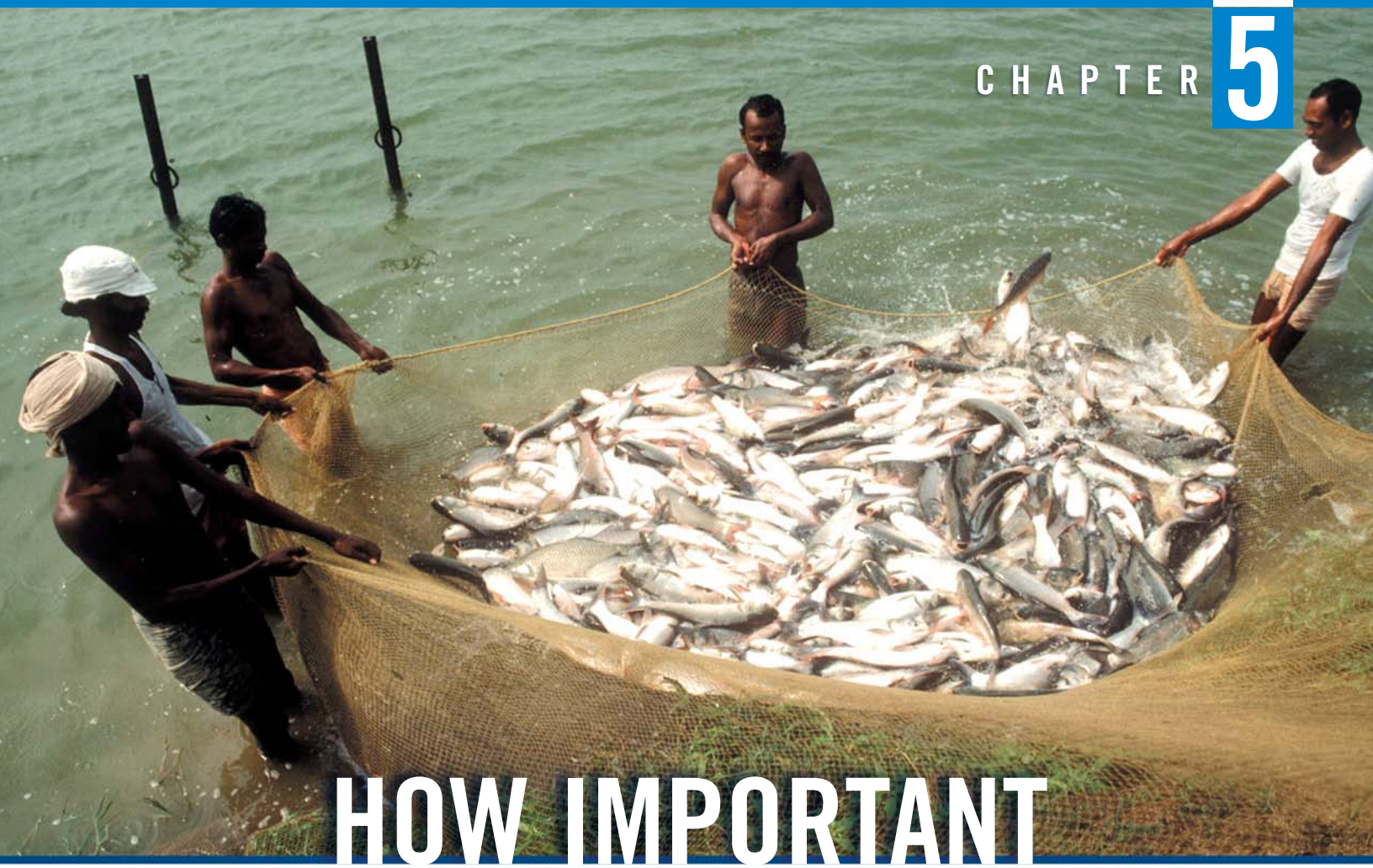
CHAPTER 5



FAO/13504/I. DE BORHEGYI

HOW IMPORTANT IS SMALL-SCALE FISHING?

Small-scale fishing is much more significant—as a source of livelihoods, food security, and national income—than most people realize. Like small-scale agriculture, small-scale fishing is widespread and crucial to employment and food supply in innumerable communities in developing nations, where some 95 percent of all fishers ply their trade (FAO 2002a).

The FAO estimates that over 90 percent of the 15 million people engaged in coastal and ocean fishing are small-scale operators—people who use small fishing vessels with a relatively low level of capital investment (see *Figure 5-1*). That number does not include the many millions of freshwater fishers and fish farmers also working at the small or artisanal level. These fishers catch or farm fish primarily for household consumption or to sell in local markets, and their incomes are usually very low. There are an estimated 5.8 million fishers in the world earning less than $1 a day (FAO 2002a).

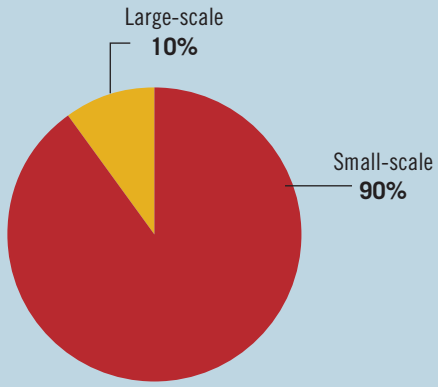
Because of the sheer numbers of small-scale and artisanal fishers, their vulnerability to competition from industrial fleets, and their potential impacts on marine and freshwater ecosystems, it is essential to factor this sector into fisheries management policies. Unfortunately, just the opposite has happened. For decades, policy-makers and consumers have ignored the importance of small-scale fishing. Since large-scale industrial fishers generally produce the fish consumed in developed countries and marketed through the international trade, most of the attention of fisheries managers has focused squarely on them. Only recently is the need for appropriate management and protection of small-scale fisheries slowly gaining recognition (Berkes et al. 2001; Drammeh 2000; FAO 2000b; FAO 2002a.).

Several factors have contributed to the lack of attention to small-scale fishing. One of the most potent is the dearth of information. Data on this sector are notoriously poor, with the number of small-scale fishers—and especially subsistence level freshwater fishers—grossly underestimated by national governments. An accurate picture of small-

scale fishing at the global level is also hard to assemble, because the definitions of small-scale and artisanal fishing vary by country. Indeed, the fish caught by small-scale fishers frequently go unreported in official government statistics and the impact of these fishers on fish stocks and ecosystems is rarely monitored. This means that the economic importance of the sector remains hidden from official view, and the implications for national fisheries policy remain unclear.

In addition, small-scale fishers tend to inhabit the political margins. Fishing communities are often remotely located, and therefore isolated from decision-making centers, increasing the likelihood that their interests will be marginalized (Le Sann 1998, Berkes et al. 2001). As a consequence, the aquatic environments and resources upon which small-scale fishers depend frequently suffer from poor management, competition from industrial fishing, and degradation from land-based activities, such as deforestation, pollution, and coastal development.

Figure 5-1: Number of Fishers in Marine Capture Fisheries



Source: FAO 2002a

HOW LARGE IS THE SMALL-SCALE FISHING SECTOR?

Because there is no universal definition of small-scale fishing and no accurate census of those who practice it, the exact number of fishers engaged in this sector is impossible to pin down. In fact, few governments know with precision how many people are occupied in the various sectors, whether industrial, small-scale, or aquaculture.

A few experts have attempted to estimate the number of small-scale fishers worldwide, including subsistence and artisanal fishers. These estimates vary widely, ranging from 12 million to as many as 50 million men and women directly involved in catching fish—and the number could be higher still (Berkes, et al. 2001; Le Sann 1998; Misund et al. 2002; Weber 1995; World Bank et al. 1992). The lower end of this range is very likely an underestimate. After all, based on national level statistics, FAO (2002a) estimates that 90 percent of the 15 million fishers occupied in marine capture fishing alone use vessels less than 24 meters in length—a relatively small-scale operation. And that does not begin to factor in those who fish inland rivers and lakes, or operate in small ponds or rice fields where they raise fish.

Certainly, inland fishing accounts for a large proportion of the world's fish production, and it is almost entirely dominated by small-scale operations. In China alone, more than 80 percent of the 12 million reported fishers are engaged in inland capture fishing and aquaculture (Miao and Yuan 2001). Moreover, in the Lower Mekong river basin of Southeast Asia (covering Thailand, Laos, Cambodia, and Vietnam) a recent study estimated that 40 million rural farmers are also engaged in fishing, at least seasonally (Sverdrup-Jensen 2002). In Laos, over 70 percent of all farm households also fish to augment their family food supplies and incomes (Sverdrup-Jensen 2002).

Simply adding together these estimates—the 13 million fishers involved in marine capture worldwide, 10 million inland fishers in China, and the 40 million Mekong basin part-time fishers—makes it clear that even the high-end estimate of

Table 5-1: Range of Estimates of Number of Fishers and Fish Farmers in Selected Countries and Regions (1996-2000)

		Small-scale or Artisanal	Medium to Large-scale or Industrial	Small (including subsistence fishers) and Large Scales Combined
Marine	World	13.5 million[a]	1.5 million[a]	> 15 million[a]
	Nigeria	272,000[b]		
	Senegal	90,000[c]	10,000	
	Chile	45,764[d]		
Inland	World			> 2.7 million[a]
	China			10 million[e]
	Lower Mekong Basin			40 million[f]
Marine and inland combined	World	12 million[g] – 50 million[h]		> 34.5 million[a]
	Philippines	675,677[i]	56,715[i]	

Sources: a. FAO 2002a; b. Horemans 1998; c. UNEP 2002b; d. SERNAPESCA 2001; e. Miao and Yuan 2001; f. Sverdrup-Jensen 2002; g. Misund et al. 2002, LeSann 1998; h. Berkes et al. 2001; i. PBFAR 2000.

50 million fishers no longer seems exaggerated as a world total for the small-scale sector. (See *Table 5-1* for the comparison of estimates in number of fishers in selected countries and regions).

In addition to the actual fishers, there are many other people who rely on small-scale fisheries for their livelihoods. Small-scale fishing is a labor-intensive activity and it is estimated that each fisher's job creates at least two other jobs in processing and distribution (Le Sann 1998). Including these ancillary workers, the total number of people who rely on small-scale fishing for income could be well over 100 million (Berkes, et al. 2001; World Bank et al. 1992).

Therefore, in terms of employment, small-scale fishing is a bigger factor in many national economies than large-scale industrial fishing, even though industrial fishers are usually responsible for a larger share of the catch. In Chile, one of the world's top producers of marine fish, large industrial fleets catch more than 80 percent of the country's total marine catch, but small-scale fishers represent 60 percent of the country's population of fishers (SERNAPESCA 2001). In general, although industrial fleets are more efficient at catching fish, and therefore more profitable, they generate much less employment than small-scale fishing.

Although the growth in industrial fishing is clearly putting pressure on small-scale fishing in many regions, the number of small-scale fishers continues to grow in many countries. In Chile, there was nearly a 50-percent increase in the number of artisanal fishers between 1993 and 1998 (SERNAPESCA 2001). In West Africa, the number of artisanal fishers appears to have increased by over 8 percent in the three years between 1993 and 1996.

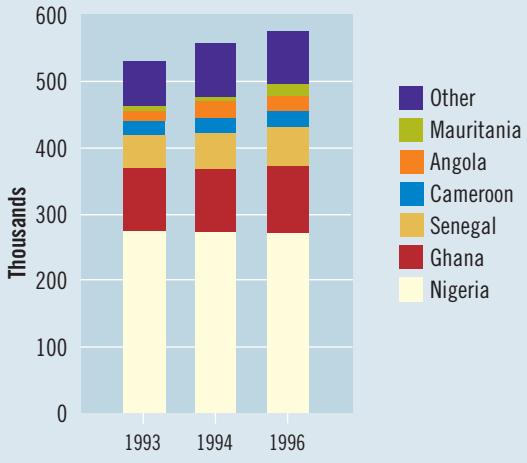
An influx of migrants looking for employment may be one factor in the increase in small-scale fishers in West Africa (see *Figure 5-2*). For example, 75 percent of the fishers in Gabon are foreigners; 65 percent in Togo; and 80 percent in Cameroon. Unfortunately, such migrant fishers tend to have even more of a marginalized social and political status than local small-scale fishers, making their voices even less heard by policy-makers (Horemans 1998).

Globally, the number of *part-time* fishers has increased much more rapidly than *full-time* fishers. While the number of full-time fishers nearly doubled between 1970 and 1990, the number of part-time fishers increased by 160 percent to 17 million, according to one FAO analysis (FAO 1999b). In Indonesia—the largest marine fish producer in Southeast Asia—the number of part-time fishers increased by more than 50 percent in ten years, from nearly 740,000 in 1989 to more than 1.1 million in 1998 (Indonesian Department of Fisheries 2000). These figures seem to indicate that people in developing countries continue to turn to fishing as an employment alternative or to supplement income from other activities, especially farming (see *Figure 5-3*).

HOW MUCH DO SMALL-SCALE FISHERS CATCH?

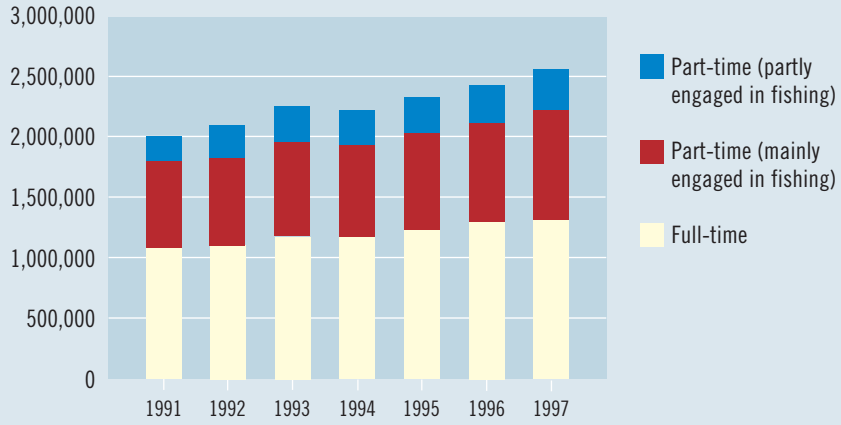
Mechanized industrial fleets are far more efficient at catching fish than small-scale fishing boats (see *Figure 5-4*). So it is easy to underestimate the collective production of the many small-scale fishers or their contribution to national economies. Some experts estimate that, as a whole, small-scale fishers produce as many fish for direct human consumption

Figure 5-2: Artisanal Fishers in West Africa



Source: Horemans 1994, 1995, 1996 and 1998.

Figure 5-3: Growth in Number of Fishers in Southeast Asia



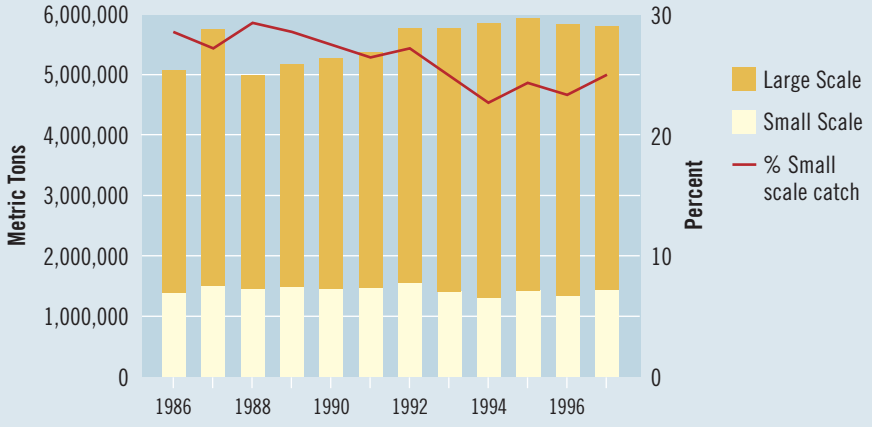
Source: SEAFDEC 2001b.

as industrial fishers (Berkes et al. 2001; Misund et al. 2002; World Bank et al. 1992). If so, that would equate to at least 30 million metric tons of fish per year—half of the 60 million tons of fish that FAO reports are annually consumed as food (small-scale fishers do not participate substantially in the harvest of small pelagic fish for the fishmeal trade, which is dominated by industrial fleets). If this is indeed the case, then small-scale fishers are just as capable of overfishing as the industrial sector.

It is also possible that the small-scale harvest could be much higher than 30 million metric tons, depending on how much of the harvest falls outside the global catch figures reported to FAO. Of course, these figures are estimates only. As indicated earlier, fish harvested by small-scale fishers often go unreported, and there are no global statistics on the size of the aggregate small-scale catch. This is particularly true for inland fisheries, where much of the catch is consumed locally and does not enter into the formal fish trade (FAO 1999a).

The structure of the small-scale fishing sector and its relation to industrial fishing differs from country to country, from region to region, and between inland and coastal waters. Freshwater fishing, for instance, is almost entirely a small-scale operation, except in large lakes such as Africa's Great Lakes, the North American Great Lakes and some operations in Cambodia's Tonle Sap.

Figure 5-4: Large- vs. Small-Scale Catch in Malaysia, Philippines, Thailand, and Taiwan



Source: SEAFDEC 2001b.

Freshwater fisheries produced almost 9 million metric tons worldwide in 2000—about 7 percent of the world's total fish production (FAO 2002a).

Small-scale fishers are also a major contributor to the marine catch. In Southeast Asia, for example, the majority of fishers are still small-scale, usually working in family-run operations with low-technology boats and fishing gear (SEAFDEC 2001a). Their production comprises a significant proportion of the region's total fish catch. For example, during the period 1986-1997, the combined annual production of small-scale fishers in Malaysia, the Philippines, Thailand, and Taiwan was around 1.4 million metric tons, or 25 percent of the total marine fishery production in these countries (see *Figure 5-4*). In terms of its economic value, the small-scale catch in these four countries was even more significant, reaching nearly US$2 billion in 1997 or over one third of the total value of fish production in these nations (SEAFDEC 2001b).

ARE INDUSTRIAL FLEETS DISPLACING SMALL-SCALE FISHERS?

As fishing technology advances and developing nations continue to support the growth of industrial fishing, the face of small-scale fishing is changing. Marine fishing in Southeast Asia is gradually becoming modernized, and industrial fleets are expanding rapidly. In Indonesia, the region's largest marine capture producer, the number of powered fishing vessels larger than 30 metric tons—a moderately sized industrial vessel—increased five-fold between 1989 and 1998 (Indonesian Department of Fisheries 2000). In response to increasing competition from industrial operators, some small-scale operators are attempting to move toward more profitable forms of fishing, targeting high-value species, such as crab, prawn, redfish, and molluscs destined for export (SEAFDEC 2001b). Some fishers have even turned to coral reef fishing, catching live reef fish which are served as a restaurant delicacy or sold as aquarium fish, often at great harm to the reefs because of the destructive fishing practices employed, such as using cyanide to stun the fish (Burke et al. 2002).

Compared to Southeast Asia, industrialization of the fisheries sector in West Africa seems slower, although nations in the region differ considerably in this regard. In Mauritania, for example, some 90 percent of fishing vessels are motorized, compared to just 3 percent in Liberia (Horemans 1998). In

general, in West Africa, small-scale fisheries still play a dominant role in terms of fish production and employment, especially for domestic fish supply (see *Figure 5-5*). Small-scale fishing in West Africa produces around 75 percent of the region's total fish catch (Horemans 1998). In fact, the artisanal catch in the region increased by 25 percent from 1992 to 1996 (Horemans 1998).

Even though industrial fishing does not yet play the same dominant role in the West Africa region that it does in other areas, it is nonetheless a considerable source of competition for small-scale producers. One reason is that many West African nations without significant industrial fleets have historically opted to sell fishing rights in their coastal waters to foreign vessels, typically European fleets. The access fees that these foreign vessels pay governments to fish in their waters are often an important source of foreign income, although this rarely trickles down to the coastal fishing communities.

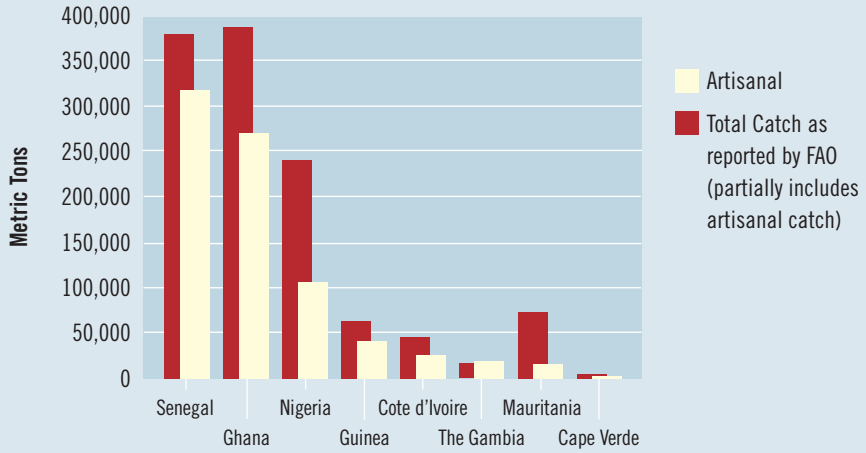
The presence of industrial fleets can have a tremendous impact on small-scale fishers. Small-scale operators traditionally catch a variety of fish species for domestic consumption, including small, low-valued pelagic species as well as more valuable demersal species. Large industrial fleets tend to concentrate on the most profitable species only, such as shrimp and demersal fish suitable for export (Horemans 1998). Where this brings them close to shore, they are often in direct conflict with small-scale fishers. When large industrial vessels, particularly trawlers, fish the coastal waters close to shore, they can degrade the sea bottom habitat and change the species composition of coastal ecosystems to a point where the local fish catch may drop precipitously.

Such conflicts between industrial fleets and small-scale coastal fishers are becoming increasingly prevalent in Asia and Africa alike, with small-scale fishers gradually losing ground. Industrial trawlers are often reported to have encroached into fishing grounds as close as a few miles from the coast—the prime fishing area for most small-scale fishers—sometimes destroying the nets set by these small-scale operators (see *Chapter 10* for further discussion on small- vs large-scale conflicts). The resulting drop-off in local catches can be dramatic. Surveys off the west coast of Africa show that fish resources in the shallow inshore waters where small-scale operators ply their trade dropped more than half from 1985 to 1990 due to increased fishing by commercial trawlers (FAO 1995a; Koranteng 2002). Unfortunately, local fishers cannot simply move on to another fishing ground when nearby waters are depleted like industrial vessels can.

Any shortfall in fish supplies due to competition with industrial fleets is bound to have a wide array of negative effects on small-scale fishers, their families, and the communities that are highly dependent on the local supply of fish for food and livelihood. Small-scale fishers are extremely vulnerable to problems such as stock depletion, and local employment alternatives may be few if fishing becomes unviable. In many cases, artisanal fishers are tied to a certain fishing ground, with their fishing methods or fishing gears tailored to catch particular species. This makes it difficult to switch locations or to target another type of fish when their preferred species are depleted or their traditional methods become unprofitable (FAO 2000a). Even if they are successful at switching to more profitable forms of fishing targeted for export—an increasingly common response to competition from industrial fleets—this may adversely affect local communities by leaving fewer fish available for consumption in local markets.

In order to forestall the negative effects of encroachment by industrial fleets, nearly all West African countries now legally grant small-scale fishers exclusive fishing rights in near-shore waters, prohibiting industrial trawlers within a fixed distance from the shore (1 to 12 nautical miles, depending on the country) or a set depth of water (Horemans 1998; Bortei-Doku Aryeetey 2002). Asian countries such as India, Indonesia, and Thailand also have banned or limited the access of industrial trawlers to

Figure 5-5: Artisanal and Total Catch for Selected West African Countries, 1996



Source: Horemans 1998; Fishstat 2003.

coastal waters along some parts of their coasts (Vijayan et al. 2000; FAO 2000c; FAO 2000d). Although their enforcement is a challenge, such regulations are an important step toward protecting the livelihood of small-scale fishers (Bortei-Doku Aryeetey 2002).

Despite some failures, co-management is generally considered the way forward in small-scale fisheries management and continues to spread around the world. The existing body of experiences is encouraging, and provides a glimpse of the challenges and opportunities for the future generation of co-management projects.

CAN CO-MANAGEMENT HELP SUSTAIN SMALL-SCALE FISHERIES?

In small-scale fisheries, particularly in developing countries, the idea of shared power and responsibilities between the government and fishing communities has emerged as an alternative framework for managing fish stocks. This management approach is referred to as "co-management"—management where government and local resource users are each given specific decision-making and monitoring rights and responsibilities. Co-management by definition includes active participation by both government and fishing communities, as well as other stakeholders such as nongovernmental organizations (NGOs) and local businesses (Wilson et al. 2003; Viswanathan et al. 2003).

The rationale behind co-management is that conventional management approaches have often failed to manage small-scale fisheries effectively or in a manner that is fair to local fishers. In pre-colonial times, local fisheries were managed by traditional authorities such as chiefs or village councils. But during colonial times these traditional arrangements in developing countries were replaced by more centralized governance regimes (Berkes et al. 2001; Wilson et al. 2003). Such centralized governing systems have continued in modern societies, where fisheries resources are usually considered state property (instead of the property of local communities), often resulting in their *de facto* treatment as open access resources (Brown and Pomeroy 1999; Berkes et al. 2001).

Unfortunately, centralized and top-down management measures have often failed at the village level (Wilson et al. 2003). One primary difficulty is that small-scale artisanal fisheries are often spread across remote rural areas, making it difficult to enforce compliance. Another problem is that these centralized systems take little heed of the different conditions or needs of local communities and often fail to ensure that local communities have equitable access to fisheries resources in the form of a legally recognized right to fish.

Co-management offers an alternative. Research shows that when communities participate in the governance of local resources, they are more likely to support management decisions about how those resources should be used, and these decisions are more likely to be successfully implemented. On the other hand, when local people are left out, it is often a recipe for conflict, inequity, and environmental harm (WRI et al. 2003). By granting local communities specific rights to use fishery resources, co-management acts as a bridge between traditional forms of community management and modern state management.

The potential of local management can be seen today in several communities where customary systems of local fishery management survive (Berkes et al. 2001). For example, in the Maluku Islands of Indonesia, the "Sasi-Laut" system, based on rules evolved by the local fishing community, regulates the use of marine resources. It includes rules on permissible fishing gear, access to the fisheries, and designation of fishing seasons and areas closed to fishing (Novaczek et al. 2001). In Japan, local fishing villages and fishermen's guilds, now formally organized into over 1,700 Fisheries Cooperative Associations (FCAs), have managed inshore fisheries for centuries (Lou and Ono 2001). The FCAs are organized geographically or around a specific fishery, for which they regulate activities using a variety of conventional measures (described in *Chapter 11*), from catch quotas to closed seasons. The Japanese government plays a supporting role, primarily providing a legal and administrative mechanism for this community-based resource management, and by supporting stock assessments and research, capacity building, and evaluation (Lou and Ono 2001).

Similar examples can also be found in Europe, such as the Cofradías (fishermen's association) system in Spain, and the Lofoten Island system in Norway (Jentoft 2003). These and other examples of traditional community-based management show that the rate of compliance with regulations tends

Y. KURA, WRI 2003

The catch is meager at the end of the fishing season in Tonle Sap Lake, Cambodia.

to increase where local users take ownership of the management objectives and collectively self-police their implementation (Brown and Pomeroy 1999; Pomeroy et al. 2001; Hauck and Sowman 2003; Viswanathan et al. 2003).

What are the conditions that lead to good community management of common resources? Research on thousands of cases of community-based management shows that key factors to success include a community-wide understanding of the value and scarcity of the resource; good communication among community members; an effort to monitor whether rules are being followed; a credible system of sanctions when rules are broken; and a mechanism to resolve disputes. Government recognition of the community's right to manage the resource itself, ensuring that local authority is not undermined, is also a crucial precondition for success (Ostrom 1990; Ostrom et al. 1999; Jensen 2000).

It's important to note that while co-management schemes can bring about more effective fisheries management, they do not ensure that this management will always foster sustainable fishing practices. The strong points of co-management are that it enables greater fairness in decision-making and a wider participation of stakeholders in the management process. But that does not always translate into an emphasis on the long-term health of local fish stocks. Much depends on the community's level of awareness about sustainable fishing practices, its economic situation, and the availability of employment alternatives to fishing. In some instances, the community may choose to prioritize short-term economic development over long-term sustainability. On the other hand, there are numerous examples where communities have chosen to prioritize conservation (Johannes and Hickey 2002; Viswanathan et al. 2003; Begossi and Brown 2003; Harris et al. 2003).

Transitioning from state-dominated management to a co-management approach can be challenging. Factors influencing a successful transition include the community's history and its economic and cultural needs, the condition of the local resources, and the details of the existing management arrangement. Therefore, there is no universally applicable guide to establishing a successful co-management regime (Pomeroy et al. 2001; Hara and Nielsen 2003). However, some lessons can be drawn from existing examples.

One important element is how power, rights, and responsibilities are shared and transferred to communities. If the decision-making power remains with the government, and communities are merely used as a local body to implement government policies that have not been cooperatively developed, the co-management program may not be successful. The main reason is that the community will not feel a sense of ownership for the management objectives (Viswanathan et al. 2003; Hara and Nielsen 2003). This is also the case if donors such as development agencies or outside conservation groups have played too central a role in the co-management scheme. For example, several co-management projects in Africa failed to reach their potential because local

communities felt that conservation goals developed by outside funders were imposed on them in a top-down fashion (Hara and Nielsen 2003).

On the other hand, in countries such as the Philippines, where the central government has encouraged decentralization of power to local governments, transition to co-management has been smoother (Pomeroy and Viswanathan 2003). In San Salvador Island in the Philippines, for instance, a group of local stakeholders successfully set up a marine protected area and regulated destructive fishing practices within the area, resulting in the recovery of reef fish species (Pomeroy and Viswanathan 2003; Viswanathan et al. 2003).

The participation of local NGOs in organizing communities and building partnerships can also contribute to the success of co-management projects. In Bangladesh, where an estimated 80 percent of rural households are engaged in inland fishing, co-management projects have evolved in some 270 water bodies since the late 1980s (Pomeroy and Viswanathan 2003). Although the level of success has varied among these projects, NGOs have played a key role in the more successful examples.

Careful planning and support from legal authorities and funders can also be key to the success of some projects. The tribal Sokhulu community in KwaZulu Natal province, South Africa, has recently gained legal access to harvest mussels from a nearby national park after a long-standing conflict between the community and park officials over illegal harvests. After a two-year period of working together and building trust, the community entered into a co-management arrangement with the park in which they have been given the legal right to harvest mussels. As part of the arrangement the community must monitor the harvest to determine if it is sustainable, and adjust the harvest level if it is too high (Harris et al. 2003; WRI 2003).

In sum, for a co-management project to be successful it should at least adhere to the following general principles:

- Policies and legislation should ensure the recognition of property rights and resource access for fishing communities;
- Local responsibilities and authorities should be well defined;
- Communities should be well organized, well represented, and aware of the issues and stakes involved;
- Government and local communities should have the capacity and the willingness to work with an array of local stakeholders, and to balance their needs;
- There should be incentives both for communities and governments to continue to participate in the scheme over a protracted period, such as guaranteed equitable sharing of costs and benefits.

Despite some failures, co-management is generally considered the way forward in small-scale fisheries management and continues to spread around the world (Wilson et al. 2003). This is partly because co-management presents one of the few alternatives to the centralized approaches that are currently the norm and are often unsuccessful. The existing body of experiences is encouraging, and provides a glimpse of the challenges and opportunities for the future generation of co-management projects.

FAO/17088/M. MARZOT

In developing countries, children often participate in fishing activities.