Global aquaculture development since 2000: progress made in implementing the Bangkok Declaration and strategy for aquaculture development beyond 2000

Keynote Address 2

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Abstract

At the *Conference on Aquaculture in the Third Millennium* held in Bangkok in February 2000, participants agreed on a global strategy towards achieving the social, economic and environmental sustainability goals of aquaculture development. The *Bangkok Declaration and Strategy for Aquaculture Development beyond 2000 w*as a watershed, occurring as it did at the turn of the millennium and creating major influences on the development of aquaculture in the decade since. This presentation briefly traces the progress of the sector during the decade that has passed since the Millennium Conference and discusses some encouraging and important historical developments that have shaped today's aquaculture sector. The Millennium Conference identified 17 key elements to a sustainable aquaculture development and recommended that states incorporate these into their strategies for aquaculture development. Each of the key elements is briefly discussed to provide an overview of the progress that was made over the past ten years in implementing the Declaration. Given the impressive growth that the sector has achieved in the past three decades, aquaculture is gradually

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being recognized for its contributions to food security, poverty reduction, rural development and economic growth. The Bangkok Declaration and Strategy will continue to guide the sector's development and management beyond 2010 through to the first quarter of this century. However, there are elements of the Strategy that require further strengthening in order to enhance its effectiveness, to achieve development goals and to address persistent and emerging threats. By endorsing the draft Phuket Consensus, Conference participants will re-affirm their commitment to the *Bangkok Declaration and Strategy for Aquaculture Development* and will recommend some new actions.

KEY WORDS: *Aquaculture, Bangkok Declaration and Strategy, Development, Global trends, Sustainable aquaculture.*

Introduction

Dear Friends,
You have heard from Professor Swaminathan on the value and importance of aquaculture as a global food production sector. I would like to focus my talk on "aquaculture's road to success". An important measure of success is the way the governance of the sector has contributed to uplifting the welfare of the small-scale, non-commercial and family-based farms from which aquaculture began, and to promoting the growth of the large commercial and industrial operations. I will also trace the progress of the sector during the decade that has passed since the global *Conference on Aquaculture in the Third Millennium* in 2000. In doing so, let me first briefly share with you some encouraging and important historical developments that have shaped today's aquaculture sector.

Since Fan Li described carp culture in earthen ponds in China in the fifth century B.C., the culture of carps has made a massive contribution to most parts of the world, providing rapidly growing populations with cheap protein. Through time, farmers of such a system have preserved its best feature:farming within the limits of nature. As the demand for fish increased, the need to build aquaculture into a fully fledged industry was felt; the first world meeting on aquaculture, *The World Symposium on Warm-water Pond Fish Culture*, was organized by the Food and Agriculture Organization of the United Nations (FAO) in May 1966 in Rome. The Symposium seeded the idea of a global conference and ten years later, the *FAO Technical Conference on Aquaculture* was held in Kyoto (from 26 May to 02 June 1976). It is widely seen as the major turning point in the development of aquaculture.

The Kyoto Conference reviewed the status, problems, opportunities and potential for the culture of fish, crustaceans, molluscs and seaweeds and issued the *Kyoto Declaration on Aquaculture* that inspired what became known as the *Kyoto Strategy for Aquaculture Development*. The Kyoto Strategy placed aquaculture prominently in national planning. The young sector thus became recognized as

a legitimate user of land and water resources, and worthy of more research investment. Personnel were trained for better planning, management, research and production. The technological component of the Kyoto Declaration boosted productivity.

In the 1980s, aquaculture began to outpace all other food production sectors. Both small-scale farms and commercial operations, supported by an increasingly efficient global trade regime and marketing network, contributed to the success of the sector. But to feed a growing world, it had to push beyond the constraints imposed by nature, at times disorderly and with little restraint. In the late 1980s, it began to show this tendency, subsequently suffering from its unfortunate effects, which included pollution, disease and social disapproval. To bring order to its development and that of fisheries as a whole, FAO and its Member Governments, in 1995, promulgated the *Code of Conduct for Responsible Fisheries*. The Code, which enshrined the principles of environmental and social responsibility, became a major guide for the more effective governance of aquaculture. Those who wanted to farm in accordance with the Code's principles were assisted through the drafting of technical guides, standards and certification schemes. Ensuring social and environmental responsibility made the sector busy.

Going into the third millennium, the sector saw the need to develop a comprehensive working strategy. At the *Conference on Aquaculture in the Third Millennium* held in Bangkok in February 2000, participants agreed on a global strategy towards achieving the social, economic and environmental sustainability goals of aquaculture development. The *Bangkok Declaration and Strategy for Aquaculture Development beyond 2000 w*as a watershed, occurring as it did at the turn of the millennium and creating major influences on the development of aquaculture in the decade since. Soon after the Millennium Conference, the FAO Committee on Fisheries (COFI) Sub-Committee on Aquaculture was established. It is the only global intergovernmental forum with a mandate to discuss aquaculture issues. It serves as an international forum for consultation and discussion on technical and policy matters that would make aquaculture contribute in a sustainable way to food security, economic development and poverty alleviation. Its creation gave a powerful impetus to the Bangkok Declaration and Strategy.

Progress towards meeting the key elements of the millenium conference

The Millennium Conference identified 17 key elements to a sustainable aquaculture development and recommended that states incorporate these into their strategies for aquaculture development. Let me take you through each element of the Declaration to provide an overview of how much progress was made over the past ten years in implementing the Declaration. During

the Conference, we will hear more on progress and improvements for further development of the aquaculture sector.

Investing in people through education and training

Aquaculture has moved from a traditional to a professional sector. The levels of education and technology have leaped over the past decades, with a great deal of changes and improvements to capacity and skills development, both formal and vocational. The progress is worldwide, the sector evolving from an unskilled to a skilled work force involving various disciplines, including biology, economics, engineering, nutrition, social science, technology and recently, veterinary medicine.

Investing in research and development

Advancement in research in aquaculture is significant. Design innovations leading to sophisticated and environmentally sound recirculation systems and to fully automated submerged commercial sea-cage systems are now in use for commercial production. We have produced aquafeeds with much reduced fishmeal contents with little or no impairment of growth rates. There are many more examples that could be given; however, we still need to continue infusing science into the sector. More work is needed.These issues will be discussed in the thematic reviews of this Conference.

Improving information and communication

Information and communication, particularly by virtual means, has improved tremendously. The sector harnessed new technologies in many ways. Many initiatives such as the World Wide Web, virtual networks, interactive videos and hard-copy publications have emerged, providing effective mechanisms for access to relevant and reliable information for all stakeholders. When I searched "aquaculture information" in Google on 09 September, 478 000 results appeared in one-third of a second!

Improving food security and alleviating poverty

Many governments recognized aquaculture as a means of food security and poverty alleviation. People-centered development became one of the points of emphasis of aquaculture policy. Aquaculture found its place in the national poverty reduction sector papers of many developing countries. Programmes focusing on empowering small-scale farmers have been initiated. The discourse on whether or not aquaculture can reduce extreme poverty continues, but there is no doubt that aquaculture contributes to improving food security and the livelihoods of millions.

Improving environmental sustainability

Environmental impacts received a high degree of attention in the past decade, typically in cases where the welfare of society was negatively affected by unregulated aquaculture development. Public pressure and continued

commercial expansion compelled the sector to mitigate its environmental impacts. Governments began to recognize that well-planned and well-managed aquaculture can yield a net social benefit because, among others, the environment is not degraded. Continuing improvements, interventions and investments are required to ensure a higher degree of environmental sustainability and economic viability in the sector as pressures on the natural resource base and public awareness of environmental issues continue to build up. A new paradigm in aquaculture management, the ecosystem approach, can better reconcile the human and environmental objectives of sustainable development.

Integrating aquaculture into rural development

Providing employment to some 30 million persons, aquaculture contributes significantly to the rural development of many developing countries. As aquaculture moved from a traditional activity to a profit-seeking commercial venture, many countries recognized its role in rural development and created conducive policy environments for its expansion. This has provided governments with guidelines to better allocate resources, helping in the more effective use of resources and in mitigating the impacts of aquaculture on society. Aquaculture development was thus elevated into aquaculture for rural development.

Investing in aquaculture development

Globally, investment in aquaculture has increased. Aquaculture is slowly changing from a traditional, small-scale activity to a more commercial sector. There is increasing investment from the private sector, good evidence not only of aquaculture`s profitability, but also of its improved governance, the private sector being assured that its investments are protected. This has attracted local and foreign direct investments. Some countries have diversified their foreign investment to include aquaculture. Most investment has long-term strategies to ensure sustainability. However, the public investment into aquaculture – particularly in research and development (R&D) support and institutional services – has been lagging behind during the past decade.

Strengthening institutional support

It is difficult to assess if major improvements in institutional support to aquaculture took place during the past decade. However, we do have some evidence of national aquaculture policies, strategies and plans being developed in several countries in regions such as Southeast Asia, Central Asia, Africa and the Pacific. Institutional strengthening programmes have also been initiated by a number of countries. In general, state-run extension services have been down-sized and legal frameworks for international trade in aquatic products have been strengthened. There is much to be done to strengthen institutional support to enable the public sector to provide the essential services needed to address various aspects of aquaculture development, in particular those affecting small-scale producers.

Applying innovations in aquaculture

There have been notable innovative ideas and technologies in aquaculture, from farmer innovations and the relevant application of indigenous knowledge to cutting edge technologies developed by or for the industrial, commercial sector. For example, an old Chinese concept, "multitrophic aquaculture" has been revitalized in many countries to improve productivity while reducing negative impacts on the environment through nutrient stripping.

Improving culture-based fisheries and enhancements

The huge potential of culture-based fisheries and enhancements for increasing fish supplies from freshwater and marine fisheries and generating income in inland and coastal areas is clear. However, while our understanding of how culture-based fisheries and enhancements can contribute to rural development and food security has increased during the past ten years, the aquaculture sector needs to make a much more concerted effort to match their vast potential.

Managing aquatic animal health

We have seen many improvements in all aspects of aquatic animal health. The aquaculture sector has acquired a better understanding of the aetiology and epidemiology of diseases. Diagnostic methods for clinical and veterinary medicine have been adapted for aquaculture, and various products (e.g. vaccines, immunostimulants and rapid diagnostic kits) are now available in the market. Producers in many countries have remarkably improved their husbandry practices, and there is now greater involvement of veterinary practitioners. Institutional, policy and regulatory aspects have been improved in many places, including cooperation between aquaculture and veterinary authorities. Some epizootics occurred, such as infectious salmon anaemia (ISA) in Chile, koi herpes virus (KHV) in many countries and epizootic ulcerative syndrome (EUS) in southern Africa. However, in general, we now have much better disease intelligence, improved emergency response and disease risk management capacities. We will likely see nanotechnology being used, and aquatic animal health will be fused into the "one heath" concept of a healthy animal, people and ecosystem.

Improving nutrition in aquaculture

The past decade saw many positive developments in aquaculture feeds and nutrition. Much progress was made in the substitution of the essential amino acids and other nutrients derived from fishmeal by the use of plant material. However, the debate as to whether it is ethical to feed carnivorous species with "vegetarian" diets has been added to the old debate over feeding fish with fish. Although overall feed management has been improved, fishmeal substitution has been effective and several major species have shown better feed conversion ratios (FCRs); substitution of fish oil continues to be considerably more problematic. Some untapped resources such as marine invertebrates may become an alternative source to fishmeal and oil.

Applying genetics to aquaculture

The bulk of aquaculture production still comes from wild or recently domesticated stocks. The genetic management and hatchery procedures for these species have generally not been adequate and systematic, including in some developed countries. This has apparently degraded the performance of many farmed species through inbreeding, genetic drift and uncontrolled hybridization. In contrast, properly managed selective breeding programmes have shown continual improvements in performance and quality. Using induced triploidy, large rainbow trout which continue to grow and remain in prime condition have been developed, while the technology has also been widely used for the production of "all-year-round" oysters. Transgenic technology has been applied to a number of fish species in recent years, although restricted to research. However, there is a high level of public concern about genetic modification (GM) technology, and the widespread adoption of transgenic fish for a single trait such as growth performance, even if it were licensed, could encounter consumer resistance.

Applying biotechnology

Biotechnology has a wide range of useful applications in fisheries and aquaculture. It brings opportunities, for instance, to increase growth rates in farmed species, boost the nutritional value of feed, improve fish health, help restore and protect environments, extend the range of aquatic species, and improve the management and conservation of wild stocks. During the 1990s, research into biotechnologies increased, and scientists have identified and combined traits in fish and shellfish to increase productivity and improve quality. Scientists have increased investigation into genes that will increase production of natural growth factors in fish, as well as the natural defence compounds that marine organisms use to fight microbial infections. Faster growing salmon, vaccines made with recombinant DNA and bioremediation agents to improve aquatic environmental quality are now commonly available. However, while taking advantage of the benefits derived from biotechnology, we also need to understand the risks and act with caution.

Improving food quality and safety

In general, the safety and quality of internationally traded aquatic animal products has increased, mainly owing to stringent trading standards imposed by the European Union (EU) and the United States of America. National regulatory frameworks, residue testing and monitoring systems and other mechanisms to reduce contaminants and residues in aquatic products have been strengthened in many countries. However, there is still a significant need to improve compliance to the World Trade Organization's Sanitary and Phytosanitary Agreement (WTO/SPS) and Codex Alimentarius requirements in many developing counties. As a consequence of the demand to demonstrate the safety and quality of aquatic products and the environmental integrity of such production systems, aquaculture certification and labelling has become a more common feature.

Promoting market development and trade

Aquatic products are increasingly traded globally, the volume having increased significantly over the past ten years. New markets have emerged, and new products have appeared in the market. With restrictions on fishing in certain seas, some aquaculture products found strong niche markets and became important commodities in aquatic food trade. Traceability and improved and value-added products entered into the market. Although it fluctuates, all in all, the price of cultured fish has declined over the past ten years, making fish an affordable food commodity to many.

Supporting strong regional and interregional cooperation

Over the past years, regional and interregional cooperation brought more benefits to aquaculture development. Many projects and programmes connecting countries and regions emerged, with several strong regional networks established. The Sub-Committee on Aquaculture of COFI was established in 2000, linking all FAO Members into an intergovernmental forum for aquaculture. This provided the necessary global focus to aquaculture. Whether or not governments and stakeholders literally took the Bangkok Declaration and Strategy as an important and agreed strategy to implement or as a quite comprehensive document covering almost all important aspects of sustainable aquaculture development, what is very clear is that reasonable progress was made in implementing the provisions of the strategy worldwide.

Conclusions

We believe that the Bangkok Declaration and Strategy will continue to guide the development and management of aquaculture beyond 2010 through to the first quarter of this century. However, there are elements of the Strategy that require further strengthening in order to enhance its effectiveness, to achieve development goals and to address persistent and emerging threats. By endorsing the Phuket Consensus, a draft document which you will find in your conference bag, we will re-affirm our commitment to the *Bangkok Declaration and Strategy for Aquaculture Development* and will recommend some new actions.

The future of aquaculture looks bright, but the challenges are also increasing. Considering the projected population growth over the next decades, it is estimated that an additional 35 million tonnes of aquatic food will be needed by 2030 just to maintain the current consumption level. Given the existing resources and technological advances, further expansion of aquaculture is only possible if the benefits are felt by everyone. The main challenge facing policy-makers and development agencies is to create an “enabling environment” for the aquaculture sector. Only in this way can aquaculture continue to grow while meeting peoples’ needs and preserving the natural environment. A mix of factors enables and constrains the growth of aquaculture as a sector: declining resource availability, tighter regulatory environment, global economic

development, increasing demand for fish and fishery products and conflicts with other resource users. Some of these constraints have led to the search for new opportunities. For example, there is a growing trend towards sea-farming where many countries are experimenting with off-shore and open-ocean aquaculture.

Amidst the global growth, aquaculture in Sub-Saharan Africa has been slow. Although the situation is changing and the rate of African aquaculture growth is picking up, it is still inadequate, considering that Africa holds the full range of resources needed for aquaculture growth. The overall contribution could be improved considerably, making Africa a high-priority region for aquaculture development. Development agencies and institutions should join hands in ensuring that aquaculture production in Sub-Saharan Africa becomes part of the continent's overall development course. Sustainable development of aquaculture requires government commitment to provide appropriate support to the sector. Commitment is seen in the form of clear policies, plans and strategies combined with adequate funding for their implementation. While a government commitment is necessary for responsible aquaculture development, it is not sufficient to ensure sustainability. The aquaculture sector needs to operate under sound macro-economic, institutional and legal frameworks. It needs private-sector investment.

In closing I would like to emphasize that, given the impressive growth rate the sector has recorded in the past three decades, aquaculture is gradually earning the recognition it deserves for its contribution to food security, poverty reduction, rural development and economic growth. All of us have a stake in this, so I hope that this Conference will bring new insights, crossing across and beyond boundaries, working together among and between groups and disciplines, bringing in science and treading through numerous and complex pathways, so that the fruits of its sustained and responsible development will benefit this generation and those that follow.

When we meet again, perhaps another ten years from now, I hope we shall be able to say with confidence that the conclusions of this Conference have yet again given greater impetus to the growth of aquaculture and that this Phuket Conference had marked the point when aquaculture embarked on the journey towards full maturity.

Thank You!