

Marine capture fisheries management in the Pacific Ocean: status and trends

INTRODUCTION

In the first half of the 1990s, in response to increasing concern about many of the world's fisheries, and following the United Nations Conference on Environment and Development (UNCED), a number of international fisheries instruments provided an impetus for countries to strengthen their fisheries management. A key step in supporting such efforts is the development of more-detailed, systematic and comparable information on fisheries management trends. In 2004, FAO developed the State of World Marine Capture Fisheries Management Questionnaire in response to this need. In 2007, FAO used this questionnaire to conduct a study of the trends in marine capture fisheries management in 29 Pacific Ocean countries.¹⁵

METHODOLOGY

In 29 countries, fisheries management experts were requested to complete the detailed questionnaire.¹⁶ The focus was on:

Box 12

Tools for measuring compliance in national and local fisheries with the FAO Code of Conduct for Responsible Fisheries

Although the 1995 FAO Code of Conduct for Responsible Fisheries (the Code) is not a legally-binding instrument, it represents a consensus between countries as to the features that should characterize systems designed to ensure sustainable use of fishery resources. As the United Nations organization responsible for fisheries, FAO monitors implementation of international instruments developed in the course of its supporting role in fisheries management at the global level.

A report on progress towards implementation of the Code and related instruments – the four international plans of action (IPOA) and the Strategy for Improving Information on Status and Trends of Capture Fisheries – is submitted to the Committee on Fisheries every two years. A useful tool for the preparation of this report is the questionnaire sent to member countries biennially. The information provided on the status of national adherence to the Code constitutes valuable feedback to FAO for judging whether its objectives are being met, and it provides a metric to member countries in judging their general progress towards internationally-agreed initiatives. It also helps fisheries administrations to address specific gaps in national implementation.

In order to be effectively operationalized, the principles of the Code need to be applied within fisheries management arrangements and awareness at the levels of regional and local governments, communities, enterprises and fishers. However, specific provisions relevant at all these levels are rarely mentioned in the text of the Code. Work under the auspices of the FAO FishCode Programme seeks to encourage this process, and is the subject of a recent report.¹ It presents an approach based on the use of questionnaires adapted to evaluate compliance with the Code in national and local fisheries, and thus to indicate measures that might strengthen their management.

- direct and indirect legislation affecting fisheries;
- costs and funding of fisheries management;
- stakeholder involvement in management;
- transparency and conflict management;
- compliance and enforcement.

The information was organized into two major components: (i) national fisheries management in general; and (ii) the tools and trends in the top three fisheries (by quantity) in each of the three marine capture fishing sectors in the Pacific Ocean (large-scale/industrial, small-scale/artisanal/subsistence, and recreational). The fisheries analysed in the questionnaire were limited to national fisheries within continental and jurisdictional waters, excluding high seas fishing and foreign fishing in exclusive economic zones (EEZs) under access agreements.

In the countries surveyed, 81 large-scale, 70 small-scale and 45 recreational fisheries were identified as the top three largest fisheries by quantity in each subsector. As the definitions for each subsector (as well as whether a fishery was defined by gear or by species) were left open to allow for relative definitions within each country, the resulting pooled data had to be used with caution. An analysis of the combined questionnaire responses provided a snapshot of fisheries



The general questionnaire approach parallels the procedures used by the International Organization for Standardization (ISO). It offers a way of converting statements of principle in a global instrument into a semi-quantitative form that can be used more readily in a multidisciplinary fisheries evaluation of management performance. Emphasis is placed on displaying the results of questionnaires in a readily understandable form, and on how they may be incorporated into decision-making. The report presents a set of example questionnaires corresponding as closely as possible to clauses from Articles 7, 8, 9, 10, 11 and 12 of the Code.

The report discusses approaches that could be used in operationalizing the Code. It uses example cases where the Code has been applied in questionnaire form for evaluating fisheries objectives described by its different articles. Other assessment approaches used for related purposes are included for reference. For example, protocols are suggested for evaluating performance in relation to ecosystem management, fisheries co-management, and stock recovery strategies, based on the FAO Technical Guidelines for the Code, workshop experience and the fisheries literature.

The report provides different formats and procedures, and it describes some of the problems encountered. Using several practical applications, it discusses the use of questionnaires to promote adherence to the Code's provisions. The focus is mainly on applications of the Code at the grassroots level by local fisheries management authorities operating within national fisheries jurisdictions.

The report includes a CD-ROM containing excerpt questionnaires.

¹ FAO. 2007. *Using questionnaires based on the Code of Conduct for Responsible Fisheries as diagnostic tools in support of fisheries management*, edited by J.F. Caddy, J.E. Reynolds and G. Tegelskär Greig. FAO/FishCode Review No. 21. Rome.

management in the Pacific Ocean in the period 2003–06, and partial results are provided below.

OCEANWIDE TRENDS

Political and legislative frameworks

All countries in the region had specific national legislation for the management of marine capture fisheries, all of which provided a legal framework for fisheries management, and almost all of which provided an administrative framework for such management. In addition, 76 percent of the countries had laws and regulations designed to serve as a legal framework for fisheries management and management plans. Where extant, the legislation set up a series of steps or a process for developing, organizing and implementing fisheries management regulations (100 percent) and management plans (71 percent). However, the term “fisheries management” was defined in only one-third of those countries responding. The vast majority (86 percent) of national legislations required that fisheries management decisions be based on biological analyses/stock assessments, and slightly fewer (69 percent each) on the following analyses: social impacts analyses; economic analyses; or monitoring and enforcement analyses. Therefore, there was relatively strong legal guidance on the processes for taking management measures as well as on the interdisciplinary information required in order to develop proper management measures.

The legislation in most countries (93 percent) identified a single agency or other authority¹⁷ with the responsibility for marine capture fisheries management at the national level. However, more than half of these agencies/authorities legally shared management responsibilities with other agencies and/or were further assisted by government or quasi-government agencies for their fisheries research (63 percent), to be further supported by universities. In many cases (67 percent), the fisheries agencies/authorities were also supported by at least one other agency (e.g. navy or coast guard) for the monitoring and control of fisheries laws.

In recent years, the policy frameworks in place in the region have moved towards sustainability (socio-economic and biological/ecosystem) objectives rather than being geared purely to production objectives. In part, this is because of the recognition of stock effects of historical overfishing and impacts on the fisheries ecosystems from within the fisheries sector as well as from other users of the aquatic environments. Where specific fisheries management objectives were provided for in legislation (76 percent), sustainability and optimal use of the resources were often listed as the principal objectives. In addition, in almost all countries, fisheries management was affected by at least one other piece of national legislation based on sustainability concepts. Moreover, the national fisheries legislation has given the fisheries management authorities the legal power to meet the priorities and obligations of international and regional agreements/conventions (86 percent).

In almost 70 percent of the countries, a large majority of the marine capture fisheries were considered “managed in some way”.¹⁸ However, for those fisheries considered managed, they were likely to be lacking any formal documented management plans (although often covered by published regulations or rules). However, the perception in the countries is that the number of fisheries managed in some way has increased in the past ten years.

State of the fisheries

When matched up with global comparisons of large-scale versus small-scale fisheries,¹⁹ the relative sizes between the subsectors differed (Table 14). As was the case in the global estimates, the small-scale fisheries involved more than 2.5 times more participants (employed part-time or full-time or as subsistence) than did the large-scale fisheries. However, unlike the global comparison, total landings from the top fisheries in the large-scale subsector were 3.6 times higher than those in the small-scale fisheries.

Table 14
Basic data on the largest Pacific Ocean fisheries, by subsector

	Large-scale ¹	Small-scale ²	Recreational
Number of participants	1.3 million	3.5 million	5.3 million ³
Total landings (tonnes)	32 million	8.8 million	2.3 million ⁴
Number of vessels	30 000	218 000	n.a.

Notes: n.a. = not available.

Data are for the top three (by quantity) fisheries for each subsector within 29 Pacific Ocean countries.

Guatemala, Indonesia, Malaysia and Panama include data from all bordering ocean/sea fisheries.

¹ Out of 81 fisheries, participants data missing for 33; landings data missing for 3; number of vessels data missing for 26.

² Out of 70 fisheries, participants data missing for 29; landings data missing for 18; number of vessels data missing for 25.

³ Includes information for 9 out of 18 countries identified as having recreational fisheries.

⁴ Includes information for 6 out of 18 countries identified as having recreational fisheries.

In addition, recent data collection efforts have shown that recreational fisheries involve potentially large numbers of fishers and landings, particularly in the developed countries in the region.

The number of participants had increased compared with the previous ten-year period in most small-scale and recreational fisheries (79 and 64 percent of the fisheries, respectively), and decreased in a small number of these fisheries (10 and 8 percent, respectively). The number of participants in large-scale fisheries had increased in almost half the countries (47 percent) and had decreased in a number of countries (37 percent).

Figure 46 shows five-year trends in landings values and quantities (based on data from the questionnaire). In the 48 large-scale fisheries of the 18 countries where comparative data were available, fewer than 40 percent of the fisheries values and quantities have decreased. In general, the trends in quantities and values have followed the same direction. However, values and quantities have followed different directions in four countries.

In the 28 small-scale fisheries of the 13 countries where data were available, 30 percent have decreased in value and 44 percent have decreased in quantity. In three countries, increased values have been experienced in the face of decreased quantities; in two countries, values have declined while quantities have risen.

The majority of large-scale fisheries presented were also considered to be top value fisheries in the countries. This was less the case in the small-scale fisheries, but still represented more than half of the fisheries investigated. Almost one-third of the recreational fisheries were considered top value fisheries.

Concerning stock status, an FAO report published in 2005 shows that, for the 181 stocks or species groups of the Pacific Ocean for which information was sufficient to evaluate the state of the resources, 77 percent were determined to fall within the range of moderately–fully exploited to overexploited/depleted.²⁰ These levels signal little room for further expansion, in addition to the possibility that some stocks might already be overexploited. It should be noted that there was still a large number of stocks for which it had not been possible to determine stock status.

Management tools in use in the largest fisheries

The toolkit of technical measures for fisheries management used in the region includes: spatial restrictions, temporal restrictions, catch and size restrictions, rights/incentive-adjusting restrictions, and gear restrictions (Figure 47). The results of the questionnaire brought to light certain tendencies within the Pacific Ocean countries:

- Countries have preferred the use of spatial (especially MPAs and temporary spatial closures) and gear restrictions (especially gear type and size) over other technical measures for managing marine capture fisheries.



Figure 46

Changes in the quantity and value of landings of the top fisheries

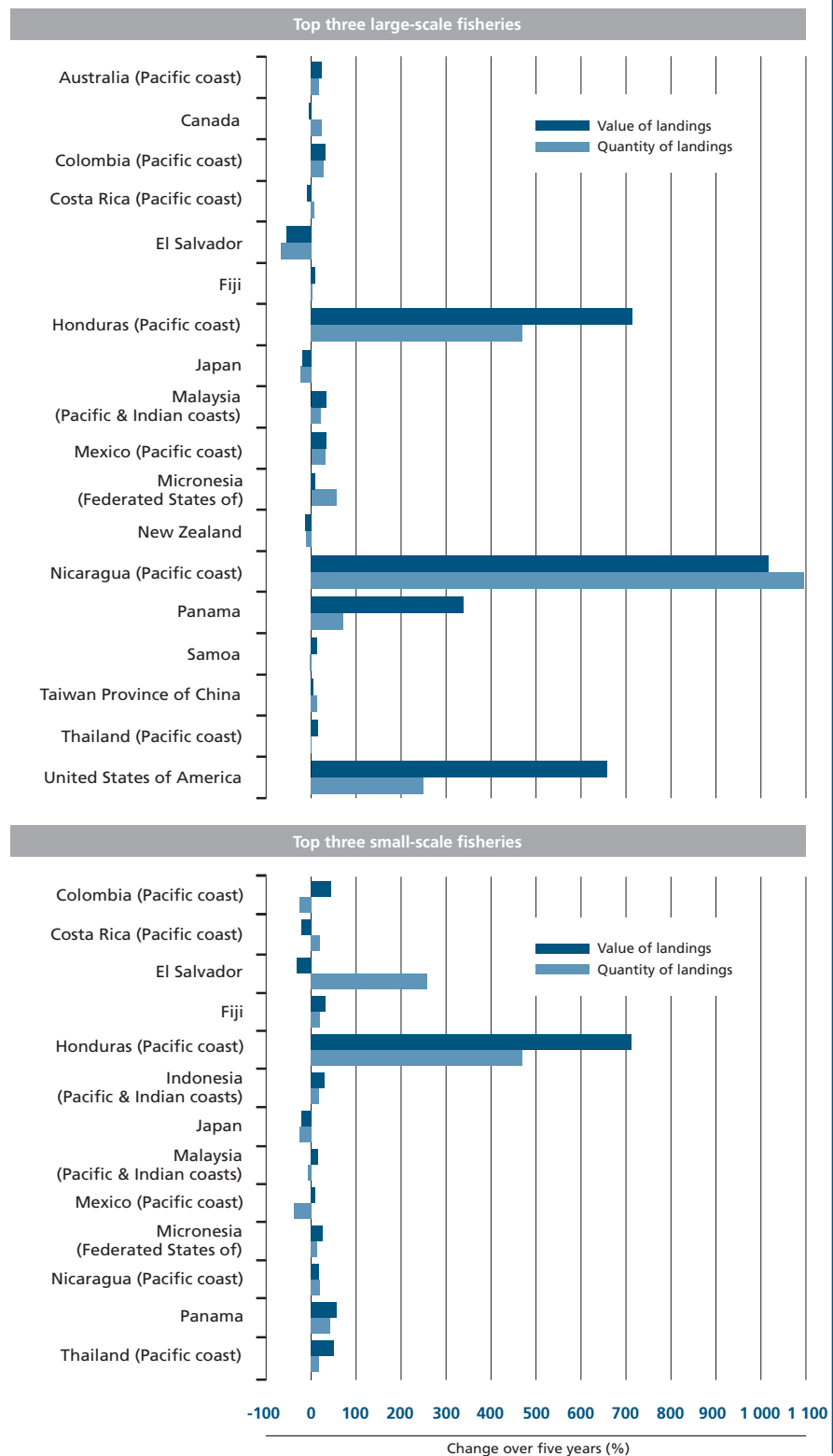
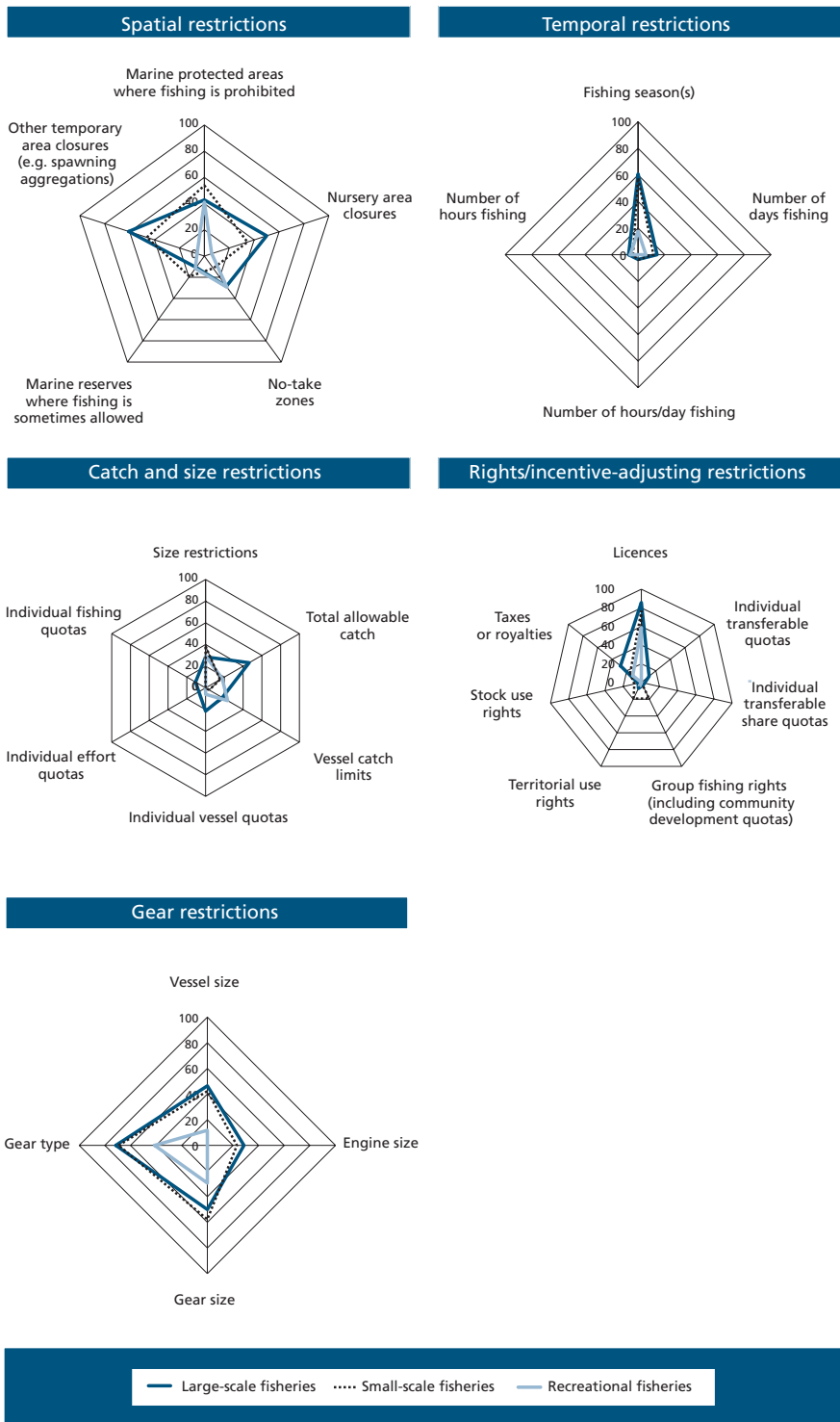


Figure 47

Technical measures for fisheries management in use in the Pacific Ocean countries (percentage of countries)



Note: Data refer to the percentage of countries in which the measure is used in at least one of the top three fisheries.

- Where used, temporal restrictions have focused on the definition of fishing seasons.
- Other than the issuing of fishing licences, very few incentive-adjusting or rights-providing mechanisms have been used.
- There has been a generalized increase in the use of management tools in the past ten years.
- Although recreational fisheries have been active in at least 18 countries in the region, few management measures have been applied to these fisheries other than the establishment of MPAs and reserves and, less frequently, the granting of licences and the adoption of gear-type restrictions.

Participatory mechanisms and conflict management in the largest fisheries

Although legal or formal definitions of those having an interest in the use and management of fisheries resources were not common in the region, stakeholders were identified in most fisheries across the three subsectors. In most cases, it was felt that arrangements had been made to consult these stakeholders and to work with them on the management of these fisheries. However, these views were less strong in the small-scale and recreational subsectors.

Where stakeholders were part of the fisheries management decision-making process, the participatory approach had led to a reduction in conflict within the fisheries. In at least half of the fisheries, it had created incentives and reasons for stakeholders to practice “responsible” fisheries stewardship voluntarily. The involvement of stakeholders tended to accelerate the management process in the large-scale subsector but not necessarily in the small-scale and recreational subsectors. Moreover, the attainment of stable stocks was not automatically associated with stakeholder involvement.

Although participatory approaches to management assisted in reducing conflict within and among the fisheries, conflict remained significant throughout the subsectors. Within the large- and small-scale subsectors, it was often caused by competition between different vessel categories or with other fisheries. In the recreational subsector, it tended to arise from competition with all other uses for the same area of water.

Conflict resolution processes were used on average in more than half of the large- and small-scale fisheries and in more than one-third of the recreational fisheries. These processes included: zoning for specific users, stock enhancement, resource allocation between and among the fisheries, and educational methods to sensitize users regarding the multiple-use nature of certain resources. There was little variation among the subsectors. However, sensitization methods were more common in the recreational subsector than elsewhere.

Fleet capacity management within the largest fisheries

Within the Pacific Ocean, fleet capacity was measured in at least half of the large-scale fisheries. However, capacity measurement in the small-scale and recreational subsectors was often not undertaken. In addition, although there was often a “sense” that overcapacity existed within at least half of the large- and small-scale fisheries, few capacity reduction programmes were put into place to adjust for the levels of capacity.

Where used, the method of preference for reducing capacity levels was the purchase of fishing licences from the fishery. This was followed by buying out fishing vessels licensed to operate in the fisheries. Licence removal was found to be an efficient means of immediately reducing any excess fishing capacity, while vessel buyouts were considered much less effective. In addition, these initial licence removals, where supported by ongoing licence purchases, were deemed effective for ensuring that any excess fishing capacity did not return.

Such capacity reduction programmes were generally supported through government funding. However, in a good number of cases, such programmes were paid for by participants in the fishery itself or, occasionally, by participants in other fisheries.

Costs and funding of fisheries management

Budget outlays for fisheries management included funding for research and development, monitoring and enforcement, and daily administrative management. In about 17 percent of the countries, these activities were not covered in some way by national government funding. National funding sources tended to decrease as management moved towards regional and local levels, contrasting the rising trends in management costs at these levels, in part a consequence of decentralization policies throughout the region. In practically all countries and at most management levels, management costs rose compared with the preceding ten-year period. On the other hand, budgets for fisheries management increased in fewer countries, and decreased in about one-third of them.

Fisheries management cost-recovery mechanisms, other than licence fees, were uncommon throughout the three subsectors. In cases where revenues were collected from fisheries activities, these revenues usually went directly to the central government budget. Therefore, no link between the benefits and costs of management services could be made, and fisheries authorities continued to base their management activities on governmental appropriations.

Compliance and enforcement

In most cases, the above-mentioned increases in management costs were associated with increased monitoring and enforcement activities, but they were also related to increased conflict management and stakeholder consultations. Compliance and enforcement tools in the region focused on inspections, whether on land or at sea. The use of additional tools, such as onboard observers or VMSs, was also widespread in the region.

When faced with infractions, most countries relied on fines or the revocation of fishing licences as deterrents. However, the perceptions in the vast majority of the countries in the region were that: (i) the funding provided was insufficient to enforce all fisheries regulations; (ii) the penalties for non-compliance were not severe or high enough to act as deterrents; and (iii) the risk of detection was too low to promote compliance with fisheries regulations.

SUMMARY AND CONCLUSIONS

Fisheries management within the Pacific Ocean varies from highly structured and centralized to devolved and community-based management systems, and from data-rich to data-poor systems. The countries also range from capital-intensive and developed economies to labour-intensive and least developed economies. Therefore, generalized comments can be easily countered by specifics. Nonetheless, several tendencies are shared across many of the Pacific Ocean fisheries.

In general, there has been a shift from development/production-oriented policies towards management and sustainability policies, and from ad hoc planning and decision-making to stated policy and management objectives supported by legal frameworks. The aim of these legal frameworks is to increase transparency in planning and decision-making by defining the roles and responsibilities of the various stakeholders, structuring the planning processes, increasing stakeholder consultations, devolving responsibility for developing and implementing management measures, and requiring more integrated information for decision-making. However, the ultimate decision-making has tended to remain at top levels without the assistance of transparent and well-defined decision-making rules and, hence, it has remained vulnerable to political and other pressures.

The funding of management comes primarily from state coffers although some countries have moved to at least partial recovery of management costs through the collection of licence fees throughout the fishing subsectors. Management costs have risen over the years as a consequence of increased monitoring and enforcement, modifying regulations and stakeholder consultations. However, the impression is that



there are insufficient funds to monitor and enforce fisheries legislation properly and that, combined with low penalties, the risks of being penalized are too low to act as deterrents – pointing to a weak point in management implementation throughout the Pacific Ocean countries.

Countries have started to expand their use of management tools, such as spatial and temporal restrictions. However, incentive-adjusting or rights-providing mechanisms have often been limited to the issuing of fishing licences. The use of varied management tools, as well as formal management plans, has been even more limited in the recreational fisheries subsector, although its importance (economic and biological) is acknowledged in a growing number of countries in the region.

Great efforts have been made to include stakeholders in the planning and management processes. This has helped to reduce conflict, increase voluntary stewardship of the resources and accelerate management processes. However, conflict has remained prevalent within and among the fisheries and among other users of the aquatic resources. To assist in minimizing these conflicts, conflict resolution methods have often been applied in the large- and small-scale fisheries, and included zoning, stock enhancement, resource allocations and sensitization methods.

Knowledge about fleet capacities and fishing efforts has increased, but only in certain areas. It is still sorely lacking in most small-scale and recreational fisheries. In addition, although knowledge about key target stocks has increased, many knowledge gaps remain, especially for the low-valued bycatch species. Contrary to a precautionary approach, and even where faced with overcapacity and overfishing, very few capacity reduction programmes have been used.

It appears that fisheries management has remained largely reactive – reacting to conflicts, stock/resource problems and international requirements – rather than providing a forward-looking framework for attaining sustainable use of aquatic resources. In addition, while legal and policy frameworks have been revisited and updated, their implementation, including their monitoring and enforcement, remains inadequate.

Actions to address these issues may include:

- the definition of pre-defined trigger and reference points for forcing management action, which would be guided by established decision-making rules and, thereby, help to increase decision-making transparency and reduce the susceptibility of decision-making to undue influences;
- the introduction of adaptive management strategies, based on strengthened institutional structures with well-defined, prioritized objectives;
- the strengthening of the application of the ecosystem and precautionary approaches to fisheries;
- the investigation of cost-effective data-gathering methods for biological, economic, social and environmental aspects of fisheries management;
- the investigation of creative and simple “win-win” techniques to minimize harmful impacts of fisheries;
- effective enforcement of fishery laws and regulations;
- improved control over growth in fishing fleet capacity;
- greater harmonization of the definition and application of laws and regulations among and within fisheries subsectors;
- the development and implementation of fisheries management plans with relevant stakeholders;
- the elimination of harmful subsidies;
- active participation in regional initiatives, such as regional fisheries bodies, to assist in the control of IUU fishing, the harmonization of fisheries laws and regulations, and the development of consistent management measures with respect to shared and transboundary stocks;
- continued involvement of stakeholders in management, with consideration given to co-management schemes requiring the creation or strengthening of organizations to represent fishers and other interests.

The countries of the Pacific Ocean need to continue in their development of sustainable fisheries management frameworks, addressing both international norms and agreements as well as adapting to their specific situation and needs. Although there is no panacea for managing all fisheries, countries could benefit from the experiences of other countries in the same region and elsewhere, and from existing literature, in the search for creative and cost-effective methods for managing fisheries.

In addition, regardless of the management framework chosen, where there is a lack of political will to implement the relevant laws, regulations and management measures, even perfectly designed frameworks will remain unenforced.

Finally, improved understanding of the effects of the management measures implemented in the fisheries (e.g. economic efficiency, social justice, and stock/ecosystem health) would greatly assist in the adaptive improvement of fisheries management.

Use of wild-fishery resources as seed and feed in aquaculture

INTRODUCTION

Since time immemorial, people have held fish captive and fattened them. Originally, the rich and powerful did this for fresh fish and, possibly, pleasure; the poor did so to save the bounty of one season for later use in periods of scarcity. Aquaculture was born when rural households recognized keeping fish as a valid component of their livelihood strategy. However, only last century, as people learned how to control the reproduction of some fish and shrimp species, did the practice develop, spread and become the focus of dedicated enterprises.

By the start of this century, aquaculture had grown much in sophistication and importance, but it had not yet – unlike the livestock industry – fully severed its dependence on wild animals. On the one hand, fish is used as feed for some cultured species; on the other, aquaculturists still depend on wild fish and crustaceans to obtain young specimens (seed) to culture. This dependence is both a strength and a weakness. It is a strength in that the industry usually has access to strong and healthy individuals. It is a weakness in that its reliance on wild stocks is, at times, detrimental to the health of these stocks²¹ and, furthermore, it excludes the possibility of using selective breeding to enhance desirable commercial traits.

Recent FAO reports have shed some light on the extent and nature of aquaculture's dependence on wild-fishery resources.

WILD STOCKS AS A SOURCE OF SEED AND BROODSTOCK

Many cultured aquatic species can now be grown entirely in captivity because scientists have succeeded in closing their life cycle. However, this is not yet possible for some of the species now raised by aquaculturists, particularly for marine finfish. The aquaculturists depend on access to wild specimens either to obtain broodstock – animals that are later bred and spawned in captivity – or juveniles to raise in captivity. In fact, those species that can be reared through a closed farm cycle require the introduction of new broodstock from the wild from time to time in order to maintain the genetic strain and avoid inbreeding.

Thus, aquaculture practices may have an impact on wild stocks. While the capture of mature animals for captive reproduction is seen as having little long-term effect on the state of wild stocks, this is not the case for the capture of young animals.

A recent FAO study indicates that, before the 1960s and into the 1970s (when the quantities produced by hatcheries was difficult to predict and often fluctuated considerably), the use of wild seed for freshwater aquaculture was common *inter alia* in Bangladesh, India, Pakistan and Viet Nam.²² However, in time, hatcheries in these countries met a large part of the seed needed by aquaculture and for capture-based fisheries. Today, aquaculturists in many countries depend partially or entirely

