL 89 VV, 1965).

improving mobilisation rates, the state pushed co-operatives to establish hydraulic brigades.

Hydraulic brigades and the production-construction dichotomy

The 1963-64 "do hydraulic work" campaign attempted to strengthen those hydraulic brigades (*đội thủy lợi*) that already existed, based on the example of Hồng Thái co-operative in Hải Dương province, and to encourage co-operatives to create new brigades. However, participation in hydraulic brigades between 1961 and 1963 proved to be unpopular.

> Although there are many organisational problems with hydraulic construction, the most serious problem is still a lack of "manpower" [*nhân lực*], labour, and organisations dedicated to creating co-operative hydraulic brigades.[44]

Hydraulic brigades were responsible for moving between various construction sites, providing the conscripted labour to large-scale worksites that was required from all co-operative members (*dân công nghiã vụ*).[45] During the 1963-64 campaign co-operatives in delta and midland provinces were given until the beginning of 1964 to organise hydraulic brigades (Hà Kế Tấn, 1966, 4).

According to the Ministry, hydraulic brigades were "a way of institutionalising the mobilisation of conscripted labour in a peace time setting." They provided an organised division of labour within co-operatives that was considered to be "neat" (*gọn nhẹ*) and "tight" (*chặt chẽ*), and created a formal distinction between productive and construction labour. A conference in 1963 concluded that hydraulic brigades improved the rate at which basic infrastructure was constructed and reduced "waste" (*lãng phí*) and "other weaknesses" that were

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[44] (Report: Investigations into hydraulics work for the 3 years, 1961, 1962, 1963, VNA3/BTL 38 VV, 1963).

[45] Labour responsibilities were divided into three categories. At the co-operative level labour was provided as "welfare" (*công ích*); when labour was provided for medium-scale systems at the district level one went as a "worker" (*nhân công*); and when you worked on large-scale systems you went as "conscripted labour" (*dân công*). All three types of labour are known generally as "công ích nghiã vụ", whether the labour took place at the provincial, district or co-operative level.

attributed to mobilising conscripted labour.[46] According to published figures, by the end of the 1963-64 "do hydraulic work" campaign, 15 000 hydraulic brigades had been created with a total of 30 000 brigade members (Hà Kế Tấn, 1966, 15). This would have meant on average that each participating co-operative was contributing two individuals per brigade.[47] According to the Ministry, hydraulic brigades brought labour productivity in deltaic provinces up from eighty percent of planned targets in 1963 to 150 per cent in 1965. In addition to the brigades themselves, productivity increases were also associated with improved tools (*dung cụ cải tiện*) (Hà Kế Tấn, 1966, 15).[48]

Districts were responsible for mobilising hydraulic brigades. The worksite would establish a management committee (*ban chỉ huy*), which was responsible for gathering the required work force. Even after a specific irrigation system had been constructed, it was incumbent on the district to ensure that labour was mobilised before each crop to repair and maintain hydraulic infrastructure.

> The workers would dig canals and dredge sluice gates in order for water to flow to the fields, and it was the co-operative's responsibility to send the people along. Before there were specialised brigades each production brigade would contribute a certain number of people. Once the hydraulic brigades were established they would provide the labour for all the people in an area. This was the way it was for irrigation and drainage systems, but in the co-operative itself, it was also necessary to order people to work. As one

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[46] (A submission from the Ministry of Hydraulics concerning the organisation of specialised brigades to do hydraulic work in agricultural co-operatives, undated, VNA3/BTL 87 VV, 1963).

[47] There are discrepancies in unpublished data concerning the total number of brigade members. Unpublished information suggests that the published figure of 30 000 is too low. A report from 1964 recorded 245 000 members in 12 341 brigades. The majority of brigades in 1964 were used for large projects such as the Neo Bùi Hòa dam and the Cầu Xe sluice gate, which were both built along the BHH system. 14 000 brigade members, in 767 brigades, were reportedly working on the Neo dam in 1964. (Report on the large points of the two-year "do hydraulic work" campaign sent to the Council of Ministers (First Quarter 1964), 2 April 1964, VNA3/BTL 48 VV, 1964). Also, in April 1964, the Hải Dương deputy, Nguyễn Vĩnh, reported to the National Assembly (*Quốc Hội*) that 800 brigades, 18 000 people in total, had been organised in Hải Dương. (VNA3/QH 279 VV, 1964).

[48] Improved tools would have involved the use of carts, or an increase in the number of shovels or baskets being used at worksites. It did not refer to mechanised labour as there is no evidence to suggest that the vast majority of earth moving at the time, even at Ministry-managed headworks worksites, involved anything more than masses of human labour.

> brigade finished its work then they would have to go and do work for another brigade somewhere else.[49]

With the introduction of hydraulic brigades, concerns arose that inequalities would emerge between co-operative members who went off to worksites and those who remained on the co-operative.[50] "If the people in the co-operative were made to suffer too much, this would create disunity within the co-operative. But, if the people who went to the worksites were paid too little, this would also result in difficulties" (Trương Quốc Lãm, 1963, 15-16). In order to solve this problem the basic wage for hydraulic brigade members was set at one half of the value of the work points that their labour would have earned them toiling in the co-operative's fields. On top of this wage, which was paid by the brigade members' co-operative, brigade members would get an additional wage from the Ministry according to the brigade's productivity at the worksite (Trương Quốc Lãm, 1963, 15-16).

Working in the hydraulic brigade provided the possibility of not only an increase in legitimate salary but it also opened up opportunities to benefit from corrupt practices. The basic salary of brigade members was paid by the co-operative; however, once the brigade arrived at the worksite it came under the direction of the worksite's management committee. Beyond the reach of their co-operative managers, hydraulic brigade members would collude (*ăn cánh*) with members of worksite management committees to add workdays to their time sheets, which they would then take back to the co-operative for reimbursement. The worksite cadres had nothing to lose by doing this and would often "recklessly confirm" (*phóng tay xác nhận*) these time sheets in order to generate goodwill among the brigade members and make them easier to manage (Mai Văn Hai & Bùi Xuân Đính, 1997). As a result of this system, there was little incentive for brigades to increase their productivity in order to receive a state-financed bonus. Brigade

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[49] (Interview, Quốc Tuấn commune, Nam Sách district, 17 May 2000/1).

[50] Workers on large-scale systems received a food allowance, which the Ministry in 1963 applied to the Council of Ministers to have raised from 250 to 300 grams of rice per person per day. Cloth was used as an incentive to complete the plan. (A submission from the Ministry of Hydraulics

members, when they falsified work invoices that were reimbursed by their co-operative, were stealing from fellow co-operative members since work points were paid according to the gross co-operative product, to which brigade members were not contributing. The overall result was that there was little incentive to work productively or carefully on large-scale infrastructure projects and consequently they were often poorly constructed.

Despite the opportunities that brigade membership offered co-operative members, images of mud and suffering pervaded people's thinking. A former co-operative manager summed up for me the general disdain for hydraulic brigade work:

> The state provided rice for conscripted labourers, which meant that you could work for a whole year and all you would have to show for it is several tens of kilograms of paddy. If you had a cup of tea on the street it would cost you one tenth of a *đông* [one *hào*] and yet one labour day [measured in paddy] would be worth five cents [*xu*].[51]

A newspaper account of a well-established hydraulic brigade provided an insight into the general attitude that people had toward hydraulic work. The article was aimed at changing people's perceptions of hydraulic work but in order to do so it had to illustrate what hydraulic work was once like:

> In the past if you spoke of the work of a hydraulic brigade, people would think immediately of expertise in piling earth on dikes or digging canals, work that had to do with the earth and timber [*thổ mộc*], heavy work which required no technology. Now things are changing. Brigades are now capable of working with steel and concrete. They now have experience with big projects.[52]

The Ministry was hoping to encourage more people to contribute their labour by appealing to peoples' attraction to things sophisticated and modern.

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concerning the organisation of specialised brigades to do hydraulic work in agricultural co-operatives, undated, VNA3/BTL 87 VV, 1963).

[51] (Interview, Quốc Tuấn commune, Nam Sách district, 17 May 2000).

[52] The particular brigade being lauded was created in 1963. Over the years it had provided 31 000 days of conscripted labour for the commune. Wherever the brigade was working, members would plant vegetables and raise pigs. Most importantly, in 1967, at the Cầu Xe sluice gate worksite in Tứ Kỳ district in the southeastern corner of the BHH polder, brigade members learned about shaving steel

For the average co-operative member, the construction-production dichotomy continued to exist even after hydraulic brigades were created because hydraulic brigades only supplied labour to large-scale construction projects. Brigade members fulfilled the co-operative's conscripted labour (*dân công*) requirements. Conscripted labour fell under the jurisdiction of the Ministry. In 1957, legislation was passed that obligated citizens to provide thirty days of conscripted labour each year, which was to be used to construct hydraulic and transportation networks (Bộ Lao động, 1957). This figure of thirty days of conscripted labour was much lower than what was demanded in reality, since co-operative members still had to provide "công nhân" as well as "công ích" to the district and the co-operative respectively.

Every year males between eighteen and sixty years and women from eighteen to fifty-five would have to provide labour for which they received no extra remuneration. For example, the rough calculations were described to me as follows:

> You would work 300 days in one year and you would have to provide 100 days of labour for hydraulics and other things, this would leave you with 200 days that would be done according to the co-operative. The work responsibilities were big don't you think? But if it was not like that then there would be no water and we would not be able to plant. Other construction responsibilities such as drying yards and large collective stables took up another thirty labour days.[53]

In the end, hydraulic brigades provided some respite for the co-operative members but this was only a small measure of the much broader labour requirements involved in modernising irrigation and drainage systems at the local and district levels. The hydraulic bargain suffered as the inefficiencies of large-scale headworks, built with conscripted labour, were exposed. In the following case study, the three trends that I have examined above are considered in the context of a large-scale hydraulic worksite.

(*cạo dỉ*), likely from the Chinese experts who were instrumental in the construction of this sluice gate (*Hải Hưng,* 1978f).

[53] (Interview, Quốc Tuấn commune, Nam Sách district, 17 May 2000).

The Trịnh Xá hydraulic worksite

The complexities of co-ordinating the many facets of large-scale construction projects are evident in the following case study of the Trịnh Xá hydraulic worksite. It also provides a more concrete view of how managerial deficiencies contributed to corruption and waste. The Trịnh Xá pumping station in northern Bắc Ninh province consisted of a total of eight pumps, the requisite gates and holding tanks, seventeen kilometres of canals of various sizes, 173 sluice gates, one 4000 kilowatt transformer and five kilometres of thirty-five kilovolt high tension wires. The project was designed to irrigate 44 000 hectares and drain from 6000 to 15 000 hectares. Work began in 1962, but moved slowly over the next two years.[54]

The worksite staff was organised into three broad categories: A, B and C. Group A was the worksite Planning Committee (*Ban Kiến thiết*) and represented the Ministry of Hydraulics. Below the Ministry was Group B, which was the worksite itself (*công trường*). This group was, in theory, contracted directly by the Ministry to carry out all construction work. In reality, Group B was responsible for earth moving, provisioning and supervising construction, while it would subcontract construction responsibilities to Group C, which consisted largely of volunteer labour (*dân công*). Provinces were responsible for recruiting Group C members, a job that Group B delegated to the District Mobilisation Committees (*Ban Chỉ huy*). Nearly all Group B members were government cadres recruited from the local provincial authorities. They were reported to be professionally weak. Technical Group B cadres at the Trịnh Xá worksite in the early 1960s had only recently graduated from university and had no practical experience.[55]

Group B, which consisted of mobilisation committees at both the district and co-operative levels, was given the task of recruiting and supervising Group C labourers. However, in the early 1960s, contracts were not normally signed between Groups B and C, partly because it was rare to have project workplans approved

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[54] (Bắc Ninh irrigation report, 4 February 1964, VNA3/BTL 57 VV, 1964).
[55] *Ibid.*

before earth moving work was underway.[56] Poor co-ordination and an overall lack of planning led to disarray around the Trịnh Xá worksite where nothing was "normal", where leadership was "not united or focussed", where each unit would relate to the other only on the basis of contractual obligations. A dependence on contractual relationships was followed by a decline in "political work", which was required to convince individuals to stay at a worksite and to work efficiently.[57]

Worksite managers at Trịnh Xá were only capable of mobilising fifty per cent of the planned labour force of several million labour days per year. There were different types of labour on the site. There were day labourers (*nhật công*), who were divided into volunteer labour (*dân công*) and contracted labour (*thuê mướn*). Managers and technical cadres were even considered to be "indirect labourers" (*công gián tiếp*). In 1963, the Ministry discovered that in order to reach its mobilisation and construction targets it was necessary to make the most of contracted labour, which, in that year, made up forty per cent of the day labour total. One of the problems with hiring day labour in the first years of the project was that payments were made from the Ministry down to Group C through the Group B and C leaders. In order to avoid the corruption that accompanied the use of intermediaries the Ministry began paying Group C workers directly.[58]

One of the big concerns in 1962 and 1963 was that materials were being pilfered at an alarming rate. The Ministry had recognised by the late 1950s that corruption and waste were a problem at large-scale hydraulic worksites. Contributing to this was a high degree of managerial chaos. In order to improve the situation the Ministry of Hydraulics created in 1958 a Bureau for Management of

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[56] As far as Trịnh Xá was concerned, the Ministry concluded in January 1962 that although the plan to irrigate northern Bắc Ninh was sound, solving the overall drainage problems in the area required further study. Waterlogging was a serious problem in Bắc Ninh that the Trịnh Xá project failed to address independently of other possible improvements in other provinces. The January 1962 design relied on other large-scale projects being constructed and changes to other river systems. Despite these concerns, construction on the Trịnh Xá system went ahead a few months later. (Minutes of the meeting to approve the hydraulic scheme for Bắc Ninh province, 12 January 1962, VNA3/BTL 49 VV, 1961-1964).

[57] (Bắc Ninh irrigation report, 4 February 1964, VNA3/BTL 57 VV, 1964).

[58] *Ibid.*

Design Implementation (*Cục Quản lý Thiết kế thi công*). This organisation incorporated the former Bureau for Hydraulic Works (*Cục Công trình thủy lợi*) and the design responsibilities that had been part of other Bureaux within the Ministry, in order to improve relations between the Ministry and the localities where worksites were situated. High-level officials within the Ministry of Hydraulics hoped that this re-organisation would help to reduce the amount of corruption and embezzlement associated with the transportation sector.[59] This, however, did not occur. Despite the administrative reforms, the incidents of corruption that had encouraged the above changes in 1958 were still present at worksites in the first half of the 1960s.

When construction on the Trịnh Xá project in northern Bắc Ninh first began in 1962, materials, especially imported items, often went missing as they were transported from warehouses to worksites. More than forty-six per cent of receipts for imported materials were improperly recorded.[60] The Ministry insisted that trucks be weighed when loaded and again on arrival and any discrepancies be accounted for. Although this went some way toward curbing theft and corruption, the Ministry found it very difficult to reduce significantly the amount of waste involved with complicated construction projects. One reason for this was an overall lack of planning, which meant that materials would be transported and then sent back because they were not needed or failed to meet design specifications. This was

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[59] (Summary report of work done in 1959 by the Bureau for Public Works, 4 March 1960, VNA3/BTL 84 VV, 1959).

[60] This reflected a history within the Ministry of Hydraulics typified by financial and materiel accounting chaos. In 1964, an extensive investigation into the finances of the Materials Bureau (*Cục Vật tư*) of the Ministry of Hydraulics was undertaken between November 1960, when the Materials Bureau replaced the Supply Office (*Phòng Cung ứng*), and the end of 1962. What investigators discovered was that the Supply Office had kept no records of inventory (*kiểm kê tồn kho*) or financial transfers (*bàn giao tài sản*), and had only a detailed list of materials that had been received between 1954 and 1960. Only in 1960 did the Bureau begin using the "commercial cost accounting" (*kinh doanh hạch toán kế toán*) system. This procedural change, however, did not solve the Bureau's accounting problems, as it was still unaware of what materials had been warehoused for the previous six years. Moreover, beginning in 1960 the Bureau began sourcing and receiving more technically sophisticated materials, much of it from foreign donors, which complicated accounting procedures. This put further pressure on nascent bureaucratic structures struggling to overcome six years of mismanagement. (VNA3/BTL 54 VV, 1964).

especially problematic in the case of imported construction materials, since foreign materials were not well co-ordinated with production designs and could not be easily replaced if worksites ran out of them or if they were inappropriate.[61]

Conclusion

Under the First FYP, the DRV began co-ordinating efforts to construct co-operatives and modernise irrigation and drainage systems. Land was collectivised and then reconfigured: field dikes were put in place as plots were levelled out in order to make the most of newly constructed canals, which would, in turn, be filled by large pumping stations. Constructing and managing local irrigation and drainage systems, however, was affected by the quality of district and commune cadres. In addition to fighting floods and drought, working in the collective fields and contributing labour to construction sites, each commune was responsible for designing a local hydraulic scheme, which was to be implemented by a local leadership that generally lacked technical skills.

Although the hydraulic bargain that emerged in the late 1950s was relatively stable, declining state subsidies and competing demands for rural labour began to erode its political and economic foundations. While shifting financial and technical responsibilities downward, the Party demanded significant amounts of labour from co-operative members. Low mobilisation rates and concerns about corruption at hydraulic worksites in the early 1960s resulted in the creation of hydraulic brigades and the implementation of administrative reforms within the Ministry of Hydraulics. The increasing tensions within the hydraulic bargain in the first half of the 1960s had implication for the state's ability to "synchronise" small and large-scale irrigation and drainage infrastructure after 1965 and, more importantly, at the beginning of the 1970s.

The bargain, as it emerged in the first half of the 1960s, was one outcome of the Party's decision to move forward with a policy of large-scale industrialisation, of

[61] (Bắc Ninh irrigation report, 4 February 1964, VNA3/BTL 57 VV, 1964).

which modernised irrigation and drainage infrastructure played an important part. Once the Party's developmental vision was subsumed, after 1965, within the wartime economy, and state investment in large-scale infrastructure declined, an important rationale for maintaining the hydraulic bargain no longer existed. Without a developmental focus, irrigation and drainage, once again, became a local rather than a regional or national concern. The break down of the hydraulic bargain between 1965 and 1972, and the Party's attempt to resurrect it after 1972, is the subject of Chapter 9.

Tables and figures

Table 8.1 Total sown and irrigated area in DRV, 1955-65

DRV Total irrigated area in 000s of hectares, 1955-1965							
Year	Total area irrigated	Total area planted	Irrigated area as percentage of total planted area	Total annual irrigated paddy area	Irrigated Spring paddy area	Irrigated Autumn paddy area	Total annual irrigated paddy area as a percentage of total planted area
1955	1047.1	2630.9	40%	1036.4	469.7	566.7	48%
1956	1389.3	2876.4	48%	1366.6	615.5	751	60%
1957	1428	2639.6	54%	1405.8	620.2	785.6	64%
1958	1462.6	2521.7	58%	1534.1	660.1	874	69%
1959	1780	2755.4	65%	1736.3	735.4	1000.9	76%
1960	1974	2820.0	70%	1832.4	757.6	1074.8	80%
1961	1948	3082.3	63%	1767	741.2	938.5	73%
1962	2143.6	3133.9	68%	1950	822.7	1036.1	81%
1963	2157.8	3109.2	69%	1944.2	827.9	1025	83%
1964	2434.5	3199.1	76%	1085.8	841.3	1138	88%
1965	2585			2185	885	1190	

Source: (VNA3/BTL 38 VV, 1963).

Note: The figures for total irrigated area include all forms of irrigation. They are not limited to irrigation using large-scale pumping station. As I highlight in Chapters 8 and 9, the irrigable potential of pumping stations was limited by the degree to which these systems were synchronised using lower level canals and sluice gates. Hence, actual irrigated area was likely lower than the official figure.

Chapter 9 An un-synchronised revolution: Hydraulic autonomy in a collectivised agriculture

Introduction

In order for large-scale irrigation and drainage networks to function efficiently, pumping stations had to be "synchronised" with canal networks in the same way that the heart and blood vessels are linked in a circulatory system. If water could not circulate, co-operatives or even entire districts were left to find local or "independent" (*độc lập*) alternatives to large-scale infrastructure. Officials used terms like "neat" (*gọn*), and "synchronic" (*đồng bộ*) in the 1960s and 1970s to describe the necessary physical connections and co-ordinated activities that were a part of canal irrigation networks. Authorities integrated households into brigades and brigades into co-operatives. Linking co-operatives were canals, which in turn depended on pumping stations for water. Modern irrigation and drainage systems in the Red River delta have been designed to create networked relationships between communes that were dependent on the same pumping stations and canal networks. This is the intrinsic "hydro-logic" of dependency that is typical of canal irrigation anywhere in the world (Lansing, 1991, 55).

There is, in such a description, the whiff of Wittfogel's hydraulic state. The fact that attempts at synchronisation were not very successful, however, underscores the important role that a hydraulic bargain or the lack thereof, has played in the historical development of large-scale hydraulic infrastructure in the Red River delta. This is well illustrated in the tension between dependence and self-reliance that typified hydraulic development between 1961 and 1981. Between 1961 and 1964, co-operatives gradually took on a greater proportion, relative to the state, of the overall cost of constructing irrigation and drainage infrastructure. Once the war against the United States began in 1965, the importance of maintaining and strengthening local-level -- co-operative, district and commune -- hydraulic

networks was vital. The "guerrilla agriculture" that typified peasant production in most of the Red River delta in the period before 1960 was resurrected during the war against the United States.

Throughout the 1960s and 1970s, the Party faced a range of difficulties as it attempted to "synchronise" irrigation systems. Inadequate planning, shoddy construction, a shortage of building materials, combined with a lack of both skilled and unskilled labour, resulted in, for example, pumping stations prone to breakdowns and leaky sluice gates. Pumping stations required electricity and fuel, which were in short supply especially during the war and in the latter half of the 1970s.[1] The Party's vision of a re-engineered countryside using canals and sluice gates reflected a parallel economic synchronisation of agriculture and heavy industry. Developing heavy industry depended on surplus agricultural production, a surplus that the centrally planned rural economy had difficulties providing.

> In a modern industrialized economy the interdependence of its various parts is a two-way affair. However, broadly or narrowly an 'industry' is defined, the scale of operation will always depend on the supplies from the rest of the economy at least as much as the scale of operations of the rest of the economy will depend on the supplies from this particular 'industry' (Erlich, 1960, 119-120).

Erlich's quote alludes to the mutual obligations and tautological relationship that existed between agricultural and industrial growth: industrial development relied on extracting surplus from agriculture, a surplus that relied on industrial production to provide the necessary inputs such as fertiliser, machinery, and of course, large-scale irrigation and drainage.

Low industrial output and dependency on foreign aid and imports resulted in chronic shortages or erratic supplies of agricultural inputs, which contributed to lower than expected yields. A lack of agricultural inputs and inefficient irrigation and drainage helped engender dissatisfaction among co-operative members toward

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[1] In the Five Year Plan covering 1976-80, fuel imports were calculated at 5 million tonnes annually when in fact only 2 million arrived (Beresford, 2000, 7). Electricity targets were set at 5 billion kWh but production only reached 3.6 billion kWh (Ton That Thien, 1983, 709).

collectivised production, and eroded villagers' confidence in the hydraulic bargain and the Party's economic development program, as it was defined by collectivisation and central planning. By 1977-78, co-operatives had turned against the centrally planned economy to such a degree that, in Hải Hưng at least, significant amounts of land were being left fallow.[2]

In the first section of this chapter, I discuss how, during the period 1965 to 1980, "independent" local-level hydraulic systems were a necessary component of an ostensibly integrated large-scale irrigation and drainage network. Between 1965 and 1972, during the American air war in northern Vietnam, Communist Party policy was to synchronise hydraulic infrastructure, but, in reality, very little progress was made in this direction. In the second section, I examine more concerted attempts by the Party to "synchronise" irrigation systems, between 1972 and 1980, to bring independent systems into larger networks using "complete and perfect campaigns" (*phong trào hoàn chỉnh*). These movements failed for a variety of reasons, one of which was that by 1975 the state was unable to ensure that pumping stations would be supplied with electricity when required. Lacking efficient headworks, co-operatives had little incentive to complete and perfect irrigation systems, a fact that signalled the demise of the hydraulic bargain. Finally, in the context of electricity shortages and chronically waterlogged collective land, I explore the role that irrigation and drainage played in helping to motivate co-operatives to resist collective agriculture policies.

Local (in)dependence in a collectivised agriculture

Synchronising irrigation systems represented attempts by the Party to create a physical connection, using canal networks, between central authorities and co-operatives. Local canal systems in the DRV were designed to rely on large-scale headworks to provide irrigation and drainage. Nevertheless, the shortcomings of

[2] The Soviet Union and other Communist allies rushed food aid to Vietnam in 1978 as a 2 million tonne rice shortage in 1977 became a 3 million tonne shortfall (Ton That Thien, 1983, 692).

the large-scale infrastructure that was put in place during the 1960s and 1970s created a situation where many local canal networks could not depend on the services of large pumping stations.

Recent research has argued that, during the co-operative period, hydraulic management was centralised and only during the latter half of the 1970s did this structure begin to reverse itself (Fontenelle et al, 2000; Fontenelle & Tessier, 1997). Such an argument implies that there were strong infrastructural and managerial links between co-operatives and the authorities responsible for managing headworks, such as pumping stations and large-scale sluice gates. My research has shown that where these links did exist they were weak. Centralised control over irrigation and drainage infrastructure required that headworks and field canals were "synchronised" (*đông bộ*). The efficiency of large-scale irrigation systems, however, during the 1960s and 1970s, was limited by a general lack of canals and defective headworks. Contrary to Fontenelle and Tessier's assertion that co-operatives in the 1970s rejected a centrally controlled irrigation system, I argue that a great many co-operatives were never truly integrated into such a system in the first place (Fontenelle & Tessier, 1997, 33-35). When co-operative members and local cadres did come in conflict with higher level authorities it was over access to water and drainage, and the efficiency of large-scale canals, sluice gates and pumping stations.

War and water

The onset of the American air war in the North in 1965, and the DRV's military campaign in the South, affected hydraulic work in two important ways. First, the war necessitated that labour be diverted away from hydraulic construction and into local militias and regular army units. As hydraulic brigades had consisted largely of young men, military mobilisation denied the Ministry of Hydraulics of its main source of conscripted labour. Second, the Ministry decided, in light of the war, not to construct new large-scale headworks but, instead, to focus on consolidating what had already been built, repairing damage done by aerial bombing and "synchronising" the various hydraulic networks that had already been constructed.

Overall, the military campaign that took place against the Americans in both the North and the South left hydraulic infrastructure fragmented and in disarray.

Phan Khánh writes that 1966 and 1967 were the most difficult for the DRV and its hydraulic modernisation program. The biggest contributing factor was the war.

> Organising hydraulic brigades had developed strongly in 1963, 1964, but at the beginning of 1965 they were falling short of personnel. This is because nearly all of the male youth had to leave the hydraulic brigades for the front. This was the same for the speciality units managed by the Ministry and Provinces, so it was necessary to begin recruiting women (Phan Khánh, 1997, 112).

Because conscript labour and technical expertise were lost to the war effort, it was difficult to continue construction on large-scale projects. Work became localised as much by necessity as by the fact that local systems were still largely "independent" in 1966. By that year, according to a ministerial report, not a single locality had managed to construct an irrigation system that linked large-scale systems and paddy fields in such a way as to irrigate "actively" (*chủ động*). "Active" in this case, refers to the Ministry's vision of combining local and large-scale irrigation and drainage systems in a "neat" (*gọn*) network of pumps, canals and sluice gates in order to intensify agricultural production, "moving from one to two and even three irrigated crops".[3] This report likely overstated the situation, and applied too narrow a definition of "neat" and "active". However, it does suggest that at the beginning of the first American bombing campaigns a great proportion of irrigated land was operating independently of large-scale headworks.

The air war against the DRV was divided into two phases. The first, known as Rolling Thunder, extended from the summer of 1965 until April 1968. American attacks were directed at economic targets and were designed to convince the DRV that it would be better to negotiate peace than to risk wholesale destruction of its industrial economy (Pape, 1990, 114). Despite a bombing policy directed at industrial targets, American bombs did damage hydraulic infrastructure. In

September 1966, sluice gates and bridges, in addition to rail yards, made up thirty one percent of all targets in the DRV (Pape, 1990, 117).[4] According to declassified CIA sources quoted in (Pape, 1990, 117) the United States did, in 1966, specifically target eight locks/sluice gates. The decision to target eight sluice gates in November 1966 was officially intended to disrupt traffic on inland waterways. However, the Chairman of the Joint Chiefs of Staff, General Earle Wheeler, noted that raids on four of these sluice gates would also "exert desirable psychological pressure on both leaders and population" (Clodfelter, 1989, 126). Although dikes were considered to be "lucrative targets", Wheeler explained in 1969 that because American leaders were trying to be "sensible men", they decided not to target them (Clodfelter, 1989, 127; Littauer & Uphoff, 1972, 40-41).

Sluice gates were dual-purpose infrastructure, serving both navigation and irrigation. While attacking such infrastructure, dikes would have easily been hit by stray bombs. Furthermore, surface to air missile sites were also included in the 1966 list of targets. In Nam Sách district, Hải Dương province, anti-aircraft guns and surface to air missile sites remain in place. One is located only 100 metres away from the dike that runs along the left bank of the Thái Bình River. Again, while targeting this particular anti-aircraft installation the dike could easily have been damaged. In 1965, American aircraft attacked seven provinces: Quảng Bình, Hà Tĩnh, Nghệ An, Thanh Hoá, Ninh Bình and Hà Tây, and, in the process, damaged fifty medium and large-scale irrigation systems (Phan Khánh, 1997, 104). In late 1965, the American attacks were broadened to include all provinces in the DRV as well as, and, this is according to Vietnamese sources that would have judged American policies based on what was destroyed rather than what was officially

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[3] (Summary report of hydraulic work in 1966 and tasks for 1967, VNA3/BTL 63 VV, 1967).

[4] Vietnamese damage figures are difficult to calculate. In come cases there is no information available and in others repairs had to be done repeatedly, obscuring the total cost of the bombing campaign. For example, statistics for damage done to hydraulic infrastructure in Thái Bình province is unavailable for 1972 and 1967. For 1966, however, 389 046 labour days were required for repairs, while for 1968 statistics are only available for the volume of stone that had to be moved, with no data available for earth moving. These omissions make accurate comparisons across time impossible (Nguyễn Am, 1993, 20).

targeted, small-scale irrigation systems. This was known as the "local war" (*chiến tranh cục bộ*) (Đảng Cộng Sản Việt Nam (Vietnam Communist Party), 1999, 225-226).

Bombing in Nam Sách district, Hải Hưng province, was first reported in November 1965, where the two bridges that cross the Kinh Thày and Thái Bình rivers, the Lai Vu and Phú Lương bridges respectively, along the main road between Hanoi and Hải Phòng, were the primary targets for American bombers. Attempts to destroy these two bridges were first reported on 5 November 1965 (Đảng Cộng Sản Việt Nam (Vietnam Communist Party), 1999, 225-226; Nguyễn Hữu Đoan, 1993, 51). In June 1966, American bombs destroyed both the Phú Lương and Lai Vu bridges (Đảng Cộng Sản Việt Nam (Vietnam Communist Party), 1999, 225-226).

A second round of bombing took place in 1972 under the titles Freedom Train, Linebacker I and Linebacker II -- also known as the "Christmas bombing" (Pape, 1990, 132). This phase of the American air war resulted in more damage to the dikes in Nam Sách than had been the case in 1966 and 1967. In May 1972, the Phú Lương and Lai Vu bridges were again destroyed. While floodwaters were rising, in July of the same year, American bombs destroyed four sections of the dike along the Thái Bình River between 9 and 11 July (Đảng Cộng Sản Việt Nam (Vietnam Communist Party), 1999, 254). At this time, 11 July, the American actress Jane Fonda was visiting the DRV. She, along with an international press delegation made up of seven reporters, inspected the damage caused by American bombs in the area of the Cát Khê sluice gate, while American bombers continued to attack other areas of Nam Sách (Đảng Cộng Sản Việt Nam (Vietnam Communist Party), 1999, 254).

Other than dikes, Nam Sách's hydraulic networks did not depend on conspicuous large-scale infrastructure such as dams or large sluice gates, and from that perspective there was little damage that American bombing could inflict. The United States did not have a policy of attacking pumping stations. This, however, was largely irrelevant because wartime shortages of electricity and petroleum meant that pumping stations would rarely have been operational. United States attacks meant that labour had to be channelled into repairing hydraulic systems and other

infrastructure rather than completing and perfecting irrigation networks. Women and older men who had been left on co-operatives in Nam Sách district were mobilised and trained to collect and dispose of "delayed action bombs" (*bom nổ chậm*), which littered most co-operatives (Đảng Cộng Sản Việt Nam (Vietnam Communist Party), 1999, 226). In Ái Quốc commune alone, in the first two months of 1969, 2100 co-operative members were mobilised to fill in bomb craters and repair roads in order to prepare for the Spring crop (Đảng Cộng Sản Việt Nam (Vietnam Communist Party), 1999, 239-240).

Officials in the Ministry of Hydraulics favoured commune-level irrigation systems during the second half of the 1960s as they were easier to protect and camouflage against American bombing raids.[5] By 1966, provinces were making most managerial decisions concerning hydraulic infrastructure. This was done ostensibly to strengthen the authority and sense of responsibility of the provincial cadres, but it also suited the "present situation" (*tình hình hiện nay*), referring to the war against the US. The Ministry feared, in 1967, that the US air campaign against the DRV would become more "fierce" (*ác liệt*) as the war in the South expanded.[6] The DRV was forced to shift its focus away from industrial growth and return to the basic concerns of increasing food production, which had preoccupied hydraulic modernisation efforts in the 1950s. The 1965 crop had been disappointing and improving yields to avoid food shortages in 1966 was imperative. During 1966-67, the Party leadership within the Ministry of Hydraulics, and the DRV in general, found itself in a difficult situation. On the one hand, Party leaders believed that American bombing would intensify, and on the other hand, within the context of the possibility of more extensive damage to hydraulic infrastructure, the DRV had to push forward with efforts to increase agricultural production.

Under wartime conditions, hydraulic work was divided evenly between the state and co-operatives: the state would try to provide co-operatives with electricity

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[5] (Summary report of hydraulic work in 1966 and tasks for 1967, VNA3/BTL 63 VV, 1967).
[6] *Ibid.*

while co-operatives were responsible for constructing and managing their own small-scale pumping stations, which often only irrigated land for several production brigades. These newly constructed pumping stations tended to lack detailed design plans, which provoked "confusion" and "disarray" (*rối loạn*), problems which eventually required wasting many labour days to resolve.[7] Co-operatives were forced to rely on traditional methods of "keeping water" in order to irrigate and, thus, focused labour on building field dikes rather than digging canals (Phan Khánh, 1997, 109, 114). This in turn, by the early 1970s, made it difficult for the Ministry of Hydraulics to achieve its broader synchronisation goals.

The case of the Lý Văn pumping station

During the war, efforts to integrate different levels of hydraulic infrastructure came to a standstill, which, as I have explained, caused co-operatives to return to pre-modern irrigation and drainage techniques. Nevertheless, there were areas in the Red River delta, by 1965, which had managed to synchronise local canals and large-scale pumps. The example of the Lý Văn pumping station highlights how even when hydraulic synchronisation did take place, inefficient pumps and water theft forced co-operatives to maintain some measure of local independent irrigation and drainage capacity.

The Lý Văn pumping station (*trạm bơm*), located in Phú Điền commune on the banks of the Kinh Thầy river, Nam Sách district, about 8.5 kms from Quốc Tuấn commune, was built in 1963. Canals that begin in Phú Điền commune connect fields in Quốc Tuấn to the Lý Vân pumping station, which was originally designed to irrigate four communes in Nam Sách district but presently services 200 hectares in three communes.[8] Since its construction, the Lý Văn pumping station and its attendant canal network have created dependent and conflictual relationships

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[7] Because there was no way for the state to regulate water use at the co-operative level, when electricity was available, those co-operatives that had pumps would "use as much water as possible with no concern about leaving some for others" (Phan Khánh, 1997, 115).

[8] (Various interviews at Lý Văn Pumping Station, Nam Sách district, October 2000; February 2001).

between and among itself and the communes that it was designed to serve. This exemplifies the "hydro-logic" of canal irrigation that I discuss in Chapter 2. The following account of the Lý Văn pumping station compares and contrasts the experiences of a headend and a tailend co-operative. It emphasises the impact that local variations in hydrology have on the types of hydraulic services that a co-operative would require. In Phú Điền commune, the headender, although local co-operative members helped construct the Lý Văn pumping station it was incapable of solving the commune's waterlogging problems. Likewise, in Quốc Tuấn commune, the tailender, water theft and a lack of electricity to run the pumps at Lý Văn meant that Quốc Tuấn commune's relatively high ground was not actively irrigated until the late 1970s.

It is axiomatic to say that irrigating land requires pumps to be located as close to available water sources as possible. Throughout the Red River delta, this has meant building pumping stations on or near river embankments. The area found immediately inside river dikes consists of very low-lying (*trũng*) or alluvial (*bãi*) land that would have acted as a flood plain before dikes were constructed, and would have been lowered further as earth was removed to build up dikes. Two thirds of the land in Phú Điền commune, where the Lý Văn pumping station is located, is considered *trũng*. Consequently, Phú Điền has acted as a "navel" (*rốn*) -- an area of land that is lower than the sixteen communes that surround it and which, therefore, collects water draining from the relatively higher land in these surrounding communes. Unfortunately for co-operative members in Phú Điền commune, the Lý Văn pumping station has never been very effective at draining land. Consequently, Phú Điền commune supplied neighbouring communes with irrigation for the Spring crop, while Quốc Tuấn commune, and others, flooded Phú Điền during the Autumn crop.[9]

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[9] Low land acts as a catchment on any scale. Nam Sách district and its southern neighbour, Thanh Hà district, resembled Quốc Tuấn and Phú Điền communes in that whenever there were heavy rains water flowed from Nam Sách into Thanh Hà, where the topography is likened to a broad sunken pan (*lòng chảo*). In order to avoid the conflicts that would emerge from these floods, in 1964 the

With the onset of heavy rains in 1971, 1974 and 1978, "while the rice was green in other co-operatives it was waterlogged in Phú Điền" (*Hải Hưng,* 1982b). The result of this was many years of low paddy productivity in Phú Điền.[10] Even with the Lý Văn pumping station in place, a single annual Spring crop was the norm in Phú Điền during the period from 1963 to 1978. This situation only began to improve in 1978 once the Phả Lại electrical generation plant began supplying electrical power to the district, and commune-level pumps began to appear, inaugurating a period of more certain harvests (*vụ chắc*).[11] For Phú Điền commune, a more dependable source of electricity meant that the Ngọc Trí drainage station, which was built in 1976 and stands less than a kilometre from the Lý Văn station, could begin working more effectively.

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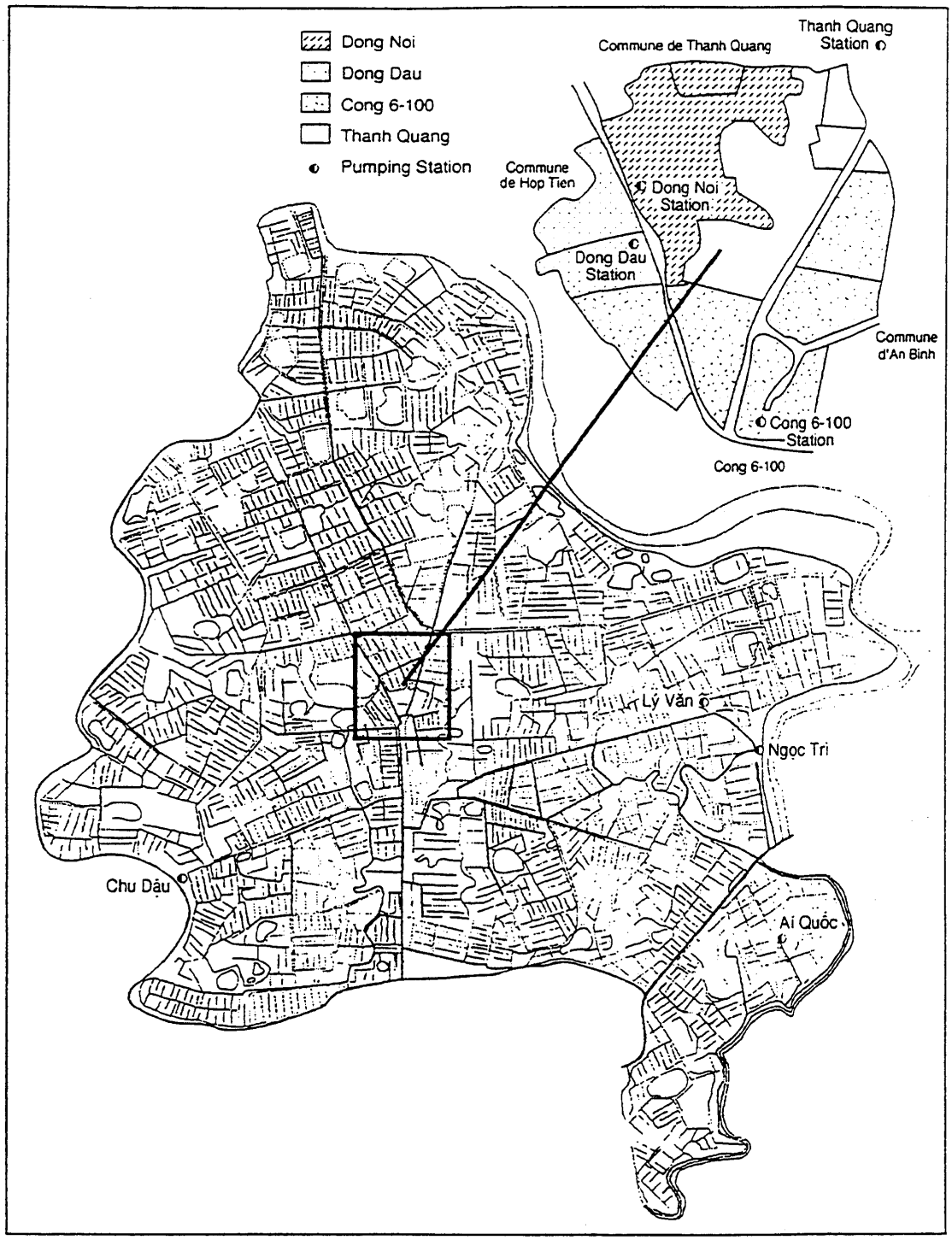
two districts were divided into ten separate drainage areas (*vụ tiêu úng*) and any unnecessary sluice gates that ran through the dike that separated the districts were removed (Mai Văn Hai & Bùi Xuân Đính, 1997, 93).

[10] There was a saying in the area suggesting that before collectivisation the economy in some parts of the commune would have been more commercial than agricultural: "ruộng An Điền, tiền Lâm Xuyên". Translated, this means "paddy fields in An Điền commune, and money in Lâm Xuyên". Lâm Xuyên is a village (*thôn*) in Phú Điền whose economy, because its fields were often waterlogged, depended on pottery production rather than agriculture (*Hải Hưng,* 1978d).

[11] (Interview Lý Văn Pumping station, Nam Sách district, February 2001).

Figure 9.1 Map of Nam Sách district and Quốc Tuấn commune (c. 1997)



Source: (Fabre, 1993)

Only by 1982, twenty years after the Lý Văn pumping station had been constructed, did Phú Điền begin to solve its chronic waterlogging problem. Once the massive drainage pumps at Ngọc Trí began functioning more regularly, labour was mobilised to divide the co-operative fields, using field dikes (*bờ*), into seven large "areas" (*vùng*) and further into twenty smaller "plots" (*khoảnh*). By doing this, the co-operative was able to terrace fields and, in effect, delimit land of a similar height obstructing the flow of water from higher to lower ground. Accordingly, twenty per cent of land was able to "keep water" in order to irrigate the Spring crop. Moreover, the co-operative also built eight pumping stations which were reported, not uncharacteristically, as being designed for "field combat" (*dã chiến*) -- small pumps meant to serve in the battle against drought and waterlogging. As a result of these improvements, *Hải Hưng* triumphantly declared in 1982 that from now on during the Spring crop co-operative members in Phú Điền "will never have to scoop water" (*không hề phải tát nước*) (*Hải Hưng,* 1982b).

Just as Lý Văn failed to solve Phú Điền commune's waterlogging problems during the 1960s and most of the 1970s, it proved equally ineffective at irrigating land in Quốc Tuấn commune. Unlike Phú Điền, Quốc Tuấn commune is characterised by medium (*vừa*) and high (*cao*) land. It lies at the far end of the canal network that connects it to Lý Văn. On my first visit to Quốc Tuấn, the commune's citizenry described in glowing terms the quality of the land in the area. A former co-operative manager (*Chủ nhiệm hợp tác xã*) boasted: "The special characteristic of our land is that it's the finest in the region. Because we have no land that's prone to waterlogging we can produce two or three crops a year without any problem."[12] Despite the high quality of the land, a significant proportion of it, classified as high land, still required "scientific irrigation" (*tưới khoa học*) -- involving pumps and canals -- if it was to produce two paddy crops.

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[12] (Interview, Quốc Tuấn commune, Nam Sách district, 24 February 2000).

With a large percentage of high ground in the commune, a canal system was of paramount importance. Until 1957, peasants in Quốc Tuấn had depended on two creeks for irrigation. One creek supplied water from Hợp Tiên commune to the northwest and the other was known as the Chung River, which ran alongside Văn Lâm commune.[13] This began to change, however, once villagers in Quốc Tuấn could link their canal network to the newly constructed headworks in Phú Điền. Despite these improvements, as a tailender in the canal network, fields in Quốc Tuấn often lacked water.

> At the time [when Lý Văn was the only pumping station in the district], getting water was very difficult because it had to traverse four communes before it arrived in Quốc Tuấn. Along the way it had to pass sixteen sluice gates that had been cut illegally into the canal embankments, each one big enough for a buffalo to pass through, and past diversions [*kè*] that would block the water's path. Only then would the water reach us. Often on the eve of the first day of the lunar New Year we would have to send members of the local hydraulics brigade armed with "bánh trưng"[14] out to the dikes that kept water in our fields [in order to guard against water theft]. Only then would water make its way to us. Once the water arrived at the commune, getting the water into the fields [*lấy nước dưỡng*] was difficult and very strenuous.[15]

Throughout the 1960s and 1970s, examples of individual co-operatives blocking up a canal or cutting sections out of embankments, in order to divert water into their fields, was commonplace.

A lack of electricity, fuel and financial resources limited the local pumping capacity of Quốc Tuấn commune, and increased its dependence on the Lý Văn pumping station. This dependence was only reduced once co-operatives had gathered enough capital to invest in their own pumps. The overall shortage of diesel pumps in the 1960s reflected the financial circumstances of co-operatives at the time. Despite a general lack of capital, co-operatives were inclined to do

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[13] (Interview, Quốc Tuấn commune, Nam Sách district, 17 May 2000).

[14] A square cake prepared for the lunar New Year celebrations made of glutinous rice and filled with green bean paste and pork.

[15] (Interview, Quốc Tuấn commune, Nam Sách district, 24 February 2000).

whatever was necessary to find alternatives to unreliable pumping stations. This is what a villager in Quốc Tuấn had to say about diesel pumps in the 1960s.

> So, in the 1960s did you have diesel pumps?
>
> *Sure the village co-operative had them, we sold everything in the village* đình[16] *to buy one diesel pump.*
>
> When was that? *In the 1960s.*[17]
>
> How many villages (*thôn*) in this commune (*xã*) sold their communal house?
>
> *There was only one village that sold their communal house since all the other villages that had communal houses had already destroyed them and had nothing left to sell.*
>
> What did you sell? Did you sell the wood?
>
> *We sold the big things in the communal house -- the wooden pillars and the two guardian statues* (*người ôm*).[18]

Considering Quốc Tuấn's irrigation requirements, a single diesel pump would have had very little impact on the total irrigated area of the commune. Lacking significant local pumping capacity, and without a stable source of electricity until 1978, throughout the 1960s and most of the 1970s, high land that lay in the centre of Quốc Tuấn commune only cultivated an Autumn crop.

A former Quốc Tuấn co-operative manager remembered visiting the Nam Thanh district offices -- Nam Sách district was combined at the time with Kim Thanh district -- in the mid-1970s, to request assistance with irrigation.

> I said to the district officials, comrades if you construct for us a pumping station it would be the equivalent of providing breakfast for the people of Quốc Tuấn. The chairman of the district said that he would talk to his comrades and that he would try very hard [*cố gắng*]."[19]

It was not up to the district chairman, however, to provide water to high land in Quốc Tuấn commune. The district was powerless to improve the capacity of the Lý

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[16] A *đình* is a village communal house where village members, men over the age of eighteen and who were registered in the village, would meet and where a local deity or historical figure would be venerated.

[17] Other interviewees were more specific on this point saying that diesel pumps appeared in Quốc Tuấn in 1964-65 along with "bicycle norias" (*cái guồng nước đạp bằng chân*) (Interview, Quốc Tuấn commune, Nam Sách district, 16 May 2000/1).

[18] (Interview, Quốc Tuấn commune, Nam Sách district, 24 February 2000/1).

[19] (Interview, Quốc Tuấn commune, Nam Sách district, 24 February 2000/1)

Văn pumping station, which had from the beginning been burdened with irrigating an area that was too large for its pumping capacity. Providing large-scale irrigation to Quốc Tuấn was the responsibility of the province, which eventually linked the commune to large-scale pumping stations in the neighbouring communes of Hợp Tiến and Thanh Quang. The Hợp Tiến pumping station had, in fact, been providing water to Quốc Tuấn since 1964 but even that had to be supplemented with other water sources. Like Lý Văn, the pumps at the Hợp Tiến station would often break down so co-operatives in Quốc Tuấn had to become proficient at "keeping water". In low areas, when there was waterlogging, co-operative members would heighten field dikes and use diesel pumps and scoops. When canals lacked water, because pumps either were without electricity or had broken down, then water would have to be scooped from ponds. If that water ran out, as one co-operative member described it, "then we would have to reconcile ourselves to living with the consequences (*chia vậy*)." [20]

Eventually, as the number of pumping stations in Nam Sách increased throughout the last half of the 1970s, and the Phả Lại electrical generation plant was enlarged in the early 1980s, Lý Văn became responsible for irrigating an ever smaller proportion of Nam Sách district (Fontenelle & Tessier, 1997, 28, see map). For example, in 1988, Quốc Tuấn financed the construction of two electrical pumping stations: Đống Nội and Đồng Dầu. A third pumping station at Cống Sáu was originally built by the district but managerial responsibility was transferred to Quốc Tuấn in 1983 (See Figure 9.1).[21] Therefore, as Quốc Tuấn commune's earnings increased as a result of improvements in productivity brought about by,

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[20] (Interview, Quốc Tuấn commune, Nam Sách district, 17 May 2000/1).

[21] A similar situation occurred at the Văn Giang large-scale hydraulic scheme in Khoái Châu district, Hưng Yên province (See Figure 1.1). The Văn Giang pumping station had been built in 1962 as part of the BHH irrigation and drainage network, and, like Lý Văn, its command area began to shrink as independent local irrigation systems were established. In the Văn Giang irrigation network, independent irrigation systems are all similar in that they access drainage canals that are rarely empty. The water in the drainage canals is runoff from the surrounding communes and, therefore, is not dependent on the main irrigation canals that lead from the Văn Giang pumping station (Fontenelle et al, 2000, 38).

among other things, the Product Contract that was instituted in 1981, which allowed for private cultivation of collective land, the commune gradually overcame its dependence on the Lý Văn pumping station.

The case of the Lý Văn pumping station, and its relationship to Phú Điền and Quốc Tuần communes, highlights the tension between dependence on large-scale infrastructure and the need for local self-sufficiency within the context of a "synchronised" irrigation and drainage system. Although the Party's goal was to integrate all levels of hydraulic infrastructure, there were a number of factors that dictated whether, once co-operatives were linked up with headworks, irrigation and drainage would, in fact, bring about an increase in double cropped land. These factors include: the hydrology of the area to be served, the financial capacity of the co-operative to address its specific irrigation and drainage requirements, levels of water theft along the canal network, the availability of electricity to run large-scale pumps and the likelihood of mechanical breakdowns.

The realities of war had dictated that, between 1965-72, synchronising hydraulic systems, although it remained a Party priority, was neglected in favour of strengthening the hydraulic autonomy of communes and co-operatives. This trend toward local self-sufficiency had a serious effect on the hydraulic bargain. In 1972, the Party began focussing, once again, on synchronising hydraulic infrastructure, and, in the process, testing the state of the hydraulic bargain. Could the relative success of pre-war hydraulic construction be repeated in the early 1970s? Would it be possible to complete the various levels of hydraulic infrastructure that had been damaged or left unfinished due to the war? In Hải Hưng province the answers to these questions depended upon the financial and hydrological conditions of individual regions. In some districts, efforts to synchronise systems went well, while in others, co-operatives found themselves relying on local resources to deal with hydraulic issues. In general, however, the hydraulic bargain, within the context of collectivised agriculture, could not be fully re-established. By 1977, land in Hải Hưng province was being left fallow at an alarming rate, with inefficient water control being an important causal factor. In response to an increase in fallow land,

in addition to numerous other factors, some co-operatives went so far as to openly defy the Party and contract collective land to individual households.

Failure to synchronise and the vicious cycle of dependency

With the end of the war in the early 1970s, the Party turned its attention to synchronising pumping stations, canals and co-operative fields. The headline of a 1973 editorial in the Party's daily newspaper, "The People" (*Nhân Dân*), asked, "Why is the efficiency of irrigation systems so low?" The main reason, according to the editorial, was that headworks were generally "deficient" (*chưa tốt*). If pumping stations are the heart (*quả tim*) and canals are the veins (*huyết mạch*) then the pumping stations are "sick" (*bệnh*) with some being "seriously ill" (*bệnh trầm trọng*).

There were many pumping stations, the article noted, that were only four to five years old in 1973, including Như Quỳnh (Hải Hưng) and Trịnh Xá (Hà Bắc (Bắc Ninh)) (see Chapter 8), where foundations were cracking and leaking water. There were even pumping stations such as La Khê in Hà Tây that were sinking and leaning to one side (*bị lún nghiêng*). Most seriously "sick", wrote the editorialist, were the sluice gates that failed to close properly. Some were leaking water at a rate of up to eight cubic metres per second, which, the article pointed out, amounted to an hourly capacity of twenty-nine 1000 cubic metre per hour pumps. In addition to the design and construction flaws, there was a lack of spare parts so when pumps broke down repairs took a long time. Electrical wires were arranged in a disorderly and unsafe fashion, and propellers on the drive shafts of pumps were often placed at the wrong angle, so that pumps transferred water very slowly from pumping stations' holding tanks into canals (*Nhân Dân,* 1973).

The article continued by noting that by the early 1970s many pumping stations had never been "synchronised" with canal networks and co-operative fields.

> Often only the primary and secondary canals were built while the necessary tertiary canals that lead the water to the fields were "neglected" [*bỏ bê*] or

> very few of them had been constructed, or were built without designs (*Nhân Dân,* 1973).

In some cases canals were too shallow; in others, the canal embankments would cave in or wash away when the water reached a certain height and, therefore, water levels in canals were kept below design specifications. On the embankments themselves, people built homes or removed sections in order to steal water. People would dam canals and let the water rise until it spilled up over the embankment, flooding fields, destroying field dikes (*bờ vùng, khoảnh, thửa*) and flowing down to the lowest areas and waterlogging land. According to *Nhân Dân* the way to solve these problems was by "completing and perfecting" (*hoàn chỉnh*) irrigation systems. Completing and perfecting irrigation infrastructure was also a means for the state to re-establish the hydraulic bargain that had been frayed by years of war.

"Completing and perfecting" irrigation systems had been a priority for the Ministry of Hydraulics as early as 1959.[22] Between 1961 and 1963, the state constructed seventeen headworks with an irrigating capacity of 259 913 hectares. However, because of a lack of canals the system was only able to irrigate 172 225 hectares (Phan Khánh, 1997, 92). Synchronising hydraulic infrastructure was designed to increase the efficiency of large-scale systems. Statistics concerning the actual area irrigated by large-scale headworks are inconsistent throughout the 1960s and 1970s, but it is clear that any figures for irrigated area by large-scale infrastructure must be considered in light of inefficiencies in canal networks. A 1963 Ministry of Hydraulics report found that many areas had local canals but still suffered from drought and waterlogging because they were not properly connected to pumping stations.

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[22] Completing and perfecting hydraulic systems appears among several other tasks in a 1959 construction report. (Report on the construction of public works in 1959, 12 January 1960, VNA3/BTL 84 VV, 1959).

> Scientific irrigation demands that canal systems be completed and perfected in order to create an irrigation network. However, the networks are still very weak....[23]

In other cases, local drainage canals were so inadequate that when water was being pumped into fields it could not be drained and the fields would end up waterlogged.[24]

These problems persisted throughout the 1960s. Unlike the 1963-64 campaign, which had focussed on labour mobilisation, the Ministry of Hydraulics' second "do hydraulic work" movement, of 1966-67, was concerned with completing and perfecting hydraulic infrastructure.

> The Red River delta is the rice bowl of the DRV, it is where the majority of the headworks for irrigation systems are located, but, by 1966, these headworks have not yet been joined up with medium and small-scale systems.[25]

At the time, completing and perfecting irrigation was couched in terms of building fields (*xây dựng ruộng đất*), which, in effect, placed the onus of "synchronising" irrigation systems on co-operatives.

> Building new fields must go hand in hand with plans to construct canals. Such efforts will lead to a completed and perfected irrigation and drainage system.[26]

Despite it's efforts during the 1960s, due in large part to the demands of war and the damage caused by American bombers, the Ministry of Hydraulics was unable to make much progress toward synchronising irrigation systems.

When attempting to complete and perfect irrigation and drainage systems the state could not concentrate only on local-level responsibilities, it had to involve work on both the "heart" and the "blood vessels". In December 1972, the Party inaugurated what would become an annual event for the next seven years, a "complete and perfect irrigation systems movement" (*phong trào hoàn chỉnh hệ*

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[23] (Report: Investigations into hydraulics work for the three years, 1961, 1962, 1963, VNA3/BTL 38 VV, 1963).

[24] *Ibid.*

[25] (Summary report of hydraulic work in 1966 and tasks for 1967, VNA3/BTL 63 VV, 1967).

[26] *Ibid.*

thống thủy nông). In 1972, a Resolution (*Nghị Quyết*) of the 19th and 20th Plenums of the Third Party Congress set out clearly the responsibilities of both central authorities and localities whereby irrigation and drainage networks were to be "fully synchronous" in three years -- by 1975. Work was divided between the Central Agriculture Committee (*Ủy ban Nông nghiệp Trung ương*) as well as its various central "branches" (*nghành*), and agriculture co-operatives (*Nhân Dân,* 1972). The results of the "complete and perfect" campaigns would reflect whether the state was capable of renewing the hydraulic bargain -- which implied strengthened collectivised production alongside more efficient large-scale irrigation and drainage.

Statistics from the 1970s suggest that the Party's "complete and perfect" campaigns, as they were carried out in Hải Hưng province, had little impact on increasing total irrigated area. An encouraging report from 1975 claimed that irrigated area had increased threefold, to a total of 15 881 hectares, since 1973 (*Hải Hưng,* 1975e). Other reports were more specific, referring to the area that was irrigated "up to the plot" (*tới khoảnh*), which implied that tertiary canals would have been in place to bring water to the edge of a fields, and the province calculated this figure at 16 453 hectares (*Hải Hưng,* 1975h). As one moves through the end of the 1970s these statistics improve only slightly.[27] By 1977, 28 000 hectares of Spring crops were being irrigated, although only 17 000 ha made use of

[27] After a meeting held in December 1978 to review the previous three years' work on completing and perfecting irrigation, the province claimed that the area completed and perfected was 117 000 ha, which conveniently surpassed the target of 115 000 ha that had been set by the Ministry of Hydraulics (*Hải Hưng,* 1979c). This was the same target that had been set in 1973, which the Province was unable to meet during earlier "complete and perfect" campaigns (*Hải Hưng,* 1976d). In fact, 117 000 hectares was greater than the total irrigated area of Spring paddy (see Chart 9.1). It is important to distinguish between irrigating *capacity* and irrigated *area*. Capacity had to do with the potential irrigated area based on the capacity of headworks. However, without secondary and tertiary canal networks in place, or if pumping stations are inoperable, this capacity would have meant very little. For example, although in 1978 irrigation capacity was as high as 119 000 ha, the actual irrigated area would have been something less than 20 000 ha (*Hải Hưng,* 1977g). Furthermore, irrigated area is officially calculated by adding the total area serviced by large-scale pumps, local pumps, diesel pumps, scooped by hand and gravity-fed irrigation. In most cases, land is actually irrigated using more than two or three of these methods. Thus, official statistics can often double or triple count irrigated area.

electrical pumps, which was indicative of completed and perfected large-scale irrigation systems (*Hải Hưng,* 1977a).[28] Thus, following some initial success, after five years, the "complete and perfect" campaign was stagnating. Up to 1977, Hải Hưng province, using a figure of 234 000 hectares of cultivated paddy land (see Figure 1.1 and Table 9.4), was never able to irrigate more than twenty-four per cent of this area using completed and perfected large-scale irrigation and drainage systems.[29] In Chapter 8, I note that, on a national level, large-scale irrigation had been serving approximately twenty-five per cent of irrigated area in 1963.

"Completing and perfecting" irrigation networks was contingent on, first, co-operatives mobilising adequate amounts of labour and, second, districts providing construction materials when necessary as well as skilled cadres to manage worksites. In both cases, the complete and perfect movements came up short. In terms of labour, efforts to complete and perfect irrigation and drainage networks relied on co-operatives to mobilise workers to complete projects for which "citizens do the work themselves" (*dân tự làm*). This proved to be a difficult task, and even in relatively good years, such as 1975, the state was unable to mobilise adequate amounts of labour. In that year, Hải Hưng province had projected that, of 4 835 000 cubic metres of earth to be moved, 2 916 000 cubic metres were the responsibility of the People. Of the latter amount, less that fifty per cent had been moved in the first ten months of 1975 (*Hải Hưng,* 1975h). In Phù Ủng co-operative, Àn Thi district, out of a total population of 2800 people, only "several hundred" were working on completing and perfecting irrigation and drainage networks. By November, the co-operative had only moved thirty-four per cent of the total volume of earth included in the plan (*Hải Hưng,* 1975g). Co-operatives in Khoái Châu district were criticised during the 1975 complete and perfect campaign for

[28] These figures vary considerably from those found in Table 9.1. The figures in Table 9.1, for the area irrigated using large-scale infrastructure, are likely the irrigation capacity of large-scale pumping stations. The statistics in *Hải Hưng* account for area that is actually irrigated by large-scale systems that have been completed and perfected.

devoting too much labour to cultivating land instead of labouring on hydraulics projects (*Hải Hưng,* 1975f). During the "complete and perfect campaign" of 1977, provincial authorities were highly critical of district officials for not ordering enough labour to worksites. Labour shortages during the final phase of construction of the high profile An Thổ drainage gate (see Chapter 7) had become so severe that the provincial authorities were considering mobilising workers from state companies (*Hải Hưng,* 1977f).

A second problem concerned transferring skilled technical cadres and construction materials to co-operatives. Although digging canals would appear to be a basic engineering task, it was important not to waste fertile soil, lose cultivable area, and to work according to the design plan, if there was one. Each district "direction committee" (*ban chỉ đạo*) would assign "model workers" to take responsibility for a worksite. The day after a site was "plotted out" (*cắm tuyên*) model workers would be placed along the canal every 200-300 metres. Before digging began, the topsoil was removed some distance from the worksite, and levelled out so that it could be cultivated. At the same time as the canal was being constructed, co-operative workers were "evening out hills and mounds" (*san các gò đống*), and filling in old canals. Ideally, co-operatives were able to increase their agricultural area in the process of digging canals. Once the canal reached the headworks, the co-operative was required to construct a sluice gate -- using bricks, pipes, sand and cement, all supplied by the co-operative -- which involved the work of at least ten tradespeople (*Hải Hưng,* 1975c). If co-operatives lacked either the skilled labour or the necessary materials, either the infrastructure was not built or it would be of low quality.

Designating infrastructure as "completed and perfected" was not always a sign that it could function properly. In a letter to *Hải Hưng*, a co-operative member complained about the "completed" (*hoàn thành*) pumping station in his area. The

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[29] To arrive at the fifteen percent I doubled the completed and perfected area of 28 000 hectares for the Spring crop assuming that the completed and perfected irrigated area would be the same for the

Tam Đô pumping station, according to the letter, had ostensibly been completed in the middle of 1976. However, it had serious structural flaws and its pumps were reportedly prone to breaking down. The writer pointed out that the vanes (*cánh*) on the sluice gate that let water into and out of the pumping station's holding tank failed to open and close properly and thus wasted water. The floor of the working area was too low, which made it difficult to access the pumps when they required maintenance. In many areas, the walls and roof had not been tightly plastered (*chưa trát vữa kín*) and would, therefore, leak whenever it rained. In October 1976, the water outside the pumping station had risen to the point where it began soaking into (*thấm*) the walls and the floor, slowly saturating the building. None of the electrical equipment, including nine Chinese-made "knife circuits" (*cầu dao*), were contained within protective boxes, which posed the obvious danger of water causing short circuits or potential electrocution, and the station itself lacked emergency equipment. The author complained that the Province had failed to take seriously the maintenance of the building or the safety of people who had to work in it. Thus, "complete and perfect", as it applied to hydraulic infrastructure, was a relative term open to interpretation and not necessarily indicative of the efficiency or capacity of an irrigation and drainage network.

The fate of the hydraulic bargain

The failure of the "complete and perfect" campaign to "synchronise" hydraulic systems in many areas of Hải Hưng, suggests that the hydraulic bargain, which had been struck during the early period of collectivisation and become less salient during the war, was not easily re-established in the 1970s. Why was this proving to be the case? Improving hydraulic infrastructure, as the pre-colonial and colonial regimes had recognised, was an important component of efforts to increase agricultural output. As long as co-operatives were concerned with increasing the area of double cropped land and improving wet rice productivity, constructing and

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Autumn crop.

maintaining irrigation and drainage infrastructure remained an important activity for the co-operative. Inefficient hydraulic infrastructure, however, made it difficult for co-operatives to make the best use of improved seeds and chemical fertilisers. In combination, new seeds, fertilisers and canal irrigation were a potent recipe for increasing agricultural productivity. Of these three inputs, water was the most critical in that it was the foundation on which high yield varieties of rice seeds and chemical fertilisers could transform agricultural production. Where irrigation and drainage were not well provided, as I explain in Chapter 8, either there would be no crop or the full potential of other inputs would not be realised. Irrigation and drainage were important contributing factors, in combination with both technical and organisational elements, to the success or failure of a co-operative's wet-rice economy. In some cases it would have played an important part in leading co-operatives into a vicious cycle of declining productivity, increasing amounts of fallow land and, eventually, private cultivation.

An example of such a vicious cycle within the context of a single co-operative is found in an interview with a co-operative member in 1976:

> Question: Why are crop yields low?
> Answer: Because we lack fertiliser.
> Question: Why do you lack fertiliser?
> Answer: Because we can only raise a few pigs.
> Question: Why can you only raise a few pigs?
> Answer: Because we lack fodder.
> Question: Why do you lack fodder?
> Answer: Because we lack foodstuff, and people in the co-operative don't have enough to eat.
> Question: Why don't you have enough to eat?
> Answer: Because our crop yields are low.
> Question: Why are you crop yields low?
> Answer:...
> (Trần Văn Hà, 1976, 129-130)

At the macro-level, Andrew Vickerman describes the tautological relationship between inputs and productivity increases as a "vicious circle" of policy failure that systematically affected the northern Vietnamese collectivised economy. This cycle of economic decline was based on the state's inability, according to Vickerman, to

"impose draconian taxation" on agriculture leaving the state to rely on trade to generate public revenue (Vickerman, 1986, xiv).

Relying on imports to cover shortfalls in domestic industrial production typified the collectivised economy. Melanie Beresford argues that, under central planning, dependence on imports to finance capital construction projects and industrial production was "the single most important factor hampering implementation of the plan (Beresford, 2000, 6)."[30] With economic policy directed at developing heavy industry, consumer goods production was neglected, which, in turn, limited agricultural production and, therefore, the possible taxable surplus available to the state. All of this further constrained industrial production and limited the potential benefits that industrial growth would have for expanding the agriculture sector (Vickerman, 1986, 6-7). Thus, it was the failure of industry to serve agriculture that led to Vickerman's vicious circle of economic decline. By the late 1970s, it was only those provinces where industrial production made up a significant portion of the local economy that large-scale irrigation and drainage systems were being synchronised. Provincial economies that were largely dependent on agriculture could no longer afford to construct or maintain irrigation and drainage infrastructure (Phan Khánh, 1997, 178-179). As such, the industrial cart came to precede the agricultural horse.

At the co-operative level, the extension of large-scale irrigation and drainage schemes was based on a hydraulic bargain whereby co-operative members would invest their labour in constructing local irrigation and drainage systems while connecting them to large-scale canals and pumping stations. Once these investments were made, more efficient water control would contribute to

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[30] Nguyễn Khắc Viện made this point in 1974 while the war with the South was ongoing.

> The largest handicap remains the weakness of the industrial sector which is not yet capable of providing agriculture with sufficient machinery, fertiliser, lime, cement for hydraulic projects, vehicles and insecticide. It is certain that with the re-establishment of peace these problems will be gradually overcome. The gravity of natural disasters demand more effective means than are presently available (Nguyễn Khắc Viện, 1974, 511).

Unfortunately, peace would not be so kind to the agriculture sector.

increasing agricultural output. Increased productivity would then provide the co-operative with the capital required to reinvest in irrigation and drainage systems, and, when they were available, purchase fast-growing seeds and chemical fertilisers. However, when co-operative incomes suffered, for whatever reason, it became increasingly difficult to maintain local systems, pay irrigation fees, or afford the salaries of local hydraulic cadres (Phan Khánh, 1997, 178-179).

The Party felt it necessary to maintain the image that neither the Ministry of Hydraulics nor provincial authorities were responsible for the shortcomings of irrigation and drainage systems. For example, in 1976 the Ministry of Hydraulics began work on five enormous pumping stations, with forty electrical and two hundred diesel pumps, in commemoration of the liberation of South Vietnam in April 1975. One of these was the Mai Xá pumping station in Tiên Lữ district, Hải Hưng province. While the Mai Xá station was under construction in February 1976, the Province had assured co-operatives that irrigation would be available for Tết, a time when co-operatives would be applying water to break up their fields (*tưới ải*) before transplanting their Spring crop. Contrary to the province's assurances, this water never arrived. In order to cover up its failure and appear to be upholding the hydraulic bargain, the Party, instead of admitting that the Mai Xá station was still several months from completion, argued that co-operatives had not requested that the Mai Xá station pump water (*Hải Hưng,* 1976c).

In May 1976, three months later, *Hải Hưng* reported that at the Mai Xá worksite there had been major difficulties mobilising materials and labour, and that construction was ongoing. Under the circumstances, it would have been impossible, contrary to the province's assurances, for the pumping station to have provided water at Tết. Work on the outlet tank and the main building had been stopped for a week because of a lack of building materials. Forty-two cubic metres of wood had been required but only ten were delivered. The district was to provide 820 000 bricks but only came up with 120 000. Cương Chính and Minh Phượng communes were to provide 1000 bamboo poles but only gave 180 and they were so rotten as to be useless. In terms of labour, the district managed to mobilise only

800 workers, which was fifty per cent of the plan (*Hải Hưng,* 1976b). During Tết, provincial authorities had attempted to transfer blame away from itself and on to co-operative officials. The symbolic importance of having the Mai Xá station operational by the beginning of Tết, forced the province to lie.

By 1979, those co-operatives that were served by the Mai Xá station were still suffering serious problems with drought and waterlogging. The main reason given for this was that that canals and sluice gates had yet to be synchronised. Canals were not long enough or deep enough. Drainage canals had not been dredged for some time and were too shallow (*Hải Hưng,* 1979d). There were further problems with the Mai Xá hydraulic network such as vandalism and water theft. The district had 200 regulating sluices but only around fifty had enough vanes (*cánh*) and opening and closing devices. As such, every time a co-operative was in need of water a hole had to be chopped in the canal embankment, whereby the fields at the head of the canal would then have too much water and those at the end would suffer from drought (*Hải Hưng,* 1979d).

Power and water

The state's most serious hydraulic shortcoming, during the 1970s, was its inability to provide electricity to pumping stations. Electrification had been a critical component of the socialist revolution. Lê Duẩn, the General Secretary of the VWP, proclaimed in 1973 that,

> Only on the basis of electrification can we consolidate the socialist economic regime, the worker-peasant alliance and the dictatorship of the proletariat, eradicate small-producer mentality [sic] and habits, strengthen and develop socialist ideology, bring the toiling people material welfare and a civilized life, and make them masters not only of society but also of nature (Lê Duẩn, 1973, 95-96).

This was a tall order for the Party. The DRV's electricity network had been badly damaged during the American bombing campaigns. By 1977, Hải Hưng province had not yet constructed the Phả Lại generating station, which would only be completed by the early 1980s. However, demand for electricity in the hydraulic

sector, as more large-scale pumping stations were constructed, was rising. The result was a large discrepancy between supply and demand (*cung và cầu*).

The Hải Hưng provincial authorities, by 1977, were encouraging people to conserve electricity and were imposing daily blackouts between seven and ten in the morning and then again from six to ten in the evening (*Hải Hưng,* 1977l). These power cuts continued until at least 1979 (*Hải Hưng,* 1979b). In a letter to *Hải Hưng*, from the provincial Electricity Management and Distribution Department (*S□ quản lý và phân phối điện Hải Hưng*), the author criticised people for using bulbs of too high a wattage and for leaving lights on all day. He also targeted people who, while trying to save scarce fuel, were using electricity to boil water (*đun nước sôi*). This, he claimed, was a form of "embezzlement" (*tham ô*) and it was having a "serious impact on agricultural and industrial production" (*Hải Hưng,* 1978h). Several years later, before the Phả Lại generating station had been completed, two families in Châu Giang district were singled out for using electricity to run an ice cream machine while pumping stations were being forced to shut down because of a lack of electricity (*Hải Hưng,* 1981c). This last criticism was not about the amount of electricity being used but was intended to juxtapose collective suffering and the selfishness of individuals who would under such desperate circumstances produce ice cream.

Power shortages often resulted from natural disasters and the overall under-capacity of the electrical transport network. A storm in 1977 knocked over power poles causing widespread blackouts throughout Hải Hưng for many days (*Hải Hưng,* 1977h). In September 1978, heavy rains waterlogged 40 000 ha throughout the province, causing serious flooding in Ninh Giang district. Draining the land using electrical pumps should have been possible except that power lines in Ninh Giang were down for five days, which meant that the pumps at the Văn Mỹ pumping station were forced to sit idle (*Hải Hưng,* 1978g). In terms of production capacity, in 1977, the provincial transformer's capacity increased to 110 kilovolts (kV) while local sub-stations were only capable of handling thirty-five kV. This forced the province to limit electricity transmission to thirty-five kV for several

years until the "local electricity branches" (*Chi nhánh điện*) were able to upgrade their infrastructure (*Hải Hưng,* 1977j).

Power shortages forced provincial authorities to cut off power to entire co-operatives. In 1977, at Ngô Quyền co-operative, Phù Tiên district, co-operative members were surprised to have their electricity cut off while irrigating their Spring paddy crop. Representatives were sent to the provincial electricity management department on three different occasions to plead the co-operative's case. On 1 April, a letter to *Hải Hưng* recounted that the co-operative had paid 5500 *đồng* of 8000 *đồng* it owed for electricity, and promised to provide the balance within the month, in return for their power being restored. The letter appeared in *Hải Hưng* four days later on 5 April, and, in it, the author complained that the Province was still not providing the co-operative with electricity (*Hải Hưng,* 1977k). As the next example highlights, blackouts would occur not only because of general shortages or because a co-operative was in debt to the authorities, but because the system leant itself to corrupt practices.

In May 1975, *Hải Hưng* published a reader's letter entitled "Why does the electricity continue to be cut off at a time when we are fighting drought?" On 22 April, the Hữu Nam pumping station in Mỹ Văn district had stopped working and required repairs. On 30 April, once the pumps were fixed, a representative from the provincial Electricity Technical Team (*Tổ kỹ thuật điện*) arrived to reconnect the pumping station to the electrical grid. The hydraulic teams of the various co-operatives were apparently delighted that after eight days the pumps would again be operational. However, at four o'clock that afternoon the head of the Phố Nối electricity sub-station (*tổ trưng điện chi nhánh điện Phố Nối*) arrived unannounced at the pumping station and ordered that the electricity be cut. Representatives from the district were on hand as well as co-operative officials to "plead for water and request electricity" (*xin nước đề nghị cho điện*). The head of the sub-station refused all requests. The author of the letter made a very salient point in conclusion: cutting off electricity while fighting drought does not help production -- this issue needs to be re-examined (*Hải Hưng,* 1975a).

Five years later, *Hải Hưng* published a letter from Nguyễn Sang of Trung Hưng commune, which was also served by the Mý Văn pumping station. This letter suggests that, with regard to the earlier incident, the Phố Nối sub-station had cut power to the Mỹ Văn pumping station because the head of the local sub station had been persuaded to supply electricity to another pumping station. The Phố Nối sub-station in 1975 had only been able to supply electricity to one pumping station at a time. Thus, electricity would generally be provided for several hours and then be cut off. According to Nguyễn Sang, this system was not economical -- not to mention easily corrupted -- because the pumps required priming (*mồi*) whenever they were restarted. Priming a pump involved diving (*lặn*) into the pumping station's holding tank to close the intake valve of the siphon pipe (*van ống xi phống*). This, the author noted, was an awful task, especially when it was really cold. In order to make use of every minute of available electricity a capable labourer would need to be posted at the pumping station throughout the day and night ready to prime the pump whenever electricity became available. By way of a conclusion, the writer suggested that the electricity branch research ways to provide electricity simultaneously so that each pumping station could have a reliable power source (*Hải Hưng,* 1980c). With the war over in 1975, citizens had become more concerned about such breakdowns, and were willing to ask more fundamental questions about the underlying capacity of the large-scale agricultural economy.

By the late 1970s, Vietnam was experiencing an economic crisis. Irrigated area in Hải Hưng began to plateau by the mid-1970s, and the slow rate of hydraulic synchronisation demand that co-operatives maintain a high degree of hydraulic self-reliance. This involved fighting droughts by "keeping" rainwater, in addition to draining waterlogged fields by hand. Moreover, collectivised agriculture was suffering a crisis of confidence. As dissatisfaction with the collectivised rural economy increased, co-operatives began to leave collective land fallow (*bỏ hóa*) and concentrate their labour on the privately controlled "five per cent" land. This land was invariably the best land in the co-operative. Because an important

determinant of land quality is the likelihood that it will be affected by drought or flood, fallow land would tend to have been collective land that was either flood or drought prone, either too low or too high to be effectively drained or irrigated by available hydraulic infrastructure. Ultimately, fallow land would have to be cultivated in order for a co-operative to feed itself. One way of doing this was to transfer collective land of a reasonable quality to households, in the form of "five per cent" land. In other cases, co-operatives went so far as to privatise cultivation of collective land.

Fallow land: "The weeds come up green and lush" [31]

With provincial authorities having a difficult time providing electricity to pumping stations, villagers in many co-operatives, especially those with a high proportion of high or low land, would have had little incentive to work on irrigation infrastructure. As the state of irrigation and drainage infrastructure declined, collective land became more prone to drought and waterlogging and in some cases was uncultivable. Fallow collectivised land was offset by increased investments in private plots or household gardens. By 1980, only twenty-five per cent, on average, of a family's income came from the co-operative, with the remaining seventy-five per cent being earned in the "supplementary economy" (*kinh tế phụ*). What was a steady decline from the early 1960s in the relative importance of the co-operative reached its nadir in 1983 with only 15.4 per cent of household income earned through the co-operative. What this meant in real terms was that five per cent of land in northern Vietnam was producing eighty-five per cent of agricultural incomes (Tổng Cục Thống kế, 1989, 139-140).

The expression "the weeds come up green and lush" was one way that a 1978 article in *Hải Hưng* described fallow land. In an effort to discredit the management capabilities of local cadres, *Hải Hưng* reported that Bắc Sơn co-

[31] "Cỏ mộc xanh rì". This phrase refers to the way the fields looked when they had been left fallow by co-operative work teams.

operative in Ân Thi district had only planted 500 of 1340 *mẫu*. The author went through a checklist of possible problems that might account for more than sixty per cent of the co-operative's land being left fallow. The article noted that the weather had been good, there was no drought or waterlogging to worry about, although the Spring crop had been harvested later than scheduled. There was no shortage of draught power. In fact, the co-operative owned 220 buffalo (*con trâu*) and there were even tractors available. The co-operative was not lacking labour as there were 1300 eligible workers, which meant, the author noted, that each person would only need to plough one *mẫu*. And yet, in some areas, as the article euphemistically described it, "the weeds come up green and lush" (*Hải Hưng,* 1978e).

The basic problem at Bắc Sơn co-operative, according to *Hải Hưng*, was that people were refusing to cultivate the collectivised land. Since the beginning of the Autumn crop, *Hải Hưng* reported, only 500 to 700 workers had gone to the fields, and that they were working no more than fours hours each day. Furthermore, buffalo were not led to the fields until eight in the morning and would be rested at ten o'clock, and left to graze between three and five o'clock in the afternoon. Of those co-operative members who were not labouring in the fields, several hundred people had left to trade (*buôn bán*) on the black market, or had migrated in order to make a living (*làm ăn linh tinh khắp nơi*). Many co-operative members, state cadres, and Party members were only interested in spending their days, as *Hải Hưng* reported, hanging about (*quanh quẩn*) their piece of five per cent land (*miếng ruộng "phần trăm"*) or their household garden plot (*mảnh vườn nhà*).[32] According to the official media, the co-operative's inability to mobilise sufficient labour, or, in their words, why work was at a "standstill" (*trì trệ*), was due to the co-operative managing labour poorly (*Hải Hưng,* 1978e). However, eight years later, in 1986, *Hải Hưng* reported that Bắc Sơn co-operative had managed to improve its

[32] There was a hierarchy of "5% land", which corresponded to the most lucrative activities available from each type, with raising fish being at the top of the list. "Nhất canh trì, nhì canh viên, tam canh điền". First ponds, second gardens and third fields. (Interview, Diệp Đình Hoa, Hanoi, February, 2001).

standard of living as the result of having built a local electricity generator. With a stable electricity source, the co-operative was finally able to operate local irrigation pumps and begin to irrigate its land (*Hải Hưng,* 1986). It is likely that the reason why land was left fallow in Bắc Sơn co-operative was more closely related to the co-operative's inability to irrigate land than it was to poor labour management practices.

Hoping to stir up enthusiasm for collectivised production, the 1978 article concerning Bắc Sơn concluded with a rhetorical flourish: do these people want to maintain their low standard of living by not fulfilling their commitments to constructing and protecting the socialist homeland? (*Hải Hưng,* 1978e) A rejoinder to this would be that for years co-operatives had been attempting to improve their living standards but they were caught in a system that offered mixed signals, where self-sufficiency was praised in the context of collectivised production. For instance, under the hydraulic bargain, co-operatives contributed labour to construct pumping stations and, in return, co-operative members expected that pumps would help irrigate and drain their land. However, after a severe storm, for example, pumps were often lacking electricity or had broken down and were unable to drain waterlogged land. When co-operatives failed to mobilise sufficient numbers of workers to drain fields by hand the state would chastise villagers for their "dependent" attitudes.

This was the case in a notoriously flood prone co-operative, Minh Đức, in Mý Văn district. Following Storm No. 4 in 1980, co-operative members were unable to depend (*ỷ lại*) on pumps, although the drainage system had ostensibly been "synchronised". Instead, people were forced to pull water using scoops and water wheels (*gầu, guồng*), in order to rescue the Autumn rice crop, which was, in some areas, covered with more than one metre of water. This process of baling water out of flooded fields is known generally as "tilting the land in order to pour water into the river" (*nghiêng đồng đổ nước ra sông*) (see Figure 9.2). Although people spent twelve hours per day for four days "tilting the land", in the end the co-operative

was only able to save 153 *mẫu* out of 620 *mẫu* of waterlogged paddy (*Hải Hưng,* 1980b). This must have been enormously disheartening.

Figure 9.2 Propaganda poster showing workers "tilting the land", October 1978

"Go and battle the water, be determined to secure victory in the Winter crop"

Source: Natasha Pairaudeau

The state preferred to hedge against the possibility of its own failure by encouraging co-operatives to be self-sufficient (*tự làm*). However, at the same time, the Party publicised its own deficiencies by praising both self-sufficiency and what it called "innovation" (*sáng kiến*). For example, while lauding the innovative efforts of the Provincial Waterway Transport and Cargo Company (*Công ty vận tải và xếp dỡ đường thủy*) for generating its own electricity, the Party admitted that during 1980-81 there were blackouts that lasted for months at a time (*Hải Hưng,* 1982d). Co-operatives were asked to become self-sufficient without reverting to "localism" (*tư tưởng cục bộ*). In other words, the state, despite its inability to supply electricity to pumping stations, was asking co-operatives to maintain their half of the hydraulic bargain.

This betrayal of the hydraulic bargain would have been difficult for many co-operative members to stomach, especially considering that draining land by hand was only the beginning for waterlogged co-operatives such as Minh Đức. Once floodwaters had receded, co-operative members went to work replanting their crops. Debris had to be removed, the whole area ploughed and fertilised once again, and finally re-seeded by hand (*gieo vãi*), which resulted in much lower yields than the transplanted crop that had been destroyed (*Hải Hưng,* 1980b).[33] Sometimes, co-operatives were forced to replant crops several times in one season for only a minimal return. Such was the case in An Viên co-operative in Phù Tiên district during the 1980 Autumn crop when after replanting paddy three times, because of successive water logging, out of a total planted area of 1020 *mẫu* the co-operative was only able to harvest forty-five *mẫu* (*Hải Hưng,* 1982c).

Co-operative members showed their displeasure with the many shortcomings of the collectivised economy, by concentrating on their plots of "five per cent" land, cultivating collective land privately and neglecting hydraulic

[33] Similar scenarios were played out nearly every Autumn in Minh Đức. Described as a "navel" (*rồn*) or a "pocket" (*túi*), land in Minh Đức co-operative collected water draining from surrounding co-operatives. Throughout the 1960s and 1970s the people in Minh Đức attempted to improve the

infrastructure. By the mid-1970s, Minh Tân co-operative in Nam Thanh district, according to *Hải Hưng*, had a history of corruption, chronic difficulties with waterlogging and an unwillingness to accept collectivisation. In 1977, the co-operative, after years of allowing private cultivation, "recovered" (*thu hồi*) 160 *mẫu* from individual co-operative members, while a further eighty-nine *mẫu* of collective paddy land that had been "encroached" (*lấn chiếm*) upon was taken back (*Hải Hưng,* 1977d). As a direct result of poor water control, the co-operative found it difficult to meet its production quotas and by 1978 work on collectivised land had come to a "standstill". In 1978, a further fifty-one *mẫu* of co-operative land was taken back from co-operative members, with thirteen *mẫu* being "five per cent" land that had been improperly allocated. However, once repairs were made to a twelve kilometre section of the main irrigation canal, co-operative members' standard of living began to improve as the Spring and Autumn crops became less prone to drought and waterlogging respectively. With these hydraulic improvements, the problems of land encroachment also diminished (*Hải Hưng,* 1978c; *Hải Hưng,* 1980a).

Improving the efficiency of irrigation and flood control infrastructure was not the only solution to the problems posed by collectivised agriculture. Testament to this is the productivity increases that resulted from the introduction of the Product Contract in 1981, which is discussed further in the Conclusion. Nevertheless, in addition to the direct impact that waterlogged or parched land had on yields, water control also had an indirect influence on the potential success of the various elements of the Party's technological revolution in agriculture. I have already discussed in Chapter 8 the relationship between breaking up the soil and increased yields. Water was also essential to the successful introduction of spring paddy seeds (*lúa xuân*) that co-operatives in Hải Hưng were encouraged to grow beginning in the early 1970s. Broadcast sown spring paddy was a fast growing

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hydraulic situation, but had little success. Finally, in 1983 the co-operative abandoned the Autumn rice crop and used the flooded paddy fields to raise fish (*Hải Hưng,* 1983b; *Hải Hưng,* 1983c).

variety that could be planted in the same field in which it would germinate and mature (*lúa xuân gieo vãi* or *giêo thẳng*).[34] There were many advantages to these seed varieties, both broadcast sown and transplanted, not the least of which was that they could be sown later than 5th month (*chiêm*) seeds making it possible to add a Winter crop between the end of the Autumn crop and the new spring paddy (*lúa xuân*) (Bùi Huy Đáp, 1976, 6; Nguyễn Khắc Viện, 1974, 510).

However, the advantages of broadcast-sown spring rice -- less labour expended and higher yields -- could be lost to weeds if water levels in paddy fields were not well controlled, since flooded fields were the best way of limiting weed growth without using herbicides (Bùi Huy Đáp, 1970, 267-271). The relationship between weeds, spring paddy, irrigation and collectivisation provide the foundation for one of the more noteworthy cases of resistance to collectivised agriculture in Hải Hưng during the 1970s. Poor water control helped catalyse co-operative leaders and members of Tam Đa co-operative, in Phù Tiên (Phù Cừ) district, in 1977, to not just accept their fate but to actively decollectivise production. Land was not just abandoned or encroached upon, it was contracted to co-operative members and farmed privately. The co-operative's failure to cultivate a Spring crop, beginning in 1976, and a series of other crop failures, forced co-operative leaders to sanction and even encourage alternatives to collectivised production.

In 1976, Tam Đa co-operative followed the orders of district officials and planted spring rice as an experiment. The crop was lost because the co-operative lacked irrigation to keep down the weeds and the district was unable to supply the co-operative with herbicide (*Hải Hưng,* 1976a). The following year, *Hải Hưng* reported that it had been several crops since Tam Đa had a successful harvest. Since 1975, the co-operative's collective economy had "fallen into decline" (*sa sút*). In 1975, the co-operative's planted area was 1419 *mẫu*, which produced 380 tonnes of cereals (*lương thực*), but during the 1977 Spring crop only 489 *mẫu* of cereals

[34] Broadcast sown fast-growing spring paddy was paired with transplanted *chiêm* paddy (Bùi Huy Đáp, 1976, 3). I have found no mention during the 1960s and 1970s of spring paddy that was

were planted, which yielded only forty-three tonnes. In terms of fulfilling production quotas, in 1975, Tam Đa transferred to the state 105 tonnes out of a 220 tonne quota. Following the Spring crop of 1977, not a single kilogram of cereals was transferred to the state (*Hải Hưng,* 1977b).

The Party attributed the shortfall in production quotas to most of the collective land having been left fallow or cultivation having been privatised. During the 1977 Spring crop the plan had called for 687 *mẫu* of paddy to be planted but in reality only 205 *mẫu* were sown. Of that, 131 *mẫu* were planted with spring rice of which nothing was harvested. Of the 205 *mẫu* that was cultivated, eighty-one *mẫu* had been worked privately (*Hải Hưng,* 1977c). The co-operative Management Committee (*Ban quản trị HTX*) had "divided up" (*chia*) eighty-one *mẫu* for co-operative members' private use. The Management Committee paid for the labour and fertiliser expenses and, when the harvest came in, co-operative members reimbursed the co-operative according to the "determined product" (*định sản*) for each field. If cultivators could increase yields above the "determined product" they could keep the excess. These types of agreements were known as "sneaky contracts" (*khoán chui*) (Kerkvliet, 1995, 402). The remaining 725 *mẫu* was either left fallow or was cultivated privately by co-operative members (*Hải Hưng,* 1977c). During the 1977 Autumn crop, privatised production was increased to 100 *mẫu*.

It was the commune Party Committee that had decided, in 1977, to divide up land and cultivate privately. The head of the committee, Comrade Đ, as he was referred to in *Hải Hưng*, took the brunt of the province's criticism over the decision to privatise production in 1977. It had been his idea to increase privatised production from eighty-one *mẫu* during the 1977 Spring crop to 100 *mẫu* for the Autumn crop. His rationale was that during the Spring crop, "because the land was going to be left fallow and because the life of the peasants is difficult, why not divide up what would have been fallow land and cultivate it." In *Hải Hưng*'s account of the meeting, where the decision was made to cultivate land privately,

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transplanted and not broadcast sown.

Comrade Đ stated that "it is generally well known that dividing up land is wrong, any comrades who agree with this can raise their hand." A few comrades did raise their hands, and were, in turn, "isolated" (*cô lập*). Other members of the Party Committee attempted to mobilise ordinary people to criticise those Party members who had chosen to support Party policy (*Hải Hưng,* 1977i). Despite the activities of other Party members, *Hải Hưng* argued that, as the chairman of the Party Committee, Comrade Đ "must be held most responsible for this very serious mistake" (*Hải Hưng,* 1977i).

According to provincial investigators, the greatest crime that Comrade Đ had committed was to stray from the "co-operativisation path", and, in the process, greatly undermine the "conviction" (*lòng tin*) co-operative members had in collectivised "production" (*làm ăn*). It would appear, however, that there was a history in Tam Đa commune of unorthodox behaviour on the part of members of the Party Committee. Between 1973 and 1977 disciplinary action (*thi hành kỷ luật*) was taken against a total of eighty party members. This, according to *Hải Hưng*, did not put an end to cases where party members would "encroach upon" collective land (*Hải Hưng,* 1977b). Thus, it is not surprising that Comrade Đ expressed little contrition when confronted by the investigative team's findings. He openly admitted that his decision to privatise cultivation contradicted Party policy, but he insisted that all he had done was to "avoid having land left fallow". Neither Comrade Đ nor many other "comrades" in Tam Đa would accept that their leadership had "shortcomings". With regard to following Party policies, Comrade Đ said that "if higher-ups want us to fix the problem then the problem will be fixed, but of course we still want to allow co-operative members to harvest this next crop privately" (*Hải Hưng,* 1977i).[35]

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[35] "trên bảo sửa thì sửa, chứ chúng tôi còn muốn để xã viên thu hoạch vụ này nữa" It is noteworthy that in years to come Tam Đa co-operative refused to cultivate spring rice but insisted, against directions from the province, on cultivating 5th month rice that required transplanting (*Hải Hưng,* 1978i).

Comrade Đ was one of many co-operative leaders in Hải Hưng and elsewhere who, in the 1970s, were contracting land to households in order to avoid having land lie fallow. The amount of land being left fallow in Tam Đa alone was insignificant on a provincial scale. However, with several hundred co-operatives reacting in a similar fashion against the collectivised economy, it is understandable that, by 1976, a land area equivalent to two entire districts was being left fallow in Hải Hưng province.

Conclusion

In the years following the liberation of the South in 1975, the "moral and intellectual leadership" of the Vietnamese Communist Party, as one author has described it, "disintegrated" (Vasavakul, 1995, 272). The legitimacy of the centrally planned economy as the appropriate path to economic development dissolved as food shortages appeared and the standard of living of villagers declined. In terms of hydraulics, this same trend was reflected in the absence of a hydraulic bargain. The Party's attempts to recreate the hydraulic bargain that had been in place in the early 1960s proved fruitless. Efforts to synchronise hydraulic infrastructure throughout the 1970s were only nominally successful.

The scientific revolution in agriculture, of which modernised irrigation and drainage were integral components, was stymied by an economy that was dependent on imports and foreign assistance for agricultural inputs. The domestic industrial sector was reliant on the increased tax revenues that were to come from increasing agricultural outputs, which was, in turn, based on the success of the scientific revolution in agriculture. All of this gave rise to a vicious cycle of declining productivity, which fed into peasant disillusionment concerning the legitimacy of collectivised agriculture. Without a hydraulic bargain in place it was difficult to mobilise peasant labour to synchronise hydraulic infrastructure. Many co-operatives faced the prospect of replanting waterlogged fields several times for only a minimal return. During the 1970s, electricity shortages and poorly constructed canals compelled co-operatives to rely on local resources to face natural disasters

such as heavy rains or drought. This was not unlike the situation villagers had faced in the latter half of the 1960s, when efforts to synchronise hydraulic infrastructure came to a standstill.

One result of the declining legitimacy of the collectivised economy was villagers' increasing reliance, throughout the 1970s, on privately cultivated "five per cent" land. This eventually led to an increase in fallow land and ultimately *de facto* decollectivisation. In 1981, the Party introduced the Product Contract, which allowed co-operatives to contract collectivised land to households. This was a significant organisational reform, which led to immediate productivity increases. As I discuss in the Conclusion, although the Product Contract effectively decollectivised agriculture in Vietnam it did not do away with co-operative management institutions. As irrigation and drainage infrastructure has been modernised and expanded throughout the Red River delta there has been a growing demand for co-operative management. In Chapter 10, I discuss how co-operatives have been maintained in many parts of the Red River delta expressly to manage the canal networks and pumping stations that appeared during the collective period.

Tables and figures

Table 9.1 Area of Spring paddy irrigated in Hải Hưng, 1976-92

Irrigated Spring paddy in Hải Hưng province by various means, 1976-1992							
Year	Total irrigated area in ha	Area in ha using various means of irrigation					
		State electricity (Provincial or district pumping station)	Local electricity (Co-operative or commune pumps)	Diesel pumps	Scooping water	Gravity fed	Electricity consumption (KWh)
1976	112014	63752		28716	6785	12731	19068388
1977	113393	73106		24489	17631	10622	n/a
1978	113420	79804		28721	13557	10131	15593127
1979	113548	85875		28447	10596	9257	15174275
1980	115455	81244		21238	3961	9112	17328590
1981	114820	74035		20967	8122	11639	19012254
1982	114015	71169		21763	8524	12559	18062339
1983	114788	77469		28655	17872	20787	17517328
1984	113372	61355		26624	13993	11139	11297968
1985	112200	57699	14773	21889	8925	8914	8114385
1986	109754	54053	17199	21866	10267	10267	10644846
1987	109595	51151	17949	21866	10634	10634	n/a
1988	105277	46719	19693	21392	7242	10242	12081350
1989	103585	43387	23396	19376	8352	9074	14351831
1990	100488	39930	28783	14013	8381	9380	7829848
1991	103941	36343	40529	11689	6428	8946	10089498
1992	101187	35568	40600	11500	4361	9158	n/a

Source: (Hải Hưng provincial Hydraulics Department, 1994, Appendix 2)

Note: For tables 9.1, 9.2 and 9.3 data is not recorded for local electricity use before 1983-84 because until those years communes were ostensibly reliant on state-supplied electricity.

Table 9.2 Area of Autumn paddy irrigated in Hải Hưng 1976-92

Irrigated Autumn paddy in Hải Hưng province by various means, 1976-1992							
Year	Total irrigated area in ha	Area in ha using various means of irrigation					
		State electricity (Provincial or district pumping station)	Local electricity (Co-operative or commune pumps)	Diesel pumps	Scooping water	Gravity fed	Electricity consumption (KWh)
1976	122636	64048			7859	19817	
1977	121713	66444		32581	7346	15342	17061644
1978	123008	73143		21696	6513	15674	14205756
1979	121578	77092		24706	6904	12834	9238391
1980	99348	54168		21364	11148	12667	3174604
1981	120124	66173		27183	13777	12991	5987885
1982	118294	48865		32085	17008	20335	4470676
1983	121260	36486		42144	20797	21833	4650989
1984	118939	40563	11138	29470	17776	19992	5559613
1985	117222	42320	17758	28334	15337	12973	6769313
1986	105692	31856	15540	31420	17164	9662	3133719
1987	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1988	109605	38371	20900	21392	11423	10518	8869510
1989	104040	32147	20680	19376	10496	10698	4912280
1990	104393	31219	36618	14013	11260	8555	5178783
1991	103365	32694	38035	11689	7142	13004	n/a
1992	99589	27648	42764	11500	10507	8912	4693634

Source: (Hải Hưng provincial Hydraulics Department, 1994, Appendix 3).

Table 9.3 Area of Autumn paddy drained in Hải Hưng, 1976-91

Area of Autumn paddy drained in Hải Hưng province by various means, 1976-1991						
Year	Area drained in ha using various means of irrigation					Electricity consumption (KWh)
	State electricity (Provincial or district pumping station)	Local electricity (Co-operative or commune pumps)	Diesel pumps	Scooping water	Gravity fed	
1976	n/a		2385	n/a	6259	n/a
1977	n/a		4730	373	3181	n/a
1978	31317		4637	0	10583	11843690
1979	34677		7162	2123	8424	12297917
1980	47551		9335	5019	549	19117984
1981	10754		5560	249	1000	8782673
1982	20494		6849	1436	13120	5067685
1983	24137		1586	0	12	3785116
1984	19094	919	7942	583	n/a	11465633
1985	26477	2711	11452	1758	n/a	11351659
1986	21901	1987	10360	5834	10339	8128333
1987	n/a	n/a	n/a	n/a	n/a	n/a
1988	n/a	n/a	n/a	n/a	n/a	n/a
1989	19082	2887	2003	1899	21557	3133873
1990	32773	3892	1622	118	6538	7915300
1991	16695	2951	636	126	5641	6921231

Source: (Hải Hưng provincial Hydraulics Department, 1994, Appendix 3).

Table 9.4 Hải Hưng Spring and Autumn paddy area, production and productivity 1960-90

Spring and Autumn paddy area, production and productivity 1960, 1965, 1970, 1976-1990 for Hải Hưng province						
	Area of Spring paddy crop (ha)	Spring paddy production (tonnes)	Productivity of Spring paddy crop (tonnes/ha)	Area of Autumn paddy crop (ha)	Autumn paddy production (tonnes)	Productivity of Autumn crop (tonnes/ha)
1960	100.4	132.3	16.39	136.8	315.3	23.05
1965	109.1	211.8	19.41	130.4	306.9	23.53
1970	100.8	225.6	31.71	121.9	292.2	23.96
1976	107.3	337.6	31.44	123.4	333.4	26.98
1977	111.3	260.8	22.54	123.1	335.1	27.21
1978	113.4	303.9	26.8	119.7	330.3	27.59
1979	114.3	277.4	24.26	120.2	336	27.96
1980	114	355	31.14	99.7	222.7	22.33
1981	114.2	363.4	31.82	122.5	346.6	28.29
1982	114.2	396.2	34.6	121	381.6	31.5
1983	114.8	419	36.5	121.3	346	28.5
1984	113.9	381.7	33.5	121.2	316.4	26.1
1985	114.2	457.9	40.07	121.2	292.7	24.16
1986	113.9	374.3	32.8	112.7	284.6	25.2
1987	113.9	253.3	22.2	120.1	401.6	33.4
1988	114	468.4	41.1	120.7	327.9	27.2
1989	114.4	465.6	40.7	121.6	404.2	33.2
1990	114.6	401.5	35	116	381.7	32.9

Source: (Tổng Cục Thống Kê, 1991, Tables 40-42, 46-48)

Chapter 10 Conclusion: The collective is dead. Long live the co-operative

Since 1930, cultivated land area in the Red River delta has remained relatively constant.[1] At the same time, population has doubled from 6.5 million in 1930 to 13 million in 1998. Under such demographic circumstances, maintaining food security has depended upon improving land productivity, which has meant increasing double cropped area. By increasing double cropped land area -- in addition to the introduction of fast growing and high yielding rice varieties -- peasants in the Red River delta have been able to improve their per capita cereals production from 277 kg in 1930 to 477 kg in 1995 (Đào Thế Tuấn et al, 1995, 3). As I have argued throughout this thesis, double cropping in the Red River delta has been contingent on peasants being able to irrigate high land during the Spring crop and drain low land once the summer rain arrives. Between 1930 and 1985, the area of double cropped paddy only increased from fifty-one to fifty-four percent of all paddy land. This is a testament to the difficulties that the Communist Party has had implementing a program of large-scale hydraulic infrastructure in the Red River delta (Đào Thế Tuấn et al, 1995, 2).[2]

Considering the official statistics found in Chapters 8 and 9 (Tables 8.1, 9.1, 9.2, 9.4), it is difficult to believe that the area of double cropped land increased only slightly between 1930 and 1985. However, as the colonial regime discovered, gathering statistical data concerning the rural economy in the Red River delta presents many methodological pitfalls, and, consequently, the accuracy of statistics

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[1] According to a team of Vietnamese researchers, between 1930 and 1965 the total cultivated land area of the Red River delta decreased from 1.2 million to 740 000 hectares (Đào Thế Tuấn et al, 1995, 3). Official statistics, however, record cultivated area in the Red River delta in the first half of the 1990s hovering around the 1930 figure of 1.2 million hectares.

[2] Statistics for double-cropped paddy do not reflect the addition of a Winter crop between the Autumn and Spring crops, which has allowed for at least one and perhaps two dry crops per single-cropped paddy field. Nor do statistics concerning double-cropped paddy account for increases in paddy productivity brought about by high yield varieties of rice and the addition of chemical fertilisers.

must be regarded with a large measure of scepticism. Official irrigation statistics have tended to focus on the capacity of large-scale pumping stations rather than actual irrigated area. As I have discussed in Chapters 8 and 9, the actual irrigated area, using large-scale infrastructure, was, in the early 1960s, between twenty-five and thirty per cent of the DRV's total cultivated area. By the late 1970s, Hải Hưng province was managing to irrigate approximately the same proportion of land using "completed and perfected" irrigation and drainage infrastructure (see Chapter 9). Tables 9.1 and 9.2 divide irrigated area according to the various means of irrigating, which highlights the fact that large-scale pumps, although very important, were not responsible for irrigating all of Hải Hưng province between 1976 and 1990.

The difficulties that emerged, with regard to the Communist Party's efforts to implement its vision of large-scale hydraulic agriculture, need to be seen in the light of a fluid interaction of political and economic forces that existed at both the central and local levels. There was a contradiction between the Party's proclivity for centralised control and its determination to limit co-operatives' dependence on large-scale infrastructure. Localities, on their own, could never have constructed or managed the large-scale hydraulic infrastructure that has been constructed since colonial times. The state has heavily subsidised large-scale pumping stations, dikes, sluice gates and dams. Likewise, mobilising sufficient amounts of rural labour for large-scale hydraulic projects relied on the peasantry being sympathetic to productivist attitudes. Under these circumstances, centralised capital but localised labour, peasants in a largely agrarian economy have significant political and economic power to influence the direction of government policy.

Contrary to Wittfogel's thesis that bureaucratic control over large-scale hydraulic infrastructure leads to political and economic absolutism, I have argued that constructing and managing such infrastructure in the Red River delta has relied on protracted negotiations between the state and water users. Bargaining has been necessary partly because of the independent nature of traditional irrigation and drainage systems, and the primacy of the agricultural sector to the Vietnamese economy. Peasants have needed to be convinced that large-scale infrastructure

would serve their interests and that the state would provide water on schedule. As was the case in both the colonial and post-colonial periods, once peasants had access to large-scale irrigation and drainage, demand grew and traditional agriculture patterns shifted toward double-cropped paddy.

Ultimately, however, the state was incapable during the 1960s and 1970s of providing the electricity and fuel required to operate the pumping stations on which large-scale irrigation and drainage in the Red River delta have depended. One important reason for the state's shortcomings was the damage that American bombers inflicted on transportation and industrial infrastructure in northern Vietnam. Furthermore, with the VWP also fighting a war in the South, the young men who were the backbone of the hydraulic brigades of the early 1960s were conscripted into military service. The consequences of war were instrumental in the emergence of the vicious circle of neglect that affected hydraulic infrastructure throughout the 1970s. This had implications for the entire rural economy, insofar as irrigation and drainage were of critical importance to the cultivation of wet rice. Collectivised agriculture suffered as co-operative members chose to focus their attention on "five per cent" land, which as it was often the best land available would have been less susceptible to flood or drought, while leaving large areas of co-operative land fallow.

I have traced the development of large-scale hydraulic infrastructure in the Red River delta from the beginning of the Nguyễn dynasty in 1803 until the introduction of the Product Contract in 1981. I have considered the important transition that took place under the Nguyễn whereby irrigation and flood control were combined in the minds of many court officials. During the 19th century, the size of hydraulic systems began to expand and the demands that the state began placing on peasant labour foreshadowed the large-scale hydraulic projects of the 20th century. However, mobilising sufficient labour proved to be difficult for the Nguyễn and, consequently, projects such as the dredging of the Thiên Đức (Đuống River) were never completed. In contrast to this, Nguyễn Công Trứ's land

reclamation project in Ninh Bình proved that, under certain circumstances, large-scale hydraulic projects could be successfully implemented.

I have argued that villagers influenced the direction that large-scale hydraulic development has taken. An important institution in this regard has been the hydraulic bargain that emerged at different times and in a variety of forms since the beginning of the 19th century. Before the Communist Party established its irrigation modernisation program in the early 1960s, colonial hydraulic projects were not often framed within a hydraulic bargain. Instead, peasant dissatisfaction was forced into the open. One of the most important examples of this was the protest that peasants in Bazan led against Bédat's water monopoly, which stemmed from Bédat's failure to convince peasants of the benefits of irrigation and, thus, include them in a hydraulic bargain. The lack of a hydraulic bargain also influenced peasants in Vĩnh Yên to sabotage floodgates. Peasants in Vĩnh Yên felt betrayed by the state and were unwilling to sacrifice their land for the benefit of people and infrastructure downstream. Consequently, the potential for political violence and unrest in Vĩnh Yên forced the colonial authorities to find alternative flood control measures.

Hydraulic bargaining has been most apparent under the Communist Party DRV government. Beginning in the late 1950s, modernising irrigation and drainage emerged as an important component of the Communist Party's attempts to increase agricultural productivity and industrialise the economy. The colonial regime incorporated a similar approach to hydraulic development in their policy of *mise en valeur*. Because of financial and political constraints, however, the construction of large-scale hydraulic infrastructure was limited. Alternatively, the Communist Party state combined authoritarian control with a developmental vision which it attempted to implement throughout the 1960s and 1970s, and, in the process, employed significant state resources in an effort to expand large-scale irrigation and drainage networks. The VWP's economic commitment to implementing its developmental ideology helped solidify its political legitimacy

with peasants while at the same time establishing the foundation of the hydraulic bargain.

At a policy level, collectivisation and irrigation modernisation were closely linked. Co-operatives were designed to consolidate management over irrigation and drainage infrastructure, and eliminate the individualism of traditional irrigation and drainage. These two trends, co-operativisation and irrigation modernisation, were complementary in many ways. However, collective land ownership, although it did facilitate canal construction, was largely anathema to northern Vietnamese agriculture. It engendered resistance and non-cooperation among villagers and cadres. Inefficient large-scale irrigation and drainage infrastructure contributed to a range of peasant grievances that resulted in activities that undermined collectivised agriculture. Although de-collectivisation did take place throughout the 1980s and 1990s, co-operatives, with land distributed among members and cultivated privately, have not disappeared from the rural economy. An important reason for this has been the need for villages or groups of villages to manage the canals and sluice gates that were constructed throughout the 1960s and 1970s.

In the following section I will consider the ongoing relevance of co-operative management for irrigation and drainage networks in the Red River delta. I will examine the implications that "Đổi Mới", or "renovation", has had for the way in which irrigation and drainage networks have been managed since 1984. Following this I examine how managing local hydraulic systems has been a *raison d'être* for "new-style co-operatives" (*hợp tác xã kiểu mới*) in the Red River delta. Finally, I briefly address the long-term economic viability of large-scale hydraulic infrastructure in the Red River delta.

The co-operative as a water management organisation

By the early 1980s agriculture was being decollectivised. Although it was not the Party's original intention, decollectivisation began in 1981 when households were, under the "Product contract" (*Khoán sản phẩm*) system, granted the right to cultivate privately what was still officially collectivised land (Nguyễn Sinh Cúc, 1991,

43-45). Under the "Product contract" formula, crops were to be planted, tended and harvested by households. Brigade members would prepare the fields, provide irrigation and drainage, supply seeds and fertiliser, and protect the land. Almost immediately, in some co-operatives, brigades disbanded and all production activities became the responsibility of individual households (*Hải Hưng,* 1981a; *Hải Hưng,* 1981b; *Vĩnh Phú*, 1981). Household production rights were formalised in 1988 under "Resolution 10" (*Nghị quyết 10*) and further strengthened under the 1993 "Land law" (*Luật đất*), through which households became the principal rural production unit and collectivised land was redistributed. Co-operatives -- the institutional framework that managed collectivised agriculture -- were never formally dissolved, although some were bankrupt after collectively owned land and buffaloes were redistributed. Many co-operatives continued through the 1980s and 1990s selling inputs to co-operative members and marketing grain, and, most importantly, managing local irrigation and drainage networks

For some Vietnamese academics, the demise of collectivised agriculture and the advent of the household economy has led to a reconsideration of how rural society ought to be "managed" (Phan Đại Doãn, 1994). Other writers have concentrated on cataloguing and analysing both contemporary and historical co-operative organisations, "tổ chức hợp tác" (Đào Thế Tuấn, 1995; Chử Văn Lâm, 1991; Nguyễn Quang Ngọc, 1995; Trần Đức, 1994). Still others have turned their attention toward the household and its present and traditional role in the rural economy (Đào Thế Tuấn, 1997; Chu Văn Vũ, 1995; Vũ Tuấn Anh, 1997). Despite post-collective discussions concerning the relative importance of households versus rural organisations within the rural economy, there has been little debate over the relevance of rural organisations designed to manage irrigation and drainage networks in the Red River delta. Nguyễn Khắc Viện recognised, in 1974, the importance of co-operative hydraulic management when he noted:

> An isolated individual cannot build a dike, dig a canal or a water reservoir. Hydraulic works require collective labour and land ownership (Nguyễn Khắc Viện, 1974, 506).

Conclusion

In 1984, the organisational structure of large-scale irrigation and drainage systems was reconfigured with the passage of Resolution (*Nghị quyết*) 112. According to this piece of legislation, managerial control over large-scale hydraulic infrastructure was transferred to district-level Irrigation and Drainage Management Companies (IDMCs) (*Xí nghiệp khai tác công trình thủy lợi*).[3] These agencies have been responsible for collecting from communes, provincially determined irrigation and drainage fees. The fees collected by the IDMCs were intended to cover operation and maintenance costs for irrigation and drainage infrastructure as well as the salaries of cadres employed by the IDMC. In reality, IDMCs have generally been unable to provide for either maintenance or salary costs. Under Resolution 112, on a national basis, IDMCs needed to collect a minimum of 400 000 tonnes of paddy in order to break even. By 1995 there was not a single year in which this had occurred (See Table 10.1) (*Nhân Dân,* 2000a). Since 1984, irrigation and drainage was supposed to be provided on a cost recovery basis. In reality, however, IDMCs depend heavily on state subsidies (Sandoz, 1995, 5). Making light of this, officials at the Nam Sách district IDMC referred to irrigation and drainage as "welfare" (*công ích*) and the IDMC as a "welfare enterprise" (*doanh nghiệp công ích*).[4]

The Nam Sách IDMC spends most of its operational capital providing electricity to the massive pumps that drain low-lying areas in the district. According to cadres at the IDMC, peasants are constantly complaining about the cost of irrigation and drainage fees. However, staff at the IDMC have little sympathy, as every year irrigation and drainage fees need to be augmented by subsidies from the central government, which rarely arrive in time to carry out repairs before the beginning of the Spring crop. This has also meant that IDMC staff often go many months without getting paid. For instance, cadres at the Nam Sách IDMC complained that they were not earning enough to have a single meal from a

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[3] This coincided with a decrease in hydraulic equipment such as dredgers and pumps that were under the managerial jurisdiction of both provinces and the central state organisations. See Chart 10.2.

[4] (Interview Nam Sách district IDMC, 23 February 2001).

roadside vendor (*cơm bụi*).[5] Between 1993 and 1998 the irrigation and drainage fee charged by the Province remained constant. In November 1998, however, Hải Dương province actually lowered fees by thirty per cent (Uy ban Nhân dân Tỉnh Hải Dương, 1998).[6]

One result of this situation has been increasing differentiation between districts where irrigation is relatively costly and others where IDMCs play a nominal role in managing hydraulic infrastructure.

> Those companies that manage irrigation and drainage systems having a high proportion of land that has to be drained often run into many difficulties. Faced with debt for an enormous amount of electricity, such companies suffer from a lack of capital to maintain systems or to pay cadre salaries. Conversely, those companies and enterprises that irrigate using gravity have had many benefits. (Phan Khánh, 1997, 215).

In cases where IDMCs are unable to drain water efficiently, conflicts can erupt between communes or districts that act as "navels" or "pockets", consisting of very low lying land, and their higher neighbours. A study done during the late 1980s in the Red River delta found that land allocation practices at the village level have mitigated the chances of such conflict by dividing equitably the risk of a household's plots suffering drought and waterlogging (Doan Doan Tuan & Masayoshi Satoh, 1998, 134).[7] This has meant that households cultivate land of varying types, not just hydrologically but also in terms of soil quality, which helps to distribute agricultural incomes equally among villagers. With plots located near the head and at the end of a canal, peasants are less inclined to waste water. In terms of drainage, because households have an equal share of low and high land,

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[5] (Interview Nam Sách district IDMC, 25 February, 2001)

[6] In Hải Dương province fees were reduced by thirty per cent (Peoples' Committee of Hải Dương province, 1998). Coincidentally, this fee reduction followed the uprisings in Thái Bình province that had taken place the previous spring. As a general rule, provinces have kept irrigation and drainage fees below the limits, legislated in Resolution 112, of between four and eight per cent of total yield (Tô Như Phong, 2000, 51). In the past, irrigation fees were included in the tax paid by co-operatives. Under the present regime, households pay fees directly to the IDMC via commune officials. Moreover, fees are paid regardless of the quality of service, that is, even when poorly serviced canals lack water (Tô Như Phong, 2000, 51). Irrigation fees, therefore, in addition to being a direct tax are also associated with a service that in many cases is not provided efficiently.

[7] (Interviews, Quốc Tuấn commune, Nam Sách district, 16 and 17 May 2000).

villages and communes can negotiate the sacrifice (*hy sinh*) of low land in order to drain medium and high land (Doan Doan Tuan & Masayoshi Satoh, 1998, 136).[8] In effect, by dispersing landholdings throughout a commune, more equitable incomes help prevent potential conflicts between water users.

Thus, an important responsibility for communes in a decollectivised Red River delta has been to arbitrate potential hydraulic conflicts and expand the effective area that is irrigated and drained -- similar to the role that communes played in the 1960s before village-level co-operatives were integrated at the commune level. Generally speaking, where "new style" co-operatives do exist in the Red River delta, providing irrigation and drainage services is one of their most important tasks.[9] This has been the case in Quốc Tuấn commune. According to one commune official, the *raison d'être* for re-establishing the Quốc Tuấn co-operative in 1997 was to manage irrigation and drainage at the commune level.[10] The new service co-operative provides irrigation and drainage to all fields in the commune, even though only seventy per cent of commune land is prepared by the co-operative and just thirty per cent of households purchase seeds from the co-operative. This same trend is reflected in a study of "new-style" co-operatives in Đồng Hỳ district, Thái Nguyên province. In this district, nine out of ten "new style" co-operatives provided irrigation and drainage, with only three out of ten co-

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[8] This is known generally as "dispersing a flood" (*phân lũ*). This is more easily done at a village or commune level. At the district level, communes that have a high proportion of lowland are at the mercy of surrounding communes if they lack effective means of drainage. In Chương Mỹ district, Hà Tây province, communes that line the Bùi River are meant to "sacrifice" themselves in order to save the Autumn crop in higher surrounding communes. In the past ten years the Autumn crop in the seven communes along the Bùi river has been lost seven times (*Nhân Dân,* 2000b). Such sacrifices are not necessarily made willingly. Recent conflicts between Phu Lam and Phu Lương communes in Hà Tây province are an example of this. (Interview, Cadre at Hydraulics Research Institute, Hanoi, November 2000).

[9] In a 1993 report by the National Institute for Agricultural Planning and Projection (*Viện Quy hoạch và Thiết kế Nông nghiệp*), seventy-four per cent of peasants surveyed believed irrigation and drainage required some form of co-operation. This was higher than the percentage who selected credit and land preparation (Quoted in Management Committee, 2000, 3).

[10] (Interviews Quốc Tuấn commune, Nam Sách district, 23 February 2000 and 20 February 2001). The "new style" co-operative in Quốc Tuấn was created in December 1997. Unlike the co-operatives of the central planning era, membership in Quốc Tuấn co-operative is voluntary and requires members to buy shares. (Quốc Tuấn co-operative, 1997).

operatives concerned with electricity production and extension services (Peoples' Committee of Đồng Hỳ district, 2000; Peoples' Committee of Đồng Hỳ district, 2001, 1).

In recent years, Quốc Tuấn commune has been investing heavily in irrigation and drainage infrastructure. This has involved, primarily, lining canals with concrete, which is a national priority, and for which the district contributes fifty per cent of material costs. I arrived one day in Quốc Tuấn to witness work being done on the two canals that ring the commune. From the Cống Sáu pumping station at the southern tip of the commune two canals run east and west forming the border between Quốc Tuấn commune and its neighbours. All commune members were responsible for providing five kilograms of paddy per *sào* in order for the co-operative to purchase cement, bricks and to cover labour costs. Labour was recruited from the various villages in the commune and included people that were not members of the co-operative.[11]

Arguably, what has developed in Quốc Tuấn, as well as other places where irrigation and drainage is provided using commune level infrastructure, is the construction of what I would describe as an "earthen hedge". In Quốc Tuấn, canals and earthen embankments have gradually created hydraulic borders around the commune, while incorporating and integrating hydraulic infrastructure at the village level. Irrigation canals in Quốc Tuấn are, for the most part, independent from canals in neighbouring communes. For example, An Bình commune on the eastern border of Quốc Tuấn is irrigated by the large-scale pumping station at Thanh Quang, whereas the majority of land in Quốc Tuấn is irrigated by commune-managed pumps. There are small dams in place at the end of those canals that would naturally flow into An Bình, to prevent water from An Bình or Quốc Tuấn from inter-mingling.[12]

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[11] (Interview Quốc Tuấn commune, Nam Sách district, 20 February 2001).
[12] (Interview Quốc Tuấn commune, Nam Sách district, 20 February 2001).

Conclusion

The example of Quốc Tuấn commune paints a picture of an independent, efficient irrigation and drainage system. However, despite its many pumping stations and concrete-lined canals, Quốc Tuấn remains dependent on secondary canals that flow to and from large-scale pumping stations. Independence within an interdependent hydraulic system continues to define irrigation and drainage management in the central Red River delta. The cost of irrigation and drainage has increased as new pumping stations have been constructed or old ones are repaired and refitted. In 2000, the Ministry for Agriculture and Rural development pledged to invest US$28 million in irrigation systems in the Red River delta and the midlands (Reuters, 2000b). In addition to that, the Asian Development Bank agreed to loan the Government of Vietnam US$300 million for rural development projects, US$60 million of which was earmarked for improvements to large-scale dike and irrigation system improvements (Reuters, 2000a). By June 2000, the Asian Development Bank and the World Bank had already invested US$445.6 million in twenty-eight irrigation projects throughout Vietnam. At the time the government of Vietnam was expecting a further loan of between US$470 and US$560 million for three or four more irrigation projects (Vietnam News, 2000).

International assistance has always been an important aspect of hydraulic construction. During the colonial period, most hydraulic infrastructure was built using loans from France. The DRV's hydraulic modernisation program relied heavily on foreign aid. Now, once again, the Vietnamese government is relying on foreign donors and development banks to provide the capital necessary to reconstruct large-scale hydraulic infrastructure, not just in the Red River delta but throughout Vietnam. When the French were considering developing pump irrigation in the central Red River delta, their economic analyses were based on the premise that as agricultural productivity increased growth in the industrial sector would offset the depreciation costs of large-scale infrastructure. The French needed to know that large-scale hydraulic infrastructure could eventually pay for itself. It is difficult to imagine that, in the foreseeable future, the Vietnamese economy will be able to afford to maintain its present network of large-scale hydraulic

infrastructure. But, then again, large-scale hydraulic infrastructure construction has been a gamble the Communist Party has had to take. With between seventy and eighty per cent of the Vietnamese population living in rural areas, and dependent on agriculture for their livelihood, the Party has had little choice but to continue to invest in large-scale hydraulic infrastructure.

Tables and figures

Table 10.1 Irrigation and drainage fee collection for all of Vietnam (1986-95)

Irrigation and drainage fee collection (1986-1995)			
Year	Tonnes of paddy collected	Percentage of break-even total of 400000 tonnes	Percentage increase on previous year
1986	141174	35%	
1987	135526	34%	-4%
1988	142747	36%	5%
1989	164560	41%	13%
1990	168988	42%	3%
1991	173761	43%	3%
1992	206736	52%	16%
1993	214809	54%	4%
1994	246130	62%	13%
1995	310937	78%	21%

Source: (Bộ Thủy lợi, 1994, 47; Phan Khánh, 1997, 214-215)

Table 10.2 State-managed hydraulic machinery (1986-94)

Hydraulic machinery and equipment in the state sector*										
Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Water pumps	1335	1328	656	616	639	614	736	245	181	250
Dredgers	330	298	350	323	320	489	463	292	201	203

**This includes the Ministry of Construction, Ministry of Transportation, Ministry of Hydraulics and 50 provinces*

Source: (Tổng Cục Thống kế, 1996, 118-119)

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Note on archival citations

Archival records are divided between VNA1 (Vietnam National Archives No. 1) which holds documents from the Protectorate of Tonkin and VNA3 (Vietnam National Archives No. 3) which maintains documents submitted by government agencies since 1945. The collections are maintained in two different locations in Hanoi. Following the archive notation I include the fond and dossier (*hồ so*) number. The abbreviations I have used for the fonds are as follows:

GGI	Government General in Indochina
RST	Resident Superior in Tonkin
NTL	"Nha Thủy Lợi" Bureau for Hydraulics (1954-56)
BTL	"Bộ Thủy Lợi" Ministry for Hydraulics
BNTQD	"Bộ Nông Trường Quốc Doanh" Ministry for State Farms
QH	"Quốc Hội" National Assembly

For VNA3 there is a designation for dossiers that are kept indefinitely (VV) and another for those that are archived for a limited period (TT). The final notation is the date that appears on the dossier. The titles of documents contained within specific dossier I have translated and include the date that they were produced if it is available. I have translated document titles without including the original to limit the size of my citations and also to make citations more accessible to non-Vietnamese speaking readers.

In archival citations, dates have been cited in full. For newspapers, dates use numbers to indicate day and month, in that order.

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