LESSONS FROM SIX CASE STUDIES

The Global Fisheries Crisis, Poverty and Coastal Small-Scale Fishers

LINKAGES • IMPACTS • OPPORTUNITIES

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Acknowledgements

We would foremost like to thank Gareth Porter for his work researching and reviewing the case studies for this project as well as his contribution to the first draft of this publication.

We would also like to thank the members of the WWF country teams and their researchers who carried out the case studies in the Philippines, Indonesia, Vietnam, Malaysia, Guatemala and Honduras, including Carlos Morales, Alicia Medina, Keith Symington, Ed Tongson, Thuy Nguyendieu, Kenneth Kassem, Kevin Hiew, Chitra Devi and Lida Pet-Soede. Without their motivation and hard work, the case studies would not have become a reality.

We also acknowledge other WWF staff members, including Reimund Kube, Daniel Afzal, Bill Eichbaum, Helen Fox, Gina DeFerrari, Bill Fox and Kimberly Davis, who provided valuable contributions and editing advice along the way. We would like to extend special attention and appreciation to Christophe Béné, Hugh Govan and Jeff Kinch for their insightful and constructive comments to the first drafts of this publication. Last but not least we would like to thank Tom Grasso and Dawn R. Montanye who initiated this unique initiative between WWF Fisheries Program and the WWF Macroeconomics Program Office.

Gabriella Richardson Temm, Ruba Marshood and Pamela Stedman-Edwards, December 2008

This report is a joint publication between the WWF MPO Poverty Environment Program and the WWF US Fisheries Program. Funding for this project was provided by the Swedish International Development Agency, the Packard Foundation and the Asian Development Bank. The interpretations and conclusions expressed in this report do not necessarily reflect the official views of WWF or any of the above mentioned institutions.

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Executive Summary

Small-scale fisheries produce more than half of the global seafood catch and provide employment for most of the world's fishers. Nonetheless many coastal fishing communities face persistent poverty and more recently decreased availability of the coastal and fisheries resources they depend upon. To better understand the drivers of unsustainable resource use and coastal poverty, WWF carried out six community-based case studies in Vietnam, Malaysia, Indonesia, Philippines, Honduras and Guatemala, designed to identify the socioeconomic obstacles at the local, national and international levels to sustainable coastal fisheries management and small-scale fisheries development.

Many of the obstacles to sustainable development and improved resource management were found at the national and international levels, outside the coastal communities:

- National political and financial priorities favor production (particularly for export) over sustainability.
- Coastal communities lack authority over their own resources.
- Foreign and other new markets create incentives for unsustainable harvesting of valuable species.
- Development policies and poverty alleviation plans do not recognize the potential of small-scale fisheries and coastal fishing communities.

In the places studied, the current rate of exploitation of coastal and marine resources is causing long-term degradation of fishing resources and associated coastal and marine habitats, with serious impacts for the coastal communities directly reliant on these resources. This overexploitation is the result of a combination of policy and market factors, including overcapacity in the commercial fishing sector, poor enforcement of fishing regulations and coastal fishing zones, and growing international markets for high-value marine products. National governments face a set of political and economic incentives that have led them to focus on increasing production and fishing capacity rather than long-term sustainability or equity. As a result, they have not succeeded in designing national development plans and poverty reduction strategies that adequately address the interlinked crises of unsustainable fisheries use and coastal poverty. International development institutions, which to some extent have contributed to overcapacity in the commercial fishing sector, have become more cognizant of these issues in recent years. Nevertheless, they have not been able to provide the right kind of incentives to ensure that small-scale fisheries are included in national development plans and poverty alleviation strategies plans. In addition, coastal communities' lack of political and economic influence undermines their

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ability to gain control over resources, retain the economic and other benefits of these resources for themselves, or use them to improve their livelihoods.

Given the evident shortfalls of existing governance systems, consensus has emerged around the need for decentralization of fisheries management authority and around the importance of co-management and rights-based management for communities. Most of the case-study countries have taken some steps in the direction of one of these less centralized management systems. However, since many of the obstacles to sustainable management lie outside the control of the fishing communities, they will need to be addressed accordingly and at multiple scales. Many of the obstacles originate from the failure of markets, national governments, and international organizations to incorporate the needs and aspirations of coastal communities and the value of the ecosystems into policies, and to establish the complex management systems needed to maintain coastal resources and ecosystems. Increasing knowledge of the relationship between fisheries degradation and poverty is gradually incorporated into the fisheries sector strategies of the major international development institutions in ways that recognize the need for cross-sectoral management and pro-poor growth. While this is an important step forward, moving towards sustainability and poverty alleviation will require additional changes at the international, national, and local levels.

The report's recommendations focus on changes that are needed in national and international policies and markets in order to create the conditions for more sustainable resource use and increased access to and control over resources by coastal fishing communities. Ideas discussed include:

- Developing coherent and holistic international collaboration and support for pro-poor sustainable fisheries management, addressing global and national issues;
- Investing in and supporting local management capacity for sustainable fisheries;
- Creating conditions for viable pro-poor sustainable fisheries management through government support for measures to reduce resource overexploitation and to promote sustainable use; and
- Promoting pro-poor economic opportunities for coastal communities that are accessible and sustainable for small-scale fishers.

In summary, addressing the drivers of poor fisheries management at the national and international levels is as crucial to the sustainable development of small-scale fisheries as strengthening the capacity, ability and rights of coastal communities to manage their own resources well.

1 Introduction

The fisheries sector has been a major source of food, employment, and economic and social benefits for people and nations for centuries. Yet today, 75% of all the world's marine fisheries are considered fully exploited or overfished (FAO 2007a).

Coastal small-scale fisheries produce over half of the global seafood catch and host the majority of the world's fishers. Small-scale fisheries make a critical contribution to food security and economic activities among the large populations that comprise coastal fishing communities, in addition to contributing to national and local economies, and increasing GDP, export earnings, and license fees. Several hundred million people worldwide are in some way involved with and dependent upon the coastal small-scale fisheries sector for their livelihoods – whether recorded officially as full-time "fishers", fishing on a part-time or seasonal basis, or involved in post-harvest activities (Andrew et al 2007)[1]. Most, probably 95% live in developing countries (OECD 2008). Many of them live in remote areas, where there are few alternative sources of income and employment and little access to services and infrastructure[2]. Products of these fisheries provide for local subsistence and local markets. As these coastal communities grow, local pressures on coastal fishery resources continue to rise. Products from these fisheries also reach international markets, particularly developed country markets, which have expanded rapidly. Yet as global demand for fisheries products expands, and as food and commodity prices remain volatile around the world, many coastal communities face persistent poverty and decreased availability of the coastal resources they depend upon. This paper explores some critical drivers of poverty and unsustainable resource use in these communities through a review of national and regional policies, development assistance strategies, and market factors affecting small-scale fisheries and coastal community livelihoods.

The close and complex relationship between fishing communities and coastal and marine resources in developing countries has been increasingly explored over the past few decades. Yet, in the face of growing knowledge about poverty and the environment, and numerous efforts to achieve sustainable fisheries management, fisheries resources continue to decline, the number of fishers has risen, and poverty persists in many coastal communities. Clearly, a piece of the complicated puzzle relating coastal fishing communities,

1 There are many different estimates of the number of fishers globally, of the number of people directly dependent on fisheries, and of the importance of fisheries to food security and national economies (Béné 2006); the figures cited here are representative of these estimates.

2 However, an increasing number are operating from semi-urban and urban areas (Béné pers. comm.)

sustainable resource management, and national development is missing. WWF initiated its effort to address this knowledge gap through six site-level case studies in three priority areas—the Coral Triangle, the Mesoamerican Reef, and the Greater Mekong's coastal Vietnam[3]—along with a literature review designed to identify socioeconomic obstacles to sustainable coastal fisheries management and small-scale fisheries development. Based on lessons from these six case studies and desktop research, this paper recognizes that the linkages between poverty and fisheries are multiple and complex and finds, among other things, that:

- Overexploitation of fisheries resources is causing long-term degradation of fishing resources and associated habitats, which have serious adverse impacts particularly for the coastal communities directly reliant on fishing.
- Overexploitation is often the result of overcapacity in the commercial fishing sector, poor enforcement of fishing regulations and coastal fishing zones, and growing international markets for high-value marine products.
- Governments face a set of incentives that have led them to focus on increasing production and fishing capacity rather than equity, poverty alleviation or sustainability.
- Governments and international development agencies have largely failed to foster the potential of small-scale fisheries to contribute to national economies and poverty alleviation, although the complex requisites of good fisheries governance are increasingly recognized.
- Coastal small-scale fishers have rarely been given rights or responsibilities for the resources they depend upon, nor adequate support, attention, and investment by governments and international development programs to sustainably manage those resources.
- Development of aquaculture has not resolved the problem of unsustainable fisheries use and coastal poverty.

3 The choice of four Asian countries reflects the fact that the majority of the world's small-scale fishers, perhaps as many as 90% (www.fao.org), live in Asia.

As a result, the communities examined in the case studies remain impoverished because existing socioeconomic institutions and incentives prevent them from controlling access to their resources, and thus from retaining the benefits of those resources which could support development, while also promoting overuse. Despite the significant contribution made by small-scale fisheries to national and local economies, they are underrepresented in the national policy arena and rarely considered in poverty alleviation or development strategies. This neglect compromises the capacity of coastal communities to achieve food security, participate in economic activities that alleviate poverty, or improve the state of their coastal and marine resources.

Following a brief description of the methodology used for the case studies and the characteristics of small-scale fisheries, the paper reviews the relationship between the current fisheries crisis and changing fishing practices in coastal communities revealed by the case studies, and then examines the national and international drivers that have led to the existing patterns of unsustainable use. The final section considers some directions for research, thought and discussion as to how these obstacles to sustainable management can be addressed so that coastal communities can better manage their resources and improve their livelihoods.

2 Methodology

The World Wildlife Fund's Macroeconomics Program Office (MPO) has developed a research methodology to examine the socioeconomic obstacles and opportunities facing sustainable development and applied in the cases discussed here to the development of sustainable fisheries regimes.

The methodology, known as the "3xM Approach" (Reed 2006), analyses these obstacles and opportunities at three levels: the local, national, and international levels. The methodology is designed to:

- Assist stakeholders at the local level to understand how existing government policies, institutions, and economic forces can inhibit or foster their efforts to reduce poverty and improve natural resource management.
- Assist stakeholders at the sub-national, national, and international level to recognize and address the political and economic factors that work against the interests of the poor and the environment.

To get at the complex causes of coastal and marine degradation and their impacts on fishing communities, six WWF study teams were asked to conduct an overview of the socioeconomic and political factors affecting poverty and the fisheries sector and to apply the 3xM methodology to a particular fishing community (or communities) where an apparent relationship exists between resource degradation and livelihoods. Based on this common methodology, analyses were conducted by WWF in Guatemala, Honduras, Indonesia, Malaysia, Philippines, and Vietnam, each looking at places where overexploitation has led to degradation of the coastal resources on which vulnerable populations depend. (Brief summaries of these studies are found in Appendix I). A four-step approach was used to apply this methodology in each of the six countries:

- Understand the international, regional and national context of the selected country's fisheries sector.
- Identify the places where poor human populations are dependent on threatened fisheries, species, or marine or coastal habitat.
- Describe the links between local impoverishment or unsustainable use in these places and local, regional, national and international drivers.
- Outline key issues to be addressed locally, nationally and internationally in order to remove obstacles and promote opportunities for improved sustainability and poverty alleviation.

In a nutshell, these case studies sought to understand the problems of unsustainable fisheries management and poverty in coastal fishing communities in terms of the underlying socioeconomic drivers. Findings from the site-specific studies provide useful examples of the difficulties and opportunities facing the participation of coastal small-scale fishing communities in poverty alleviation initiatives and facing the development of sustainable resource-management regimes.

3 The Coastal Small-Scale Fisheries Sector

3.1 Characteristics of Coastal Small-Scale Fishers

Small-scale fisheries around the world make use of a wide variety of marine ecosystems and target multiple species using many different capture techniques. What they have in common are low levels of capital investment and management resources, generally low production levels, large numbers of fishers, and limited access to markets, in comparison with larger industrial or commercial operations. As a general rule, small-scale fishers use smaller boats and lower technology gear than their industrial counterparts, fish close to shore, sell their product locally or use it for subsistence, and are highly dependent on coastal resources for subsistence and livelihoods[4]. Small-scale fishing may be a full-time activity, but is often part time either because of the seasonality of fisheries or because it is used as a fall-back activity when other sources of income are unavailable. The number of part-time fishers has increased (FAO 2005), suggesting the increasing importance of fishing as a safety-net or supplementary economic activity.

The six WWF case studies reviewed in this paper looked at a variety of small fisheries. The study in **Indonesia** looked at the live reef fish trade (LRFT), where boats with outboard (rather than inboard) motors are considered small-scale. Data on the north coast of Java in the late 1980s showed that nearly 95% of the fishing vessels relied on outboard motors (McElroy 1991). In **Malaysia**, the small-scale or "traditional" fishers are those who do not operate trawl or purse-seine vessels. They represent almost half of the 89,000 or so fishers who operate within 30 nautical miles of the coast and about 80% of the country's fishing vessels, though they captured less than 25% of the catch in 2004. Small-scale fishers in the **Philippines** are designated as "municipal"

4 The FAO Advisory Committee on Fisheries Research (ACFR) Working Party on Small-scale Fisheries has proposed a useful description, based on common characteristics:

"Small-scale fisheries can be broadly characterized as a dynamic and evolving sector employing labour intensive harvesting, *processing and distribution technologies to exploit marine and inland water fishery resources. The activities of this sub-sector, conducted [full-time, part-time, or just seasonally], are often targeted on supplying fish and fishery products to local and domestic markets, and for subsistence consumption. Export-oriented production, however, has increased in many small-scale fisheries during the last one to two decades because of greater market integration and globalization. While typically men are engaged in fishing and women in fish processing and marketing, women are also known to engage in near shore harvesting activities and men are known to engage in fish marketing and distribution.*

Other ancillary activities such as net-making, boat-building, engine repair and maintenance, etc. can provide additional fishery-related employment and income opportunities in marine and inland fishing communities. Small-scale fisheries operate at widely differing organizational levels ranging from self-employed single operators through informal micro-enterprises to formal sector businesses. This sub-sector, therefore, is not homogenous within and across countries and regions and attention to this fact is warranted when formulating strategies and policies for enhancing its contribution to food security and poverty alleviation." (FAO 2004)

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fishers and include all those who fish up to 15 km from the coast and use boats of less than 3 tons. The number of municipal fishers has fluctuated greatly in recently decades, including a tripling to 1.8 million between 1995 and 2005, reflecting an influx of part-time fishers. In Sablayan, one of the communities WWF Philippines studied in depth, only 5.7% of the labor force considers fishing their primary occupation, and most fishers have at least two sources of income. In **Guatemala**, small-scale or artisanal fishing is a subsistence activity which relies on the use of canoes (*cayucos*) and other small boats. Likewise, in **Honduras** the approximately 22,000 artisanal fishers, representing the overwhelming majority of the nation's fishers, do 95% of fishing from wooden canoes propelled by oars and sails. Small-scale fishers in **Vietnam** are those who operate in inshore fisheries—defined as those with depths of less than 30 m. They account for about 85% of all of Vietnam's fishing vessels. Compared with those in the Philippines, Vietnamese coastal small-scale fishers rely more heavily on fishing for livelihoods. About 70% of the population in the two communities that were WWF research sites depend on fishing for at least half of their income.

3.2 Small-Scale Coastal Fisheries and Poverty

As our understanding of poverty has evolved in recent years, so too has the understanding of the links between poverty and coastal small-scale fisheries. Income poverty is frequent in these communities, as are the other characteristics of impoverishment, including poor health, nutrition, education, infrastructure and housing. As many as 50 million people who depend to some degree on fisheries are poor in absolute terms (OECD 2008). The case studies provided ample evidence of high levels of poverty in the communities studied, in terms not only of income but also access to health care, education, and other basic necessities for improving quality of life. For example, among the Southeast Asian countries studied:

- Filipino fishing households suffer from a higher incidence of poverty and worse access to basic necessities than the average Filipino household (FAO 2005 and 2007b).

- 80% of Indonesian fishing households earn incomes below the country's poverty threshold (FAO 2007b).
- In the Tay Ninh province of Vietnam, 88% of very low income households were linked to the fisheries sector (FAO 2007b).
- In Indonesia, most small-scale fishers are indebted to moneylenders and vessel owners who are able to buy their products at below-market prices and charge annual interest rates of 60% (Briggs 2003).

In the past, the frequency of poverty among coastal fishing communities has been blamed on the nature of the fisheries resources. Because fisheries appear to be open access resources, it has been assumed that they will be overexploited, leading to impoverishment of fishers and a persistent cycle of resource overuse and degradation. It has also been suggested that impoverished people become fishers, often because they do not have access to land[5], since fisheries provide a livelihood of last resort. Although the fairly open nature of fisheries does mean that overexploitation is common, coastal fishing communities have shown this is not inevitable. On the contrary, fishing communities, when given appropriate rights, capacity, and ownership over their resources, can play a central role in coastal resource management and in many cases take actions to achieve sustainable fisheries management, restore stocks overexploited by large-scale fishing operations[6], and protect other coastal resources important to fisheries such as mangroves.

While the absolute scarcity of fisheries resources, low incomes among fishers, and migration into the sector in difficult economic times are all part of the story, the relationship between coastal resource use and poverty is more complex. As our understanding of the causes of poverty have become more sophisticated, it has become clear that the impoverishment of fishing communities, like the impoverishment of other rural communities, is the result of exclusion from socioeconomic opportunities (see Béné 2003) through exclusion from access to resources and the benefits generated by those resources. Social, political and economic institutions that govern access to all kinds of resources—including fisheries and other coastal resources, capital, education, and infrastructure—reinforce poverty in many places of environmental concern, including coastal regions.

The 3xM approach starts from the supposition that social and economic factors, not only at the local level but also at the regional, national and international level, may reinforce impoverishment by depriving local people of adequate access to, or control over, the natural resources on which they depend. Thus while the case studies discussed here examine the overexploitation of fisheries resources in terms of how local resources are controlled or appropriated and depict the creation of cycles of unsustainable use, the more important findings concern the social and economic institutions that lead to this behavior and deprive local coastal communities of the economic and political power to use their coastal resources as a means to development.

5 See Béné 2003 for a review of the prevalence of these views and their shortcomings.

6 Several papers have addressed the conditions necessary within small-scale fishing communities to establish and maintain local fisheries management systems. Among the most useful of these is Andrew et al (2007) who provide a scheme for "diagnosing" or analyzing and managing small-scale fisheries in terms of intra-sectoral issues; see also, for example, Cinner's (2005) discussion of customary marine tenure, Béné (2003) on the role of control over resource access within the community, Kurien (2004) on re-assertion of traditional property rights, or Pollnac and Pomeroy (2005) on the factors affecting sustainability of integrated coastal management.

3.3 The Fisheries Crisis, Resource Use, and Poverty in Coastal Small-Scale Fishing Communities

Each of the case studies looked at a fishery where fish stocks are declining and increasing fishing efforts are bringing reduced returns. Fishing is the largest extractive use of wildlife in the world, and provides the primary protein source for over 950 million people worldwide (URI and FIU 2006). Over the last 50 years, fisheries reached unprecedented levels of production. Impact on fisheries likewise has been unprecedented, firstly from overfishing, as access to growing international markets has driven both commercial and small-scale fishers to put greater pressure on local resources. Pressures also come from pollution, habitat destruction, agriculture, tourism development, oil and gas extraction, shipping, aquaculture and climate change.

The resulting degradation of coastal and fisheries resources—readily acknowledged today—has serious adverse effects on food security, employment opportunities, and standards of living for the small-scale fishing households that comprise the majority of people dependant on fishing for their livelihood (Béné 2003). Nearly 90% of the 38 million people recorded as fishers worldwide are classified as small-scale (Béné et al 2007), and many more millions are in some way dependent on the small-scale fisheries sector. The sector is critical to food security in the countries studied. For instance, in Vietnam, fish provides 37% of daily animal protein and, in Indonesia and Malaysia, the sector's contribution to domestic consumption is relatively more important than to trade (FAO 2007b). Thus the declining state of fisheries resources can be expected to have disproportionately heavy consequences for developing countries, their national economies and their poorest communities, particularly coastal fishing communities (URI and FIU 2006).

Overexploitation by the commercial fishing sector is often responsible for declining fishing opportunities for small-scale fishers. The larger commercial fishing boats encroach on coastal fishing zones, generally known as Exclusive Economic Zones (EEZs) or territorial waters, which are often legally set aside for national coastal resource users. Commercial vessels, particularly trawlers, often indiscriminately scoop up resources, permanently alter marine ecosystems and destroy habitats, and cause rapid and serious depletion of fish stocks. Overfishing leads to long-term changes in the ecosystem structure, first as predator fish are largely removed and then as fishers begin removing ever smaller fish. In these case studies, we see that the result is rapidly declining catches for the inshore fishers, to which they must adjust by going farther out to catch fish and by using increasingly unsustainable methods, such as illegal net-mesh sizes, cyanide or dynamite, just to maintain their income. The development of aquaculture, often viewed as a quick solution to overfishing and an alternative livelihood for fishers, has in turn created new demand for "trash fish"—brought in by trawlers—to feed to some species of farm-raised fish.

In other cases, the development of new markets for high-priced products such as lobster and live reef fish has created economic opportunities for small-scale fishers; but these opportunities promote unsustainable extraction and destructive techniques which will soon deplete the target populations. In addition to reducing populations of sought-after species, fishing for these high-value species has led to widespread degradation of coral reefs in the cases studied, which is associated with long-term changes in the ecosystem structure.

3.4 Impacts of Fisheries Exploitation: Six Cases

The six case studies in the Coral Triangle (Philippines, Indonesia, Malaysia), Central America (Guatemala, Honduras) and Vietnam describe this process in detail. This section provides a brief summary of this aspect of each case, highlighting the changes in fishing practices driven by overfishing, falling incomes and new markets. The following section examines the socioeconomic factors that have led to this impasse.

PHILIPPINES

Filipino small-scale fishers in the municipal waters of Sablayan, Occidental Mindoro are no longer able to make a living using traditional fishing methods because of dramatic declines in the size of their daily catch. Historical catch data on those fisheries, which researchers obtained through interviews with fishers in the region (Abesamin 2006), show that the average catch-per-day for lift-nets has declined steadily from 40 kg/day in the 1960s to only 9.8 kg/day since 2000. A similar decline was documented for fishing with multiple hooks, which yielded an average catch of 25 kg/day in 1970-79 but has yielded only 6.2 kg/day since 2000. The daily catch rate from hook-and-line fishing increased from the 1960s to the 1980s, but that rate has since fallen to just 23 kg/day from a high of 58 kg/day. In interviews conducted for the case study, 30% of the Sablayan fishers complained that low fish-catch was by far their most serious fisheries problem. The same dynamics are apparent at the second Filipino research site, the Davao Gulf fishery (BFAR 2006). There vessels using commercial fishing gear, notably *payaos* (devices that aggregate pelagic fish), showed an upward trend in catch-per-day in the 1980s and 1990s. However, catch-per-day for those using gill nets, the most common type of fishing gear, declined precipitously during the same period. At some monitoring centers in the Davao Gulf, the share of small-scale fishers' catch in the total fell from 76% in 1998 to just 15% in 2003. The cost of the extreme declines in fish-catch to food security for coastal communities is significant; annual fish consumption per capita has plummeted from over 40 kg in 1988 to just 31 kg in 2004 (National Inland Fisheries Institute 1990; White et al 2006). Small-scale fishers are responding to the crisis by using illegal and destructive gear, including illegal net-mesh sizes, cyanide, spear-fishing and blast-fishing.

INDONESIA

The growth of the live reef fish trade (LRFT) in Indonesia's Savu Sea is a response to the overexploitation of Indonesia's demersal fish stocks and the development of markets for live food fish. The loss of demersal fish stocks has been dramatic; indications are that the stocks off Kalimantan in the South China Sea have fallen from 2.4 tons/km^2 in 1975 to 1 ton/km^2 in 2002, and that biomass of demersal stocks in the Java Sea dropped by roughly 75% between 1976 and 2001 (Mous et al 2005). The

growing market for live reef fish, destined almost exclusively for the restaurants of Hong Kong, has meant that fishers can earn relatively high salaries. The LRFT, however, is dependent on destructive fishing practices. Use of blast-fishing and cyanide are not only depleting fish stocks but also destroying Indonesia's reefs. Blast fishing, used to stun schooling reef fish, damages coral formations and kills non-target and juvenile fish and invertebrates over a large area. The use of sodium cyanide is even more common for catching live reef food fish (primarily grouper and Napoleon wrasse) and rock lobsters; the cyanide solution used to capture large reef fish also kills smaller fish, invertebrates and coral reef organisms. Over time cyanide fishing can lead to the collapse of entire coral reef ecosystems.


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MALAYSIA

In Malaysia, resource surveys show a clear and steady decline of nearly all demersal fish populations since 1969, and fish biomass has declined precipitously, perhaps by 90% since 1971, in the rich coastal waters of Peninsular Malaysia (Dept. of Fisheries). Three main factors have led to the decline in fish landings for traditional fisheries revealed in WWF's study on the west and east coasts of Peninsular Malaysia: depleted fisheries resources, competition from commercial fisheries, and illegal fishing by foreign and unlicensed Malaysian fishers. However, the economic impacts of the decline in fishery resources have been buffered in Malaysia by a rise in fish prices, driven mainly by rising incomes in the larger society and by the scarcity of commercial fish species. The case study of two Malaysian fishing communities found that fishers were earning more in 2007 than in 1997 and that they were also better off in regard to access to water as well as possessions (e.g. televisions, cars, etc.), though income poverty levels remain very high. The fishers' prosperity was also boosted by part-time jobs, mainly in tourism. Thus there is not a clear link in the Malaysian case between falling fish stocks and poverty, but rising incomes may well be disguising the sustainability crisis in Malaysian fisheries. The increasing demand and declining supply of fish in Malaysia may indicate food security challenges to come.

GUATEMALA

Marine fishing in Guatemala is in crisis; industrial fishing operations have been largely shut down because of high fuel and fishing gear costs combined with the degradation of marine resources. Nearly three-quarters of the shrimp fleet is inactive, as is just over half of the commercial long-line fleet. This national fisheries crisis is reflected in Guatemala's small inshore fishery on the Caribbean coast, of which the town of Livingston is one of the most important centers. Livingston's fishing population—nearly a third of whom are women—constitutes 25% - 30% of the town's population.

In the absence of official statistics on fish catch, interviews with fishers give a picture of the perceived trends. All of those interviewed said that their catch rate had deteriorated to less than half of what it had been just 15 years ago. Local fishers believe this decline is due to: increased pressure on fish stocks as more people enter the fishery; and increased use

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of illegal fishing techniques by outside fishers, including very small net-mesh sizes that capture even the very youngest of the species fished. Fishers in Livingston encounter many small fishing boats from other communities in their waters using illegal mesh sizes. Another recent study of Guatemala's artisanal fisheries (PROBIOMA/AECI/UNIPESCA 2005) confirms this trend, showing a remarkable reduction in the size and weight of fish as well as the variety of species caught on the Caribbean seaboard in the span of a few years. According to this study, half of the fish caught in 2005 weighed less than one pound, down from an average of three and four pounds in 2001–2002; and in those same years, fishers experienced a sharp decline in the variety of species caught, from eleven to just four.

Fish prices have increased in response to declining catches, but fishers feel they have gained relatively little benefit because costs have also gone up. In Punta de Manabique, fishers told interviewers that, after deducting for fuel, salt and labor, they earn below minimum wage. Many sell their fish to middlemen who set their prices very low. The profit margin for these middlemen, based on the information provided by fishers and buyers, is between 50% and 55%. The major exceptions to the economic woes of Guatemala's artisanal fishers are the lobster and conch markets. Fishers who catch these species make incomes well above the community average, because of high market demand. Together this evidence suggests that the ecosystem that has supported the Caribbean inshore fishery has undergone fundamental changes that are causing the collapse of many of the species on which the fishery has depended in the past and, with certain exceptions, the Guatemalan fishers, like those of the Philippines and Vietnam, are suffering deepening poverty.

HONDURAS

Fishing in Honduras is dominated by commercial or industrial-scale fishing for lobster, by far the country's most profitable marine product. Honduras is now the third-largest exporter of frozen lobsters to the US market, exporting more than 1.3 million kg of lobster annually. Lobsters are caught in two ways: divers and pot traps (lobster traps i.e. *nasas*). Catching lobster with pot traps would be much more sustainable if the traps used were in accordance with legal requirements. But the setting of illegal traps is widespread. Using divers to catch lobsters, however, is even more damaging to the stocks. Divers usually catch juvenile lobsters along with the adults, which is both against the law and biologically unsustainable for the lobster stocks.

Not only is production in decline, but divers are going deeper to get the lobsters. Honduran regulations require that a diver must not perform more than two deeper-than-60-feet immersions per day[7]. However, the lobsters are becoming more difficult to find, and the WWF study found, divers perform as many 13 such immersions, to depths as great as 120 to 150 feet, without protective equipment such as depth and pressure regulators. As a result, nine divers died in 2006 and, since 2004, more than 1,000 divers have suffered permanent injury from compression sickness. Most of the divers are *Miskitos*, who come from very isolated, impoverished areas of the Atlantic coast that lack economic alternatives. Divers can make as much as $1.85 per pound of lobster caught, which adds up to as much in a successful 12-day trip as a *Miskito* could make in a year working in agriculture (Dodds 1998).

Despite the fact that it is unsustainable in both biological and human terms, lobster fishing by diving boat is now much more profitable than pot traps: the average diving boat catches 35,000 pounds whereas the average pot-trap boat catches only 6,000 pounds. The pot-trap industry is operating at a loss and is proposing new regulations that would make lobster-fishing more sustainable while leveling the playing field. But high prices keep the lobster diving boats afloat, even as lobster resources continue to shrink.

Shrimp fishing in Honduras is also in sharp decline with only 55 shrimp boats still active, compared to 118 authorized boats a few years ago. Shrimp fisherman have been hit by a combination of shrinking resources, increased operating costs, and a reduction in international prices as a result of vast increases in production of farmed shrimp, particularly from China (WWF Centroamérica 2007).

VIETNAM

Interviews conducted by the case-study team with Vietnamese fishers highlighted three factors that drive local economic pressures: high oil prices, declining fish prices and declining fisheries resources. These factors are clearly closely interrelated. A remarkable 100% of the fishers interviewed said that the fish they catch have been getting both fewer and smaller over time. They also observed that high-value species, such as white prawn, tiger shrimp and horse fish, are disappearing. In the two communities studied in the Gia Linh district of Quang Tri province, fishers noted that, in the past, the beach seine for anchovy was so productive that it had long been a common saying that "Fishing all year may catch less than September anchovy beach seine." In the last several years, however, anchovy have nearly disappeared[8]. As the catch of these species shrinks, so does its value by weight. And as the resources closer to shore are degraded, fishers must venture farther out, incurring higher fuel costs. Fishers also routinely use illegal fishing gear, particularly very small mesh nets that catch immature fish and other marine life (Nguyen Cho Hoi et al 2006).

An additional pressure is the growth of the fishing population. The small-scale fisheries sector in Vietnam has served as an economic safety net in difficult economic times (Kurien 1988, Bailey 1988, Béné 2006). As a result, the number of fishers in Vietnam nearly doubled between 1985 and 1995 as 200,000 new fishers entered the marine-capture fisheries. That growth may reflect the fact that fishing is often a part-time activity (Aasen et al 2003).

Shrimp are by far the highest value aquatic resource in Vietnam's marine fisheries, bringing ten to 30 times more than the mixed fish and trash fish that

7 Submarine Fishing Occupational Health and Security Regulations

8 It should be noted that populations of anchovy, like the majority of pelagic species, are known to fluctuate greatly, primarily as a result of environmental variables, in particular up-wellings (Béné pers. comm.)

are the other main catch of Vietnamese trawlers. Nevertheless, the shrimp trawl fishery in the Gulf of Tonkin, one of the country's four most important fishing grounds, is collapsing. Shrimp have become so scarce that fishers are catching shrimp that are only one-third of the minimum legal length in the case of some species. Other species that were found in abundance in the 1980s have disappeared (Nguyen Viet Thanh 2006). Whereas 1 kg of catch in the Gulf of Tonkin in the 1970s contained on average 13-15 pieces[9], today 1 kg contains 52-60 pieces. Along with the size of shrimp, the landing prices by weight for shrimp have also shrunk.

In the Vietnamese communities studied, fishers, including shrimp fishers, face additional economic hardships because of the competition from bigger boats coming from other provinces and using illegal fishing methods such as high-voltage lamps and electric wires that shock big shrimp but also kill small shrimp and fish (WWF Greater Mekong 2008). The larger boats not only take more of the catch but diminish the resources by employing these unsustainable fishing methods. Because of such illegal fishing methods, the catch and incomes of local fishers have significantly declined, according to their own reports. At the same time, vast increases in farmed fish from Vietnam and China sometimes lower the price that Vietnamese fishers can get for fish; in other cases (not in the communities studied), shrimp aquaculture creates demand for feed fish, creating an incentive to exploit all sizes of fish. This demand can be expected to lead to quicker collapse of the fishery, with both ecosystem and food security implications.

Fishers have had to increase their fishing effort to make up for lost product value. They have also begun using much smaller net-mesh size to compensate. This effort by fishers to avoid a precipitous fall in their incomes only accelerates the decline in the resource and hastens the day when the fishery will face complete collapse. The rapid decline of catch-per-trip in Vietnam parallels the degradation seen in Malaysia and the Philippines—a serious loss of biomass of commercial species of fish and the rapid rise in the proportion of trash fish in the total catch. The situation for most fishers has reached the point where they would like to leave fishing and adopt a more secure livelihood.

9 The best estimate from government data is that biomass of penaeid shrimp stocks fell by half in just over 25 years, from 1975 to 2002 (Nguyen Viet Thanh 2006).

4 Coastal Communities and the Drivers of Unsustainable Fisheries Management: Findings from the Cases Studies

The pattern of declining fish stocks and increasingly unsustainable harvesting of marine resources is evident in all of the case studies. There are several important external drivers that share responsibility for the increasing pressure from commercial fleets on coastal resources and for the failure to control overexploitation that emerge from these case studies.

Among these drivers of unsustainable resource use are political and economic decisions at provincial, national and international levels, and pressures from the international seafood market. Political marginalization and socioeconomic poverty in fishing communities undermines their ability to contribute to the much needed fisheries management changes. In particular, coastal communities' lack of political and economic influence prevents them from controlling access to resources, retaining the economic and other benefits of these resources for themselves, or using them to improve their livelihoods.

The key external drivers of the current relationship among degraded coastal resources, high poverty levels and limited coastal livelihood options revealed by the case studies and the literature review include the following conditions:

1. *National political and financial priorities favor production (particularly for export) over sustainability*
2. *Coastal communities lack authority over their own resources*
3. *Foreign and other new markets create incentives for unsustainable harvesting of valuable species*
4. *Development policies and poverty alleviation plans do not recognize the potential of small-scale fisheries and coastal fishing communities*

These drivers are described in greater detail below. Several of the countries considered in the case studies are beginning to move towards new management arrangements for small-scale fisheries, notably through devolution of some rights and responsibilities to communities. These efforts are discussed at the end of this section. Section 5 considers directions for thought regarding how national and international actors can support an equitable transition to sustainable fisheries.

4.1 Findings: Socioeconomic Drivers of Unsustainable Fisheries Use

1. *National political and financial priorities favor production (particularly for export) over sustainability*

National policies in each of the countries studied promote rising commercial production rather than long-term resource management. National priorities are skewed toward production growth and expansion of commercial fleets for a number of reasons, including limited appreciation for the full

socioeconomic value of the small-scale fisheries sector, the scarcity of government resources in developing countries, the perceived need to increase GDP and export earnings, and the revenue generated from licensing and access fees. The resulting inattention to small-scale fisheries has meant that, on the one hand, they are left out of poverty alleviation plans and are given little voice in the management of their resources (as discussed below). On the other hand, governments promote overexploitation of those same resources by commercial and industrial fishing operations or through other economic activities within the coastal zone, such as agriculture and mining. Thus the poor communities who are heavily reliant on fisheries and other coastal resources remain marginalized while their resources are increasingly overexploited.

Although responsible government agencies may be aware of the acute need for management reforms in the case of degraded coastal and marine resources, including the need for cross-sectoral management of these complex resources, numerous pressures inhibit the needed changes. The pressures range from institutional imperatives to contribute to national GDP growth, to the fear of removing a social safety net for fishers, to the desire to retain the political support of vessel-owners by maintaining the existing fleet size and sectoral productivity. These pressures—some of which operate at a level well above the fisheries managers themselves—reduce the political will of policymakers to address the most immediate causes of overfishing and continuing decline of fisheries resources.

Overcapacity: The emphasis on exports and production has led to fishing overcapacity in many fisheries. Earlier development efforts in many countries promoted the fisheries sector by subsidizing modernized boats, motors and fishing gear as a means to increase production. As a result, today commercial and, in some cases, even small-scale fishing fleets, are far too large and efficient. In Vietnam, for example, the number of registered motorized fishing vessels grew from 29,000 with an average engine capacity of 16.9 horsepower in 1985 to 91,000 vessels with an average capacity of 58.5 horsepower in 2006 (Vietnam News 2006). Furthermore, these official figures are considered a severe underestimate of the actual number of operating vessels because many are unregistered. About 80% of this large fleet is concentrated in the inshore fishing zone. A national-level plan approved in 2006 (Government of Vietnam) to reduce the fleet has been ineffective, and lower levels of government have not even been made aware of it, most likely because implementation of fleet reduction would cause a drop in production and would put tens of thousands of fishers out of work.

A similar problem of overcapacity was recognized in Malaysia in the early 1980s, when analysis of catch statistics showed that the inshore fishing areas were overexploited and that some commercial species had virtually disappeared. In response, Malaysia established a quota system for licenses, going further than many other countries in making a formal commitment to controlling fishing and reducing the fleet size. In practice, however, the political and economic pressures to increase production prevail. Likewise a ban on trawlers within the coastal zone was not adequately enforced, and regulations to increase net-mesh size have yet to be implemented. However, total landings have continued to increase, reaching at least three times the sustainably harvestable level (Mohammed 1991).

Promoting production increase: In addition to maintaining unsustainably large fleets, policies in many of these countries call for maintaining or increasing fisheries production. In Vietnam, Malaysia and Indonesia, a policy of maintaining high levels of catch—and specifically trawl catch, which in some cases involves illegal fishing—inhibits improved management of both coastal and commercial fisheries. Similarly, commercial fishing industries

in Guatemala and Honduras operate with limited supervision, which allows them to maintain high catch levels, though at the cost of sustainability.

Lack of monitoring and enforcement: Another indication of skewed national policies is the inadequate level of resources provided for monitoring fishing operations, enforcing regulations, and monitoring fish and resource status (FAO/RAP/FIPR 2004). As crucial as these activities are to achieving sustainable use of coastal and offshore marine resources, institutions responsible for monitoring and enforcement of fisheries regulations are systematically deprived of needed capacities and resources. Every one of the case studies points to inadequate enforcement of existing laws and norms for fishing because of lack of government funding, itself a reflection of the low priority given to sustainable fisheries. For example, in Indonesia the study found no effort on the part of the national or provincial governments to enforce laws against blast-fishing or cyanide use to capture live reef fish. Nor is there a system to monitor the live reef fishery, and only limited records are kept of total catch. In Vietnam, patrols are too infrequent to pose any serious threat to illegal fishing operations; fishers generally move to a different area or land their boats when there is a patrol. Similarly in Guatemala, the government unit charged with managing fisheries and aquaculture resources (UNIPESCA) has a paltry budget (under US$600,000), most of which is generated by selling fishing licenses. The staff is very small, with only one staff person and no working boat to cover the entire Atlantic coast. A similar situation exists in the Honduran Caribbean coast, where there are limited personnel despite the importance of lobster and shrimp fishing based there. Moreover, none of the six countries is investing in research and monitoring, which are crucial for bringing information to the local level so that sustainable management mechanisms can be identified, developed and implemented.

Incompatible responsibilities: Conflicting policies and government responsibilities sometimes make management for sustainability impossible. In several of the countries, including Guatemala, Honduras and Philippines, the agency responsible for fisheries is located within the agricultural ministry, which is responsible for increasing production, not for sustainability or poverty reduction. Budgets are too often dependent on licensing fees, which increases incentives for fisheries agencies to sell licenses rather than restricting fishing and promoting sustainable fisheries management practices. The Philippine fisheries agency (BFAR), for example, has a very limited role in the government despite the importance of small-scale fishing in the national economy[10]. Because the emphasis of the agricultural ministry is on increasing production, BFAR can make no move to control fishing. The agency fears that any explicit recognition of the need to rebuild fish stocks would undercut its precarious position in the ministry and further reduce its voice in policy and budget matters. Three-fourths of the fisheries budget now goes to aquaculture, rather than management, enforcement or research (Anon. 2006). Thus not only do the institutions responsible for fisheries management in the Philippines lack the tools to achieve sustainable fisheries management but also they fall victim to the sector's quintessential dilemma: they are compelled to give up important policies for the sustainability of fisheries in order to fight for a voice and budgetary allocations. Such conflicting responsibilities can even lead to politically motivated distribution of fishing licenses in exchange for political support, as appears to be the case Malaysia.

10 Small-scale fishing provides 40-60% of the protein requirements of the coastal population and employs 1.8 million people in the Philippines.

In other cases, the conflict of interest lies in the relationship between the private sector and the government agency responsible for fisheries. In Indonesia, 90% of the trawl catch is landed by foreign fleets, a fact which has never been acknowledged by the Indonesian government. Efforts to cancel the permits of these foreign trawlers have failed several times because too many influential people, including the Indonesian navy, are profiting from these operations.

This confusion of responsibilities is in part a reflection of the inappropriate allocation of national and local responsibilities with regard to resource management (FAO 2004). Clearly some laws, norms and organizations are required at the national level, particularly in the case of fish stocks with large territories and in the case of fishing vessels coming from other areas and other countries. But others are clearly better formulated and enforced at a local level to fit local circumstances and to take advantage of local stakeholder interest and knowledge about sustainable use.

2. *Coastal communities lack authority over their fishery resources*

Coastal communities in these case studies lack property rights over the resources they depend on and are not empowered to manage local fishery resources. Yet national governments have failed to manage these resources sustainably or for the benefit of the poor. While the complexity of fisheries management requires the participation of national-, and local-level institutions, in the cases studied, the national-level institutions and policies have neither met the needs of communities nor granted them control over those resources.

Failures of centralization: Within the coastal communities, the problem of overfishing and lack of management and enforcement is widely recognized. Interviews with fishers in Vietnam found that 44% considered the management of their own fishery very poor, noting particularly the lack of human resources and equipment for enforcement of fishing regulations. Nearly two-thirds of these fishers understood that destructive fishing methods represent a serious threat to the resources. In the near-shore areas, communities try to cope with the problem of illegal fishing but they need government assistance to deal with vessels intruding illegally into their fishing zones. Malaysian fishers have looked to the central government to protect them from encroachment on coastal fishing grounds by local and foreign vessels. The support that these fishers have received from the government tends to be ineffective or untimely, but they have no authority themselves to deal with this problem. Likewise Honduran inshore fishers face serious threats from the encroachment of industrial fishing vessels. Particularly troubling to them is their lack of control over the kind of fishing net used by those industrial vessels, many of which are illegal. Also, bottom-trawling by these vessels results in high levels of by-catch (the incidental catch of non-target species), further degrading the inshore zone. Closed seasons have been established, but they have not been strictly enforced due to the lack of capacity of the national fishing agency.

Limits to decentralization and co-management: While the importance of community participation in resource management is gaining increasing recognition, in many cases central, provincial and even local government officials maintain their power over marine fishery resources, limiting opportunities for management reforms toward more community-based sustainable coastal fisheries. Although marginalized coastal communities have the potential to improve their livelihoods through community institutions (Kurien 2004), a lack of political and institutional frameworks to leverage this capacity, coupled with significant physical and geographic barriers, make it difficult for remote communities to demand rights and responsibilities for their resources. In the Philippines, for instance, the government has made an effort to decentralize,

giving municipal governments the power to enforce fisheries law up to 15 km from the shoreline (Philippines 1991). However, this transfer of authority was effected without any equivalent shift in financial resources. Only 6% of the national fisheries budget is transferred to the municipalities; all other funds must be obtained through a real-estate tax that is notoriously difficult for the municipalities to collect. Thus, fisheries management must compete with other municipality priorities, such as infrastructure and health, for funding, and the local capacity to provide needed support to fisheries is severely limited.

In Malaysia, co-management schemes that could give communities greater control have been proposed, but the current government approach is largely based on firm central control over most decisions about access to fishery resources. Any transfer of authority would also be complicated by the fact that fishers' cooperatives in Malaysia are government-supported institutions with few genuine roots in the communities. After decades of government leadership of those cooperatives, fishers are unprepared and ill-equipped to take on responsibility for management. Fisheries management has been similarly centralized in Vietnam. In Honduras, there is a legal basis for fishers to demand decentralization of management decisions to the communities who are directly affected, based on a 1959 law. However, at the sites that WWF studied in Honduras fishers are not sufficiently organized and lack political clout to demand more control over resources.

3. *Foreign and other new markets create incentives for unsustainable harvesting of valuable species*

Commercial fisheries and aquaculture have received support from governments and international development agencies. However, their expansion has been largely fueled by the growing international markets for fish and high-value products such as live reef fish, shrimp and lobster. High-priced markets, often in developed countries, create large profits for exporters, middlemen and vessel-owners, and sometimes even provide relatively high levels of income for fishers themselves. The opportunity to sell to lucrative foreign markets—as well as to foreign tourists in some countries—creates powerful incentives for unsustainable fishing by commercial fleets, exacerbated by ineffective governance. The parallel growth of aquaculture to supply both foreign and domestic markets has generated its own set of problems in several of these cases.

Commercial fishing: Commercial trawlers, both domestic and foreign, are much more efficient than small-scale fishers and, as a result of their high capture-rates, bear the blame for declining fish resources in several of the cases. These pressures, which increasingly reach well into the EEZs of developing countries, also provide direct incentives—in the form of licensing fees and other income—to the host governments to make allowances for destructive fishing practices. This has partly been the case in Indonesia, where foreign trawlers are common. While commercial fishing adds to GDP, foreign-exchange earnings and fiscal revenues, these benefits generally fail to reach the poor coastal communities. Yet it is those communities which pay the costs. They are often the most negatively affected by commercial fleets, which degrade their coastal resources and threaten their food security and livelihoods.

Near-shore communities are sometimes involved in commercial fishing for these markets too. The live reef fish food trade in Indonesia and lobster fishing in Honduras both hire local, near-shore fishers to procure the target species. Although in both cases, the local fishers earn dramatically less than their industry and vessel-owner partners, they earn considerably more money than those fishing for local markets. Given this incentive, the fishers are driven to use illegal, destructive measures and to compromise their health. LRFT fishers engage in blast and cyanide fishing—destroying or poisoning

coral reefs and their associated ecosystems. In the lobster fisheries of Honduras, *Miskito* fishers engage in dive fishing—catching unsustainably young lobster and risking their lives. The legal-sized lobsters are exported, primarily to the US, and the undersized lobsters are sold in the Honduran market, particularly to tourists, and elsewhere in Central America. In neither case does the government make a serious effort to monitor or regulate the fishery. These examples illustrate the difficulty of controlling illegal and destructive fishing when markets are profitable for everyone involved.

Aquaculture: As the marine fisheries of the world have declined over the past two decades, the aquaculture sector has grown dramatically. Aquaculture has been promoted as a way to take pressure off coastal and marine fisheries and to provide jobs for coastal communities. However, with its expansion has come a rapid growth in markets for "trash fish" as feed for some species of farmed fish[11]. These trash fish have become an important product of the trawl fleets of several key Asian fishing nations, adding another obstacle to reducing the extent of trawl fishing and by-catch in those countries[12]. This increase in capture fisheries further affects the health of the ecosystem through high levels of by-catch and by reducing the number of juvenile fish and food for larger fish, which poses a long-term threat to food security.

In addition to the environmental issues raised by some aquaculture practices, numerous studies and experiences indicate that efforts to move many fishers out of the fishing sector and into aquaculture are unrealistic. While some fishers may participate in aquaculture for supplemental income, it is unlikely that they will fully leave coastal fishing. Technologies required for aquaculture are prohibitive to coastal fishers due to the cost and training needed. As a result, the growth of aquaculture has made only a limited contribution to poverty alleviation in these cases.

When it became clear to Malaysia's economic planners in the late 1980s that marine capture catch could not continue to increase, there was a major push to expand aquaculture production to ensure food security. From around 55,000 metric tons (MT) in 1985, aquaculture production soared to 132,700 MT in 1995 (Ministry of Agriculture 1999). This rapid increase in production was accompanied by a near doubling of bottom-trawl catch, reaching over 60% of total marine catch (Ogawa 2004) and reflecting the growing catch of low-value trash fish that feed farmed finfish and shrimp. A similar growth in aquaculture and trash-fish catch occurred in Vietnam. In these years, Malaysia's agricultural policy was based on the view that, through the rapid growth of aquaculture of high-value finfish and shrimp for export, the country could generate the hard currency needed to import cheaper fish for domestic consumption (Othman 2006). This strategy has required increased fishing by trawlers to support the aquaculture industry. The losers in this plan are the small-scale traditional fishers, whose share in the marine catch has declined drastically, and the health of the coastal ecosystem.

4. *Development policies and poverty alleviation plans do not recognize the potential of the small-scale fisheries sector and coastal fisheries communities*

National development and poverty reduction strategies in WWF's case study countries do not adequately address the interlinked crises of unsustainable fisheries and poverty, largely as a result of the combined impact of the drivers

11 The bulk of aquaculture is for seaweed, mollusks and omnivorous or herbivorous species of fish such as tilapia and carp; however, some high-value products such as shrimp and salmon depend heavily on capture fish for food (Aaron McNevin pers. comm.).

12 Worldwide, capture of trash fish for aquaculture feed is estimated at between 5 and 7 million tons (World Bank 2008).

discussed above. Governments continue to promote overuse of the fisheries resources and leave a strong social and economic resource for local and sustainable coastal fisheries management—the fishing communities themselves—underutilized. International development institutions have become more cognizant of the issues in the fisheries sector, but have not given enough attention to providing adequate incentives to ensure that small-scale fisheries are included in national development and poverty alleviation plans.

Past approaches: Significant development aid, provided by national, bilateral and multilateral institutions, has been spent with the intention of raising the living standards of small-scale fishers and their communities in developing countries—largely to no avail. Most of these development interventions focused on accelerating national economic growth through technology and infrastructure development and through market-led economic policies (Béné et al 2007). Time has shown that policies promoting increased economic growth at the national level are not necessarily pro-poor; such policies tend to favor large-scale development approaches over small-scale efforts and do not distribute the sector's revenues to local-level government and coastal communities. While some countries have shown rapid economic growth, they have not shown corresponding improvements in livelihoods (FAO 2004). There is little evidence that national-level economic growth alleviates poverty in small fishing communities, which are facing problems engendered by commercial fleets and international markets.

Until fairly recently, the development community addressed the relationship between fisheries management and poverty reduction in a unilateral way, focused on aggregate growth in production in the fisheries sector. In the 1970s and 1980s, the World Bank and other international financial and development institutions considered fisheries as a promising vehicle for economic growth and invested in productive capacity without much regard for livelihoods issues. This export-led growth model carried over into many early poverty reduction strategies, and ultimately overlooked the livelihood and economic advancement opportunities within the small-scale fisheries sector and coastal communities and the associated benefits to national economy. When it became clear that the results of such strategies were overcapacity and overexploitation of target species, the major development institutions reduced their involvement in the fisheries sector and switched their focus to aquaculture and coastal zone management (World Bank 2004).

New understanding: Interest in the relationship between the fisheries sector and poverty reemerged in the late 1990s when the Asian Development Bank's policy revision moved that organization away from its earlier emphasis on production (ADB 1997) and the World Bank (2000) published a concept note on international assistance in the sector. A 2006 internal review recommended ADB integrate fisheries into rural development programs. At the same time, the World Bank launched its first fisheries-related investment fund in partnership with the Global Environment Facility, WWF, FAO and the African Union, "The Strategic Partnership for a Sustainable Fisheries Investment Fund in Sub-Saharan Africa". The FAO produced a study (2005) arguing the importance of small-scale fisheries to poverty alleviation and food security, and subsequently presented arguments for inserting fisheries-related programs into key national documents on grounds of growth and equity (FAO 2007b).

Yet, despite increasing international concern about global fisheries, the small-scale fisheries sector is still largely neglected in national-level development plans and poverty alleviation strategies. Several studies (Thorpe 2005, Thorpe et al 2005) of the integration of fisheries issues into development strategies found that most Poverty Reduction Strategy Papers (PRSPs), which provide the strategic basis for much international development assistance, fail to make substantive analyses of the causal links

between fisheries and poverty-related issues, although there has been some improvement (Thorpe 2007). In several cases (including Guatemala and Honduras), the PRSP failed to refer to fisheries at all. Country Assistance Strategies were found to be even less concerned with the links between fisheries and poverty. A more recent study (FAO 2007), looking at the PRSPs and national development plans for ten countries belonging to the Asia-Pacific Fisheries Commission (APFIC), found that seven of the ten documents made reference to causal links between fisheries issues and poverty, and eight of them referred to responses to such linkages. However, few had developed either the causal links or the responses in a substantive way.

More positively, increasing knowledge of the relationship between fisheries degradation and poverty is now incorporated into the fisheries sector strategies of the major development institutions in ways that recognize the need for cross-sectoral management and pro-poor growth. World Bank policy for the sector now notes that past failures resulted from the lack of broadly agreed strategies integrating developmental, social and natural resources requirements (World Bank 2006b). Investment in the sector is now expected to build capacity of coastal developing countries and address key issues in fisheries governance, such as limiting access and allocating resources in an equitable way that is compatible with sustainable ecosystem use. Likewise FAO has developed a Sustainable Fisheries Livelihoods Programme, and recent FAO studies have focused on the relationship between small-scale fisheries and poverty and the means for supporting sustainable livelihoods (Béné 2006, Béné et al 2007).

4.2 Moving Towards Solutions

The obstacles to sustainable management are great and the drivers of unsustainable use are strong. Given the failures of the existing centralized governance systems for fisheries management, some consensus has emerged around the need for decentralization of management authority and around the importance of co-management and rights-based management. While there is some overlap among these terms, to clarify: Decentralization entails the delegation of management functions to local-level government institutions or fisher communities. Co-management systems allow governments to share authority and responsibilities of fisheries management with key stakeholders, thus leveraging the capacity of communities, using the support of provincial and national governments. In such systems, the balance

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of power between central authorities and local communities can vary greatly, with a variety of divisions of authority and responsibilities possible (Ebbers 2003, Pomeroy et al 2006). Also attracting increasing interest is the concept of rights-based fisheries. Under a rights-based system, the government authority grants a particular group of fishers access to and rights to use a fishing ground; rights are accompanied by obligations to comply with the rules and regulations of the management regime (Ebbers 2003). The intent of such systems is to "empower coastal communities with a voice and more responsibility" over resource management, enabling them to become active participants in fisheries management and decision-making processes, balancing rights and responsibilities in partnership with, rather than in opposition to, government (Pomeroy et al 2006)[13].

Most of the case-study countries have taken some steps in the direction of one of these less centralized management systems, steps intended to improve the conditions for sustainable use of these valuable coastal resources and the livelihoods of those dependent on them. Several examples follow, providing evidence that positive change can be made even in the face of strong incentives to unsustainable use, but also providing evidence of the many difficulties that are faced by efforts to decentralize and shift towards co-management regimes.

Vietnam: Management of fisheries in Vietnam has been highly centralized, with no decisions about fishing access or regulation of effort left to local communities. However, the national fisheries support programs are now giving serious consideration to co-management. A 2006 decree allows provincial governments to delegate coastal area management to the district and commune level. Models are being developed at the district level with provincial support for managing coastal fishery resources, including formulation of management plans, conflict resolution and enforcement. Nine provinces in Vietnam are preparing plans for co-management schemes under a Danida-funded project that is being rolled out in locations where overfishing is severe. The organization of fishers' unions is a crucial element of these experiments. These local unions help resolve conflicts and provide members with legal advice and micro-credit. In the future, these associations are expected to obtain legal authority over the marine fishery under their management, meaning they will have a voice in key questions of access, fishing regulations and enforcement. The provincial authorities are expected to strengthen these

13 A number of studies provide examples of the capacity of fishing communities to manage their coastal resources, particularly when community property rights are established. See Kurien (2004), Pollnac and Pomeroy (2005), Cinner (2005) and Berkes (2007). However, others indicate the difficulties of community-level management (Neiland and Béné 2003, Béné 2006).

associations through capacity-building efforts and information exchange. The transition to community co-management is not guaranteed, however. Even if the national and provincial governments are prepared to delegate control over management of inshore fisheries, local governments are likely to pose obstacles to community participation.

Malaysia: Although control of coastal fisheries remains highly centralized in Malaysia, the country has an example of successful co-management in its inland fisheries. The *tagal* system in Sabah allows local communities to form committees that identify fishing sites at which yearly or twice yearly communal harvests are organized, with the catch shared equally. As a result of this system, many river fish populations have recovered in recent years (APFIC 2006). The *tagal* scheme is made possible by relatively new state laws that empower communities to establish regulations for their resources. In support of this, the national fisheries department provides capacity-building and material assistance and helps promote ecotourism in *tagal* zones where no harvesting is allowed. However, because the system is rooted in Borneo's native customary rights which do not extend to Peninsular Malaysia, and because customary sea rights in Sabah are undeveloped, transferring such a scheme to Malaysia's inshore fisheries would be difficult.

Honduras: Honduras also offers an example of co-management, linked in this case to a protected area. At the instigation of an association of businessmen in the tourism industry, the Honduran government designated the Cayos Cochinos Archipelago as a Marine Protected Area. The tourism industry depends on the continued existence of the area's unique flora and fauna. Unfortunately, this effort initially left the local communities, primarily *Garífuna* fishers, out of the process, leading to high levels of tension and conflict between fishers and the outside groups supporting the protected area. The area's protected status, however, created opportunities for the *Garífuna* community to improve local fisheries management. In the early 2000s, the community pushed the Honduran government to prohibit fishing with scuba gear in the area. The resulting decree established a system of fisheries co-management in the archipelago that involves the protected area management agency, the fishing communities and the national fisheries agency. Each year they agree on the level of fishing effort, specific fishing zones, targeted species and closed seasons.

Indonesia: In Indonesia, new legal provisions raise the possibility of revitalizing traditional methods of regulating fishing effort by inshore fishing communities. A strong system of customary law, *sasi laut*, formerly established limits on access to marine resources and provided the basis for community-based regulations such as prohibition on types of fishing gear, closed seasons, demarcation of community fishing grounds and the size of harvestable marine products (Novaczek et al 2001, Harkes and Novaczek 2002). This traditional management system has been largely eroded, however, and it is unclear whether, under current conditions, Indonesian fishing communities can recreate the community institutions that supported these systems. In most such communities in recent decades, fishers have been unwilling to abide by traditional restrictions in large part because their chronic debt means they cannot restrict their incomes (Wahyono et al 1993). Moreover, the new law does not address the greatest problem for sustainability, the intrusion of large foreign trawlers; fishing communities cannot exclude licensed boats from their fishing grounds. Any effort to reform this law would be strongly resisted by foreign and domestic interests.

International initiatives: Shifts toward co-management, community rights over coastal resources, and sustainable use will only be possible with the full support of national and local governments, support which can be bolstered by international development agencies through

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information, technical assistance and funding. For example, the World Bank's PROFISH Global Program on Fisheries (World Bank 2006a) aims to improve livelihoods in the small-scale fisheries sector in part by ensuring that sustainable fisheries initiatives are included in national development plans and poverty reduction strategies. Initial efforts are underway in Indonesia and Mesoamerica among other places. NGOS are also playing an important role. For example, WWF's Smart Fishing Network Initiative offers a plan for addressing the national and international obstacles to sustainable fisheries through a focus on rights-based management intended to change the behavior of fishers, governments and markets for key marine species, particularly to reduce by-catch and illegal, unreported and unregulated fishing. Likewise the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, supported by a consortium made up of WWF, Conservation International and The Nature Conservancy, will work with six countries in the Coral Triangle region to break down barriers to sustainable resource use that, even under decentralized management regimes, are beyond the control of local communities. This initiative is designed around ecosystem-based fisheries management (EBFM), an approach that aims to integrate ecological, social and economic goals, recognizing the fishing communities as key components of the ecosystem (Grieve and Short 2007). Success of these management systems will depend on multi-sectoral support for poor fishing communities, not only for fishing rights and capacity but also in other areas that drive poverty. As yet, experience with implementation is limited, and the complexity of the issues necessarily means progress is slow.

5 Thoughts on Building a Sustainable Fisheries Regime

Analysis of these case studies has identified a number of international- and national-level obstacles to sustainable management of small-scale fisheries and poverty alleviation in coastal fishing communities. These obstacles to sustainable resource use have multiple impacts on fisheries management: they discourage political leaders and fisheries managers from taking policy decisions for sustainability; impede actions to reduce fishing-fleet overcapacity and to improve monitoring and enforcement of fisheries and fishing regulations; prevent local communities from controlling access to fisheries resources; and reinforce the weakness of fisheries management institutions.

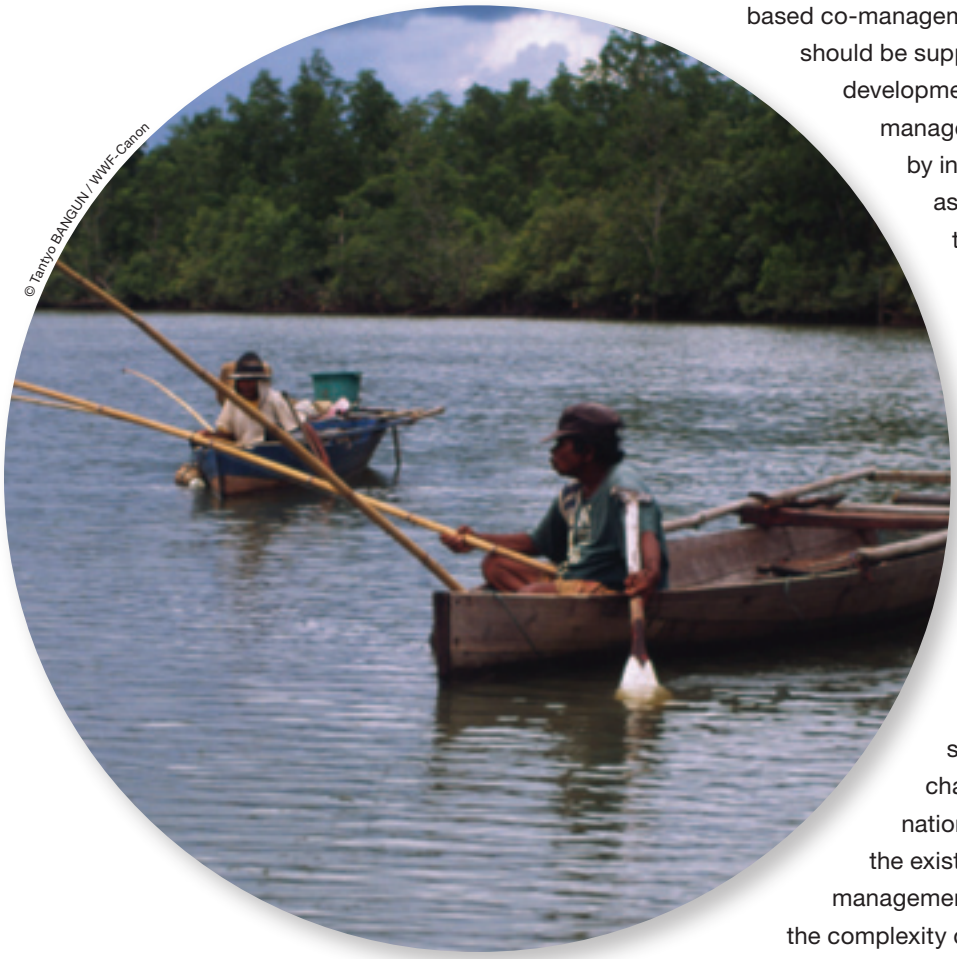
Together these socioeconomic obstacles promote degradation of coastal resources, may reinforce impoverishment of small-scale fishers, and prevent the reforms that could promote the development of coastal communities. At root, these obstacles stem from the institutional failure of markets, national governments, and international organizations to value the livelihoods of these communities and the ecosystems on which they are based, and to establish the complex management systems needed to maintain the resources of these ecosystems.

As fish stocks shrink in combination with increasing global demands for fish, and growing food insecurity, habitats are degraded and resource managers and national decision-makers are challenged to find effective alternatives to centralized management for small-scale coastal fisheries. As discussed above, many countries are moving towards decentralization of responsibility for fisheries management; approaches such as co-management and community-based or ecosystem-based management are expected to fill in the management shortfalls of centralized efforts. Under a decentralized or co-management model, decisions are brought down to levels more appropriate to the functioning of the resource (ecosystem-based) and social systems (community-based) (Pomeroy et al. 2007). Support for community empowerment, including access to and control over resources, is clearly one important tool for achieving sustainable management of small-scale fisheries.

But before adopting wholesale a co-management or rights-based approach to management of small-scale fisheries, a few caveats are in order. Such systems are necessarily complex. Management models must be tailored to each specific situation, considering both the ecosystem and the socioeconomic and political factors involved. Assessments of existing systems are still few and not always positive (Béné 2006). Problems inevitably arise because community-based management does not necessarily ensure management for sustainability or for equity, depending on many factors, including how the community is defined and how power is

shared within the community. Others arise because ecosystems and human communities do not overlap exactly, meaning that a human community may not be able to control what goes on in large parts of an ecosystem it shares with others.

Equally important, however, is a key finding of these case studies: Many of the obstacles to sustainable management lie outside the control of the fishing communities. Because these arise within various economic sectors and at national and international levels, they will need to be addressed appropriately. First, clearly, the overfishing of marine capture species is now a global problem driven by large market demand and overcapacity in many countries. Second, national governments have strong incentives to increase production, for reasons of GDP, foreign-exchange earnings, and fiscal revenue from licenses and taxes. Third, fisheries agencies in particular face a set of incentives that promote production over sustainability. And finally, even in optimal circumstances, small-scale fisheries may not produce sufficient income to raise the growing poor populations of fishing communities out of poverty.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Achieving sustainable fisheries management that benefits the poor and the environment will require multi-layered, cross-sectoral and or pluralistic approaches (Berkes 2007). Such complex systems will include appropriate fisheries management at the national level and integration of fisheries into poverty alleviation and coastal management strategies at the national and international levels. The establishment of locally based co-management systems and property rights should be supported by an appropriate national development agenda and fisheries management program, in turn supported by international development assistance that takes into account the needs and capacity of coastal communities to achieve local and national development goals in the context of sustainable small-scale fisheries. The process and the building blocks needed to create a more sustainable fisheries regime are the focus of the remainder of this paper.

Moving toward sustainability and poverty alleviation in small-scale fisheries will require changes at the international, national, and local levels to alter the existing incentives and create a management system that addresses not only the complexity of coastal and marine

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ecosystems but also the complexity of the human systems that govern resource utilization and fishing. While clearly our knowledge about coastal and marine environments and resources must be built up in order to better govern for sustainability, the policy components are equally critical. Addressing the drivers of poor fisheries management at the national and international levels is as crucial as developing the capacity of coastal communities to manage their own resources well.

The proposed directions for further work discussed below are drawn from the case studies and WWF's broader experience with community management, environmental sustainability, and national and international policy frameworks. These thoughts focus on some ways in which international development institutions (including the international financial institutions, such as the World Bank and Asian Development Bank, as well as international and bilateral aid agencies and international NGOs) and national governments could work to provide conditions in which coastal communities can utilize and increase their capacity to manage their resources for their long-term benefit and to build new livelihood opportunities that will ensure the long-term sustainability of the world's coastal resources[14]. Many of these ideas are being widely discussed already, but governments and international institutions must work together to find the processes and institutions to support long-term sustainability of small-scale fisheries.

14 Béné and Neiland (2006) provide an excellent research agenda focusing on the relationship between poor people and natural resources in inland fisheries that is very relevant here.

1. ***Develop coherent and holistic international collaboration and support for pro-poor sustainable fisheries management, addressing global and national issues:***

   Define ways in which development institutions could best support the establishment of international conditions favorable to sustainable fisheries use and encourage developing countries to better integrate pro-poor sustainable coastal fisheries management into policy and economic planning.

The international development institutions are uniquely placed to support a widespread shift toward more sustainable resource use. Moreover, these institutions have the technical capacity to address and influence many environmental, economic and governance issues.

Global issues: Overfishing, growth of seafood markets, expansion of aquaculture and degradation of coastal resources are global phenomena. If there is to be a measurable impact on our marine and coastal resources and on the livelihoods and economic opportunities of those who depend on them, they will need to be addressed globally. At the international level, these institutions could play a key role in changing conditions that impede sustainable fisheries management and in improving global governance of marine resources. Some potential directions include: fostering international understanding of the complex problems facing the fisheries sector to increase political interest in sustainability; harmonizing the many international policies that affect fisheries activities and management; promoting changes in international norms such as WTO rules and international market standards on both capture fish and aquaculture products, in order to reduce the returns to unsustainable production; and promoting international agreements that would allow for greater national and local management of resources by controlling encroachment by foreign fleets and overfishing in international waters.

National issues: At the country or regional level, the development institutions should encourage the inclusion of small-scale fisheries in economic and poverty-alleviation planning. Potential directions include: promoting a better understanding of the crucial socioeconomic role that small-scale fisheries play in many developing countries in order to increase government commitment; collaborating in the technical and social science research and monitoring needed to establish sustainable management plans; and supporting national-level policy reforms. Using their analytic resources in collaboration with local fisheries biologists, economists and other experts, these institutions could provide strong evidence of the economic and social benefits of taking a more sustainable course. In this vein, the development institutions could create strong incentives for national governments to invest resources from development aid and poverty alleviation assistance in sustainable management of fisheries as a means of alleviating poverty and improving coastal fisheries management.

Unsustainable fishing is clearly linked to substantial vested interests which block progress on the most basic policy reforms, notably capacity reduction plans, adequate monitoring and enforcement systems, elimination of excessive foreign fleet presence, and complete transparency in issuing fishing licenses to foreign and domestic fishers. By giving small-scale fisheries a key place in development assistance plans and poverty reduction strategies, for example by supporting assessments of coastal communities' contribution to Millennium Development Goals, the development institutions could support the efforts of national governments to make these reforms.

2. *Invest in and support local management capacity for sustainable coastal fisheries:*

Consider effective means by which governments could empower small-scale fishing communities to better manage coastal fisheries—including decentralization and definition of resource and management rights—and to build up local management capacity.

While reforms have been initiated in some of the case-study countries, further progress toward decentralization and the shift of management authority to appropriate levels, including the fishing communities, is needed.

Designing reforms: Currently lacking is definition of an efficient process by which governments can implement the institutional and legal reforms that will give resource users and local citizens' groups greater authority, capacity and accountability for resource management (Béné 2006, Andrew 2007, World Bank 2006b). Clearly governments should support the inclusion of local and regional social organizations in decision-making, ensure their access to information, and work to build their capacity. To this end, evaluating the potential of co-management, the distribution of management rights, and financing mechanisms for sustainable use should receive more attention, as should questions of how to implement these systems effectively. In view of the potential pitfalls (Béné and Neiland 2004, Béné 2006), consideration should be given to the key role that development institutions could play in providing technical assistance to support viable and effective decentralization and co-management systems.

Fostering local institutions: Co-management and rights-based systems allow communities to take on increased management responsibilities. Development institutions, governments and NGOs should also consider the most effective ways to mobilize and empower small-scale fishing communities to participate in decision-making processes, as well as the types of institutional and financial structures that will provide transparency, promote equity and enable effective participation of stakeholders in coastal fisheries management. While many of these communities may not currently have strong fishers' organizations *per se* that could provide for local resource management, they do contain forms of local organizations and collective action that, among other roles, may serve to regulate access to resources and the distribution of their associated benefits. If given the necessary rights and responsibilities, they may have the potential to contribute substantially to the sustainable management of their resources. However, many communities do not have the organizational, technical or financial and resource capacity to take on these responsibilities. Possibilities to consider for building up these institutions include supporting local social networks, organizations and capacity-building. Effective mechanisms for coastal communities to engage in the policy and decision-making systems will need to be designed and implemented. Also, problems with locally based management have arisen in some instances because of lack of local funding for management efforts. Development institutions and governments should continue to investigate possible sources of funding for sustainable management institutions, perhaps through the capture and redistribution of resource revenues.

3. *Create conditions for viable pro-poor sustainable fisheries through government support for measures to reduce resource overexploitation and to promote sustainable use:*

Consider how national governments could reduce pressure on resources by improving management of commercial and foreign fleet access to coastal fishing areas, increasing limitations on fishing, and increasing monitoring and enforcement, and could support sustainable use through initiatives to create international markets for sustainably-produced products.

Small-scale fishers have strong incentives to manage their resources sustainably when they are able to control access to and use of those resources and their benefits. Currently, their rights are diminished not only by policies that centralize control over resources but also by the encroachment of commercial fishers and by market failures and environmental degradation.

Reducing pressures on resources:
The sustainability of coastal fisheries is highly dependent on a reduction of the growing pressures from commercial fleets. All six of the case studies pointed to a need for improved fisheries regulations and enforcement, whether through structural reforms of the responsible government bodies, coordination with regional or international institutions, or through increased decentralization of management to local levels. Tools governments can use to achieve the needed reduction in catch levels are well known: reducing the number of permits that give commercial and foreign fleets access to national waters, increasing the cost of licenses to these fleets, creating closed seasons and protected areas, and regulating access to fishing grounds, the size of the catch, and the use of gear and fishing methods that stress fish stocks and cause environmental degradation. All of these controls will reduce encroachment on and degradation of the resources upon which small-scale fishers depend. Supporting the property rights of coastal communities must entail enforcing existing regulations (or developing new policies in their absence) to exclude outside fishers and implementing a variety of these management tools as appropriate. The difficulty lies in defining how best to overcome the vested interests that favor the commercial fishers.

Markets for sustainably produced products:
National-level action only addresses part of the issue. Growing markets for seafood products in wealthy nations are another major driver that prevents stakeholders from making the reforms necessary to achieve sustainable fisheries. In addition to the encroachment of foreign trawlers in many of the countries, Indonesia's LRFT fishery and the Honduran lobster fishery provide clear examples of a foreign demand on local resources driving unsustainable practices, resource degradation, and adverse pressures on coastal livelihoods even by those who most depend on those resources. Reducing foreign demand for unsustainably harvested products will require actors at local, national, regional and international levels to promote responsible fishing practices and purchasing policies as well as responsible consumption. Consideration should be given as to how this can best be achieved: options include influencing key actors throughout the seafood product supply chain and carrying out major information campaigns in order to persuade industrial seafood purchasers, traders and individual consumers to elect sustainably sourced seafood products. As with other "certified" products, ways need to be found to ensure that markets for unsustainably harvested marine products are reduced and that sustainable production increases community well-being, thus generating national- and local-level interest in sustainability.

4. *Promote pro-poor economic opportunities for coastal communities that are accessible and sustainable for small-scale fishers:*

Define effective ways in which national governments and development institutions, with the input of local communities, can promote pro-poor economic growth and the development of livelihood opportunities that balance the role of coastal fisheries, aquaculture and other sustainable options.

Responding to the fisheries crisis and breaking the links between small-scale fishing and poverty will require integrated development of fishing communities designed to improve livelihood quality and expand opportunities. This is particularly urgent in light of growing coastal populations and, correspondingly, growing populations of small-scale

fishers. Aquaculture has been the primary option offered in the face of declining marine and coastal resources, receiving considerable private and public sector funding in recent years. However, at least as currently practiced, aquaculture may entail its own set of environmental problems, and in many instances its introduction has not provided an alternative occupation for coastal fishers. Because of poverty—including low levels of education, limited access to capital and other resources, geographic isolation and aversion to risk—many small-scale fishers do not participate in aquaculture production. For the same reasons, there are few other livelihood options open to them.

Pro-poor growth: Reforms in the fisheries sector and in related coastal resource management should aim to bring benefits to the poor[15]. Sustainability will require a reduction in fishing effort, to be achieved through controls on the number of fishers, types of gear, catch numbers or access to fishing grounds. This reduction should not come at the cost of the poor. Enforcement of controls on commercial fishing or illegal resource use should include measures to increase the opportunities for small-scale fishers as fish stocks recover and as small-scale fishers are better able to compete. Likewise the granting of rights over resources
should benefit small-scale fishers first. Revenue generated from the fishing sector through licenses and taxes should be reinvested in measures for sustainability, such as monitoring and enforcement, which will benefit the poor. Revenues can also be invested in ways that will increase the benefits that small-scale fishers retain from fishing, such as infrastructure for fish storage and transport. However, improving conditions in the fishing sector is only one of the steps necessary to reduce poverty in these communities.

Integrated development: Addressing poverty and sustainable fisheries will require finding ways to address all the aspects of poverty and to create new livelihood opportunities. The people of these communities need resources—education, health, access to capital and markets, social safety-nets—that will allow them to develop or engage in new or existing economic activities that do not draw unsustainably on coastal resources. This could include an increase in post-harvest processing of marine capture and aquaculture products, which would ensure that a greater share of market value remains in the community. Ideally it will include opening of a new range of livelihood options along the coast and beyond that are compatible with the protection or more sustainable management of coastal and marine ecosystems. Some such activities worth consideration include: tourism, which is exploding in many places where there are poor coastal populations and high travel potential and can be developed in a sustainable way that provides real employment opportunities for fishers; and payment for environmental services where communities are protecting valuable regional or global environmental resources, such as mangroves that provide nurseries for marine species or coral reefs that protect enormous biodiversity. These options and many others should be considered as we move forward toward the full integration of small-scale fisheries and coastal fishing communities into poverty alleviation and sustainable development plans.

15 See OECD 2008 for a fuller discussion of the means to pro-poor growth.

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Appendix I. Summaries of WWF Case Studies

This appendix provides brief summaries of the six case studies conducted by WWF, focusing on the issues of poverty, local organization and governmental management of fisheries (please contact gabriella.richardson-temm@wwfus.org for more information).

The Greater Mekong

The Greater Mekong region covers the extensive Mekong River Basin, which originates in the Tibetan Plateau and includes Vietnam, Cambodia, Thailand and Lao PDR. Within this vast region, the South China Sea comprises 1,500 km of coastal waters running along southern Cambodia, southeastern and peninsular Thailand, and western and southern Vietnam, with the Gulf of Tonkin at its northern end. The South China Sea is one of the most important waterways on the planet linking the Indian Ocean with the Western Pacific. It is a clearinghouse for international fishing boats that land their catch in the ports across the region, including fish caught in the Coral Triangle (see below). Its fishing grounds are among the most heavily utilized and undermanaged on Earth, creating a wide range of threats. Unsustainable offshore and inshore fishing have depleted fish stocks throughout the coastal waters. Water pollution is serious, particularly close to urban and industrial centers, and conversion of mangroves, primarily to aquaculture, has occurred at a rapid pace. Some 23 cetaceans, about which little is known, have been recorded in the region. The Irrawaddy dolphin is one of the most threatened inshore-dwelling species, often trapped in fishing gear and targeted for the wildlife trade. Four species of sea turtle also inhabit the area and are declining in numbers, heavily affected by fishing boats. The region's habitats are also used for wintering and passage feeding grounds by at least 35 shorebird species, including a number that are endangered.

Vietnam

WWF-Vietnam undertook field research in three locations: Gio Linh District of Quang Tri province, Nui Chua National Park in Ninh Thuan Province, and the Gulf of Tonkin shrimp trawl fishery, located in the north, center and south of Vietnam respectively, and so representing different types of fishing communities. Most fishers in these three areas understand that overharvesting is the primary challenge; while their fishing effort is increasing, the size of the fish caught continues to decrease. The key contributors to the unsustainable use of these Vietnamese fisheries are the large number of inshore fishers using too many boats; the large number of modern-equipped fishing boats operating in the inshore fisheries; the heavy use of destructive fishing practices (dynamite, electricity, small mesh net, coastal trawl gear); and the limited enforcement of fishing regulations.

The poverty rates at these three sites, based on government criteria, are relatively high. Most families of fishers depend primarily on fishing, and they are highly vulnerable because of the degradation of the fishery resources, unstable incomes, inadequate access to markets and/or lack of credit, and lack of skills and education needed to pursue alternative livelihoods. As a result, fishers are afraid to try a non-fishing livelihood. Even if initial financial support were provided, most fishers report they would probably continue in fishing. In fact, the labor force in capture fisheries is expanding in both of the provinces, since fishing serves as a safety net when jobs in other sectors are scarce.

In the absence of strong organizations in fishing communities, fishers depend on the government to protect their resources. However, units of the Defense Police and Fishery Inspection Department responsible for preventing illegal fishing lack the personnel and equipment to inspect most capture activities on the sea. They are supposed to apprehend trawlers who intrude on near-shore areas but enforcement is weak, despite many petitions by inshore fishers. Lack of comprehensive management agreements between provinces is also major obstacle for implementing regulations.

The study found conflicts between government goals of economic growth, poverty reduction and resource protection at all three sites. Provincial authorities seem largely unaware of national capacity reduction goals, and provincial economic plans often call for increased landings. The national government strategy of replacing many small boats with fewer high-capacity boats might be sound if accompanied by the right policies and conditions, but in practice it has resulted in depletion of stocks and intrusions by the bigger boats into near-shore fisheries. Meanwhile, few resources have been devoted to restructuring of coastal fisheries to create better livelihoods.

The Coral Triangle

Spanning Malaysia, Indonesia, the Philippines, Papua New Guinea, the Solomon Islands, Fiji and Northern Australia, this extraordinary expanse of ocean covers some 5.7 million km^2. Ecologically the Coral Triangle matches the diversity of the Amazon rainforest; no other place on Earth is as rich and varied in marine life. It is home to 75% of all known coral species; more than 3,000 species of reef fish and commercially valuable pelagic species; 6 of the 7 species of marine turtles; migrating populations of whale sharks and manta rays; and many marine mammals including several endangered species of dolphin, whale and dugong.

But the Coral Triangle is straining to support one of the highest human population densities in the world, providing food and income to about half a billion people. In the Philippines and Indonesia, coral reefs provide annual economic benefits estimated at US$1.6 billion and US$1.1 billion per year, respectively. Today many of the region's commercial fish stocks are fully or overexploited. The destruction of marine resources is exacerbated by the extreme dependence of coastal economies on local natural resources, by population growth and by poverty.

Philippines

WWF-Philippines selected one village in Davao, on Mindanao Island at the southern end of the Philippine archipelago, and one in Sablayan, Mindoro Island, in the western part of the archipelago, for the case study. Davao fishers enjoy better infrastructure and greater access to urban markets and have more diversified fishing activities, but suffer from degraded habitats due to land-based activities, weak institutions and enforcement, and consequently smaller catch levels than those in Mindoro. Fishers in Mindoro have relatively less income because of poorer infrastructure and little access to urban markets, even though marine habitats are better preserved and fisheries enforcement is more

effective. Data from six coastal provinces in the Philippines for the common hook-and-line type of fishing reveal that fish catch has dropped dramatically in recent decades. Fishers are responding to the decline by using illegal and destructive fishing gear, including illegal net-mesh sizes, compressor fishing using cyanide, and spear- and blast-fishing.

The study finds that given their present degradation, these fisheries cannot generate enough yields and economic surpluses to lift a large number of small-scale fishers from poverty. Moreover, the two sites require different strategies to lift households from poverty. The Mindoro site requires investments in post-harvest facilities for both farm and fishing sectors to provide more opportunities for women. The Davao site requires capacity-building to increase employability of household members so they can take advantage of the rapidly urbanizing economy.

Three institutional issues highlight how conflicting goals and responsibilities lead to unsustainable resource use. The Bureau of Fisheries and Agricultural Research (BFAR) of the Department of Agriculture is responsible for fisheries, but the Department of Environment and Natural Resources (DENR) is responsible for managing fisheries habitat. There is also a conflict between BFAR's mandate to conserve fisheries resources and its mandate to meet production targets. Finally, local governments are responsible for managing municipal fisheries but have inadequate financial and human resources to carry out that task. Most municipal governments have a limited tax base and little capacity to collect taxes; they are reluctant to impose new taxes for fear of political backlash. Fisheries management tends to lose out to other services, such as health and infrastructure, in the competition for municipal funds.

Malaysia

WWF-Malaysia carried out research in two small-scale or "traditional" fishing communities in the Langkawi District, on the northwest coast of Peninsular Malaysia on the Strait of Malacca. In recent years Malaysian fisheries in the Strait have experienced a major decline in biomass, which may be as great as 90% since 1971 (Dept. of Fisheries). This decline in biomass has had a serious impact on catch-per-unit of effort for traditional fishers. That impact is exacerbated, moreover, by government policies that encourage large-scale and commercial fishing at the expense of the small-scale fishers.

Income data collected for the study indicates that Malaysian fishers are now earning substantially more than they were ten years ago, although nearly two-thirds supplement their income from fishing with another job or part-time work. Other indicators of poverty researched at the two sites—health, education and property ownership—also point to improvements in the well-being of Malaysian traditional fishing communities. Three-fourths of those surveyed have access to low-cost government medical facilities, and their children are less than four kilometers from primary and secondary schools. All have access to clean water (two-thirds to three-fourths of them obtaining the water from a public

tap). Nearly all respondents own their own home and 90% or more own television sets, refrigerators and motorcycles. The latter figures represent dramatic improvements over their socioeconomic status of ten years ago.

Nevertheless, more than 60% of the respondents fall below the poverty line, according to the government definition of poverty. While nationwide the overall poverty rate has been reduced to less than 5%, some 30% of fishing households fall below the poverty line, the highest percentage for any occupation group. And 8% of fishing households are defined as “hardcore poor”.

The two communities studied have fishing associations, which are government supported, but only about half the fishers belong to them, mainly because of the cost of membership and because there are no clear material benefits to joining. In the absence of strong local organizations, no local or national institutions appear to be acting to protect the interests of the fishers. Thus little progress has been made in regard to encroachment on local fishing grounds by illegal trawlers. In response to specific complaints, the authorities send out patrols, but they are usually too late to catch the intruders. No regular patrols guard against such illegal intrusions. However, because of overexploitation of the fisheries in Langkawi District, the Department of Fisheries is using its control over fishing licenses to reduce the number of traditional fishers.

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Indonesia

WWF-Indonesia’s study focused on the case of the live reef fish trade (LRFT) in Indonesia, which has a devastating impact on populations of reef fish. The field research was conducted over three months in ten districts around the Savu Sea. However, researchers soon realized that the fishing under study was mostly conducted by outsiders. (Locals primarily fish for the local market or produce dried fish.) Noting that the LRFT is a lucrative business for all concerned, the study observes that it is not poverty but inappropriate and inconsistent government policies that appear to be the main cause of the degradation of reef fish populations. The newest fisheries law includes clearer, more specific and more comprehensive prohibitions on various fishing practices than the previous law. However, the potential for improved management depends on whether implementation of the

regulations provides for a shift from growth-oriented management toward management for sustainability, decentralization of fisheries management authority and other reforms.

Guidance for implementation of such reforms is still lacking, however. Worse, there are no regulations at the district level on reef fisheries that limit live reef fisheries to special zones. Nor is there any system to monitor and control the fishery or trade, and only limited records are kept of the total number of fish that leave the district to be sold elsewhere. Fishers from South Sulawesi do not even need obtain the special permit from the fisheries service required to catch live reef fish, but simply meet with the village chief and get approval for catching fish in that area, often with a kickback to the chief.

The most promising approach to controlling LRFT is to reduce Hong Kong demand though education and information programs and to increase Indonesian capacity for monitoring and controlling vessels that enter Indonesia's waters. With intensive patrolling, such destructive (illegal and unreported) fishing could be stopped. However, the government has not adopted any such program because it does not perceive sufficient benefit. To date the government revenue derived from the live fish trade is low because illegal trading is largely undetected by the fisheries agencies.

Reef fish mariculture has been regarded as a potential alternative to the LRFT in Indonesia, but it depends on collection of wild grouper fry, which is unlikely to be sustainable. What little is known about natural fry mortality rates suggests removal of juvenile fish could have a significant impact on adult stock and should be regulated. The limited availability of feed for grouper mariculture also means that only well-funded producers would be able to undertake such a business.

Another serious obstacle to grouper mariculture as an alternative is the absence of any strong local institutions in the area. The local institutions lack clear structure, norms, members and group culture, as well as a market network, mariculture knowledge and capital. They were formed for economic purposes, such as fisheries trading, shipping and

transportation, and represent four main ethnic groups: *Bugis, Bajo, Makasar* and *Flores*. But the capacity of these institutions to work with technology and on social cooperation was found to be low. Although that capacity might be improved through government assistance, few financial resources are allocated to support the fishers and their local institutions.

Mesoamerican Reef

The Mesoamerican Reef is a globally important and highly productive ecosystem, comprising the coasts of the eastern Yucatán Peninsula in Mexico and Belize and the Guatemalan and Honduran Caribbean coasts. In this region, coastal wetlands, lagoons, sea-grass beds and mangrove forests provide habitat for many threatened and endangered species. Unusual geographic features include an array of patch reefs and faros in a deep shelf lagoon, a diversity of reef types in a small geographic area, and large offshore mangrove cays. Among the most commercially and biologically important species for these countries, most of which are being overexploited, include lobster, snappers, groupers, shrimp, sardines and some shark species.

Because fishing in the reef is one of the main income sources for many coastal communities and some commercial fisheries, there is great pressure on coastal marine resources due to increasing extraction, degradation of breeding and nursery areas, and insufficient management, as well as degradation and pollution from tourism and maritime transport. In 1997 the governments of these four countries signed a Mesoamerican Reef (MAR) initiative, known as the Tulum Declaration, which established commitments for the creation of protected areas in each of the MAR countries, and which addressed coastal regulation, water pollution, research and social participation within a framework of cooperation and mutual understanding. While the agreement paved the way for significant international funding for conservation of the reef, the pressures remain; and overfishing and its negative impacts on coastal communities continue to be an area where there is still much to be done.

Guatemala

The Central America office of WWF carried out research on small-scale fishers in Guatemala in four communities in Livingston, a municipal capital, and in the Punta de Manabique Protected Area. The biggest problem encountered by the fishers in these areas is that catch volumes of both scale fish and shrimp have fallen drastically in recent years. On both Pacific and Caribbean coasts, artisanal fishing production has fallen by 75% over five years. In 2005, half the fish being caught weighed less than one pound, whereas just three years earlier the average weight was 3 to 4 pounds.

Most fishers interviewed blame the lower catch rates on the large number of fishers and on an increase in the use of indiscriminate or illegal fishing. Unsustainable fishing can also be traced to weak fishing regulations with unclear sanctions for noncompliance and to the lack of implementation of regulations. For example, the prohibition on the use of 1¾ mesh nets for shrimp was established to allow juvenile shrimp as well as juveniles of other species to escape harvesting. But the government fisheries management organization, UNIPESCA, lacks the resources to carry out the necessary inspections to ensure compliance.

There is also a serious institutional obstacle to enforcement: UNIPESCA does not have full power over fisheries management policy. Instead its parent organization, the Ministry of Agriculture, establishes the fishing regulations and makes most of the decisions, sometimes even without the participation of UNIPESCA, as is the case with imposing and lifting closed seasons.

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As a result, although closed seasons have been established, they are not strictly enforced, due to UNIPESCA's lack of capacity to exercise required supervision and control. On the Caribbean coast, fishers themselves enforce closed seasons for shrimp, lobster, conch and sardine harvesting. Self-regulation does however not cover other problems of fishing vessels and gear associated with unsustainable use.

Another factor that reduces incomes for fishers is the marketing system, which allows middlemen to take 50% to 55% of the purchase price, according to information provided by fishers and buyers.

Honduras

Five communities located in two areas—the Cuero y Saldo Protected Area and Roatán, Bay Islands—were selected for the study in Honduras. In all five communities, fishers reported that catch volumes have decreased considerably during the past 10-15 years, as has the average fish size. Ninety-five percent of fishing is done from wooden boats, propelled by oars and sails, which are between 9 and 20 feet in length. Most fishers own a canoe (*cayuco*).

In Roatán, small-scale fishers are too few and the fishing equipment and gear that they use is too primitive to seriously affect the sustainability of

the local fishery resources. The exception is divers who harvest lobsters around the island from commercial vessels.

In the commercial fishing sector, lobsters are caught both by divers and by means of pot traps (*nasas*). But boats carrying divers catch about five times more lobsters than pot-trap boats. Both types of boats commonly violate regulations on the number of divers or traps they can carry. A recent study by the industry found that many lobsters caught are below legal size (interview with a Caribbean Fishery officer). Divers do not follow regulations on either the number or depth of dives; as a result, some 200 divers are treated every year for diving-related health problems, nine divers died performing their jobs in 2006 alone, and many are forced to retire because of long-term health problems related to diving. Most of the divers are *Miskitos* from very isolated areas of the Caribbean coast who face extreme poverty and have few other economic opportunities.

DIGEPESCA has responsibility for regulating fishing in Honduras, but it has not been given the financial resources or personnel needed for that task. It has a total of only 140 staff countrywide; only two individuals cover all the Bay Islands.

Tourism growth and attendant population growth without planning have led to ocean contamination and excessive sedimentation, affecting fishery resources. Mangroves, which are crucial to the early stages of certain species, are also being seriously affected by this disorderly development.

The industrial fishers' organization, the Caribbean Fishers Association (APESCA), is believed to have considerable political power, and as such could play an important role in defining sustainable industrial fishing practices. No comparable small-scale fishers' organizations exist and there is recognition of the need for a similar association of artisan-fishers.

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