Chapter 16. Synthesis of Part IV: Food Security and Safety

Group of Experts: Andrew A. Rosenberg

Fish products, including finfish, invertebrates and seaweeds, are a major component of food security around the world. In addition to providing a source of high-quality protein and critical long chain omega-3 fatty acids with well-known nutritional benefits in many countries, fish and fishery products are the major source of animal protein for a significant fraction of the global population, and in particular in countries where hunger is widespread. Even in the most developed countries, consumption of fish is increasing both *per capita* and in absolute terms, with implications for both global food security and trade.

Fisheries and aquaculture are a major employer and source of livelihoods in coastal States. Significant economic and social benefits result, including providing a key source of both subsistence food and much-needed cash for many of the world's poorest peoples. As a mainstay of many coastal communities, fisheries and aquaculture play an important role in the social fabric of many areas.

Small-scale fisheries, particularly those that provide subsistence in many poor communities, are often a key source of employment, cash, and food in coastal areas. Many such coastal fisheries are under threat due to over-exploitation, conflict with larger fishing operations, and loss of productivity in coastal ecosystems due to a variety of other impacts. These include habitat loss, pollution and climate change, as well as loss of access to space as coastal economies and uses of the sea diversify.

Globally, world capture fisheries are near the ocean's productive capacity with catches in the order of 80 million metric tons. Only a few means to increase yields are available. More effectively addressing sustainability concerns including ending overfishing, eliminating illegal, unreported and unregulated (IUU) fishing, rebuilding depleted resources, reducing broader ecosystem impacts of fisheries, and adverse impacts on them from pollution, are important aspects of improving fishery yields and thereby food security. For example, ending overfishing and rebuilding depleted resources may result in an increase of as much as 20 per cent in potential yield, if the transitional costs of rebuilding depleted stocks can be addressed.

In 2012, more than one-quarter of fish stocks worldwide were classified by FAO as overfished. Although these stocks clearly will benefit from rebuilding once overfishing has ended, other stocks may still be classed as fully fished despite being on the borderline of overfishing; these stocks could yield more if effective governance mechanisms were in place.

Current estimates of the number of overfished stocks do not take into account broader effects of fishing on marine ecosystems and their productivity. These impacts, including by-catch, habitat modification, and food web effects, are important elements in the

sustainability of the ocean's capacity to continue to produce food and must be carefully managed. These very real threats endanger some of the most vulnerable populations and marine habitats around the world and need to be directly addressed to improve food security and answer other social needs.

Fish stock propagation may provide a tool to help rebuild depleted fishery resources in some instances. Propagation programs must be carefully designed and maintained in order to really benefit resource sustainability.

Fishing effort is subsidized by many mechanisms around the world and many of these subsidies undermine the net economic benefits to States. Subsidies that encourage over-capacity and overfishing result in losses for States and these losses are often borne by communities dependent upon fishery resources for livelihoods and food security.

Aquaculture production, including seaweed culture, is increasing more rapidly than any other source of food production in the world and is expected to continue to increase. Aquaculture, not including the culture of seaweeds, now provides half of the fish products covered in the global statistics.

Aquaculture and capture fisheries are co-dependent in some ways, as feed for cultured fish is in part provided from capture fisheries. They are also competitors for space in coastal areas, for markets, and potentially for other resources (labour, governmental support and attention, etc.). Significant progress has been made in replacing feed sources from capture fisheries with agricultural production (e.g., soybeans), although more work is certainly needed.

Aquaculture itself poses some environmental challenges, including potential pollution, competition with wild fishery resources, potential contamination of gene pools, disease problems, and loss of habitat (e.g., from the construction of shrimp ponds). Examples of these challenges, and measures that can mitigate them, have been observed worldwide and need to be directly addressed by management action.

In both capture fisheries and aquaculture, gender and other equity issues arise. A significant number of women are employed in both types of activities, either directly or in related activities along the value chain. Women are particularly prominent in product processing, but often their labour is not equitably compensated, and working conditions do not meet basic standards. Poor communities are often subject to poorer market access, unsafe conditions for labour, and other inequitable practices that need to be remedied.

The ongoing impacts of a changing climate, including ocean acidification, pose great challenges for fisheries and aquaculture. Climate change is already resulting in shifts in the distribution and productivity of fishery resources and marine ecosystems more generally. This impacts fishing businesses and communities, yields and food security. Changes in availability and yields for individual resources may be positive or negative but in any case result in greater uncertainty for fishers, communities, businesses and fishery governance frameworks.

There are major capacity-building needs with regard to food security and food safety.

- The complexity of the issues concerning food provisioning from the sea requires a multidisciplinary approach to research. While the fields of fishery and aquaculture science are well developed, there are critical needs for research on small-scale subsistence uses of the marine environment as well as recreational, cultural and spiritual aspects of marine resources. In addition, greater understanding must be developed of the structure, function and dynamics of marine ecosystems and of the economic and social aspects of human society that depend upon these resources.

- It is necessary to improve understanding of the role of fisheries and aquaculture in commerce, employment and the support livelihoods. Therefore advanced capacity building is necessary for appropriate skills to be able to use advanced technologies to create wealth from capture fisheries and aquaculture in a sustainable way.

1. Capture fisheries

- Efforts have been made to create awareness to reduce post-harvest losses, especially in small-scale fisheries, as a means of increasing production. However, little is known about what new methods are being implemented and to what extent they impact on production. There is a gap in capacities needed to develop, deploy, and evaluate approaches to reduce waste and post-harvest losses and ensure that new technology is transferred to those that need it most.
- Efforts have been made to reduce by-catch and other broader ecosystem impacts of fishing and to increase awareness of these problems. For example, globally it is still poorly known whether by-catch excluder devices have been successfully adopted in terms of the relative ratio of the target catch landed and the by-catch either landed or discarded. It is necessary to build capacity to monitor and ensure compliance with measures such as these that are intended to reduce ecosystem level impacts.
- If ecosystem-based approaches to management are to be implemented, integrating fisheries governance with governance of other marine sectors, greater scientific and technical capacity will be needed to inform the process.
- If further depletion of fishery stocks due to overfishing, climate impacts or other pressures is to be avoided, trends in fishing effort, landings, geographical scope, species composition and other key attributes must be ascertained and consistently monitored, and data must be made broadly available. It is necessary to build enough capacity with appropriate technological and scientific skills and the necessary equipment to provide adequate information and data to facilitate regional and global management.
- Technical capacity to monitor and control seafood safety is urgently needed. Methodologies must be shared and deployed and greater training in procedures that safeguard seafood supplies is necessary.

- Certain issues, particularly at the micro level, demand additional research and therefore need capacity-building to address them. The state of small-scale fisheries throughout the world, and gender issues in fisheries, are particularly prominent and are poorly studied. A further issue that has been seriously under-researched is the relationship between capture fisheries and aquaculture.

2. Aquaculture

- Much better data and analysis of the trends, character and factors influencing aquaculture production are needed. In principle these data should be more accessible than capture fisheries data but in practice this is not the case. Understanding this rapidly growing sector is vital to the understanding of food security patterns and needs.
- Disease and product safety are a key challenge for aquaculture. Greater scientific and technical capacity is needed to address these challenges in many countries and data and scientific information must be shared in order to exchange lessons learned.
- Aquaculture technology crosses the spectrum from relatively simple small-scale operations to larger-scale enterprises. It includes breeding, feeding, health and safety aspects. Sharing both technology and approaches to improve efficiency and sustainability is an important aspect of improving food security and safety.

3. Fish stock propagation

- For propagation efforts to be successful, capacity must be developed that will promote efficient and effective approaches and comprehensive monitoring of these efforts. These must be well designed experiments that rely on lessons learned from other efforts around the globe.
- Proposed propagation efforts will benefit from a comprehensive, integrated, ecosystem-based fisheries-management approach. Capacity is needed in terms of individuals, infrastructure and institutions to deliver effective stock propagation.

4. Seaweeds as a resource

- Seaweed aquaculture is seriously affected by disease, as with other forms of intensive aquaculture. Research on seaweed diseases and new techniques for combating the diseases are needed along with the technical capacity to deploy new methods.
- Undertaking and building capacity for biochemical research on seaweed extracts from various species will enable them to be harnessed for their wide variety of nutrient, medicinal and food values.