The role of national governments in river management

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The Yellow River, China. Source: Flickr user Bert van Dijk

This discussion of the role of national governments in relation to river management uses three examples to highlight major themes – the Yellow River, the Colorado and the Murray-Darling system. I will argue that river management has requirements that only governments can hope to meet. Other types of organisations or institutions can assume responsibility for at best one or a few aspects of the whole. Even if governments cannot take account of all eventualities – as is undoubtedly the case – they can go further than any other institutional option in their capacity to respond comprehensively to the difficult issues facing river management. This capacity is evident in a number of areas. First is the access of national governments to enormous resources in areas such as funds, research and management. Second is the capacity to assess issues from a catchment wide perspective and distribute costs and benefits between different stakeholders, particularly upstream and downstream. Third is the ability to create frameworks of laws and regulations to which other individuals and other institutions have to respond. Fourth is the potential for a higher degree of corporate consistency over the long term (although religious organisations such as the Catholic Church are perhaps even more successful in that regard).

Yellow River

The Yellow River has been chosen to focus the initial discussion. It is one of the most productive and destructive rivers on the planet and its management has been a primary responsibility of Chinese governments for thousands of years. The productivity made possible by the Yellow River has provided the economic surpluses that have supported brilliant civilizations in the region since the second millennium BCE, but its periodic breakouts and changes in direction as it threads across more than five thousand kilometres of western and northern China have caused some of the worst disasters in recorded history. The flood of 1931, for example, is estimated to have drowned up to four million people. The capacity to harness its productivity has provided Chinese Governments with vast tax revenues but inability to stop the river periodically flooding and changing course has historically been a serious threat to their continued legitimacy. This was true of governments four thousand years ago when the strong Chinese State first developed and it is still true today when the challenges facing officials responsible for managing the river are being intensified by the high rate of extraction and the prospect of climate change which is predicted to result in more intense floods and droughts in a long term drying trend.

The river's productivity and potential for destruction both derive from the volumes of silt that it carried down from the upper catchment. When it overflows its banks on the flood plain along its middle reaches and the water slows down it loses energy and the capacity to carry as much silt as it did when flowing rapidly. The silt coming out of suspension is then deposited in the bottom of the river channel and alongside on the flood plain raising the river and its banks still further. As a result, for hundreds of kilometres the Yellow River stands many metres higher than the surrounding densely populated plain. When a break occurs flood waters soon extend over large areas with catastrophic impacts on people with limited resources to protect themselves. Over thousands of years the Chinese state has devoted enormous effort strengthening the banks and supporting dykes and attempting to maintain the integrity of the river banks. The catchment of the Yellow River is subject to a highly variable climate resulting in frequent floods, some of enormous proportions that it is difficult or impossible to contain. Since records first began to be kept catastrophic breakouts have occurred every century or so, the last in 1938. (In that case deliberately done by the Nationalist government to slow Japanese troops which it did for a few weeks at the cost of hundreds of thousands of Chinese civilian lives). As a result of these breakouts the river has sometimes changed its path across the plain and re-entered the sea hundreds of kilometres north or south of its previous estuary.

In addition to the flows coming from the headwaters in Tibet there are three factors which exacerbate the danger of flooding. These are silt deposits, ice dams that sometimes form in

winter in the two reaches of the river which extend far to the north and, perhaps paradoxically, reduced flows during non-flood times as a result of intense demand from agriculture, industry and human consumption across a region populated by more than four hundred million people.

The Yellow River carries more silt per unit volume of water than any large river (about double that of the Colorado River and three times the Mississippi). Most of the silt comes from erosion in the middle reaches as it passes through the Loess plateau. To reduce erosion in that region the government has undertaken a series of payment-for-ecosystems-services schemes and rural development projects, the largest of their kind worldwide, to promote crops, horticulture and vegetation to hold the fine soils in place. These measures are estimated to have reduced silt loads by about 30%. It has also built the large Xiaolangdi Dam to act as a silt trap and supply water to flush the river. As the river flows into the dam and slows down it drops its silt to the floor of the storage. Forecasts are that the dam will be effective for another ten or twenty years by which time it will be full of deposited silt and river managers will need to find other options.

Central to the story is the impact of reduced flow due to increasing demand. During the 1980s, 1990s and early 2000s there were many years when the river no longer reached the sea. In 1997 flow stopped for 226 days and the last 800 kilometres of the river was dry. These periods of no flow devastated irrigation in the lower reaches and caused great difficulties for urban centres which had to get water from elsewhere. In addition it also reduced the capacity of the river to flush silt through the system and increased the flood risk. Reduced volumes of water left in the river means that the flow speed is also slower which causes silt to drop out of suspension sooner. When the river mouth closes the silt which is still being mobilized upstream has to be deposited elsewhere. During times of low flows it is deposited in the river channel itself thereby reducing its size and the volume that can be held in the river before flooding occurs. With the mouth blocked deposits from small floods also lift the height of the river banks and sometimes obliterate the major channel which is difficult to recreate. When a significant flood occurs uncontrolled breakouts then become unavoidable with a high risk of disaster.

In 2002 the national government responded by introducing strict limits on extractions in upstream provinces and an elaborate system of monitoring and real time control of diversions which allow the central authority to cut off diversions when trigger points are hit. This is complemented by an elaborate system of compensation to spread costs between stakeholders upstream and downstream. As a result there have been no periods of non-flow since 2002. The river managers have also developed river pulsing techniques based on large releases for short periods from river storages to push silt through the system and hopefully

out of the estuary. Not surprisingly the water shortages in North China are also creating great incentives to improve water use efficiency and a wide range of reforms are being pursued by the Chinese government including water trading. Beyond this is the massive south-to-north water transfer scheme with its three routes designed to divert some of the much larger flow of the Yangtze for the benefit of the more meagre Yellow River. The most eastern of the three routes follows the Grand Canal first put in place in the sixth century BCE and is about to commence operation. The west and middle routes are still being developed. All these measures have so far succeeded to the extent that there has been no major floods or breakouts since 1938 but the river system is just as vulnerable to a very large flood as it ever was in the past. That said, even though the future is uncertain, the long record of Chinese Government management of the Yellow River is one of the grand iconic stories in the desperate struggle by the human species to tame and harness their environment.

Colorado River

Colorado River, United States

The Chinese story of the role of the State in relation to the Yellow River is unique but there are many other examples from elsewhere which demonstrate a similar central role for national governments even if not over the same time span. The history of United States federal government involvement in the development of the Colorado River has a number of interesting aspects. The story could start in a number of places but the role of the national government in the negotiation of the 1922 Compact of the River is one possible point. Bringing together the seven upper and lower Colorado Basin states Hubert Hoover, the national government facilitator, brokered a water sharing arrangement that has proved surprisingly resilient over the subsequent ninety years. One of the first products of the new

compact (a voluntary agreement made under the implied threat of an externally imposed solution) was the Hoover Dam funded by the federal government completed in 1935. Through its capacity to provide hydropower and regulate river flows it has underpinned the development of the south-west of the United States since the 1930s.

The central government of the United States (conceptualised in its wider sense so as to include national institutions such as the Supreme Court) has subsequently shaped development in the region by funding strategic projects such as the Central Arizona Project, influencing water management plans through legislative requirements such as the Endangered Species Act and arbitrating disputes between the Colorado Basin states. More recently, using an approach that hints at how its role could evolve to deal with the predicted disruptive impacts of climate change, in 2007 it pressured the lower Colorado states to negotiate between themselves an exceptional circumstances drought management plan to share water that would protect key assets such as the major cities. The four states acted in response to the threat by the national government that if they did not come to an agreement it would impose its own water sharing plan on them. Although the scale of the 2007 agreement was relatively small it did provide a significant demonstration of the creative potential of national governments to influence the behaviour of sub-national actors.

Murray River, Australia. Source: Flickr user jcolman

Murray-Darling Basin

Confronted by a rather similar deadlock in the Murray-Darling Basin in the 2000s the Australian Government undertook a direct takeover of water management responsibilities

through the Water Act 2007. The previous arrangement, in place for over ninety years, had been a confederate pact put in place by parallel legislation in all jurisdictions and glued together by the periodic injection of Commonwealth or national government funds and the vague threat of legal action by South Australia in the High Court. Known in its post 1980s version as the MDB Initiative, by the mid-2000s it had clearly stalled in its capacity to manage increasing development pressure, severe drought and the prospect of climate change. The national government with its financial resources and basin wide reach was clearly the only government in a position to organise a collective response. It did this by introducing legislation that gave it responsibility for policy through an overall Basin Plan with implementation being delegated to the states in their respective sections of the catchment. This created a situation where the national government will be able to blame bad outcomes on poor implementation and conversely the states will be able to point to inappropriate, ignorant, inadequate or poorly resourced policy. Under the previous arrangement states shared collective responsibility for policy. A direct takeover was not the only option available to the national government. It could, for example, have used its financial leverage to pressure the Basin states to accept four out of five majority decisions on the MDB Ministerial Council, thereby getting rid of the requirement for unanimity. This would have meant that any government wanting to block a decision would need the support of at least one other government rather than just asserting a veto which they did not have to justify. That would have fundamentally changed the dynamics of high level decision making in the MDB. There may be faults with the argument just put forward but it illustrates the more fundamental point that there should have been a more wide ranging public discussion about institutional design before the national government imposed its new model.

Conclusion

This opening opinion piece for our International Water Politics short lecture series has two aims. The first is to focus attention on the unique and central role of national governments in relation to the management of large rivers and the second is to open up discussion about how that role should be exercised. In the comparison between the United States and Australia for example it could be argued that the United States federal government took its more restrained approach because the political opposition to its presence in the south-west was so strong that it had to be relatively indirect in the way it used its power. The Australian government by contrast had more public support and so was able to act more coercively in relation to the states. It could also be argued, however, that even though the Australian Government was able to intervene overtly and take over policy control in a more high profile way it would have been better advised to exercise restraint and redesign the rules under which the MDB governments interacted rather than itself take on the central responsibility.

In the case of China, given the dangers, there would seem to be more justification for very direct central action.

The purpose of this article is not to explain the past actions of the various central governments in ways that will cause the reader to agree with my interpretations or the actions as described but rather to break through the dominant narratives about central governments and provoke readers to think about alternatives. We cannot change the past but we can change our understanding of it and that can affect our thinking about future options.

Further reading:

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6. Connell, D. and R. Q. Grafton (2011), *Basin Futures: Water reform in the Murray-Darling Basin*, ANU E-Press, available at: http://epress.anu.edu.au/titles/basin_futures_citation

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