THE POLITICAL ECONOMY OF MARINE FISHERIES DEVELOPMENT IN INDONESIA

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The Importance of the Sea

The seas surrounding Indonesia have shaped its history and will continue to play a major part in determining the future course of its development. As an archipelagic nation, Indonesia's marine environment is a dominating physical reality. The sea makes up roughly two-thirds of the nation's total area. In addition to 2.7 million square kilometers of territorial waters, Indonesia's jurisdiction extends over a further 2.1 million square kilometers of ocean as its Exclusive Economic Zone. Among the many resources found in this vast expanse, none—including, I would argue, oil and gas—is more important than fisheries resources. Fish provides more than 60 percent of the animal protein intake of the average Indonesian[1] and is the only affordable source for the majority of the population. According to the Directorate General of Fisheries (DGF), approximately 1.3 million Indonesians are directly employed as fishers in the marine sector,[2] with at least an equal number employed in various supportive roles, including boat building and fish processing, distribution, and marketing.[3] In addition, fisheries products are becoming increasingly important as sources of export earnings.

Despite the importance of the fisheries sector to national welfare, most fishers are small-scale producers who are among the poorest of the poor in Indonesian society. Foremost among the reasons for this poverty is overfishing in key fishing grounds off Java, Sumatra, and Sulawesi.[4] Clear evidence of resource limitations notwithstanding, however, during the past two decades the Indonesian government has made a series of conscious policy decisions to encourage development of a modern and, by Indonesian standards, capital-intensive fishing industry. This article elucidates the rationale behind these national policies and provides an assessment of the role of international development agencies in influencing and supporting them.

As can be expected during any period of rapid technological and structural change, the benefits of fisheries development in Indonesia have not been equally shared. The

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[1]Biro Pusat Statistik, *Neraca Bahan Makanan di Indonesia* (Jakarta: Biro Pusat Statistik, 1982).

[2]DGF, *Annual Fisheries Statistics, 1984* (Jakarta: Directorate General of Fisheries, 1986).

[3]Very few Indonesian women participate in fishing at sea. Women are, however, heavily involved in fish processing and marketing (Aminah and A. Wijayanti, *Peranan Wanita dalam Kehidupan Sosial Ekonomi Masyarakat Nelayan di Daerah Nelayan Muncar, Banyuwangi-Jawa Timur* (Jember, East Java: Universitas Negri Jember, 1980). There are no good data on the number of women who capture and collect marine products in shallow lagoons, on exposed coral reefs, and in other important coastal areas, or whether these activities are oriented towards subsistence needs or the cash economy.

[4]Conner Bailey, A. Dwiponggo, and F. Marahudin, *Indonesian Marine Capture Fisheries*, ICLARM Studies and Reviews No. 10 (Manila and Jakarta: DGF, Marine Fisheries Research Institute, and the International Center for Living Aquatic Resources Management, 1987), Table 2.32, pp. 56–57.

situation in Indonesia's fisheries sector is partly analagous to the impact of the Green Revolution, where landless laborers and limited resource farm households often gained relatively little from increased productivity and sometimes suffered from lost income and declining employment opportunities as a result of new agricultural technologies.[5] So too in the fisheries sector, improved technologies have benefited some at the expense of others. Indeed, it can be argued that the situation in fisheries is even worse than in agriculture because fishers directly compete with one another over a finite resource. Through the promotion of rapid technological change, fisheries development in Indonesia has become a zero-sum game, where those who control the most powerful technologies have a clear competitive advantage and individually prosper, even as others are swept aside and fish stocks depleted.

In this article, the argument is advanced that these policy outcomes were the direct consequence of choices favoring efficiency over equity, exports over domestic fisheries supply, and resource exploitation rather than resource management. These choices were driven by national economic priorities and supported by external development assistance agencies. The result has been the creation of a clearly identifiable dualistic industry structure in the fisheries sector through support given to domestic entrepreneurs. These entrepreneurs, in turn, have invested in powerful new fishing technologies, most notably trawlers and purse seiners.[6]

The perspective of political economy provides the theoretical framework for analysis of development policy affecting Indonesia's fisheries sector. At its core, investigations into political economy focus attention on the interplay of key actors in shaping public policies which determine the allocation of scarce resources within society. The key actors in the present article include the DGF, the various international development assistance agencies, domestic entrepreneurs with investments in modern fishing units and fish processing facilities, and the mass of small-scale fishers who make up roughly 90 percent of total employment in Indonesia's fisheries sector.[7] This latter group, far from being passive victims of technological progress, played an active role by forcing the government to impose virtually a complete ban on trawling in Indonesia after 1980. They accomplished this by engaging in widespread acts of violence, including the use of molotov cocktails, against wooden-hulled trawlers which encroached on their traditional fishing grounds. This trawler ban, to which we will return below, forced the government to pay closer attention to the traditional resource use rights of small-scale fishers. However, this action did not alter the basic course of development policy, which has continued to emphasize inccreasing production through the introduction of new, relatively capital-intensive technologies.

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[5]See W. L. Collier, et al., *The Acceleration of Rural Development on Java: From Village Studies to a National Perspective* (Bogor: Agro-Economic Survey, 1982); F. Kasryno, *Technological Progress and Its Effects on Income Distribution and Employment in Rural Areas: A Case Study in Three Villages in West Java, Indonesia* (Bogor: Agro Economic Survey, 1981); B. L. M. Schiller, "The 'Green Revolution' in Java: Ecological, Socio-economic and Historical Perspectives," *Prisma* 18 (1980): 71–93; J. C. Scott, *Weapons of the Weak: Everyday Forms of Peasant Resistance* (New Haven: Yale University Press, 1985).

[6]Trawlers and purse seiners in Indonesia typically are wooden-hulled boats displacing 30 gross tons and powered by inboard diesel engines generating 100–200 horsepower. The trawl net is conically shaped and pulled through the water, usually at or near the bottom. Purse seiners use a net to encircle a school of fish swimming at or near the surface. After completing the circle, a rope or cable running through a series of rings at the bottom of the net is pulled tight, closing off the bottom of the net (the "purse") to prevent fish from escaping.

[7]Bailey, Dwiponggo, and Marahudin, *Indonesian Marine Capture Fisheries*, Table 3.6, p. 87.

The article begins with a brief review of resource potentials and limits, turning then to examine the symbiotic roles of the DGF and international agencies in shaping fisheries development policies in Indonesia. This is followed by a discussion of the dualistic industry structure which emerged in large part due to these policies. In the next two sections, the impact of violent protest by small-scale fishers on development policy is assessed and the argument made that policies of the 1980s represent continuity rather than change despite the dramatic issuance of the trawler ban. The concluding section addresses the central problem of balancing resource management and fisheries development in a manner that assures both biological sustainability and socially sound allocation of access to available fish stocks.

Resource Potentials and Limits

Marine fisheries are a biologically renewable resource that can be continuously exploited at a certain level without adverse effect on the stock. Beyond that point, putting more boats and nets in the water will not result in any increase in the catch; indeed, the opposite is likely to occur if stocks become depleted. Economically, the consequences of over-exploitation involve misuse of limited capital resources and the dissipation of resource rents available to society.[8] Socially, the consequences include reduced employment opportunities, lowered incomes, and a likely reduction in the supply of fish to local consumers.[9]

A central problem of fisheries management is the absence of property rights limiting access to the resource. The free movement of people into fishing is possible because of the absence of property rights governing access to the resource. Fish are an open-access resource, freely available to anyone with the means to catch them. In Indonesia, easy entry into fishing is made possible by the relatively low capital requirements necessary to purchase a small used boat and simple fishing gear. Investment costs of representative small-scale fishing units (i.e., boats and nets) are shown in Table 1. In Indonesia, as elsewhere in Southeast Asia and many other tropical developing countries, the fisheries sector may be likened to a safety valve, absorbing surplus labor from other sectors of the national economy. The problem is that, as pressures on the resource increase, fishing becomes a competitive scramble that often leads to over-exploitation and the concentration of fishing power into the hands of relatively few people.

In its official pronouncements, the DGF minimizes the problem of resource limits, estimating total Maximum Sustainable Yield (MSY) for all marine resources within Indonesia's jurisdiction, including both territorial waters and the Exclusive Economic Zone, to be 6.5 million metric tons (mt) per year.[10] In 1986, total marine fisheries catch was just over 1.9 million mt (Table 2), approximately 29 percent of this estimate.

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[8]I. R. Smith, *A Research Framework for Traditional Fisheries*, ICLARM Studies and Reviews No. 2 (Manila: International Center for Living Aquatic Resources Management, 1979).

[9]Conner Bailey, "Social Consequences of Excess Fishing Effort," in *Proceedings, Symposium on the Exploitation and Management of Marine Fishery Resources in Southeast Asia, Darwin Australia, 16–19 February 1987*, RAPA Report: 1987/10 (Bangkok: Regional Office for Asia and the Pacific, Food and Agriculture Organization, 1987), pp. 170–81.

[10]DGF, *Hasil Evaluasi Potensi Sumber Daya Perikanan Laut di Perairan Indonesia dan Perairan ZEE Indonesia* (Jakarta: DGF, 1983).

Table 1
Investment Costs and Average Annual Productivity of
Typical Large- and Small - Scale Fishing Units

Subsector	Type		Cost	Productivity (mt/unit, 1980)	Total Units (1980)	% National Catch (1980)
Large-Scale	Trawler	Rp	9,000,000	70.4	2,476	12.5
	Purse Seiner	Rp	15,000,000	38.0	3,700	10.1
Small-Scale	Danish Seine	Rp	956,000	6.7	2,884	1.4
	Mobile Lift Net	Rp	570,000	9.3	6,056	4.0
	Set Lift Net	Rp	275,000	6.5	13,082	6.1
	Trammel Net	Rp	334,000	2.0	24,803	3.6
	Hand Line	Rp	82,000	1.4	79,184	8.1

Sources: Bailey, Dwiponggo, and Marahudin, *Indonesian Marine Capture Fisheries*, 1987, Tables 5.1 and 5.4, pp. 105, 111. Data on productivity per unit are national averages based on data for 1980, the last year before the trawler ban came into effect (DGF, *Annual Fisheries Statistics, 1980*).

Table 2
Indonesia's Marine Fisheries Sector: Landings, Fleet Composition,
and Employment, 1969-1984

Year	Landings		Fleet Composition		Employment	
	'000 mt	% change	Number	% Motorized	Number	% change
1969	785	—	280,633	1.9	n.a.	—
1970	807	2.8	295,436	2.0	n.a.	—
1971	820	1.6	284,838	2.5	n.a.	—
1972	836	1.9	295,281	3.0	n.a.	—
1973	889	6.2	242,882	5.1	n.a.	—
1974	949	6.8	270,369	4.9	n.a.	—
1975	997	5.1	257,152	5.8	n.a.	—
1976	1082	8.5	245,725	7.1	811,512	—
1977	1158	7.0	248,544	8.2	815,947	0.5
1978	1227	6.0	248,113	10.5	831,965	2.0
1979	1318	7.4	257,905	12.4	833,997	2.4
1980	1395	5.8	271,856	16.5	970,731	16.4
1981	1408	0.9	295,627	23.6	1,104,649	13.8
1982	1491	7.5	300,549	28.3	1,170,864	6.0
1983	1682	7.3	307,057	28.1	1,226,643	4.8
1984	1713	1.8	313,640	29.9	1,294,472	5.5
1985	1822	6.3	316,446	30.2	1,286,448	<0.1>
1986	1923	5.5	318,095	31.1	1,357,279	5.5

Sources: DGF, *Annual Fisheries Statistics 1982;* DGF, *Annual Fisheries Statistics 1986* (Jakarta: DGF, 1988).

National leaders and top DGF officials frequently point to these figures to justify expanded investment in the productive capacity of the fisheries sector. However, the data upon which total MSY has been calculated are of uneven quality, and the resulting estimates seriously overstate realistically achieveable harvests. Roughly two-thirds of the DGF's resource estimate is based on indirect measures, such as level of primary productivity (i.e., nutrient levels in seawater, the assumption being that there are fish feeding on these nutrients), or extrapolations from other comparable fishing grounds for which data do exist.[11] Moreover, these figures include resources said to exist either at great depths and/or in fishing grounds located at great distance from existing ports and markets.[12] Even if one were to accept the DGF's estimates of MSY from these areas, the technical and economic feasibility of catching and marketing these resources is very much in doubt. Indonesian marine biologists, including those who work for the DGF and the Marine Fisheries Research Institute (a separate agency under the Ministry of Agriculture), realize the gulf between reality and official pronouncement but are powerless to point out the gross simplification of resource potentials touted by their political superiors.

Simply put, the DGF's official estimates of resource potentials are misleading. As guides to policy, these estimates are actually dangerous in that they encourage continued emphasis on production-oriented development programs. In the absence of adequate resource management capacity, these programs threaten to increase over-fishing. Moreover, overly optimistic assessments of resource potentials simply mask the fact that Indonesia must pay greater attention to resource management if development efforts are to be biologically sustainable.

The reality is that Indonesia's marine fisheries resources are unevenly exploited. Generally, shallow inshore fisheries, especially those close to major population centers (and hence markets), are heavily exploited and offer limited potential for expanded harvests. This is particularly true for the Malacca Straits, the north coast of Java, and South Sulawesi Province. Combined, these three coastal areas account for just over half of total landings and just under half of all those directly employed in the marine fisheries sector.[13] Areas where the potential for increased production probably does exist are located in the sparsely populated eastern half of the archipelago, where local markets have limited capacity to absorb increased supply. Harvesting these resources for the large Java market will be possible only by breaking the control of that market by a tightly controlled syndicate of ethnic Chinese dried fish wholesalers.[14]

The political economy framework is nicely suited to the fisheries policy arena, where competition over scarce resources is nearly universal. In this context, setting fisheries policy is a kind of balancing act, the goal of which is to achieve an appropriate balance

[11]Bailey, Dwiponggo, and Marahudin, *Indonesian Marine Capture Fisheries*, pp. 19–21.

[12]Included as part of this estimate of sustainable yield are bottom-dwelling fish of the Banda Sea and the Indian Ocean, where extreme depths in excess of 3,000 meters are common. The only areas where reasonably reliable stock-assessment data are available are the Java Sea and the Malacca Straits, both of which are heavily fished and in some cases over-exploited.

[13]DGF, *Annual Fisheries Statistics, 1984.*

[14]Based on local production, per capita supply of fish on Java is roughly half the national average. No adequate data exist on inter-island trade in fish products. Most of this trade is in salted sun-dried fish and is controlled by the syndicate. Indonesians, including officials of the DGF with whom I worked during 1981–1982, referred to this group as a "mafia." Remarkably, no studies have been conducted on the extent of control over dry fish markets exerted by this syndicate, which is widely believed to use violence or the threat of violence to keep outsiders from penetrating the Java market.

between resource management (the imposition of controls) and development (the promotion of growth in production). Policy makers have to decide between such contradictory goals as maximizing social benefits (e.g., employment and equitable income distribution) and promoting economic efficiency (e.g., through the introduction of powerful new technologies which replace labor with capital). At the same time, government policies call for simultaneously increasing domestic food supply while increasing exports of fisheries products. All of these goals are to be achieved while ensuring the biological sustainability of a resource vulnerable to over-exploitation. With slightly differing emphases, each of these five goals has been stated as official Indonesian policy in all four Five-Year Plans (Repelita) of the New Order era.[15] Yet, in the context of resource scarcity, trade-offs between these goals must be made.

Institutional Symbiosis of National and External Agencies

The DGF is the government agency primarily responsible for both management and development activities. Viewed from the perspective of staff and financial resources committed, however, it is clear that the primary business of the DGF is the administration of development activities aimed at increasing production. Two-thirds of the DGF's total expenditures under Repelita IV (1983–1988) were allocated to increase marine and inland fisheries landings and aquaculture production; less than 3 percent was targeted for fisheries resource management and environmental protection.[16]

This allocation of funds may be short-sighted given the biological vulnerability of fisheries resources to over-exploitation, especially where powerful new fishing technologies are in use. However, it is an understandable approach if we view the DGF as a functioning bureaucratic entity engaged in strategies of organizational survival and expansion. The institutional interests of the DGF as a government agency are served if it enhances its standing within the Ministry of Agriculture and the government as a whole, defends its bureaucratic turf, and attracts external funds for staff and operations.

One way to accomplish these goals is to emphasize the growth potential of the fisheries sector. The DGF's emphasis on creating a "modern" fisheries sector—the launching of a Blue Revolution parallel to the Ministry's Green Revolution—provides a positive image of the fisheries sector's future. These efforts have focused primarily on the introduction of powerful new fishing technologies and the major infrastructural improvements needed to support this development. To this end the government has provided subsidized credit programs, port development projects, and research on the most efficient designs for boats and fishing gear, with the stated goal of "modernizing" the fisheries sector by encouraging the use of more powerful and profitable technologies. The DGF also has enthusiastically supported national efforts to expand non-oil exports. The DGF's emphasis on export-oriented development is mirrored by external development assistance agencies, which are able to justify their investments on the basis of potential foreign exchange earnings.

External assistance agencies have been very influential in shaping the direction of fisheries policies in Indonesia. During the early 1970s, the Asian Development Bank (ADB), the World Bank, and the Japanese government loaned the Indonesian gov-

[15]Bailey, Dwiponggo, and Marahudin, *Indonesian Marine Capture Fisheries*, p. 90.
[16]DGR, *Annual Fisheries Statistics, 1980* (Jakarta: DGF, 1982).

ernment more than US$13 million to support the establishment of four parastatal enterprises to exploit tuna for export markets.[17] In the mid- to late-1970s, the ADB and the World Bank provided credit to the fisheries sector for construction of new trawlers, as well as for the improvement of fishing ports, ice plants, and other infrastructure necessary to support trawlers and purse seiners. The Food and Agriculture Organization (FAO) established a school for training captains, mechanics, and gear specialists to support these rapidly growing capital-intensive fishing enterprises. During the period 1974–1983, external assistance totaling US$207.3 million was provided for fisheries development, almost half of which came from the ADB.[18] In addition to these official assistance projects, foreign investors (primarily Japanese) invested US$64.5 million to establish joint-venture corporations with Indonesian counterparts.[19]

In addition to investments in new fishing units, these agencies have supported improving urban port facilities and fish distribution channels, most of which were designed to support large-scale offshore fisheries in areas where the DGF has identified potential for increased harvests.[20] Small-scale fishers, whose technologies restrict them to coastal waters, are effectively excluded from this current phase of development. Of the total funds made available by international agencies for fisheries development, less than US$10 million has been devoted to the small-scale subsector. Funded from this money were two projects on extension methods for small-scale fisheries supported by the FAO, and projects by the German Technical Assistance Agency (GTZ) and the US Agency for International Development (USAID). Among foreign agencies involved during the 1970s, only the GTZ provided assistance in developing resource assessment and management capabilities among their Indonesian counterparts.

The influence of external assistance agencies in fisheries development cannot be measured in terms of expenditures alone. Internationally supported projects generally involve matching contributions by the Indonesian government, effectively committing a significant proportion of limited human and financial resources available to the DGF for new program initiatives. The opportunity to work on an internationally supported fisheries development project is highly prized within the DGF itself, where working on such projects provides an important measure of prestige. Opportunities for international travel, training, and graduate education open the doors for professional advancement. Involvement in international projects also brings honoraria to supplement the meager salaries earned by Indonesian government officials. In short, internationally sponsored projects attract the best and brightest of available DGF staff through a combination of immediate gains and long-term benefits for career development.

Emergence of a Dualistic Industry Structure

Prior to the mid-1960s, the only people exploiting fisheries resources in Indonesia were small-scale producers, most of whom used sail or paddle powered boats and simple fishing gear. Most fishers in Indonesia still fit this basic description; nearly 70 percent of

[17]PT Perikanan Samodra Besar, *Skipjack and Tuna in Indonesia* (Jakarta: PT Perikanan Samodra Besar, 1981).
[18]ADB, *Indonesia Fisheries Sector Study* (Manila: Asian Development Bank, 1983).
[19]Abdu Rachman, "The Development of Industrial Fisheries in Indonesia," Report prepared by the DGF (Jakarta, mimeo, 1982).
[20]ADB, *Indonesia Fisheries Sector Study*.

all fishing boats in Indonesia are non-motorized (Table 2). The number of motorized boats gradually increased from the mid-1960s until the early 1980s, when a rapid growth in the use of engines occurred. Most of the motorized fleet are small-scale boats powered by outboard engines.[21] However, over the past decades, technological changes have transformed the fishing industry into a dualistic one where small-scale producers have been progressively marginalized through the introduction of large-scale fishing units such as trawlers and purse seiners.[22]

The year 1966 represents a watershed marking the beginning of a new era of fisheries development in Indonesia. In that year, trawlers first were introduced into Indonesia by ethnic Chinese fishers from Riau Province, who had observed their effectiveness on the Malaysian side of the Malacca Straits.[23] By the early 1970s, a second type of modern fishing unit, the purse seiner, made its appearance. The introduction of these modern technologies created opportunities for new entrants into the fisheries sector, most notably entrepreneurs from other sectors of the economy, who invested in trawlers and purse seiners.

Data on investment costs for trawlers and purse seiners, as well as for typical small-scale gear, are presented in Table 1. By Indonesian standards, both trawlers and purse seiners are relatively capital-intensive types of fishing units, requiring investments at least ten times greater than the most highly capitalized small-scale unit. The pay-off from these higher investments is a significant gain in productivity. In 1980, annual landings per unit averaged 70 mt for trawlers and 38 mt for purse seiners, while the national average for all types of fishing units was less than 4 mt.[24] Since the mid-1960s, small-scale fishers have experienced significant changes in their own technology, including the increased use of outboard engines and the adoption of nylon netting. Yet even with these innovations, small-scale fishers continued to experience limited, and in many cases declining, productivity due to increased pressure on fish stocks. Twelve small-scale gear types representing 81 percent of all fishing units in Indonesia had average annual per unit landings of 3 mt or less and five (42 percent of the total) averaged 2 mt or less. Hand-lines, the least expensive and most common type of small-scale fishing unit, averaged only 1.4 mt of fish per year (Table 1).

Such low levels of productivity are a major factor in explaining poverty among many small-scale fishers in Indonesia. But blaming technological constraints for this poverty overlooks the more fundamental problem of a dwindling resource base, caused by the

[21]DGF, *Annual Fisheries Statistics, 1984*.

[22]The DGF divides the fisheries sector into small-, medium-, and large-scale subsectors, the latter referring to certain private corporations (including joint ventures) and state enterprises which operate steel-hulled vessels that are generally far larger and more powerful than the wood trawlers and purse seiners that are the focus of our attention here (and which the DGF refers to as "medium-scale"). These larger boats are relatively inconsequential in terms of numbers of boats (approximately 300 out of over 300,000 fishing boats), employment (0.6 percent of the national total), and landings (less than 2 percent of the total catch) (Bailey, Dwiponggo, and Marahudin, *Indonesian Marine Capture Fisheries*, Table 3.1, p. 65; pp. 66–67, 85, and 87). Moreover, because they typically operate in isolation from small-scale fishers, they have little impact on that group. The term "large-scale" is used here to describe trawlers and purse seiners to emphasize differences in level of investment and technological power that distinguish these from small-scale fishing units.

[23]R. G. Boudon, et al. *Report on Costs and Earnings Survey of Malaysian Trawl Fisheries, 1969–70* (Kuala Lumpur: Ministry of Agriculture and Lands, 1970); M. Unar, *Review of the Indonesian Shrimp Fishery and Its Present Development*, Laporan Penelitian Perikanan Laut 1 (Jakarta: Lembaga Penelitian Perikanan Laut, 1972).

[24]Bailey, Dwiponggo, and Maharudin, *Indonesian Marine Capture Fisheries*, Table 3.5, p. 84..

by the introduction of trawlers and purse seiners and the intrusion of these modern boats into coastal waters, the traditional fishing grounds of small-scale fishers.

Relative investment cost and differential levels of productivity are not the only major differences between small- and large-scale fisheries. Equally important, if we are to understand these two classes of fishers, are the fundamental differences in values and motivations that distinguish them. Owners of large-scale fishing units are commercially oriented entrepreneurs whose goals are profitability and capital accumulation. The combination of productive power represented by modern technologies and the behavior of economically "rational" individuals, who seek to maximize personal gain even at the expense of collective loss through over-exploitation, has been the primary factor contributing to the over-exploitation of marine resources in Indonesia. Under conditions of open access to the resource, Hardin's classic statement of the "Tragedy of the Commons" becomes all too true.[25]

Small-scale fishers also exert heavy pressure on marine resources, but this is attributable less to a combination of mechanized fishing power and profit-seeking behavior than to the sheer numbers of people involved. Small-scale fishers are no less rational economically than their large-scale counterparts, but what constitutes rational behavior among this group has to be understood in the context of their particular circumstances. Traditional fishing technologies are inextricably linked to the values of local fishing communities, and these in turn shape a wide range of social and economic relationships. Profitability and capital accumulation are only two goals among many. Careful examination of sharing systems among small-scale Indonesian fishers clearly shows that non-economic factors often shape the social relations of production, mitigating the harsher aspects of purely economic factors.[26]

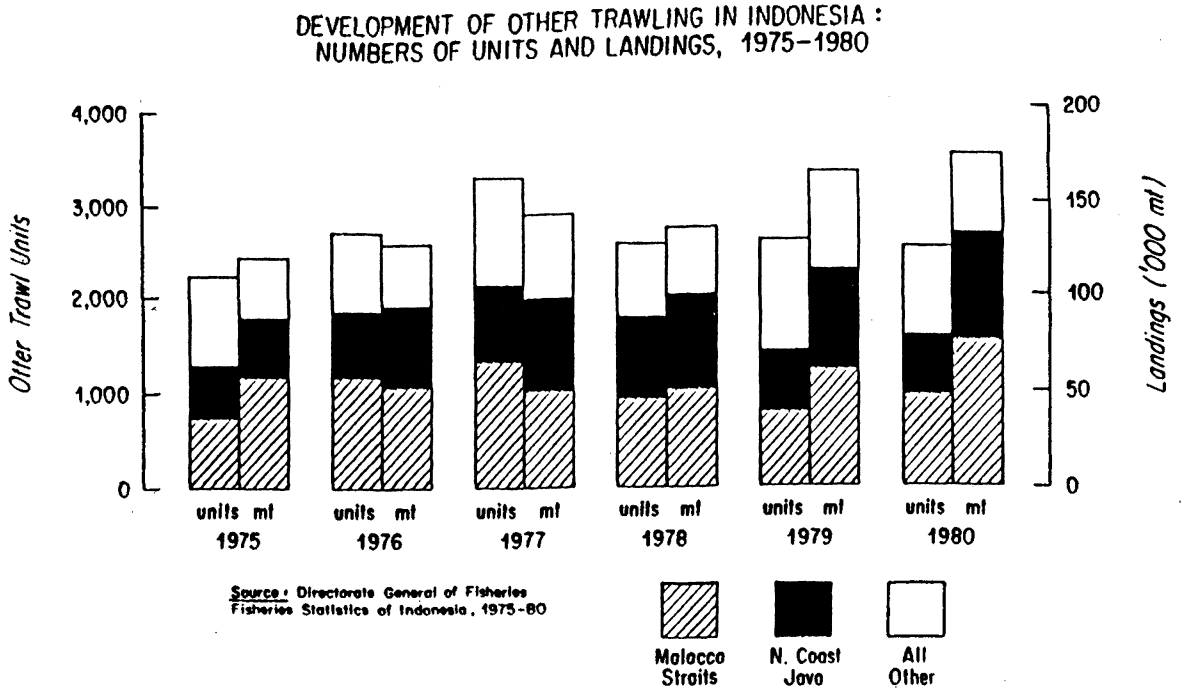
Firebombs and Fish

By 1980, trawlers and purse seiners combined accounted for 23 percent of total marine fisheries landings (Table 1), although they represented only 2 percent of the nation's fishing fleet.[27] During the 1970s, trawlers and purse seiners were most heavily concentrated along the north coast of Java and in the Malacca Straits (Figure 1), where they made up 3 percent of the boats but accounted for 39 percent of the total catch.[28]

By the end of the 1970s, the rapid growth of large-scale fisheries, especially of trawlers, led to serious problems of resource depletion along the Malacca Straits and the north coast of Java, fishing grounds which for centuries had provided a livelihood for large numbers of small-scale fishers. On the north coast of Java in 1980 there were 266,000 fishers, most of whom were totally dependent on fishing for their livelihoods.[29] Most of these were small-scale fishers who operated in direct competition with trawlers in attempting to catch demersal (i.e., bottom dwelling) species such as shrimp.[30] Shrimp are

[25]G. Hardin, "The Tragedy of the Commons," *Science* 162 (1968): 1243–48.
[26]Aminah and Widjayanti, *Peranan Wanita dalam Kehidupan Sosial Ekonomi.*
[27]DGF, *Rancangan Pembangunan Pertanian Repelita IV, Sub-sektor Perikanan* (Jakarta: DGF, 1982).
[28]Bailey, Dwiponggo, and Maharudin, *Indonesian Marine Capture Fisheries,* pp. 21–22; Table 2.6, p. 23.
[29]DGF, *Rancangan Pembangunan.*
[30]In the three areas most directly affected by trawlers (Malacca Straits and north and south coasts of Java) there were in 1980 a total of 57,772 small-scale demersal fishing gear, representing roughly 50 percent of the total (DGF, *Annual Fisheries Statistics 1982*). Average crew sizes for demersal and non-demersal gear are

Figure 1



by far the most valuable of these demersal species because of strong international demand. Before they were banned, trawlers operated primarily in shallow coastal waters where shrimp are most abundant. Exact data are unavailable, but a reasonable estimate is that 80 percent of all shrimp exported from Indonesia during the 1970s were caught by trawlers.[31] During the ten year period 1977 through 1986, average annual export earnings from fisheries products were over US$240 million, with frozen shrimp accounting for roughly 80 percent of this value (Table 3).

In Indonesia, as elsewhere in Southeast Asia, trawling through coastal waters frequently led to the destruction of nets and traps set by small-scale fishers and occasionally to the ramming of small boats, with a resulting loss of life and property.[32] Trawling in shallow coastal waters also had devastating effects on fish stocks. Coastal waters serve as the nursery grounds for many commercially valuable species of fish. In the process of dragging the trawl net through the water, large numbers of sexually immature and undersized fish were caught (and generally turned into animal feed). This disruption of

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roughly the same; thus, we can estimate that 193,000 small-scale fishers (50 percent of the total in these areas) were directly affected by trawler operations. Average household size among small-scale fishers is over 5.0 (Bailey, Dwiponggo, and Marahudin, *Indonesian Marine Capture Fisheries*), indicating that approximately one million people were affected by competition with trawlers in these three areas.

[31]Small-scale fishers caught more than 20 percent of all shrimp landed, but relatively little of this went into the export market. Shrimp packers for export based their operations in major fishing ports where trawlers were based and relied almost exclusively on these trawlers for their supply. When trawlers were banned from most parts of Indonesia, these same packers were forced to obtain supplies of shrimp for export from coastal fishing communities, providing small-scale fishers access to world markets and higher prices.

[32]Conner Bailey, *The Sociology of Production in Rural Malay Society* (Kuala Lumpur: Oxford University Press, 1983); T. Panayotou, "Economic Conditions and Prospects of Small-scale Fishermen in Thailand," *Marine Policy* 4, 2 (1980): 142–46; I. Sardjono, "Trawlers Banned in Indonesia," *ICLARM Newsletter* 3, 4 (1980): 3; Smith, *Research Framework for Traditional Fisheries.*

the reproductive cycle contributed significantly to the problem of resource depletion.[33] As a result of over-exploitation and resource depletion, trawlers suffered declining catch rates during the latter half of the 1970s.[34] Nonetheless, their operations remained profitable because of the high prices paid for shrimp on the international market. Small-scale fishers along the Malacca Straits and the north coast of Java, however, found themselves increasingly unable to compete over a dwindling resource base.[35]

Table 3
Indonesian Fisheries Exports

	Shrimp		Tuna		Other		Total	
Year	'000 mt	US$ Million	'000 mt	US$ Million	'000 mt	US$ Million	'000 mt	US$ Million
1977	31.6	140.2	1.9	0.02	24.1	22.8	57.6	163.0
1978	32.6	162.0	9.4	6.2	21.5	25.2	63.5	193.4
1979	34.7	200.5	9.8	8.0	23.8	28.3	68.3	236.8
1980	31.9	180.9	11.1	12.9	35.7	32.6	78.7	226.4
1981	25.0	162.8	14.0	15.4	36.2	47.2	75.2	225.4
1982	25.6	181.6	18.8	19.9	45.2	47.9	89.6	249.4
1983	26.1	194.4	20.3	14.8	42.0	47.8	88.4	257.0
1984	28.0	195.6	14.7	10.7	33.0	41.8	75.7	248.1
1985	31.0	202.7	17.9	13.8	35.6	42.9	84.5	259.4
1986	36.1	284.9	24.2	18.1	47.1	71.1	107.4	374.1

Source: DGF, *Statistik Ekspor & Impor Hasil Perikanan, 1986* (No. 9, STAT.EKS.IMP) (Jakarta: DGF, 1986).

Small-scale fishers responded to these threats to their lives and livelihoods with violence, including use of molotov cocktails and other weapons.[36] No reliable estimates exist regarding the number of people killed or boats sunk. From interviews conducted by the author during 1981–1982 in fishing communities in the affected areas, and with government officials working in those areas, it is clear that the violence was widespread and serious. In Malaysia, where similar problems arose, more than sixty boats were sunk and twenty-three fishers killed during the period 1970–1973.[37]

In Indonesia, the government first responded to this violence by issuing a series of regulatory measures designed to restrict trawlers from operating in coastal waters. These

[33]T. Azhar, *Some Preliminary Notes on the By-catch of Prawn Trawlers off the West Coast of Peninsular Malaysia* (Manila: South China Sea Fisheries Development and Coordinating Programme, 1980).
[34]Bailey, Dwiponggo, and Marahudin, *Indonesian Marine Capture Fisheries*, pp. 21–25; 27–32; 38–41.
[35]Conner Bailey, "Government Protection of Traditional Resource Use Rights—The Case of Indonesian Fisheries," in *Community Management; Asian Experience and Perspectives*, ed. David C. Korten (West Hartford, Conn.: Kumarian Press, 1986), pp. 292–308.
[36]Ibid.; A. F. LaPorta, "Pribumi Fishermen and the Trawlers," Unclassified letter to US Embassies in Jakarta and Kuala Lumpur from US Consulate in Medan, dated December 5, 1978; N. Naamin, *Masalah-masalah yang dihadapi dalam Pelaksanaan KEPRES 39/1980 tentang Penghapusan Penggunaan Jaring Trawl* (Jakarta: Pusat Penelitian dan Pengembangan Perikanan, 1982); Sardjono, "Trawlers Banned in Indonesia."
[37]D. S. Gibbons, "Public Policy towards Fisheries Development in Peninsular Malaysia: A Critical Review Emphasizing Penang and Kedah," *Kajian Ekonomi Malaysia* 13, 1 & 2 (1976): 89–121; Smith, *Research Framework for Traditional Fisheries.*

efforts, which involved increasingly stringent restrictions (especially on trawlers), failed due to inadequate enforcement capabilities. The profits from illegal trawling for shrimp were too attractive and the enforcement effort too weak for these restrictions to have any significant effect.

In the face of continued violence, the government imposed a total ban on all trawling in waters off Java and Sumatra through promulgation of Presidential Decree No. 39 of 1980. This ban was extended nationwide, with the exception of the Arafura Sea, by Presidential Letter of Instruction 11, effective January 1983.[38] One result of the trawl ban was an immediate but short-lived decline in shrimp exports, which subsequently reached new highs (Table 3). The removal of trawlers also led to an immediate surge in employment, particularly among small-scale fishers (Table 2).

Presidential Decree No. 39 is a remarkable document given the national drive to increase non-oil export earnings. Trawlers had accounted for most shrimp destined for export markets. Indonesia's trawler ban also is remarkable because, unlike previous efforts to restrict trawlers (in Indonesia or anywhere else in the Third World), this decree has been effectively enforced. This can be explained in part because it is relatively easy to impose a total ban on all trawling, as compared to imposing restrictions on trawling to certain areas or seasons. More important, the issuance of a Presidential Decree was a statement of political will which put the weight of the government and the military behind enforcement efforts.

The more intriguing question is, why did the government take this action in the first place? In part, the answer may be found in the growing concern among researchers and administrators alike regarding resource sustainability and the plight of small-scale fishers.[39] In addition, several influential politicians working through the Himpunan Nelayan Sa-Indonesia (HNSI, All-Indonesia Fishers' Association) identified themselves with this cause and lobbied for government action. The HNSI is a "functional organization" associated with Golkar, the governing "party" of Indonesia. Like other such groups, the HNSI serves to articulate interests of a certain category of citizens to the government and provides group leaders with a political power base. Government responsiveness to the needs of such groups and their leaders serves to build and maintain political support. But, in the final analysis, the government was forced to act because of the willingness of numerous small-scale fishers to use violence as a means of defending their interests.

Fisheries Policies During the 1980s

The elimination of trawlers beginning in 1980 initially reversed the decade-long trend towards the concentration of fishing power. However, many trawler owners and other investors quickly shifted over to purse seiners, which increased in numbers from 3,700 in 1980 to over 5,000 by 1984.[40] Purse seiners have become particularly significant

[38]The Arafura Sea was excluded due to the existence of long-term agreements under which joint-venture corporations (primarily Japanese-Indonesian) operated large steel-hulled trawlers in that area. These larger vessels appear not to have had a serious impact on local small-scale fisheries of this sparsely populated area.
[39]Sardjono, *Trawlers Banned in Indonesia.*
[40]DGF, *Rancangan Pembangunan Pertanian;* DGF, *Annual Fisheries Statistics, 1984.*

along the north coast of Java, where in 1984 they accounted for over 36 percent of total landings but only 2.5 percent of boats in the fishing fleet.[41]

As important an act as was the trawler ban, Presidential Decree No. 39 did not result in a significant shift in the government's development priorities. There was, however, a shift in strategies. Since 1980, the focus of the DGF's attention has shifted away from almost exclusive emphasis on the marine sector. Increased attention is now being devoted to brackish-water shrimp production in coastal ponds (*tambak*). Indonesia is trying simultaneously to intensify production in existing ponds and extend *tambak* production of shrimp into new areas, to counterbalance the decline in shrimp exports resulting from the trawler ban.

Indonesia currently has nearly 200,000 hectares of *tambak* in production,[42] mostly operated using simple production techniques in use for hundreds of years. During certain seasons, post-larval shrimp (*Penaeus spp.*) and milkfish (*Chanos chanos*) fry are abundant in coastal waters. The traditional system utilizes tidal action to carry these organisms through dug channels into a pond, where they are trapped and allowed to grow until they reach harvest size (roughly six months). Little or no supplemental feeding is provided. Rather, the shrimp and fish depend on nutrients brought into the pond with the tides. The system requires limited cash expenditures to operate once the ponds are in place. This low-cost approach is well suited to small-scale producers.

The DGF has made shrimp mariculture development its number one priority and has urged external development agencies to provide support in this field. As a result, during the mid-1980s, the ADB, the World Bank, USAID, and the governments of both Belgium and Italy, have provided funding for production of shrimp in *tambak*.[43] The ADB alone has made a loan of US$50 million to the Indonesian government for intensifying and expanding pond production of shrimp.

The social and ecological consequences of focusing on increased production of shrimp in *tambak* parallel those of capital-intensive marine fisheries development. Most official effort is directed towards increasing production through capital-intensive systems beyond the financial and technical abilities of small-scale producers. Moreover, in the process of encouraging rapid development of pond-produced shrimp, large areas of mangrove in Sumatra, South Sulawesi, and the south coast of Java are being cleared. Massive mangrove conversion threatens the sustainability of marine harvests of shrimp and other valuable commercial species which are dependent upon mangrove habitat during critical periods in their life cycles.[44] Conversion of mangrove to shrimp ponds also threatens the livelihood of rural residents who depend on mangrove resources for firewood, charcoal, lumber and roofing materials, fruits, shellfish, and fish. In short, clearing mangrove to build ponds involves converting a multiple-use resource vital to the livelihoods of many coastal communities into a single-use resource that becomes the

[41] DGF, *Annual Fisheries Statistics, 1984.*
[42] Ibid.
[43] Conner Bailey, et al., *Aquatic Resources Development Feasibility Study*, 2 vols. (Diamond Springs, Calif.: Resources Development Associates, 1985).
[44] P. Martosubroto and N. Naamin, "Relationship between Tidal Forests (Mangroves) and Commercial Shrimp Production in Indonesia," *Marine Research in Indonesia* 18 (1977): 81–86; R. E. Turner, "Intertidal Vegetation and Commercial Yields of Penaeid Shrimp," *Trans. American Fisheries Society* 106, 5 (1977): 411–16.

private property of a wealthy individual or corporation.[45] "Large-scale aquaculture enterprises frequently displace small-scale fishers and aquaculturists through subsidized financing and institutional arrangements that favor the large-scale or corporate investor," according to Smith and Pestano-Smith.[46]

Conclusion

The first step in formulating sustainable and socially equitable fisheries development policies is to recognize resource limitations and to realize that hard choices must be made. Indonesia's trawler ban is an example of such a choice. In 1980, a conscious decision was made to protect the interests of small-scale fishers by eliminating this highly productive class of fishing vessel. Such dramatic actions against the rich and for the poor are sufficiently rare to be remarkable. However, with the notable exception of the trawler ban, fisheries policies in Indonesia over the past twenty years have been largely indistinguishable from those elsewhere in Southeast Asia or the rest of the Third World. Minimal effort has been expended on resource management, largely due to wildly optimistic official estimates of resource potentials. As a result, economic and political pressures have led to policies which emphasized expanded production rather than resource management.

From the perspective of the DGF, development is synonymous with increasing production. The introduction of new capital-intensive technologies—whether in marine fisheries or shrimp mariculture—is seen as the best way of achieving this goal. The DGF continues to focus on production rather than management and capital-intensive technologies rather than distributional equity. Yet, fisheries development efforts make little sense unless they are socially beneficial and are designed to be sustainable over time. Resource scarcity and the social disruption caused by rapid technological innovation make it necessary to integrate and balance production-oriented development projects with resource management policies that address fundamental issues of resource allocation and equity.

International development agencies have contributed significantly to the pro-growth orientation of national fisheries policy in Indonesia and are in a position to exert considerable leverage over the future direction of this sector's development. This could be a positive or negative influence. There is a natural tendency among external development agencies to evaluate more positively project proposals that promise expanded production rather than those which seek to place limits on production. Yet, within Indonesia's fisheries sector, some limits must be established to ensure that the development that does take place is biologically sustainable and socially just. External agencies are in a position to influence policy by supporting those development efforts which not only meet fiscal and technical criteria but also serve these broader goals.

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[45]Conner Bailey, "The Social Consequences of Tropical Shrimp Mariculture Development," *Ocean and Shoreline Management* 11 (1988): 31–44.

[46]I. R. Smith and R. Pestano-Smith, "Social Feasibility of Coastal Aquaculture," *ICLARM Newsletter* 8, 3 (1985): 6–8.