

gap between supply and demand in Africa will continue to grow, even if existing levels of wild-caught fish can be maintained and aquaculture continues to progress at the current rate.

TECHNOLOGY—FISHERS THAT ARE BETTER AT CATCHING FISH

Even as the global fishing fleet has remained relatively stable in number of vessels over the last decades, improved fisheries technology has meant the catching capacity has increased enormously. It has been estimated that since 1965 there has been a 270 percent increase in average fishing power. In the past, the capabilities of fishing vessels and the technology available to detect and catch fish often limited fishing activities to near-shore areas, or shallow waters. The open ocean and the deep sea provided natural refuges for fish. Today, Global Positioning Systems (GPS), echo sounders, and monofilament nets all greatly enhance the efficiency of fishing operations. For example, in the Pacific Island countries, outboard motors have allowed small-scale fishers to exploit remote fishing grounds previously accessible only to local communities.

SUBSIDIES—A DRIVING FORCE IN CREATING OVERCAPACITY

Many subsidies are introduced for what are presumed to be socially beneficial reasons, and are not inherently perverse. However, it is now clear that the existence of billions of dollars of subsidies in the fisheries sector undermines efforts to develop and manage sustainable fisheries. A number of studies by the World Bank and other international organizations estimate the range of global subsidies as between US\$12 billion and US\$20 billion a year. Up to half of these subsidies promote overcapacity and over-capitalization, leading to overexploitation. The remaining subsidies are directed toward fisheries management, research, conservation, and programs designed to reduce overfishing.



General Guidelines for Successful Fisheries Management

Successful fisheries management systems need to meet objectives in at least three domains:

- the biological—conservation and sustainable use objectives;
- the economic—wealth and efficiency objectives;
- the social—meeting equity objectives, in terms of access to resources, distribution of benefits, and human welfare.

A successful management regime must also reflect a realistic political consensus among key stakeholders, and have the institutional capacity to define an appropriate balance among these contending domains and objectives. In addition, successful management must adapt itself to changes in the fishery.

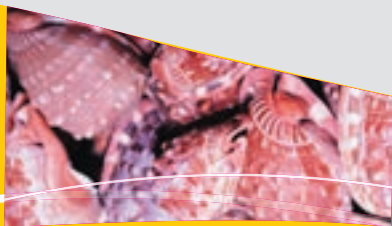
Tools Available to Restore the World's Fisheries

The problem of overfishing is complex. Although there is no single solution to the fisheries crisis, there are a number of management approaches and instruments that can lead to more sustainable use and productivity. For any given fishery a unique combination of tools will be needed. The World Bank, working with the international community, can support client countries to selectively use the policy tools and the programs described below.

IMPROVEMENTS TO GOVERNANCE

The World Bank recognizes that governments face a major challenge to establish effective governance systems that ensure sustainable supplies of fish.

However, there are important opportunities for the World Bank and the international community to build programs to improve fisheries governance. Limiting access to fishing is a fundamental first step. This can be done through management programs, such as licensing, rights-based management, co-management, community management, and international fisheries agreements. Controlling the size and capacity of fishing fleets and their activities—the “fishing effort”—is equally important. The World Bank can help client countries design programs to offset the political or social costs of implementing pro-poor policies or removal of excess fleet capacity.



MANAGEMENT TOOLS

Ecosystem-Based Management

During the last few decades, fisheries management plans have generally been focused on the main target species in a fishery. However, fishing activities usually impact non-target species and affect overall ecosystem functions (such as predator-prey interactions, species composition, nutrient flows, and habitat quality). Thus, sustainable fisheries management approaches require consideration and management of the entire marine ecosystem that supports the fisheries—not just the target species.

Marine Protected Areas

A Marine Protected Area (MPA) can offer a range of protection—from complete prohibitions against removal of any living creature, to other regulations such as seasonal closures or restrictions on the removal of specific species.

Science has shown that MPAs contribute to sustainable fisheries. Marine reserves serve as refugia for target species, allowing them to survive critical parts of their life cycle in order to mature and reproduce. Over time, the fish populations in the protected areas grow and help repopulate the adjacent fishing grounds, the so-called “spillover” effect. The long-term benefits to fishers can outweigh the short-term loss that they may experience in the early years when the MPAs are established and fishing grounds are closed. The World Bank can help mitigate these short-term economic hardships through fostering science-based approaches to

Large, Old Female Fish Produce More Fish

In a study of 76 Marine Protected Areas, abundance approximately doubled, biomass increased 2.5 times, average body size increased by approximately one third, and the number of species present per sample increased by one third.

*In part, this is because of a concept that describes the importance of old females that contribute a large amount of eggs. For example, one 10 kilogram red snapper (*Lutjanus campechanus*) produces over 20 times more eggs at a single spawning than 10, one kilogram snappers. Researchers have also recently found that the eggs from older females produce larvae that grow faster and are more resistant to starvation than larvae from younger females.*

the design of MPA networks, supporting alternative livelihoods for affected fishing communities, and creating more equitable systems for benefit sharing.

Buybacks

In many fisheries, it is necessary to reduce the current fishing fleet, or fishing capacity, in order to achieve sustainable fishing levels. ‘Buybacks’ are a means of removing fishing vessels from the fleet by decommissioning vessels or buying back fishing licenses. These programs have had mixed success; because of the level of funding and controls required, there is more experience implement-



ing buyback systems in industrialized countries than in developing countries.

Co-Management and De-Centralized Decision-Making

Co-management refers to an arrangement whereby a government and users of the resource share the responsibility for management of the fisheries. This has been one of the most successful approaches to fisheries management. The advantage is that the fishers can influence the decisions made, while governments can ensure that long-term management objectives are met. Participation in decision-making gains the support of the fishers, confers legitimacy on the regulations, and fosters compliance, which may also reduce the costs of monitoring and surveillance.

Rights-Based Management

Another management technique is to assign different forms of property rights to what previously has been considered an open-access resource. Some of these systems are known as Individual Transferable Quotas (ITQs), Annual Catch Entitlement (ACE), and Territorial Use Rights in Fishing (TURFs). While there is general agreement that open access to oceans and lakes has led to overfishing, ending open-access regimes means that some people will be excluded from fishing. Experience shows that property rights systems can improve profitability, but may also have

the unwanted result of concentrating wealth in the hands of a few. The application of property rights as a fisheries management tool requires analysis of opportunities and challenges on a case-by-case basis, and must meet equity objectives, both in terms of access and distribution.

Monitoring and Enforcement Tools

Effective monitoring, control, and surveillance (MCS) are fundamental to enforcement of fishery regulations. Trained fishery officers and cost-effective technologies are required. Technology now has the potential to track and detect fishing vessels worldwide, including those engaged in Illegal, Unreported, and Unregulated (IUU) fishing. The international community can help developing countries strengthen their MCS capacity and implement sound fisheries governance in order to meet the fisheries targets set by the WSSD.

Certification Programs for Fish Products

The international trade in fisheries is very large—almost US\$60 billion annually—and fish products are the fastest growing internationally traded agricultural commodities. Certification programs can promote sustainable fishing and poverty reduction by creating market mechanisms that encourage fisheries to be managed in compliance with a suite of criteria such as stock condition and ecosystem impact (see *Certifying Sustainability*).



Certifying Sustainability

The Marine Stewardship Council (MSC) is one example of a fisheries certification program. MSC accredits third party certifiers to determine if fisheries meet its environmental standard for sustainable and well-managed fisheries. Fisheries that meet the standard have permission to use the MSC label in marketing materials and products from that fishery can display the MSC label.



Promotion of Alternative Livelihoods

Promoting fisheries management programs alone, which can result in lost livelihoods and employment, is neither appropriate nor politically viable. Therefore, the promotion of alternative livelihoods has become a common complementary feature of fisheries reform. These alternative livelihood programs often have the twin goals of reducing the fishing effort and raising the economic standard of living of coastal fishing communities or individual fishers, whose income from fishing is often declining steadily.

AQUACULTURE: TOWARD SUSTAINABILITY AND RELIEF FOR WILD STOCKS

There is enormous potential for aquaculture to respond to the growing demand for fish products and relieve pressure on wild capture fisheries—especially in developing

countries. The growth of aquaculture has been staggering. Over the last 30 years there has been a 9.1 percent annual growth in aquaculture around the world, with the greatest contribution to this increase coming from China.

Many types of aquaculture have very low impact on the surrounding environment. This is particularly true for seaweed and cultured species such as carp, oysters, and some species of tilapia that feed on plants and plankton. However, some aquaculture activities can have negative environmental impacts, such as local pollution from fecal matter, or from the use of antibiotics or pesticides. Plants and animals that escape from aquaculture operations can have negative impacts on wild populations through the spread of disease or from competition between farmed and wild populations. Disease transmission can create a financial burden on the industry and require measures to sterilize surrounding aquatic systems.

Another challenge for aquaculture is its dependence on the use of products from wild-caught fish as feed for farmed fish. Many cultured species, such as shrimp or salmon, grow best when fish proteins and oils are included in their diets. These ingredients for fish feeds are derived from fishmeal, fish oil, and 'trash' fish, which was often discarded in the past. In 1988, aquaculture consumed 10 percent of the world's fishmeal supply and 16 percent of the global



supply of fish oil. By 2000, these percentages had grown to 35 percent and 54 percent respectively. In order to avoid dependence on fishmeal and fish oils, the industry is developing substitutes derived from soy, yeasts, and palm oil.

Restocking and Stock-Enhancement Programs

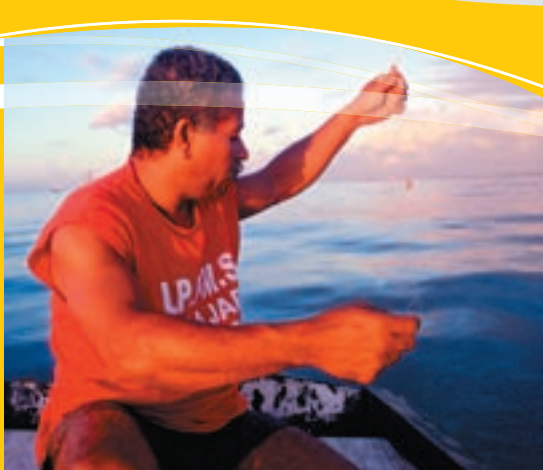
The natural supply of juveniles limits the size of many exploited stocks of aquatic organisms. Consequently, there has been an increased interest in stock-enhancement programs. Most stock-enhancement programs involve the release of juveniles reared in hatcheries, or the collection, rearing, and transplantation of wild juveniles. It is important to closely monitor stock-enhancement operations to ensure that released organisms enhance, and do not compete with, existing wild populations, or reduce genetic biodiversity of wild stocks.

How the World Bank Is Contributing

The World Bank's current efforts concentrate on coastal management, inland fisheries, and smallholder aquaculture operations, mostly in developing countries in Africa and East Asia.

The World Bank will broaden its support for sustainable fisheries at country, regional, and global levels, and is establishing a new Global Program for Sustainable Fisheries (PROFISH). In implementing this program, the World Bank is focusing on policy reforms guided by the FAO Code of Conduct for Responsible Fishing, and is working with global partners, including the Food and Agriculture Organization, the International Union for the Conservation of Nature (IUCN), WorldFish Center, and regional organizations.

PROFISH will focus on good governance, sustainable fisheries policies, and the promotion of effective fisheries strategies. In cooperation with the Global Environment Facility (GEF), the World Bank is participating in regional fisheries initiatives, such as the Strategic Partnership for Sustainable Fisheries in Sub-Saharan Africa, and building on GEF's large marine ecosystem projects.



The World Bank's Commitment to Fisheries

The rationale for greater involvement in fisheries issues by the World Bank and the international community follows directly from the World Summit on Sustainable Development (WSSD) and the Millennium Development Goals (MDGs).

These initiatives identify an imperative to reduce poverty among 30 million small-scale fisheries and their dependents, now faced with declining income. These initiatives also speak to the urgent need to address the looming ecological crisis associated with overfishing and degraded aquatic ecosystems.

The World Bank, working with its client countries and the international donor community, has the capacity to combine policy dialogue at the highest levels with specific investments. It plans to help mount a global effort to revitalize fisheries by:

- Strengthening the institutions dealing with the governance of fishing in the developing world;
- Including a fisheries component in the national development and poverty alleviation strategies of countries;
- Helping countries develop the legal and regulatory frameworks for sustainable fisheries;
- Supporting the establishment of market-based incentives for sustainable fishing and curtailing open access to fisheries through rights-based fishery management regimes;
- Raising the awareness within industrial countries of the need for reform in areas such as subsidies;
- Providing support and training for human capacity building, including development of effective negotiating skills and strategies;
- Supporting more services to marginalized rural fishing communities and assisting coastal communities in managing their fisheries in a sustainable manner;
- Promoting establishment and implementation of marine reserves and protected areas;
- Providing technical support for the development of sustainable aquaculture activities.

The Bank recognizes that it is time for a proactive, international approach to improve the fisheries sector worldwide. The challenge in moving toward a sustainable fishing industry is to maintain economic growth and development by enhancing productivity and the wealth of fisheries, while avoiding the overfishing and ecological degradation that we see today.

The World Bank is committed to helping establish institutions, values, and practices that will safeguard the future of fish resources and the health and livelihood of communities who depend on these resources for their income, nutrition, and quality of life.



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