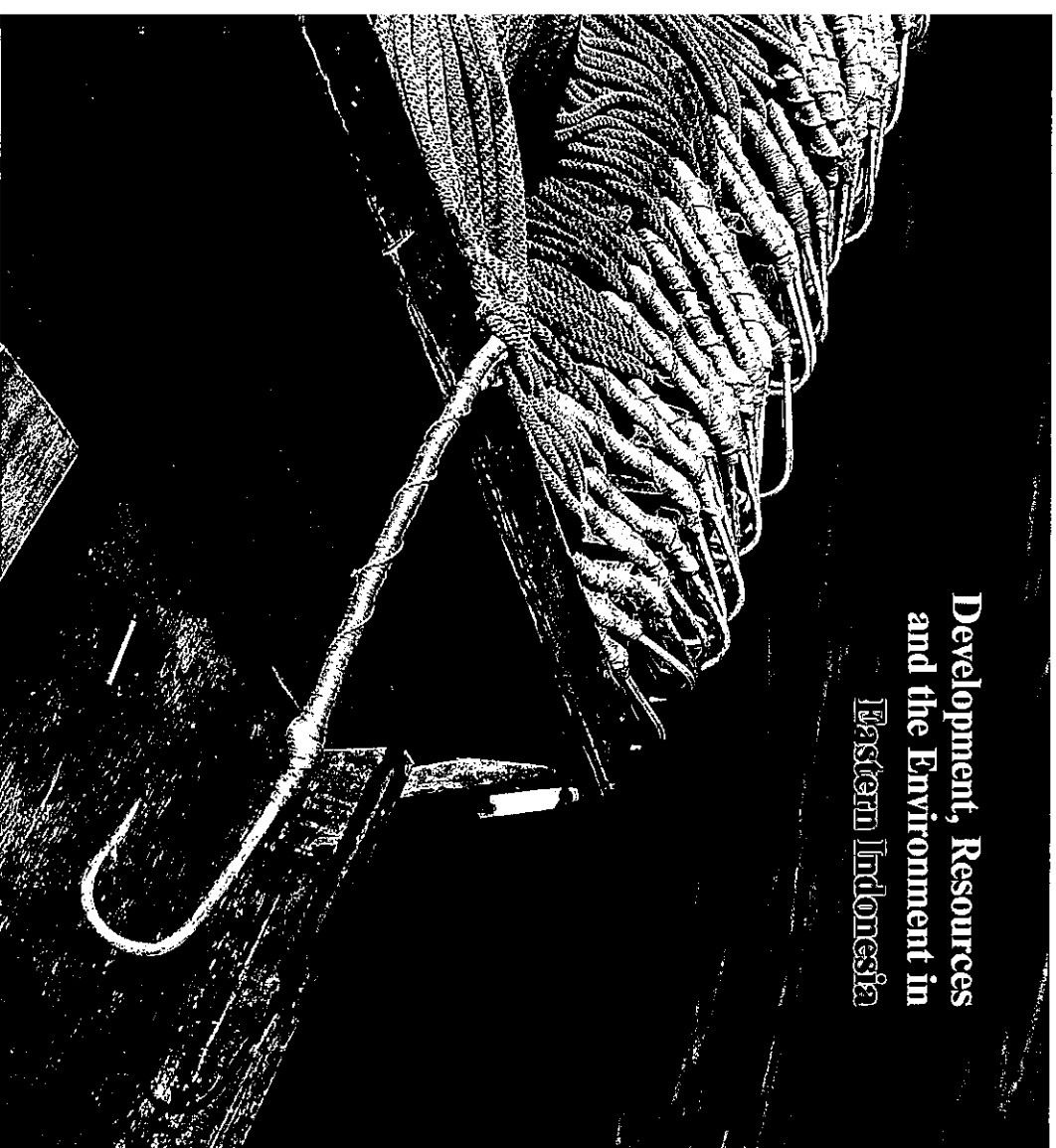


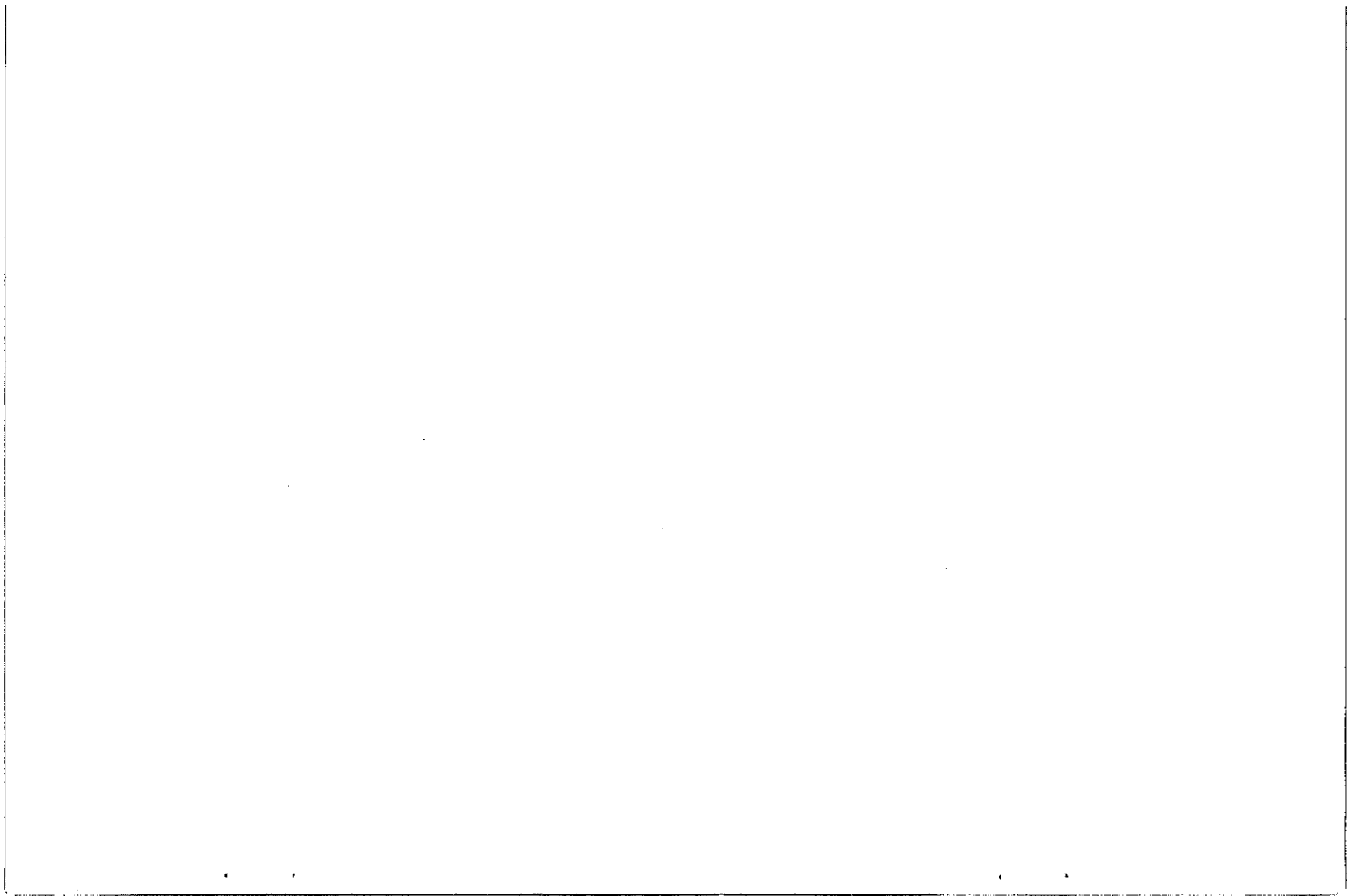
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Development, Resources  
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*Western Indonesia*



Edited by  
Budy P. Resosudarmo and Frank Jotzo



## 8 ILLEGAL FISHING IN THE ARAFURA SEA

*Budy P. Resosudarmo, Lydia Napitupulu  
and David Campbell*

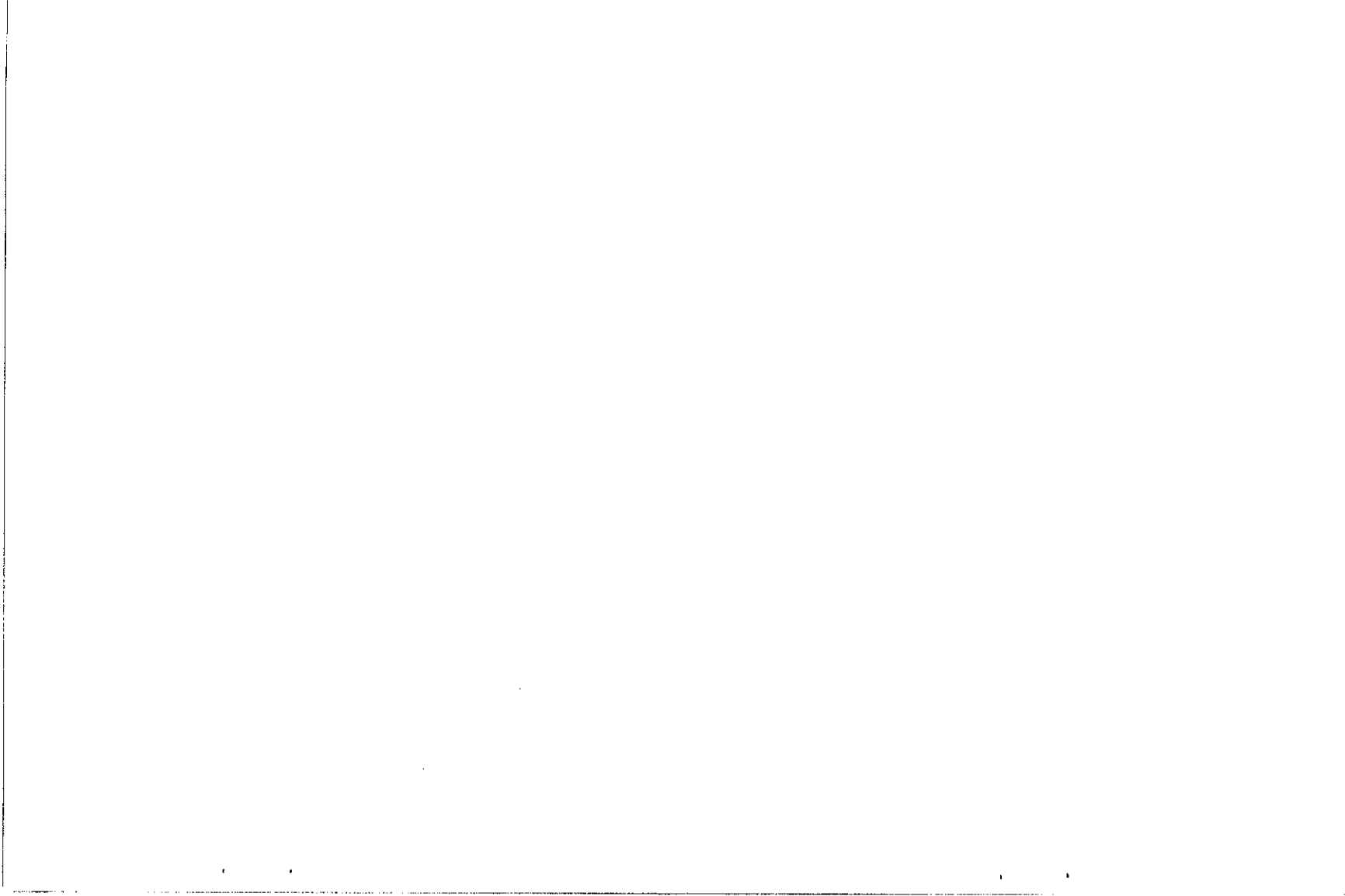
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The Arafura Sea forms part of the Sahul Continental Shelf and covers an area of 650,000 square kilometres. It is bordered to the north by the southern coast of Papua, to the west and southwest by the Banda and Timor Seas, and to the south and southeast by the Gulf of Carpentaria and the Torres Strait (Map 8.1). In most parts, the shallow sea floor consists of a vast sand and mud bank ranging from 50 to 80 metres in depth (Tomascik et al. 1997).

As the Arafura Sea is one of Indonesia's most productive commercial fisheries, it is sometimes referred to as one of the nation's 'golden fishing grounds'. In addition to its shallow depth, this productivity is the result of a system of southward-flowing rivers originating in the central dividing mountain range that forms an east to west cordillera through central Papua. These rivers deposit a heavy load of nutrient-rich sediment in the thriving coastal mangrove forests along the south coast of Papua from Kimaan Island to the Mimika River. The mangrove forests, in turn, provide spawning grounds and sources of food for various fish and shrimp<sup>1</sup> species and other biota (Petocz 1987; Sadhotomo, Rahardjo

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<sup>1</sup> In Indonesia, 'shrimp' is the default common English translation of *udang* (order *Decapoda Crustacea*, suborder *Natantia*), to which all species of shrimps and prawns belong (Sumiomo and Priyono 1998). The main species harvested commercially in the Arafura Sea is the *Penaeidae* family, to which the well-known banana prawn (*Penaeus merguensis de Man*) belongs (Holthuis 1980). In this chapter, the term 'shrimp' is used in reference to the shrimp and prawn category, while 'prawn' is used if it is a more common name for a particular species.



Map 8.1 The Arafura Sea and Surrounding Areas



and Wedjatniko 2003). Despite the Arafura Sea's productivity, however, the widespread incidence of illegal fishing — especially by large vessels — raises questions about the real benefits of the fishery for Indonesia.

Illegal fishing leads to socio-economic losses through overfishing, the transfer of benefits overseas, ineffective public spending on fishery management and administration, and the undermining of Indonesian administrative bodies and institutions. In this chapter we review the nature of illegal fishing in the Arafura Sea, its national and local effects, the consequences of decentralization and regional autonomy for illegal fishing, and ongoing policies for its prevention and mitigation.

## 1 DEVELOPMENT OF A CONCEPTUAL FRAMEWORK

Consideration of the loss of social benefits from illegal fishing includes factors such as market failure and agency failure. Here we set out the principles by which these possible sources of net social loss due to illegal fishing in the Arafura Sea fishery can be examined.

### Market Failure

When individual rights to units of fish are inappropriate or are inadequately enforced, profit-maximizing fishers will race each other to maximize their harvest of the available fish stocks. Although it may be socially preferable to forgo some of the catch so that fish stocks and fish biomass can increase, without effective rights to the resource, fishers will be uncertain as to whether they will be able to harvest the future benefit of forgoing current catches. As a result, they will ignore the effect of their harvesting activities on fish biomass, including higher unit costs of harvest due to reduced fish stocks, lower future catch rates and increased operational costs due to the crowding of fishing boats and fishing gear while fishing. These costs to society are referred to as negative externalities because they are external to the fishers' cost accounting, and are an example of market failure.

The direct economic consequences of market failure are the inefficient use of factor inputs and low returns from the fish resource. The first is caused by the use of more effort—labour, equipment, fuel, supplies—than necessary to catch a given harvest. Such excessive use of scarce resources has a cost to society as a whole, as these resources could have provided a greater social benefit were they used elsewhere. Low returns from the fish resource are a consequence of overharvesting of the fish stock and fish being taken at a non-optimal age class (catch size). Returns are also affected by the competitive race among fishers to maximize their

share of the catch, which results in poor-quality catches and the dumping of peak loads onto the market. If rights to the resource were more appropriate and secure, fishers would have an incentive to concentrate on the most economic means of catching fish, thus maximizing the prices received through better timing of catch onto the market, and improving catch quality.

To understand the overharvesting of fish stocks, it is useful to recognize that fish biomass or fish stocks can be described as 'flow' resources—that is, different units of the resource become available at different times (as such, fish stocks are a form of natural capital), and for each fish age class, there are annual changes in biomass due to natural growth, natural death and predation (including disease and harvesting). For the younger age classes, growth in biomass will exceed the natural loss in biomass through natural causes. These two biological variables will affect the rate (or flow) of the harvestable fish biomass and, therefore, the sustainable yield. In addition, the unit cost of harvest will increase with decreasing stock size. That is, the fewer fish there are, the harder fish are to locate and the lower the catch per unit of fishing effort will be.

The biological nature of fish resources and the unit cost of harvest determine the economically optimal sustainable yield of the fishery. When stocks fall below the optimal size due to too much effort being expended, *stock overfishing* occurs; when a fish age class is harvested to the point that expected biomass growth exceeds the social discount rate, *growth overfishing* occurs. Both causes of overfishing result in economic losses and decreased benefits to society (see Clark 1985; Anderson 1986; Grafton et al. 2006).

#### Agency Failure

The role of fishery managers is to maximize the socio-economic benefits from fish resources in a sustainable way. In this role, both government and fishery managers act as agents for the Indonesian public, who are the owners of the resource and who fund the fishery management agency. Under the limitations and constraints of international law, and the restraints imposed by the rights and interests of traditional owners and regional groups, a necessary condition is that the marginal return from public investment in fishery management at least equals the marginal cost of management. If this is not the case, management costs will be an additional source of social loss and a burden on the public, in addition to the loss from overfishing.

Agency failure occurs when agency members carry out their functions according to their own interests rather than the interests of the public (Campbell and Haynes 1990; Mueller 2003; Weimer and Vining

2005). This leads to failures in fishery management. For example, monitoring and control procedures may be lacking or inadequately enforced, and fishery management tools may be inappropriate or inappropriately applied.

Agency failure is relevant in accounting for the level of illegal fishing in the Arafura Sea fishery. Wasted public expenditure, overfishing and non-productive investment in self-seeking behaviour by government and agency bureaucrats result in agency failure and social loss.

## 2 MANAGEMENT OF THE ARAFURA SEA FISHERY

The Indonesian maritime jurisdiction extends to the margin of Indonesia's exclusive economic zone (EEZ), that is, all waters within 200 nautical miles of the Indonesian islands, as regulated by Law No. 5/1983 on Indonesia's Exclusive Economic Zone and Law No. 17/1985 on the Ratification of the United Nations Convention on the Law of the Sea. Under the Constitution, the main principle guiding resource utilization is that: 'The land, the waters and the natural riches contained therein shall be controlled by the State and exploited to the greatest benefit of the people' (article 33, paragraph 3). This article guides all laws and regulations relating to natural resource utilization, including marine resources.

Indonesian laws and regulations form a hierarchy under the Constitution in order of decreasing importance, as set out in Law No. 10/2004 on the Establishment of Laws. This hierarchy is as follows.

- 1 Laws or Acts (Undang-Undang) or Government Regulations in Lieu of an Act (Peraturan Pemerintah Pengganti Undang-Undang).
- 2 Government Regulations (Peraturan Pemerintah).
- 3 Presidential Regulations (Peraturan Presiden), formerly Presidential Decrees (Keputusan Presiden).
- 4 Regional Regulations (Peraturan Daerah), consisting of Provincial Regulations (Peraturan Daerah Provinsi), District/Municipality<sup>2</sup> Regulations (Peraturan Daerah Kabupaten/Kota) and Village Regulations (Peraturan Daerah Desa).

The laws and regulations governing marine resource utilization can be grouped into the following categories (Rudiyanto 2002).

- 1 Marine spatial regulations on the geographic extent of the oceans and maritime zones.

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<sup>2</sup> Henceforth called 'districts' for simplicity.



- 2 Environmental regulations relating to environmental protection and natural resource conservation.
- 3 Maritime regulations regarding the sectoral use of ocean resources.
- 4 Terrestrial spatial regulations relating to general planning of coastal areas.
- 5 Terrestrial sectoral regulations relating to coastal resource utilization.
- 6 Decentralization regulations relating to the division of authority for the management of Indonesian waters between the central government and local governments, and to revenue sharing between the central, provincial and district levels of government.

Although there is no mention in this hierarchy of Ministerial Decrees (Keputusan Menteri) or Ministerial Regulations (Peraturan Menteri), and their status is therefore unclear, they continue to be an important tool in fishery management. For example, Agriculture Ministerial Decree No. 607/1976 on Fishing Zones reserved coastal areas for small fishing vessels, thus giving coastal communities restricted access to fish resources, protecting the spawning grounds of fish stocks and providing protection for juvenile fish against overfishing.

This decree has been renewed several times, the latest being Agriculture Ministerial Decree No. 392/1999. It established three fishing zones based on distance from the shoreline at low tide, boat size and gear type. Zone I is comprised of two parts: Zone Ia extending out to three nautical miles and Zone Ib extending 3–6 nautical miles. Zone Ia is for non-motorized vessels of up to 5 gross tonnes and less than 10 metres in length fitted with stationary gear or unmodified non-stationary gear. Zone Ib is for vessels of less than 12 metres in length fitted with non-stationary fishing gear (purse seine to a maximum head rope length of 150 metres or drift grill nets to a maximum length of 1,000 metres). Zone II extends 6–12 nautical miles from the shoreline. It is for motorized vessels of up to 60 gross tonnes fitted with purse seine to a maximum head rope length of 600 metres if operated from one boat and 1,000 metres if operated from two boats, or with drift nets to a maximum length of 2,500 metres, or with tuna longlines with a maximum of 1,200 hooks. Zone III extends from 12 nautical miles to the EEZ boundary. It is for vessels of up to 350 gross tonnes, except in the Malacca Strait, where the maximum vessel size is 200 gross tonnes. There are no restrictions on gear used, except that the use of purse seine nets to take large pelagic fish is forbidden in Tomini Bay and in the Maluku, Seram, Banda, Flores and Savu Seas. Except in the Malacca Strait, vessels of 350–800 gross tonnes using purse seine nets are permitted if they operate at least 100 nautical miles from the shoreline.

An important national institutional change was the shift in 1999 of responsibility for marine resource management from a directorate-

general in the Ministry of Agriculture to a newly created ministry, the Ministry of Marine Affairs and Fisheries (MMAF).<sup>3</sup> This upgrade enabled national fishery-related issues to be fully represented at the presidential cabinet level for the first time, and to be more closely integrated with other national policy issues (Dutton 2005).

### 3 UNDERSTANDING ILLEGAL FISHING IN THE ARAFURA SEA

#### Observed Forms of Illegal Fishing

Illegal fishing in the Arafura Sea takes several forms. The most conspicuous is fishing without an entitlement or licence to fish—that is, poaching. This was a common practice up to the late 1990s. Indonesia's vast seas, coupled with lax patrolling, meant that the risk of being caught was low compared with the benefits received. According to the MMAF, in 2001 about 85 per cent of all vessels over 50 gross tonnes (about 7,000 vessels) were operating without a licence (*Kompas*, 9 June 2003; *Tempo Interaktif*, 30 February 2003).

A second form of illegal fishing is the use of falsified or forged documents, either the supporting documents required when applying for a fishing licence or the fishing licence itself. Forgery of supporting documents was made possible by the government's weak licensing process, whereby licence applications were not thoroughly checked. Fegan (2003) found that some applicants were even able to get away with providing a false address. Since 2001, the MMAF has been conducting checks of suspicious supporting documents submitted for licence applications. At least up until 2004, it found that a large proportion of these documents were either forged or unrecognized by the (supposed) issuing authority (MMAF press release, 5 May 2004).

Forgery of fishing licences has a number of variants. Some licences look completely authentic, yet are not formally registered with the licensing authority. This indicates weaknesses in the MMAF's licensing procedures as well as the willingness of some MMAF staff to accept inducements, a problem acknowledged by the former minister, Sarwono Kusumahadja (*Business News*, 10 March 2000). It has been reported that a fake licence costs US\$10,000–20,000, whereas an official (legal) one costs US\$25,000–55,000 (Charoenpo 2002; Sitathan 2003). Official licences may also be copied, made to look authentic, then used by other vessels of a similar type (*Kompas*, 17 March 2005). The cost of duplication is cer-

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<sup>3</sup> When established in 1999, this institution was called the Ministry of Marine Exploration and Fisheries. The change in name occurred in 2000.

fairly trivial compared with the cost of obtaining a licence. The benefits of forged licences are clear: operators can avoid arrest when stopped by law enforcement authorities, while the vessel owners can avoid paying taxes.

A third form of illegal fishing is fishing in violation of fishing licence conditions with respect to vessel size and gear type, fishing ground, fishing zone, home port or crew. Fishing vessels are considered to be operating illegally when they violate any of these particulars. While many violations can only be detected by well-equipped patrols, it is not difficult to detect many other forms of violations without actually inspecting a vessel's documentation—by comparing the vessel size with its location of operation, for example. During a field trip conducted for this research in 2004, one of the authors observed a large vessel in excess of 200 gross tonnes trawling less than one mile from shore a half-hour from the town of Kaimana, a small Papuan town on the Arafura Sea; at least three others could be seen on the horizon. According to a local fisherman in the area, this is a regular occurrence. Large vessels have also been observed operating closer than a mile from shore, including entering estuaries along the Merauke coast.<sup>4</sup>

A fourth type of illegal fishing, and probably the most common, is underreporting or misreporting of catch. This occurs when vessels report lower than actual catch volumes, or document only a few species rather than the actual species composition of the catch, categorizing the rest as 'mixed fish'. Based on research conducted between 1998 and 2000 in eastern Indonesia, Fegan (2005) concluded that, on average, operators report only 30 per cent of their catch.

#### **The Actors: Foreign Vessels**

While both foreign and Indonesian fishers are involved in illegal fishing in Indonesia, it is the foreign fishers that have the greatest impact. Illegal foreign fishers originating from Thailand, Taiwan, South Korea, China, the Philippines and Japan have been fishing in Indonesian waters without permits since the 1960s (Fegan 2005). During the 1980s and 1990s, illegal fishing by Thai-based operators was reportedly responsible for the biggest loss of earnings (60 per cent) in the form of forgone revenues (Charoenpo 2002). Most of these Thai trawlers were fishing in the Java Sea. By the end of the 1990s, it appears that at least 3,000 Thai vessels were operating in an area extending from the South China Sea to the Java and Arafura Seas (Heazle and Butcher 2007). In the Arafura Sea, large shrimp

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<sup>4</sup> Personal communication with several local leaders in Merauke, 20 August 2004.

trawlers have dominated illegal fishing activities since the early 1970s. Vessels from Thailand, South Korea and other Southeast Asia countries appear to have been particularly prevalent since the early 1990s (*Kompas*, 17 March 2005; *Kompas Cyber Media*, 5 March 2005).

In the new millennium, illegal fishing by Chinese operators has increased in prominence. In 2003, 23 Chinese-flagged purse seiners, reportedly on their way to the Arafura Sea, were caught fishing without permits around Tomini Bay in Sulawesi (*Republika Online*, 9 June 2003). In August 2005, the navy patrol chief for eastern Indonesia reported that in January–August 2005, most of the vessels apprehended for illegal fishing in the Arafura Sea were from China or Thailand (*Tempo Interactive*, 30 August 2005).

Most illegal foreign fishing vessels operating in the Arafura Sea have bases in Indonesian ports, such as Surabaya (East Java), Manado and Bitung (North Sulawesi), Kendari (Southeast Sulawesi), Benjina and Tual (Maluku), Sorong (West Papua) and Kimaan and Merauke (Papua) (see Map 8.1) (*Kompas*, 17 March 2005).

#### The Actors: Indonesian Middlemen

The ‘conventional’ form of illegal fishing, practised by both Indonesian and foreign vessels, was to operate in the Arafura Sea without the necessary documentation. But as illegal fishing came under increased scrutiny in the 1990s, most foreign operators chose to reflag their vessels as ‘Indonesian’ by registering them as being owned in a joint venture with an Indonesian entity, or as being chartered from an Indonesian company. In both cases, the Indonesian company only had to provide the vessel licence and, in a few instances, port services (such as arranging papers for the crew, providing domestic supplies of fuel, food and water, and dealing with or bribing officials). Although they received a fee for their services, they had no ownership in the vessel, gear or catch and no share in the profit or loss. Inkopal, the cooperative owned and run by the Indonesian navy, held many of these ‘joint venture’ licences (Fegan 2003, 2005; Heazle and Butcher 2007). This constitutes a conflict of interest, as the Indonesian navy is also involved in enforcement.

With the advent of licensing reforms and increased surveillance since 2001, new actors have surfaced, and the role of Indonesian licensing agents, especially those with high-level political connections and capital, has become more important. Previously, the main role of Indonesian partners was to obtain forged licences, but since 2001 they have had the more sophisticated task of obtaining both forged licences and the information needed for illegal fishers to avoid surveillance activities. These new actors do not wait to be approached by foreign companies but

actively seek out and resell licences to foreign operators (*Jakarta Post*, 26 September 2001). They are not just middlemen but often the part or full owners of one or more fishing vessels.

A recent investigative study by an Indonesian environmental non-government organization (NGO) highlights the significance of Indonesian businessmen in illegal fishing activities.<sup>5</sup> The most important of them is a businessman based in Surabaya since at least 2002. While he keeps a very low profile in Indonesia, in mainland China he is known as the 'King of Aratfura'.

The King allegedly started his business by obtaining introductions from high-ranking Indonesian navy officers. He has expanded his operations by distributing leaflets advertising his services throughout Chinese ports. He is said to own around 60 fishing vessels and to have part ownership of hundreds of others. Most of the fish harvested by his vessels is shipped directly to China, since he does not own any land-based processing plants in Indonesia.

In the past, it is believed that the King's illegally operating ships were able to avoid apprehension by obtaining inside information on details of navy patrols. In 2005, however, four of his ships were apprehended for illegal fishing in the Aratfura Sea, resulting in one case in the death of a crew member. The captains and crew members later received very lenient sentences, indicating a possible close relationship with local officials, including those within the judicial system (*Kompas Cyber Media*, 21 September 2005).

According to the NGO, a second prominent player is a Jakarta-based gang leader with close connections to the military. In 2006 he is reported to have obtained a large number of fishing licences on the basis of a promise to build processing plants in eastern Indonesia; since the mid-2000s, having or intending to build a processing plant has been an important requirement to obtain a fishing licence. Yet another large player is 'Uncle T', a Semarang-based businessman who is alleged to have the backing of the family of former president Soeharto (*Kompas*, 16 February 2003).

### Decentralization

In 2001 the central government introduced a decentralization policy aimed at devolving some of its decision-making and fiscal powers to the provincial and district levels of government. The policy was implemented through Law No. 22/1999 on Regional Government and Law No. 25/1999 on Fiscal Balancing between the Central Government and Regional Governments, later amended as Law No. 32/2004 and Law No.

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<sup>5</sup> Personal communication with staff member, Jakarta, 14 March 2006.

33/2004 respectively. These laws contain administrative inconsistencies, raising questions about how the decentralization policy is to be applied at the local level.

Law No. 32/2004 delegates responsibility for managing marine territories to the relevant provincial and district governments. This includes exploration, exploitation, conservation, spatial planning, administration, law enforcement, contribution to defence and maintenance of national integrity (Law 32/2004, article 18). District governments are responsible for the marine territory extending 0-4 nautical miles out from the shoreline; provincial governments for the marine territory extending 4-12 nautical miles; and the central government for the marine territory extending 12-200 nautical miles. Consequently, jurisdiction over the Arafura Sea is now shared between the three provincial governments of West Papua, Papua and Maluku, several district governments and the central government.

To further complicate the situation, the local governments' territorial jurisdiction is not consistent with their authority for vessel licensing. As noted earlier, Agriculture Ministerial Decree No. 392/1999 states that vessels of up to 5 gross tonnes can operate in Zone I; vessels of up to 60 gross tonnes in Zone II; and vessels of up to 350 gross tonnes in Zone III. However, Government Regulation No. 54/2002 on Fisheries Business gives district governments the authority to license vessels of up to 10 gross tonnes; provincial governments the authority to license vessels of 10-30 gross tonnes; and the central government the authority to license vessels of over 30 gross tonnes (Table 8.1). Clearly there are jurisdictional inconsistencies between the fishing and licensing regulations, as the following three examples demonstrate.

First, the licence for a fishing vessel of 30-60 gross tonnes would be issued by the central government, but the fishing zone regulations would allow it to operate in the provincial zone, 6-12 nautical miles from shore. Thus, vessels of this type would operate under the jurisdiction of both the central and provincial governments. Provincial governments are not happy with this situation, especially as they receive no revenue from licensing while still incurring management and enforcement costs.<sup>6</sup> Should such a vessel enter the provincial jurisdiction, it is clear that there would be an incentive for the provincial government to argue that the vessel was fishing illegally. Second, a motorized vessel of 5-10

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6 Under Law No. 25/1999 (as well as Law No. 33/2004), 20 per cent of the revenue from fishery-related charges is allocated to the central government, with the remainder distributed equally among all district governments. Importantly, there is no mention of any required allocation for provincial governments (Alisjahbana 2005).

**Table 8.1** *Jurisdictional Inconsistencies between Fishing and Licensing Regulations*

	Zone I			Zone II	Zone III
	Zone Ia		Zone Ib		
<b>Fishing zone regulations (Ministry of Agriculture Decree No. 392/1999)</b>					
Distance from low-tide mark (nautical miles)	0-3	3-6	6-12	12-200	
Vessel size (gross tonnes)	≤5	≤5	≤60	≤350	
	District Governments	Provincial Governments	Central Government		
<b>Marine territorial jurisdiction (Law No. 32/2004)</b>					
Distance from low-tide mark (nautical miles)	0-4	4-12	12-200		
<b>Vessel licensing authority (Government Regulation No. 54/2002)</b>					
Licensing authority (gross tonnes)	≤10	10-30	30+		

gross tonnes would obtain its licence from the district government but operate in provincial waters where the issuing district had no authority. And third, zone violations would occur when a vessel that had received its permit from one district or province operated within the jurisdiction of another district or province. A zone violation of this kind occurred in 2003 when the Merauke Fisheries Service apprehended 30 vessels in Merauke waters whose licences had been issued by the Manokwari Fisheries Service.<sup>7</sup>

These jurisdictional inconsistencies have created a 'new game in town' whereby government agencies provide fishing licences for vessels that operate outside their jurisdictional control, thus gaining access to a lucrative source of locally derived revenue without having to incur any

<sup>7</sup> Personal communication with an officer of the Merauke Fishery Service, August 2004.

management costs. This creates interagency conflicts and undermines efforts to prevent illegal fishing.

#### 4 THE IMPACT OF ILLEGAL FISHING

The effects of illegal fishing are felt at the national, regional and local levels. They include direct financial losses and indirect non-financial losses. The latter are not easily observed but can be substantial. Such impacts occur as a result of the direct theft of fishery resources, the mismanagement of biological capital, increased operational costs and the misallocation of resources through self-seeking behaviour. This leads to social mistrust of policing and enforcement as well as negative social interactions between illegal fishers and local communities.

##### Direct Financial Losses

The national annual financial loss from illegal fishing in 2002-03 has been estimated at roughly US\$2.1 billion. This comprised around US\$1.2 billion in lost fish exports, US\$0.6 billion in forgone licensing fees, US\$0.2 billion in unwarranted fuel subsidies<sup>8</sup> and US\$0.1 billion in the loss of royalties and other fees (*Tempo Interaktif*, 19 February 2003). In September 2006 the fisheries minister, Freddy Numbery, said that the annual financial loss due to illegal fishing was about US\$3 billion (*Suara Pembaruan*, 29 September 2006). Though these figures are rough estimates, they are consistent with the estimate above that about 7,000 vessels of 50 gross tonnes and over are engaged in some form of illegal fishing.

##### Biological Capital and Operational Costs

Excess fishing effort and the mismanagement of fish stocks (which are a form of natural capital) affect both current operational costs and future returns. In 2001, the MAAF's Centre for Research on Fish Capture found that the stock of large pelagic, demersal and shrimp species in the Arafura Sea had been overexploited (Fox, Adhuri and Resosudarmo 2005). There is ample evidence to suggest both stock and growth overfishing, leading to suboptimal stock levels and increased cost per unit of catch.

Table 8.2 shows that there was a large increase in the number of licensed trawlers operating in the Arafura Sea fishery in the 1990s. Between 1992

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<sup>8</sup> This was from the consumption of domestic fuel by illegal fishers. Before the reduction in fuel subsidies in October 2005, the domestic price of fuel was much lower than the world price.



*Table 8.2 Licensed Vessels Operating in the Arafura Sea by Gross Tonnage, 1992–2001 (no.)*

Vessel Type	<50 GT	51-100 GT	101-200 GT	200+ GT	Total
<b>Shrimp trawlers</b>					
1992			198	59	257
1996	39	59	280	53	431
2000	70	207	198	51	526
<b>Fish trawlers</b>					
1992					222
1996	13	116	250	209	588
2000	1	65	346	367	779
2001 <sup>a</sup>	1	67	351	376	795
<b>Bottom trawlers</b>					
2001	7	9	16	1	33

GT = gross tonnes.

a As of September 2001.

Source: Sadhotomo, Rahardjo and Wedjatruko (2003).

and 2000, the number of shrimp trawlers doubled while the number of fish trawlers more than tripled. During the same period, total recorded annual landings from the Arafura Sea rose from around 18,000 to 25,000 tonnes for shrimp and from 170,000 to 262,000 tonnes for fish (Table 8.3). The fact that the annual recorded landings for shrimp and fish did not increase in line with the increase in the number of licensed vessels provides further evidence of overfishing.

A number of other studies support the increasing concern about overfishing. Evans and Wahju (1996) observed a 50 per cent reduction in the average catch per unit of effort between 1970 and 1990 for shrimp trawlers owned by an Ambon-based firm operating in the Arafura Sea. Iskandar, Suniono and Sarjana (1993) found that there had been a decline in the size composition of the shrimp catch between 1985 and 1990, indicating size overfishing.

Suniono and Priyono (1998) estimated the sustainable annual yield of shrimp in the Arafura Sea to be about 17,200–21,700 tonnes per year. The data in Table 8.3 indicate that, even without taking illegal fishing into account, total shrimp landings were already at the top of this range in 1996 and had exceeded it by 2000. The high incidence of illegal fishing in the Arafura Sea further compounds the problems of excess fishing effort and excess harvesting of shrimp.

Table 8.3 Reported Annual Shrimp and Fish Landings in the Arafura Sea, 1992–2005 (thousand tonnes)

	1992	1996	2000	2003	2005
Shrimp	18	21	25	21	22
Fish	170	216	262	273	273
Total	188	237	287	294	294

Source: MMAF (2002, 2005a).

Overfishing—including illegal fishing—in the Arafura Sea fishery affects not only Indonesian landings but the health of adjoining national fisheries. For instance, collaborative research by Australia's Commonwealth Scientific and Research Organization (CSIRO) and the MMAF's Centre for Research on Fish Capture showed that red snapper stocks (*Lutjanus erythropterus* and *Lutjanus malabaricus*) in the neighbouring sea waters of eastern Indonesia and northern Australia had declined to 10–20 per cent of their 1971 level by the early 2000s (Badrudin and Blaber 2003). If current levels of fishing activity continued, it was predicted that red snapper stocks would collapse by 2007 in both the Indonesian and Australian fisheries (Blaber et al. 2005).

#### Allocative and Distributional Effects

In recent years small-scale fishers, particularly traditional indigenous fishers in places like Merauke, have experienced a decline in both catch sizes and the size of the fish caught. They attribute this to illegal inshore fishing by large vessels. For fishers and their families, the lower yields lead to decreased fish consumption and lower fishery earnings. For the broader coastal community, the main impact comes from the likely increase in the price of fish. It is important to recognize that the decrease in the supply of fish also has secondary budgetary effects, in terms of reduced earning opportunities for those who handle the catch onshore (Vieira 2004).

As a result, many traditional fishers have been faced with the choice of either fishing further out to sea or switching to farming. In both cases, they encounter the problems of lack of capital and lack of know-how (that is, how to operate motorized boats or cultivate crops). Some of the increase in offshore fishing by small-scale vessels is observable in the increase in the number of small Indonesian fishing vessels operating illegally in the Australian EEZ (see Chapter 9). Disenfranchised by

what they perceive to be unfair enforcement, and unable to compete with illegal operators, some inshore communities resort to destructive (and illegal) fishing practices such as the use of explosives or cyanide to kill fish (Erdman 2000; Apituley and Hiarrey 2004). Such practices affect fish stock recruitment and destroy the inshore environment important to fish spawning, thus further reducing future catches, future returns and social well-being.

Important to any consideration of illegal fishing is the perceptions of those who do—or would like to—comply with fishing regulations. Any perceived lack of transparency, reliability or equity of enforcement is likely to reduce their acceptance of and compliance with fishery regulations (Dahuri and Dutton 2000). Non-compliance with fishing regulations works to the relative financial disadvantage of complying fishers, giving them an incentive not to comply.

At present, compliant fishers are subject to higher marketing and taxation costs than illegal fishers, who are able to achieve operational and other advantages by ignoring the restrictive requirements of their licences or by not paying licence fees and other fees and charges. The illegal operators of large boats are also able to pay higher prices for fish at sea than their onshore competitors. Operators of small and medium-sized vessels have a financial incentive to participate in these at-sea sales, both because of the higher prices paid and because the income from these sales is easier to protect from port charges and taxes.

#### **Social Effects**

The broad social implications of illegal fishing are often observed at the local level. In Merauke, for instance, illegal fishers provide markets for the products of local communities, thus implicating them in illegal fishing. The lack of a developed market for fish in the coastal areas of the district, far from the city of Merauke, is a major reason for sales at sea by small-scale and artisanal fishers. However, the volumes involved are small, since foreign operators prefer deep sea (demersal) species such as pomfret. Some foreign operators barter for the fish provided by artisanal fishers, especially as they may not have any local currency. Bartering can be advantageous for local fishers, since there is a dearth of goods such as clothes and other household items in many rural areas of Merauke. In addition, local fishers are able to trade fish for foodstuffs such as coconuts and other fresh fruits.

At times, illegal fishers come into conflict with small local communities and small-scale or artisanal fishers, especially when large and medium-sized vessels breach their zoning and gear regulations. In retaliation, local Merauke and Kaimana fishers have been known to destroy

or cut the nets of illegal operators, sometimes sharing the nets among themselves.

The presence of foreign fishers also raises concerns about the transmission of human (and fish) diseases. For instance, while it is unclear how much illegal fishers have contributed to the spread of HIV/AIDS in Merauke, it is generally believed that the disease was introduced by Thai ship crews in the 1980s. Merauke has the highest incidence of HIV/AIDS in Indonesia, but other coastal Papuan cities such as Timika, Sorong, Jayapura and Nabire also report high incidences of the disease (*Kompas*, 5 June 2000). According to a local organization in Merauke that cares for HIV/AIDS sufferers, between 1992 and March 2006, 827 people were infected and 197 people died from HIV/AIDS (*Media Indonesia Online*, 8 April 2006).

## 5 EFFORTS TO COMBAT ILLEGAL FISHING

The MMAF has initiated a number of actions to reduce the extent of illegal fishing in Indonesian waters. These can be grouped into three broad types of activities: regulatory reform, strengthened law enforcement, and improved fishery information and management systems. All have been applied in the Arafura Sea fishery.

### Regulatory Reform

Following its establishment in 1999, the MMAF streamlined and improved the licensing system in order to combat illegal fishing. Through Government Regulation No. 54/2002 on Fisheries Business, the ministry reduced the number of different types of fishing licences from around 15 (13 from the Ministry of Transportation and two from the Ministry of Agriculture) to three, consisting of an overall commercial licence for firms involved in fishing (SIUP), a fishing vessel licence for Indonesian and foreign operators (SPI) and a separate licence for vessels transporting fish (SIKPI). The regulation also changed the basis for vessel licensing from type of fish harvested (large pelagic, small pelagic or demersal) to type of gear used. Under this regulation, foreign vessels were allowed to operate in Indonesian waters through joint ventures between Indonesian and foreign entities, by chartering a vessel from an Indonesian company or by operating in the central government's zone, 12–200 nautical miles offshore.

Foreign entities wishing to operate within the Indonesian EEZ must obtain a foreign fishing allocation or quota (APLA) before being allowed to apply for the required licences (*Kompas*, 9 June 2003). The allocations are set out in bilateral agreements between the Indonesian and a number

of foreign governments. The agreements place limits on the number of fishing vessels from the country concerned and require the foreign government to ensure that its vessels comply with Indonesian regulations (Trihawono 2002).

The MMAF has also tried to reduce the number of vessels licensed to operate in Indonesian waters. Between 2001 and 2003, it reduced the number of centrally licensed vessels operating in the four fishery management areas surrounding Papua from around 3,700 to 2,600 vessels, or by 39 per cent (MMAF 2005a). Over the same period, however, the number of vessels licensed by district and provincial governments to operate in the Arafura Sea with inboard motors increased from around 1,000 to 2,200 vessels, or by 105 per cent (MMAF 2005b).

In October 2004, Law No. 31/2004 on Fisheries was enacted to replace Law No. 9/1985. It regulates fishing effort, including providing for the establishment of specialist courts with sole responsibility to try suspected violators. Under the new law, the severity of the penalties for violations varies according to the role of the perpetrator. As a result, criminal activities<sup>9</sup> are dealt with more severely than violations,<sup>10</sup> and vessel or business owners face more severe penalties than captains or crew. Importantly, by focusing on the vessel or business owner, the new law targets the primary beneficiary of illegal fishing and the person best placed to ensure compliance with fisheries legislation and management practices (Agoes 2005).

#### Law Enforcement

Since the early 2000s, the Indonesian government has taken a number of steps to strengthen the fisheries monitoring, control and surveillance system at the national, regional and local levels. One component of this system was the plan to have 1,500 of the 2,350 fishing vessels of 100 gross tonnes and above fitted with satellite tracking devices by 2004. How-

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<sup>9</sup> Criminal activities include gear violations; deliberate pollution and/or destruction of fish resources and/or the environment; deliberately catching, cultivating, transporting, processing or marketing fish without a fishery business licence (SIUP); and owning or operating a fishing or fish-transport vessel without the appropriate licence. These criminal acts are punishable by imprisonment of 5–10 years and/or a fine of Rp 1.5–20 billion.

<sup>10</sup> Violations include the construction, importation or modification of a fishing vessel without the consent of the relevant authorities; operating an unregistered vessel; and violating the code of conduct for foreign vessels, such as not stowing away fishing gear when traversing Indonesian waters without a permit. These violations are punishable by a maximum of one year's imprisonment and/or a fine of Rp 0.2–1 billion.

ever, by mid-2004 less than half the planned number of vessels had been equipped with such devices.<sup>11</sup>

To further strengthen compliance, the MMAF has instituted a number of measures to support local jurisdictions in carrying out surveillance and enforcement activities, under Ministerial Decree No. 58/2001. These include the introduction of civil fishery officers to investigate and prepare cases against illegal fishers and bring them before the new fishery courts. The officers have been provided with improved fishery monitoring vessels and are equipped with firearms and other self-defence equipment.

#### **Improvements in Information and Management Systems**

In 2005 the MMAF began publishing official statistics detailing the number of vessels holding central government licences by size, home port and gear type. The first of these reports provided data on licences issued between 2001 and 2003 (MMAF 2005b). To overcome some of the earlier difficulties in enforcing licensing requirements, the MMAF is setting up a data exchange system that will connect the ministry with its regional offices. This will allow quick and accurate exchange of data among fishery offices and agencies, and should prove a boon for efficient licensing and enforcement.

### **6 FINAL REMARKS AND CHALLENGES**

The overall challenge for the Indonesian government in marine resource management is to optimize the socio-economic benefit from the resource. An ongoing impediment to achieving an optimal outcome in the Arafura Sea has been the level of illegal fishing. In this chapter we have described the forms of illegal fishing, the actors involved and the significant socio-economic losses caused by illegal fishing. We have also discussed the problems of market and agency failure contributing to illegal fishing, and described the bio-economic and agency requirements to address them.

The first challenge is to overcome institutional and agency failure with regard to illegal fishing. This will require the synchronization of laws and regulations across governmental levels to meet the common goal of maximizing the socio-economic benefit from the country's fisheries. For example, action is needed to synchronize Law No. 32/2004, Agriculture Ministerial Decree No. 392/1999 and Government Regulation No. 54/2002 to obtain a consistent licensing regime across the different

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<sup>11</sup> Personal communication with staff of the MMAF's monitoring, control and surveillance team, August 2004.

zones and territories. In parallel, laws and regulations need to be strictly enforced, particularly in relation to large, organized foreign and local players with links to local fishery management and enforcement bodies. Agency failure, which occurs when some members of the respective agencies exhibit self-seeking behaviour rather than acting in the public interest, must be eliminated. Independent investigations are needed to bring such officials before the courts.

The second set of challenges is to overcome the problems of market failure that are currently causing overinvestment in fishing effort, overharvesting of fish stocks, and crowding or gear conflict among fishers. In broad terms, this can be dealt with by putting either input or output controls in place. Input controls rely on the use of technical constraints to overcome excess fishing effort, overharvesting and the harvesting of fish at too small an age class. While input controls have a long history, they have had at best limited success, because they fail to take into account the behaviour of fishers and the incentives they face to continue overfishing (Grafton et al. 2006). One of the most commonly discussed output (or yield) controls is the use of the individual transferable catch quota (ITCQ). While the ITCQ has had mixed success, it does address the question of inadequate rights to fish resources by giving individual fishers specific rights to a proportion of the allowable catch.<sup>12</sup> Also relevant to this set of challenges is the possible establishment of a system of marine protected areas. This might help to protect fish stocks and maintain fish yields over the longer term. It would also be easier to administer and ensure greater compliance than other management options.

Ideally, individual jurisdictions would choose the mix of management options best suited to their local circumstances, rather than it being a question of one approach versus another. That is, different components of an 'optimal' management structure would be introduced, depending on their suitability, the likely level of acceptance and the capacity to ensure compliance. But regardless of the form of management, strengthening fisheries surveillance and enforcement is a matter of urgency. This

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<sup>12</sup> The application of the ITCQ depends on identifying the annual total allowable catch, where this is set at a level to achieve the maximum economic benefit. The total allowable catch is shared among the fishers licensed to operate in a fishery, so that the actual allowable catch for each vessel will vary from year to year depending on the level of the total allowable catch. Under the ITCQ, fishers are free to sell or lease their quotas or, in the case of a fleet owner, consolidate them across a number of vessels. Where quotas are applied and compliance is enforced, both improvements in profits (as a result of lower harvesting costs) and improvements in prices (as fishers concentrate on quality rather than quantity) have been observed. An example of this outcome is observable in the Australian southern bluefin tuna fishery (Campbell, Brown and Battaglene 2000).

could be facilitated by collaboration between Indonesia and neighbouring countries, particularly Australia, to monitor fishing activities in the Arafura Sea. Also important is developing a good data set, a better appreciation of fisher behaviour and a better understanding of the nature of the fishery, including both its biological and economic aspects.

The Indonesian government has taken a number of steps to mitigate illegal fishing in the Arafura Sea. These include the creation of a separate ministry for marine territories and fisheries, the establishment of a new legislative and judicial framework, and a greater emphasis on monitoring and control. However, the effectiveness of the various measures is not known; they may have resulted merely in a change of players or changes in the ways illegal fishing is carried out. At least until the mid-2000s, illegal fishing in the Arafura Sea fishery continued to be an important issue compounding the problem of non-optimal harvesting of fish stocks, with the accompanying loss of social well-being. It is important to note that the consequences of illegal fishing are not limited to Indonesia, but are shared worldwide.

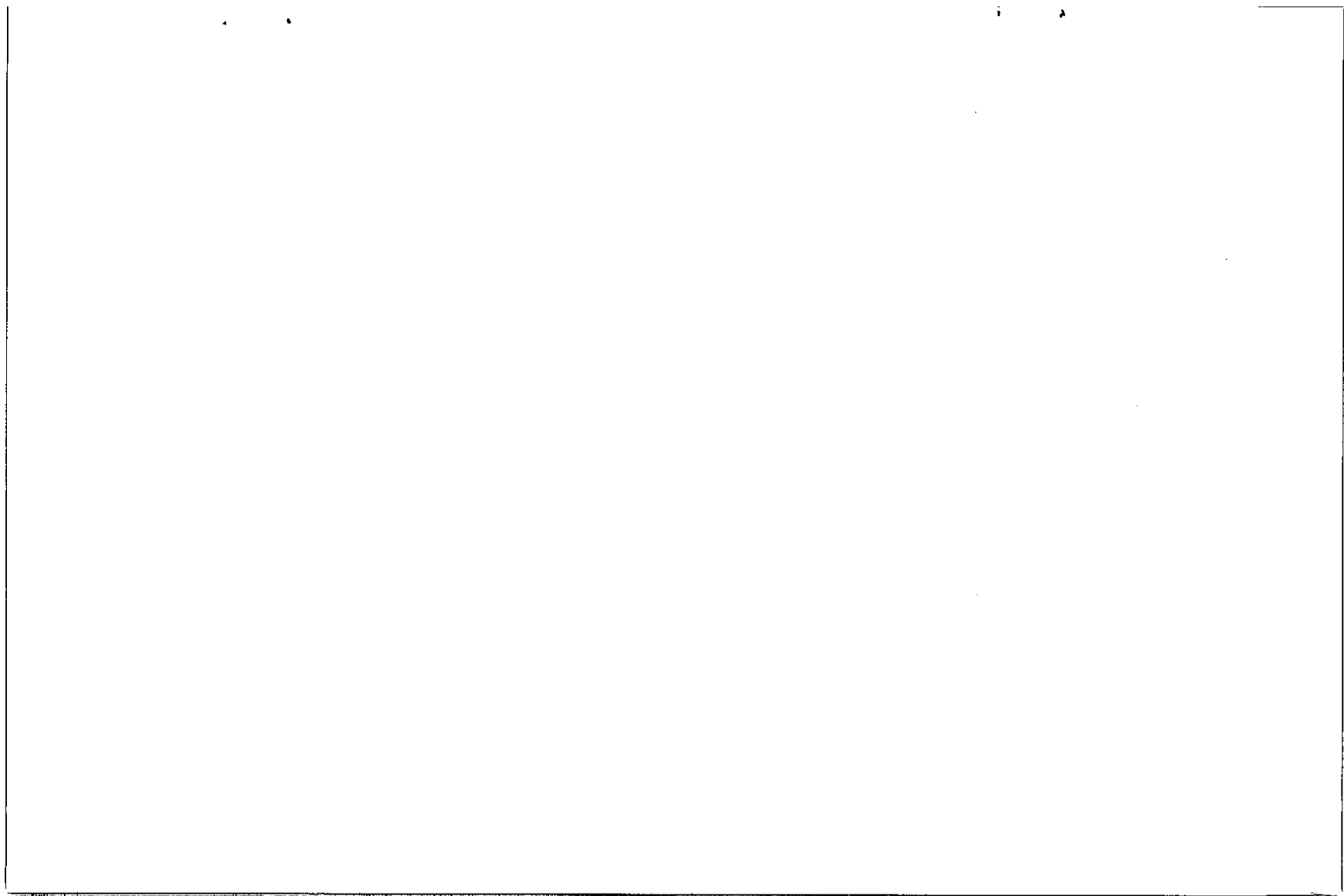
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WORKING WITH  
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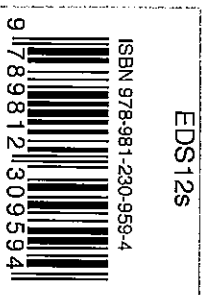
Development, Resources  
and the Environment in  
Eastern Indonesia

With its low incomes, lagging social indicators and widespread poverty, eastern Indonesia epitomizes the problems of development in Indonesia. The challenge is to advance the economy. But this means more intensive use of natural resources, placing pressure on the region's unique ecosystems.

This book explores the trade-offs and synergies between development, social concerns and the environment in Papua, Maluku and East Nusa Tenggara. It is written by leading scholars and experts on the region. They investigate the dilemmas of fishing in eastern Indonesia's seas, the strategies and challenges for mining and forestry, and the efforts to tackle biodiversity conservation and climate change. The book lays out the challenges for development, public administration and public health in Papua. It maps Maluku's road to recovery from conflict. It examines ways to alleviate poverty in the desperately poor province of East Nusa Tenggara. The book provides an overview of the economy of each of these provinces, making it an essential resource for anyone interested in the challenges of development and environment in eastern Indonesia.

*"This book contains rich material on development in an unusual and interesting setting. I commend it to anyone interested in the challenges of development and its interaction with the environment."*

**Professor Ross Garnaut**  
Vice-Chancellor's Fellow and Professorial Fellow  
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