

Aquaculture planning

Policy formulation and implementation for sustainable development



Cover photographs:

Top left: A worker at the Kwangchow Centre near Canton, China checks the growth of carp fingerlings prior to transferring them to maturing ponds (©FAO/F. Botts);

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Right: Harvesting Nile tilapia from a pond at an agriculture-aquaculture cooperative in N'Dress, Central African Republic (courtesy of Jérôme Lazard/Sarnissa).

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sustainable development

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by

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Preparation of this document

A first draft of this document, initially prepared by Graham Haylor and Graeme Macfadyen (Poseidon Aquatic Resource Management Ltd.), served as a background paper for the Expert Consultation “Improving planning and policy development in aquaculture” held in Rome, Italy, on 26–29 February 2008. The Expert Consultation was convened to make recommendations on how to plan for aquaculture development and to produce an outline for FAO Technical Guidelines for Responsible Fisheries on improving the process of aquaculture policy formulation and policy implementation, to be published at a later date. The Expert Consultation recommended that, after being appropriately revised and elaborated based on the Expert Consultation outputs and participants’ comments, the background paper be published in the FAO Fisheries and Aquaculture Technical Paper series.

Abstract

With the dramatic recent growth of aquaculture, the planning of its development has become increasingly important. Proper planning will stimulate and guide the evolution of the sector by providing incentives and safeguards, attracting investment and boosting development. Moreover, it will help to ensure the long-term economic, environmental and social sustainability of the sector, and its ultimate contribution to economic growth and poverty alleviation.

This paper provides practical guidance to aquaculture policy-makers and implementers on policy formulation and processes. It starts by reviewing governance concepts and international policy agendas relevant to aquaculture development and proceeds by defining “policy”, “strategy” and “plan” while explaining common planning terminology.

The paper proposes practical steps for improving policy formulation processes. These include: recognizing a timely opportunity for change; ensuring coordination and communication among stakeholders; adopting a participatory approach; learning lessons from elsewhere; and accepting that conflicts may arise and lead to hard choices. It highlights means for implementing aquaculture policies, notes the benefits of an ecosystem approach and proposes a range of instruments which, if implemented at various levels, will help progress towards the development goals for the sector. However, the successful implementation of aquaculture policies depends on overcoming challenges related to weak human capacity, institutions and monitoring systems and to inadequate financial resources. Therefore, the paper also suggests the means to do so.

Central to successful planning in the aquaculture sector are coherence in the planning process and an emphasis on interdisciplinarity beyond sectoral remit through institutional collaboration, human capacity development and participation. It is also necessary to embed the chosen approaches and instruments in the principles of good governance. Together, these key elements will ensure the soundness and effectiveness of aquaculture development policies and the positive contribution of the sector.

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Abbreviations and acronyms

CCRF	Code of Conduct for Responsible Fisheries
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
EAA	ecosystem approach to aquaculture
GIFT	genetically improved farmed tilapia
HACCP	Hazard Analysis and Critical Control Point (system)
M&E	monitoring and evaluation
MDG	Millennium Development Goal
NGO	non-governmental organization
SPS Agreement	Agreement on the Application of Sanitary and Phytosanitary Measures
SWOT	strengths, weaknesses, opportunities and threats

1. Introduction

The planning of aquaculture has become increasingly important with the dramatic growth of the sector. Global aquaculture output has more than quadrupled since 1985, and more than doubled in the last decade, reaching 62.9 million tonnes in 2005 (FAO, 2007a). Recent studies on the future demand for, and supply of, fish and fishery products predict continued expansion of aquaculture, given the stagnation of global output from the commercial fisheries (Brugère and Ridler, 2004; Delgado *et al.*, 2003; Ye, 1999). This growth in aquaculture, its reliance on natural resources and the potential conflicts that may arise from it underscore why planning the sustainable development of the sector is more necessary than ever.

In general terms, the act of planning a sector's development provides the means to regulate, in the public interest, its development in order to achieve a set of determined goals and objectives. As such, planning reduces risk, informs decision-making, establishes trust and conveys information. To be applicable and effective in achieving the desired goals and objectives, planning relies on political support, participation and resource commitment. Thus, policy formulation (and its related implementation) is the outcome of a planning process. This applies to aquaculture development where planning is an important process that will stimulate and guide the evolution of the sector by providing incentives and safeguards, attracting investments and boosting development, while ensuring its long-term sustainability (economically, environmentally and socially) to ultimately contribute to economic growth and poverty alleviation. However, planning is not a magic formula for achieving development progress. Inadequately carried out, it will yield results that may not be any better than if no provisions for planning had been made.

Problems hampering optimal planning processes in aquaculture development usually relate to weak planning processes and inadequate human capacity, and to information and data gaps. This has led to the overall slow or uncoordinated growth of the aquaculture sector in some regions, to poor economic choices and decisions, and to conflicts with other sectors and within the aquaculture sector itself. Although efforts have been made both at national levels to support aquaculture planning, additional measures are necessary to help countries overcome the planning challenges they face.

As highlighted during the third session of the Sub-Committee on Aquaculture in New Delhi, India, September 2006, FAO Members, regardless of the state of advancement and development of aquaculture in their countries, realized the importance of planning for its sustainable development and its contribution to food security and economic growth. However, the working document presented during that session pointed out that the capacity to plan aquaculture development, i.e. to place aquaculture in the context of national development, through the formulation of coherent policy frameworks was often lacking in those countries that need it most (FAO, 2006). As a consequence, FAO Members of the Sub-Committee on Aquaculture recommended that an Expert Consultation on improving policy development/formulation and planning in aquaculture be organized during the intersession.

This Fisheries and Aquaculture Technical Paper was initially drafted as a background paper for the Expert Consultation held in Rome in February 2008 as a response to the Sub-Committee's request. It was later revised to incorporate comments and suggestions from the consulted experts, as well as the outcomes of the Expert Consultation. It refers indirectly to the outline for technical guidelines on improving planning and policy formulation and implementation for aquaculture development

that was produced by the experts invited to the Expert Consultation and builds on the outlined contents. It follows the logical structure of planning – while the first half is dedicated to aquaculture policy formulation, the second half deals specifically with policy implementation. Chapter 2 serves as a preamble on governance, while Chapter 3 defines what is now understood as “policy”, “strategy” and “plan” and sheds light on the logical steps of planning. Chapter 4 sets the broader context within which aquaculture policies have to be formulated and implemented, taking into account the major issues and commitments that are currently influencing – and will continue to influence in years to come – the development of aquaculture. Chapter 5 details the succession of steps needed to formulate aquaculture policies, emphasizing the need for participation and coordination in this process. Chapter 6 deals with the implementation of aquaculture policies, reviewing the instruments available to do so. Chapter 7 provides avenues for overcoming the challenges of policy implementation, namely human capacity development, institutional strengthening, resource mobilization and adequate monitoring and evaluation. Chapter 8 provides a set of conclusions. Finally, this document also includes two practical examples of aquaculture policy formulation processes undertaken at the national level (Appendix 1), along with some guidance on how to carry out an institutional assessment (Appendix 2).

This document is the first of a series of Fisheries and Aquaculture Technical Papers that will be dedicated to aquaculture planning and governance. A complementary document to the present Fisheries and Aquaculture Technical Paper will be published later. It will contain a number of national aquaculture policies, strategies and/or plans as illustrations of the concepts presented here. A Fisheries and Aquaculture Technical Paper addressing the topic of aquaculture governance will also be published as part of this series.

2. Aquaculture governance

This chapter focuses on the subject of governance because good governance is fundamental for successful aquaculture development policies to be formulated and implemented. While governance principles, which this chapter describes, set the context within which aquaculture development should take place, good governance results from the actual compliance with these principles, leading, as a result, to the sustainable, effective and equitable development of the sector.

WHAT IS GOVERNANCE?

Some definitions

The concept of governance is not new, but it has come to the fore in the last decade. It is a complex notion that is difficult to capture in a single and simple definition. Many attempts at defining governance have been made (Box 1), referring directly or indirectly to (McCawley, 2005):

- The process by which governments are chosen, monitored and changed.
- The systems of interactions between the administration, legislature and judiciary.
- The ability of governments to create and implement public policy.
- The mechanisms by which citizens and groups define their interests and interact with institutions of authority and with one another.

BOX 1

Some definitions of governance

“Governance can be seen as the exercise of economic, political and administrative authority to manage a country’s affairs at all levels. It comprises the mechanisms, processes and institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations and mediate their differences.” (UNDP, 1997, pp. 2–3)

Governance is “the traditions and institutions by which authority in a country is exercised for the common good. This includes (i) the process by which those in authority are selected, monitored and replaced, (ii) the capacity of the government to effectively manage its resources and implement sound policies, and (iii) the respect of citizens and the state for the institutions that govern economic and social interactions among them.” (Kaufmann, Kray and Zoido-Lobatòn, 1999, p. 1)

“Governance may be defined as the sum of the many ways individuals and institutions, public and private, manage their common affairs. It is a continuing process through which conflicting or diverse interests may be accommodated and a co-operative action may be taken. It includes formal institutions and regimes empowered to enforce compliance as well as informal arrangements that people and institutions either have agreed to or perceive to be in their interests.” (European Commission, 1995, p. 2)

“Governance denotes the use of political authority and exercise of control in a society in relation to the management of its resources for social and economic development. This broad definition encompasses the role of public authorities in establishing the environment in which economic operators function and in determining the distribution of benefits as well as the relationship between the ruler and the ruled.” (OECD, 2003)

Underlying governance is the notion of power, how it is exercised by the individuals or groups concerned, and how it shapes their relationships, decisions and actions. Thus, governance can be referred to as the processes whereby “elements in a society wield power, authority and influence and enact policies and decisions concerning public life and economic and social development” (Governance Working Group of the International Institute of Administrative Sciences, 1996) and “make important decisions, determine whom they involve in the process and how they render account” (Graham, Amos and Plumptre, 2003). The visible signs, or manifestations, of governance are thus agreements, procedures, conventions or policies that define who obtains power, how decisions are made, and how accountability is rendered. By relating to the way higher-level decisions and policies are made and how power and responsibility are shared, governance therefore holds a meaning broader than that of “government” and different from that of “management” (Béné and Neiland, 2006). However, it links the two by facilitating the development and articulation of appropriate management systems.

Characteristics of good governance

The set of characteristics underlying good governance are: participation, consensus orientation, strategic vision, responsiveness, effectiveness and efficiency, accountability, transparency, equity and the rule of law (UNDP, 1997; ESCAP, 2009; see Box 2).

Overarching these characteristics are the three founding principles of good governance (Schaffer, 2008):

- the promotion of inclusiveness;
- the promotion of lawfulness;
- the promotion of accountability.

BOX 2

Characteristics of good governance

Participation – All men and women should have a voice in decision-making, either directly or through legitimate intermediate institutions that represent their intention. Such broad participation is built on freedom of association and speech, as well as capacities to participate constructively.

Consensus orientation – Good governance mediates differing interests to reach a broad consensus on what is in the best interest of the group and, where possible, on policies and procedures.

Responsiveness – Institutions and processes try to serve all stakeholders.

Effectiveness and efficiency – Processes and institutions produce results that meet needs while making the best use of resources.

Accountability – Decision-makers in government, the private sector and civil-society organizations are accountable to the public, as well as to institutional stakeholders. This accountability differs depending on the organizations and whether the decision is internal or external.

Transparency – Transparency is built on the free flow of information. Processes, institutions and information are directly accessible to those concerned with them, and enough information is provided to understand and monitor them.

Equity – All men and women have opportunities to improve or maintain their well-being.

Rule of law – Legal frameworks should be fair and enforced impartially, particularly the laws on human rights.

Inclusiveness requires that governing structures, either formal or informal, be representative of, or give voice to, a wide range of diverse interests, including those of the poor. Inclusiveness relates closely to issues of empowerment (conscientization and social mobilization), participatory democracy, civil-society organization (including the role of non-governmental organizations [NGOs] and the media), and decentralization. **Lawfulness** requires that governing structures abide by the rule of law and serve as guarantors of lawful civil conduct. Lawfulness relates closely to issues of justice, conflict resolution, criminality, peace and security, social violence (including domestic violence), human rights, etc. **Accountability** requires that governing structures remain answerable for their actions and open to sanction (including dismissal) if they violate the principles of inclusiveness and lawfulness. Accountability relates closely to issues of corruption, transparency and access to information.

APPLICATION TO CAPTURE FISHERIES AND AQUACULTURE

Governance in capture fisheries is relatively more advanced than in aquaculture because of the long history and international context of fishing and fisheries management. This experience can provide useful insights for the development of good aquaculture governance. In the context of capture fisheries, fisheries governance is the sum of the legal, social, economic and political arrangements used to manage fisheries. It includes legally binding rules, such as national legislation or international treaties, and it relies on customary social arrangements as well as on respective national frameworks provided for all economic activities. Focus on governance in fisheries has increased in recent decades because of the growing realization that fish stocks in different parts of the world were being increasingly harvested beyond their optimal level and the fishery sector was in economic and social difficulty (FAO, 2001). The UN Law of the Sea Convention (1982), complemented by other related international agreements, establishes the global framework for the governance of marine fisheries. The Code of Conduct for Responsible Fisheries (CCRF), adopted by FAO Members in 1995 and elaborated on since then, is considered to be the foundation upon which to promote sustainable fisheries and aquaculture development for the future at national levels.

Good governance in capture fisheries involves “control over our fishing fleets and enforcing limits on catches and numbers of fishers so our fish stocks can recover. It requires eliminating billions of dollars of subsidies each year that contribute to overcapacity and the depletion of fish stocks, even on the high seas. Good governance means equitable access to the fish resources – protection of our inshore and coastal fisheries on which the poor and the small-scale fishers depend, while clearly defining the important role of the industrial fisheries. Good governance will recognize the important links between aquaculture development and the responsible management of our water basins, the wetlands, and the coastal zones. Good governance involves transparent and participatory decision-making that is accountable to stakeholders now and in future generations”.¹

In the context of aquaculture, examples of good governance are fewer because aquaculture activities usually occur within national jurisdictions and the sector has traditionally been considered jointly with capture fisheries in policies and international agreements (e.g. Article 9 under the CCRF). However, growing external pressures on the industry are prompting it to improve its governance and there is evidence of good practices in some parts of the world – which translate directly into high production outputs. Achieving good governance in aquaculture is as important an objective as aquaculture development (increases in outputs) *per se* as it will ensure the achievements of sustainable aquaculture development ecologically, economically and institutionally.

¹ Address by Warren Evans, Director of Environment, The World Bank. NEPAD Fish for All Summit, Abuja, Nigeria, 25 August 2005.

Good governance in aquaculture will benefit the sector in the short and long terms as it is becoming increasingly recognized that problems and failures in aquaculture development are no longer solely related to technological issues.

In this spirit, efforts are becoming visible at national levels to consider the development of the sector in a holistic manner through ecosystem approaches, to formulate national policies and implementation strategies focused on the sustainable development of the sector, to establish or revise legal frameworks and regulations, to recognize the importance of stakeholders outside aquaculture in policy and participatory decision-making, to establish producers' organizations and responsive institutions to deal with aquaculture, and to promote internationally-endorsed codes of conduct in farming practices.

IMPROVING GOVERNANCE IN AQUACULTURE

Issues

In most of the world, albeit to varying degrees, aquaculture is driven by the commercial sector, whose motivation is profit. For these farmers, an enabling environment that reduces risks and lowers transaction costs for all business activities by creating a climate conducive to private investment is critical if they are to invest and expand. However, the creation of such an enabling environment is dependent on improving political stability and legislative transparency and on addressing poverty and property rights issues. This is fraught with two main difficulties. First, governance is difficult to improve and a sensitive subject because its assessment, which tends to be carried out by outsiders and goes beyond sectoral remit, can raise fundamental questions related to the functioning of societies in general and to the behaviour of their citizens and leaders. If "bad" governance is associated with political underdevelopment, should an assessment of a country's political institutions be a terrain for development agencies, especially those dealing with aquaculture, to venture on? Whose role should it be to promote corrective measures, and how far beyond aquaculture should they extend? Second, there are some inherent difficulties in "measuring" progress towards good governance in aquaculture, which calls for a value judgement over the criteria of good governance. Such value judgements may differ among agencies and among governments. For example, views of liberals and statisticians differ over the nature of "good" governance although, in practice, the liberal view of governance based on responsiveness, accountability, democracy and participation has appeared to be the conventionally-endorsed approach (Béné and Neiland, 2006).

Choosing indicators to evaluate or monitor governance can be controversial, especially where they include corruption and transparency. Although such debates may seem beyond the remit of aquaculture development, improving aquaculture governance will sooner or later, directly or indirectly, encroach on these issues.

Another type of difficulty relates to the nature of the measures needed to improve or achieve good governance in aquaculture. Such measures call for, among others, an identification of the constraints to achieving good governance and decisions related to a realistic time span to do so, bearing in mind that achieving good governance also depends on many allied improvements, as in education for example. Furthermore, some prioritizing may be necessary depending on the objectives of development decided, e.g. poverty alleviation or economic growth and profits, as each objective will not require the same kind of governance-related interventions. Finally, good aquaculture governance is ultimately dependent on good governance at national/global levels, begging the "chicken and egg" question of which should come first.

Planning

In these circumstances, adequate planning and policy-making are the key means by which governance can be improved. Good planning for aquaculture development,

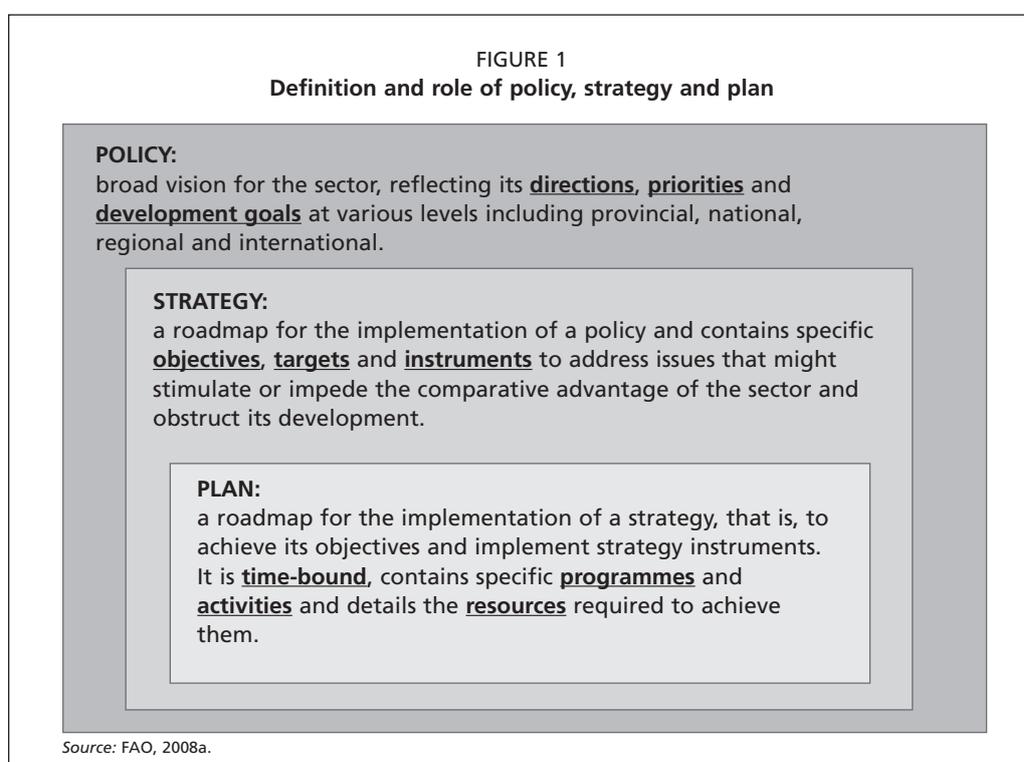
encompassing the formulation of policies and decisions over their means of implementation, contributes to the good governance of the sector and, thus, to its sustainable development. The process of planning will also ensure the delivery of quality outcomes for aquaculture stakeholders and citizens (including consumers) at large, and the realization of public-sector efficiency.

3. Policies, strategies and plans

Aquaculture policies and the means to implement them are the outcome of planning processes, which is commonly referred to as “policy-making”. Policy-making is sometimes described as: “the processes by which governments translate their political vision into programmes and actions to deliver desired changes in the real world” (Government of the United Kingdom, 1999).

DEFINITIONS: POLICY, STRATEGY, PLAN

Planning is a logical and rational process that involves formulating policies, strategies and plans. These items have a specific role and have been defined as illustrated in Figure 1.

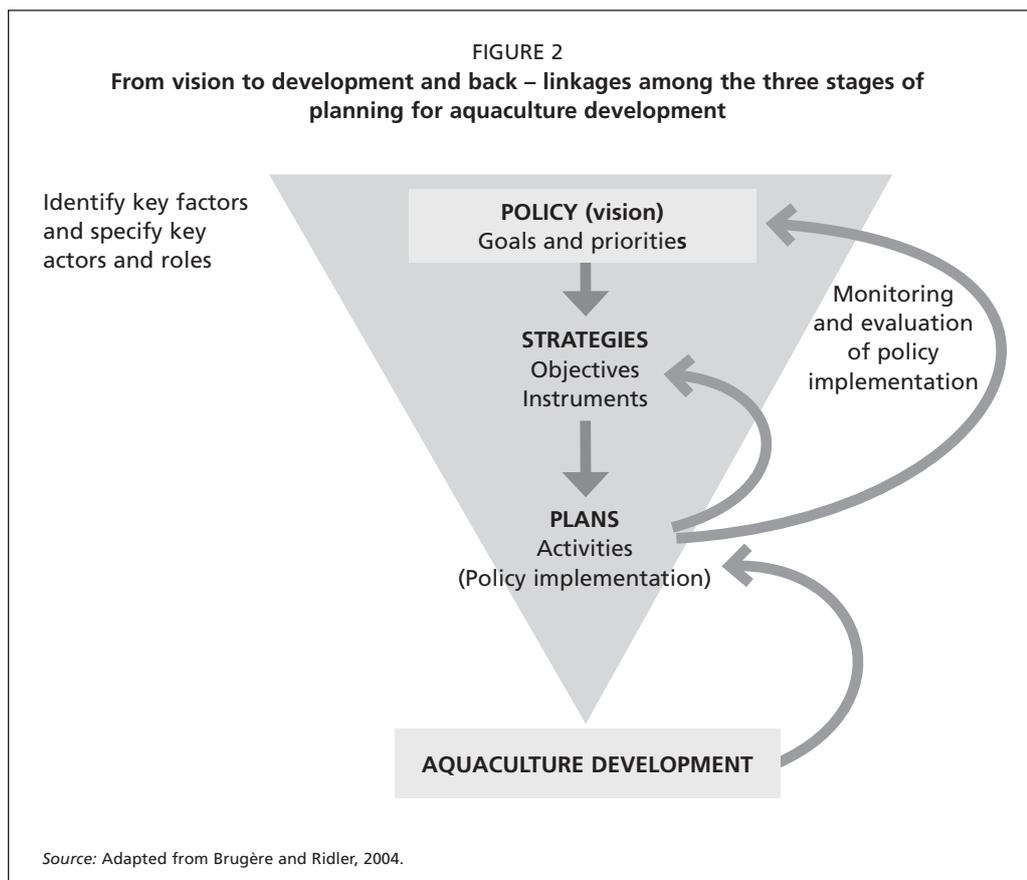


Because of their practical nature, strategies and plans can be linked together in a single document. Policies, however, are sometimes presented as stand-alone documents, later complemented by a strategy and plan. In any case, policy-making (planning) should follow a three-stage “hierarchical” order, as is indicated in the following section.

HIERARCHY AND ROLE

The “hierarchy” among policy, strategy and plan and their logical continuity are illustrated in Figure 2, which indicates how one moves from “policy” to “implementation”, the latter leading to aquaculture development.

Initially, at the top of the hierarchy of planning, at any tier of government and, with all the more reason, in aquaculture, there is a statement of policy goals. These are usually broad and qualitative, such as achieving poverty alleviation, creation of employment or sustainable development. Policy goals may be underpinned by a broad vision statement and should be based on identification of key problems and issues



(Brugère and Hishamunda, 2007; FAO, 2008a). Policies should also frame the broad roles of the key actors to be involved in aquaculture development: the public sector, the private sector and the civil society. For this reason, this item of the hierarchy is sometimes referred to as “policy framework” or “strategic framework”.

Below the policy come the strategies. These provide a set of practical objectives to meet the policy goals. These objectives can be either qualitative or quantitative or both (FAO, 2008a). It is normal for each policy goal to be supported by a number of different strategies. Also of importance during this stage is the specification of cross-cutting strategies in support of more than one policy goal. For example, strategies relating to human and institutional capacity development, research and strengthening of cross-sectoral collaboration may all help to support work towards a number of policy goals.

The third stage in the hierarchy – agreed plans – focuses on the steps that might be taken to implement the policy, i.e. on the “how”, “what”, “who” and “when”. Plans contain the instruments and activities that will support the achievement of each strategy objective and lead to the overall implementation of the policy through the achievement of the policy goals. Strategies and plans can be presented as part of the same document. Plans/activities should: (i) have a time frame; (ii) allocate responsibility to those who will undertake them; (iii) be prioritized; and (iv) ideally identify the funding necessary to their implementation.

Based on these considerations, policies should be formulated first, strategies second and plans third. By way of an example, one policy goal may be for the aquaculture sector to contribute to national economic growth. This goal might be supported by a number of strategies, one of which could be the sustainable development of inland aquaculture (while others might focus on coastal aquaculture and post-harvest issues of fish quality and value addition). Increasing inland aquaculture production through a set of activities would contribute to achieving this strategic objective and might include,

for example, attracting private sector investment (with details of how this will be done), introducing new freshwater fish species able to compete internationally (with details of the chosen species), and other activities as appropriate. Equally, increasing coastal aquaculture could be a second desired strategic objective, which could be realized through specific activities such as zoning of coastal areas and research into improved husbandry techniques for brackish species. The time frame and resources needed for each activity would be specified.

In addition to monitoring the implementation of policy, it is also important to monitor and evaluate processes used to define policy goals and to achieve them, so that lessons can be learned and documented for future policy development processes and for readjustments in the plan and its activities. This monitoring mirrors the constant adjustment that farmers make with their business plans – assumptions and practices are changed as information arrives and parameters evolve.

Finally, to be relevant, aquaculture policies have to be closely linked to global agendas and have to be congruent with other policy agendas. Before embarking on an aquaculture policy formulation exercise, one has to be aware of the broader context of aquaculture development. Elements of the global policy context and of the interferences with aquaculture development are reviewed in the next chapter.

4. Global context and policy agendas relevant to aquaculture development

Aquaculture policies must reflect the thrust of relevant national, regional and international goals and agreements guiding development as a whole. Aquaculture policy formulation will not take place in isolation but within the context of other commitments, which policy-makers should be aware of. This will enable the outcome of aquaculture planning to be consistent with, and relevant to, broader policy agendas related to poverty alleviation, gender equity, world trade, environmental protection, climate change adaptation and overall economic growth. Account must be taken nationally of the contribution of aquaculture development to rural and peri-urban development, food production, livelihoods improvements, domestic and export markets, foreign exchange earnings, and others. Policy-makers have to appreciate the scale of integration and competition with other sectors of the economy, such as expanding urbanization, irrigated and rainfed agriculture, forestry, livestock production, ecosystem services and industry, and the resources on which aquaculture systems depend, including water, land, coastal and marine and many other environmental resources and production-enhancing inputs. This is a considerable task – only the main policy agendas of relevance to aquaculture are reviewed here.

RESPONSIBLE FISHERIES AND AQUACULTURE

The CCRF represents the most significant globally recognized international framework in the realm of the world's marine, coastal and inland fisheries and aquaculture. Based on major international agreements (United Nations Convention on the Law of the Sea, United Nations Conference on Environment and Development, Convention on Biodiversity), the CCRF sets out principles and international standards of behaviour for responsible practices with a view to ensuring the sustainable and effective conservation, management and development of living aquatic resources (FAO, 1995). It highlights how fisheries, including aquaculture, provide a vital source of food, employment, recreation, trade and economic well-being for people throughout the world for both present and future generations and should, therefore, be conducted in a responsible manner. In other words, the CCRF suggests that aquaculture should be developed and planned in the context of sustainable development. This is currently being reinforced by the promotion of an ecosystem approach to aquaculture development² (Soto, Aguilar-Manjarrez and Hishamunda, 2008).

The CCRF devotes Article 9 to aquaculture development:

“9.1.1 States should establish, maintain and develop an appropriate legal and administrative framework which facilitates the development of responsible aquaculture.

9.1.2 States should promote responsible development and management of aquaculture, including an advance evaluation of the effects of aquaculture development on genetic diversity and ecosystem integrity, based on the best available scientific information.

² The role of this approach is elaborated upon in Chapter 6.

- 9.1.3 States should produce and regularly update aquaculture development strategies and plans, as required, to ensure that aquaculture development is ecologically sustainable and to allow the rational use of resources shared by aquaculture and other activities.”

FOOD SECURITY, POVERTY ALLEVIATION AND ECONOMIC GROWTH

Food security and poverty alleviation are key components of the Millennium Development Goals (MDGs). Those engaged in aquaculture planning should ensure that policy documents are framed against the backdrop of the MDGs and strive to exploit better the national potential of fisheries and aquaculture to attain the MDGs (Thorpe *et al.*, 2006). Aquaculture can contribute to food security because fish is an important source of animal protein in much of Africa and Asia, and because commercial aquaculture provides employment and income with which food can be purchased. It can also alleviate poverty through multiplier effects on incomes, be a source of foreign exchange and generate tax revenues for public spending on poverty alleviation and safety net programmes (Hishamunda, Cai and Leung, 2009a).

Economic growth affects the development of aquaculture in several ways. As economies grow and the purchasing power of individuals increases, lifestyles and food choices change, tending to increase consumption of fish. This will increase reliance on aquaculture as a source of fish (Delgado *et al.*, 2003). Relative prices will rise, particularly for high-value finfish and crustaceans, stimulating investment in aquaculture and also technological progress. Adequate planning and implementation of appropriate economic instruments are needed to guide such developments and ensure that increases in aquaculture outputs stimulate economic growth and contribute to the alleviation of poverty.

ENVIRONMENTAL SUSTAINABILITY

Environmental concerns oblige aquaculture policy-makers to assess environmental risks in their planning. The impact of aquaculture on the environment is mixed, with aquaculture offering relief to overexploited fish stocks while causing long-lasting changes and detrimental impacts on the environment. Among the reported adverse environmental effects of aquaculture activities are damage to ecosystems and benthic populations, effluent discharge, environmental contamination resulting from the use of veterinary drugs, groundwater contamination, introduction of exotic species, genetic impacts on wild stocks, introduction of pathogens, and social conflicts caused by resource access and competition for use (Phillips and Subasinghe, 2008). These impacts will not only affect aquaculture but also other sectors that share the same water resources, such as agriculture and horticulture, calling for a holistic approach to developing the sector and allocating resources. The environmental objective of policy should be to ensure that the development of aquaculture is sustainable. If developed and managed properly, aquaculture can become a sustainable industry supplementing food supplies from the capture fisheries.

New legal instruments are emerging to control the use of aquatic commons more effectively, with regulations enacted (although not always enforced) to protect mangrove areas. However, aquatic coastal farming is likely to intensify, expand and diversify in ways that are currently unforeseen. Thus, policy changes will need to drive a gradual convergence between aquaculture development and the ecosystem approaches to fisheries and aquaculture called for in the Johannesburg Declaration of the World Summit on Sustainable Development (2002) and FAO (FAO, 2003a; Soto, Aguilar-Manjarrez and Hishamunda, 2008). Other environmental protection conventions, such as the Convention on Biodiversity and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), also influence how resources can be used for aquaculture.

SOCIAL ACCEPTABILITY AND RESPONSIBILITY

Social acceptability is an integral part of sustainability. However, it has usually become an issue for aquaculture planners and developers only after sections of the population have demonstrated discontent through conflict or litigation. While aquaculture can contribute to economic growth, it can also create social disruption and inequalities. Conflict over resource allocation and resentment over hiring practices are part of the social risks of aquaculture (Bueno, 2008). This can be particularly acute if small elites, domestic or foreign, dominate the industry.

Policy-makers must be aware of negative perceptions that sometimes surround the aquaculture industry as the repercussions on its development can be severe. To counteract negative perceptions, the industry can play a role by ensuring that benefits of aquaculture accrue locally and by publicizing its adherence to socially responsible practices (its “corporate social responsibility”). Preventing the opportunistic behaviours that have tarnished the image of aquaculture development, for example through free-riding and corruption, is an issue that can be tackled through improved planning and the implementation of specific policy instruments. In this respect, encouraging communities to participate in decision-making (as with site selection) is important.

EQUITY

Equity is another policy agenda that interfaces with aquaculture planning and policy formulation. It requires a commitment to more participation by women and other under-privileged groups at all stages of agenda setting, planning and policy-making. Concerning women, the Beijing Declaration and Platform for Action of the Fourth World Conference on Women (1995) provides a mandate to promote active and visible mainstreaming of gender perspectives in all policies and programmes, including aquaculture. As projects and governments begin to make active and conscious efforts to understand and document men’s and women’s perspectives on aquaculture, there is evidence that, even in the most disadvantaged regions, men and women working together increase well-being (Orissa Watershed Development Mission, 2006). Policy-makers need to be aware of the relevance of gender equity to the policies they create and the role that aquaculture can play in the lives of women and men.

INTERNATIONAL TRADE

International trade and related dynamics such as the requirements for international standards for hygiene and traceability may prompt an aquaculture policy review. The process referred to as globalization is encouraging change and the spread of information; it is encouraging technical capacity development to exploit more fully the comparative advantage of aquaculture and to reduce transport and communications costs related to its development. This is also changing patterns of trade in goods and services, investment (and the treatment of foreign investment), ideas (intellectual property), and affecting the mobility of factors of production as well as disease and parasite transmission. Half of the world’s fish exports come from developing countries. However, while beneficial, international trade also presents challenges related to environmental conservation and can threaten the rights and sustainability of the livelihoods of the poor in developing nations (FAO, 2003b; Kurien, 2005; World Bank, 2004).

Multilateral trade negotiations most relevant to aquaculture policy formulation include the liberalization of international trade, further reduction of import tariffs and the implementation of the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) and the Agreement on Technical Barriers to Trade, including fisheries subsidies, labelling matters, and treatment of foreign investors. The measures included in the SPS Agreement are among the most relevant for fish trade and may prove to be most challenging for developing countries because they can be used as a means of protectionism. The change in import regulations, such as the introduction

of the Hazard Analysis and Critical Control Point System (HACCP), is probably the most prominent example of an SPS Agreement application. The relevant provisions of the SPS Agreement for trade in fish and fish products are:

- to use harmonization principles, i.e. to establish national sanitary and phytosanitary rules reflecting standards agreed in the relevant international institutions, such as the Codex Alimentarius, for fish products;
- where international standards do not exist or harmonization is not appropriate, to use the alternative equivalence principle whereby the importing country accepts that sanitary and phytosanitary measures in the exporting country achieve an appropriate level of health protection, even though they differ from the measures used in the importing country;
- to provide either scientific evidence or appropriate risk assessment if a country intends not to rely on harmony or equivalence but rather on its own domestic standards.

Certification schemes can also influence international trade, but the proliferation of independent aquaculture schemes and codes of conduct has created some confusion that may be harmful to the sector³ (Liu, 2007). Accessing foreign markets requires that the demand for more hygienic products and traceability, along with environmental and social sustainability criteria, be met, and this in turn calls for good management practices, enforcement of regulations and overall better governance of the aquaculture sector.

THE GLOBAL WATER CRISIS

Although aquaculture is “non-consumptive”, unlike other activities that use water as an input in their production processes, the allocation of freshwater and groundwater in aquaculture is a major management and policy issue because of its scarcity in certain countries. Even if the MDGs were to be reached, 800 million people in the world would still be without sustainable access to safe drinking-water and basic sanitation. Therefore, in countries where aquaculture is promoted, policies and instruments behind the development of the sector must ensure that water is allocated efficiently (UNDP, 2006).

To improve water productivity and use efficiency, the potential for integrating aquaculture with agricultural water use, which can be implemented with benefit to both, could be considered (Brugère, 2006a; Gooley and Gavine, 2003; Haylor, 1994). Because pond fish culture does not consume all the water, further productive value can be derived from the water released, e.g. during fish harvests. Fish effluent has been shown to be a useful source of nitrogen and phosphorus for crop production, and FAO has been working towards raising the profile of integrated irrigation aquaculture (Halwart and van Dam, 2006). The relative water requirements and the relative productive values of water in relation to location may guide decisions about water allocation, the selection of irrigated crops and other productive uses of water under different conditions. The integration of aquaculture in the water resources management discourse has become more of a policy than technical issue, but it is being increasingly recognized as having a role to play in improving water management at basin level in order to safeguard livelihoods and the environment in the face of water scarcity (UNESCO, 2006).

³ At the time of writing, FAO is working on the development of a set of guidelines for trade in aquaculture products, to be internationally endorsed by its Members. These guidelines are intended to ensure that all aquacultural producers from developed and developing countries and small-scale and large-scale operations are able to benefit equally from the opportunities offered by aquaculture certification and that small-scale producers are not unduly disadvantaged.

CLIMATE CHANGE

Physical and biological climate-induced changes in marine and freshwater systems are being increasingly observed (Barange and Perry, 2009). The severity of climate change impacts on aquaculture are dependent on the nature (freshwater, brackish, marine) and location (tropical, temperate) of operations and on the direct and indirect impacts of climate change on the natural resources it requires, primarily water, land, seed, feed and energy (De Silva and Soto, 2009). Positive impacts of climate change on aquaculture include higher food conversion efficiencies and growth rates in warmer waters, increased length of the growing season and range expansions polewards owing to decreases in ice (Easterling *et al.*, 2007). However, as capture fisheries provide major feed and seed inputs to aquaculture activities, variations in the quantity, quality and prices of these inputs will have direct repercussions on the overall efficiency of aquaculture systems.

Allison *et al.* (2009) have identified the national economies most vulnerable to climate change because of their dependence on fish for employment, domestic and export incomes and dietary protein supply. However, the complexity of vulnerability⁴, its uneven distribution and difficult prediction make the impacts of climate-related changes on those depending on aquaculture for their livelihoods as varied as the changes themselves (Daw *et al.*, 2009).

Aquaculture presents some scope for adapting to climate change and mitigating its own impact on climate change. Although adaptation and mitigation measures should be commensurate with risk, they should become an integral component of aquaculture policies and/or strategies.⁵ To this end, and to overcome the additional pressure of climate change on improving governance in aquaculture development, the sector needs to engage with diverse stakeholders, including consumers, governments and allied or competing industries in order to create economic opportunities, in particular for vulnerable groups, while increasing the long-term resilience of the sector to climate-induced changes (FAO, 2008b).

CONCLUSION

To pursue its growth globally, the aquaculture sector will need “organizing” in the institutional sense of the term (North, 1997). Framing the sector within adequate institutions should be done to ensure its constant contribution to economic growth and international agendas. To this end, aquaculture policy-makers will have to coordinate development with other sectors and institutions, some of which will be competing. This will require constant consultation in order to minimize conflicts, e.g. between freshwater aquaculture and agriculture (for land and water), mariculture and tourism (for space and landscapes) or capture fisheries (for space and feed). Nevertheless, sound policy formulation processes, the subject of the next chapter, can be a way to ensure that these issues are adequately addressed and that aquaculture remains compatible and synergetic with other sectors and broader policy agendas.

⁴ Vulnerability, i.e. the extent to which people (and systems) are affected by climate change, is determined by three factors: exposure to a specific change, sensitivity to that change, and how well one can respond to impacts and/or take advantage of opportunities (Adger *et al.*, 2007; Daw *et al.*, 2009).

⁵ Depending on the importance given to climate change mitigation and adaptation as a policy goal or as a strategic objective towards the sustainable development of the sector.

5. Steps for improving policy formulation

This chapter considers planning in itself, i.e. the process through which policies are developed and formulated, and the steps required for improving this process. Policy initialization, definition of policy goals, the methodologies of policy development and the importance of consensus building have been identified as key stages of policy development processes (FAO, 2008a). These stages imply (Haylor and Savage, 2003a and 2003b; Macfadyen, Haylor and Brugère, 2006):

1. recognizing a timely opportunity for policy change;
2. ensuring coordination and communication in planning;
3. adopting a participatory approach;
4. learning lessons from elsewhere;
5. accepting that hard choices may be inevitable.

STEP 1: RECOGNIZE A TIMELY OPPORTUNITY FOR POLICY CHANGE

It is important to consider first when might be a good time to formulate an aquaculture policy and to develop a strategy and a plan. For example, planning processes may be most effective working within an existing cycle where periodic reviews are carried out, e.g. every five or ten years. Such periodic reviews are advisable because they identify the needs and opportunities of the sector. Technological change or new trade agreements may offer opportunities that are not evident at the farm level, and did not exist earlier. This encourages environmental and social issues to be included alongside economic perspectives, making the case for interventions to be strategically planned instead of being reactive and uncoordinated (Haylor and Bland, 2001).

As noted earlier, Article 9.1.3 of the CCRF recommends the regular updating of plans. However, policy change can also be initiated under a “political” impetus or as part of a specific agreed policy development exercise (Macfadyen, Haylor and Brugère, 2006). The nature of the policy formulation process chosen (i.e. regular or ad hoc) may also in part determine how much time is available to support it.

Recognizing a timely opportunity for policy change may also be dependent on the identification of a “champion of change”. This could come from an external source or from a key policy-making actor or agency at the state or national level, as was the case with China and Viet Nam. A “champion of change” might even originate from an informed policy implementer or recipient (group). Some examples of different champions of change are:

- The “Doi Moi” policy reforms in Viet Nam, which moved the country towards a market economy, had government leaders as policy actors and champions of change.
- The change in policy governing inland fisheries in Cambodia (the fourth-largest inland fishery in the world) was championed by the NGO community and eventually the Prime Minister.
- The policy governing soil and water management in the United Republic of Tanzania was championed by a university research group with sustained funding and a commitment to communication.
- FAO projects, implemented at national levels, have helped define policy frameworks and implementation strategies for the sustainable development of aquaculture in Africa (e.g. Cameroon) and Asia (e.g. Pakistan).

Summary of key questions for policy-makers

- What specific “indicator”/sign exists that suggests a policy change is needed, be it economic, environmental, institutional and/or political?
- Is it the right/best time to make a policy change? If not, when might be a better time?
- Will policy change take place as part of an established planning cycle, or through a more informal/ad hoc process?
- Is there an obvious “champion of change”? If not, could one be identified and encouraged to endorse this important role?

STEP 2: ENSURE COORDINATION AND COMMUNICATIONS IN PLANNING

A key factor in the successful planning of aquaculture is coordination. Lack of coordination in aquaculture planning is usually a hurdle because of the multiple actors involved directly and indirectly in the development of the sector – aquaculture impinges on a number of departments and probably different levels of government. For example, in Canada, although the Department of Fisheries and Oceans is the lead federal department for aquaculture, there are in total 17 federal departments and agencies delivering programmes and services to the aquaculture industry, among which six have “significant responsibilities” (Standing Committee on Fisheries and Oceans, 2003). In addition, the relative novelty of aquaculture in much of the world encourages a scrutiny that a traditional sector might not face. Conflicts with customary activities can easily arise where communication is ineffective and decision-making not transparent.

Table 1 gives examples of reasons for communication “breakdowns” between aquaculture stakeholders. Coordination during the policy formulation phase of aquaculture development – and especially during its implementation – is critical to overcoming these challenges.

To increase coordination, nominating a lead agency or “competent authority” to overcome communication problems and enhance the integration of support sectors (such as training, extension and legislation) in aquaculture planning can be a means to address constraints linked to disfunctioning institutions (Brugère, 2006b). However, whatever its nature, the credibility of the nominated competent authority is paramount and needs to be entrenched in legitimacy. While the impetus for policy formulation may come from the private sector, or may be due to external forces such as international trade agreements, a lead agency/competent authority has legitimacy if it comprises policy-makers who have been put in place through a widely recognized and supported democratic and balanced process, and if it is empowered to oversee the policy formulation and implementation processes under way.

TABLE 1

Examples of communication issues between aquaculture stakeholders

Stakeholders	Reasons behind communication “breakdowns”
Aquaculture farmers (private sector) – public service providers	In hierarchical societies, farmers often have difficulty approaching officials within the context of a relationship that is usually quite formal and top-down.
Aquaculture policy-makers – implementers	National governments often formulate policy based on the recommendations of a planning commission with insufficient participation of local-level/regional-level implementers.
Researchers – everyone else	Research is often conducted bearing little relation to the most pressing issues facing aquaculture producers and related upstream/downstream stakeholders, with results poorly communicated to government and producers.
Donors – donors	Donors can have different (sometimes conflicting) aquaculture development agendas, which can impede the coordinated development of the activity at country level.
Fisheries/environmental legislators – aquaculture legislators	Legislation designed to “conserve” fisheries and pristine waters can do so at the expense of aquaculture development.

The competent authority/lead agency could be a designated government department or unit, or a new authority established for this purpose.⁶ In the case of the former, it could consider a task force to oversee the planning process. The task force can comprise different working groups and, if multidisciplinary, will have a broader perspective of how aquaculture impinges on, and is affected by, different interest groups. A task force that is also interdepartmental and with participants from different tiers of government could minimize disputes and reduce transaction costs. In the latter case, if a legitimate and competent authority to guide aquaculture, such as a government department or unit, does not already exist, a new body may have to be established to guide the planning process, among other things. In India, for example, the National Fisheries Development Board (established in 2006) oversees both aquaculture and fisheries, providing a broad perspective for different sectors with a stake in coastal management. However, the context of the establishment of such institutions is conditional to their success – the sustainability of an institution established as a response to a crisis is bound with difficulties linked to the lingering of power forces and conflicting interests (Dixit, 2003). This may explain why the Aquaculture Authority of India, created by a Supreme Court Order in 1996 to address the conflicts associated with shrimp development, was still struggling ten years after its creation (Bhat and Bhatta, 2004; Brugère, 2006b).

One possibility is to outsource the policy formulation process. This may have advantages if there is a shortage of human capacity in government departments. However, such an agency should be supervised, because supervision by a government body will ensure consistency with overall national development goals, and it should build national capacity to ensure that the policies formulated are implemented.

The competent authority will have to coordinate with other tiers of government. Constitutional and political factors may determine the tier of government where the lead agency is placed. However, in aquaculture (as in some other sectors), decision-making is best served by a combination of high-level and local jurisdictions. The principle of subsidiarity suggests that certain issues should be left to local authorities. Where there are neither externalities nor economies of scale, as is the case with site selection, the local population may be able to make its own decisions based on its own priorities. In India, while the Union Government controls fisheries beyond territorial seas, coastal (within 12 nautical miles) and inland fisheries management are the responsibility of the states, in the interest of local decision-making (Morgan, 2006). A similar arrangement has been made in Canada, another federal country. Federal and provincial ministers have agreed to a joint responsibility for the management of aquaculture, with most provincial governments assuming responsibility for site selection (licensing), promotion, development and regulation of the industry through federal-provincial memoranda of understanding (Standing Committee on Fisheries and Oceans, 2003). Empowering local communities and collaborative management increase the likelihood of habitat protection and environmental sustainability. On the other hand, where there are externalities, as with regulations on importing exotic species, higher-level decision-making is needed. Coordination and harmonization among different levels of authority is thus key to preventing “environmental dumping”, whereby one jurisdiction accepts standards unacceptable to others that will have repercussions on all.

Summary of key questions for policy-makers

- Are there communication gaps and issues? Between whom?
- Are there means already in place to help with the coordination of planning processes?
- Has an (existing) competent authority been identified to take the lead in the policy formulation process (and later oversee its implementation)? If not, should it be created, or will a task force need to be established?

⁶ Aspects related to the creation of new institutions are dealt with in greater depth in Chapter 7.

- Which planning decisions can be delegated to lower levels of administration? Which cannot?

STEP 3: ADOPT A PARTICIPATORY APPROACH

Sustainable development requires that people participate in the debates and decisions that affect their lives. Article 6.13 of the CCRF states that the decision-making process should be timely and transparent. It also states that there should be active participation by stakeholders in aquatic resources decision-making. Stakeholders need to be able to receive information (“informed consultation”) but also to express their opinions. Poor people are often excluded from these processes by geography and lack of resources or skills, and many groups – including women – are also kept silent by social structures and cultural traditions. Such social inequities often prevent the underprivileged from participating effectively in democratic institutions and give disproportionate power to those who command crucial resources such as income, education and influential connections (Dreze and Sen, 2002).

Including proposed beneficiaries of service provision and policy implementers in policy formulation can benefit the planning process and produce more workable and useful policies (Cook, 2002; DFID, 2004a; Ellis and Biggs, 2001; Goetz and Gaventa, 2001; Robb, 1999; Saxena, 2002). It increases public ownership and trust in government, and often leads to more effective policies by contributing to more transparent and accountable governance, to the creation of a vibrant and dynamic civil society, and to rapid and more equitable economic growth (Wilson and Warnock, 2007). It can be a means of integrating traditional knowledge into decision-making, and incline stakeholders to engage in the implementation of policies that they themselves have helped to develop.

How much participation should there be?

There are various degrees of participation. At the project level, it can range from being “manipulative” or “passive”, where people are told what has already been decided or enacted, to being “interactive” or leading to “self-mobilization”, where people take the initiative, develop external contacts and retain control over resources (Pretty, 1995). In policy and decision-making processes, participation can be “instructive”, where the government makes decision but mechanisms exist for information exchange. It can be “consultative”, where the government is the decision-maker but stakeholders have a degree of influence over the process and outcomes. It can be “cooperative”, where primary stakeholders act as partners with the government in the decision-making processes (Sen, 2001).

Although, as a principle, participation should be sought to its fullest extent, various constraints often limit the effectiveness of such an endeavour, resulting in more “functional” participation where predefined project goals take precedence (Pretty, 1995). Participatory methods involve expenditure of money, time and skill, but efficiency demands that the additional costs of greater participation be weighed against additional benefits. Time constraints will also determine the extent of participation. If policy formulation must be completed in a short period, participation by all stakeholders is likely to be precluded. However, the outcome of participation processes that include fair representation, appropriate government resources and are consensus-driven are more likely to be considered legitimate by stakeholders (Mascarenhas and Scarce, 2004). China’s success in aquaculture has been largely due to government-led policies. However, while authorities facilitated and formulated policies and guidelines to speed up the structural reform of the fishery sector, fish farmers had the freedom to make production decisions (Hishamunda and Subasinghe, 2003).

Who should participate?

In planning processes, efforts should be made to consider the participation of a wide range of stakeholders. Potential stakeholders for aquaculture policy-making could include fish farmers (i.e. private sector aquaculture producers) and fishers, self-help groups and associations, NGOs, government departments (including fisheries and non-fisheries administrations and ministries), research institutions, regulatory bodies, and processing, trading and supply services (e.g. boatyards, net suppliers, fish feed, seeds [hatcheries]) (Macfadyen, Haylor and Brugère, 2006). A stakeholder analysis can help identify the groups that need to be consulted and to:

- identify and define their characteristics;
- assess their interests, i.e. what are likely to be their key aims and needs;
- assess how their interests might affect the outcome of the planning process;
- determine their potential influence and importance in the process.

What are some participatory methods?

Actively facilitating people's participation in policy change and supporting service recipients in sharing their experiences and their perspectives about service provision are important. There is a wide range of participatory methods, but local-level workshops with groups of stakeholders from different communication communities⁷ (recipients, community leaders, field staff, state government staff, national government staff and key policy-makers) are usually effective and a good starting point. Using case studies can be an effective mechanism to illustrate complex interactions, and alternative approaches such as using film and drama may be an appropriate way to bridge communication gaps resulting from hierarchies, literacy limitations, language differences and heavy workloads (Harrison and Brock, 2006). Such approaches have been successfully used in fisheries and aquaculture policy formulation in India (Haylor and Savage, 2003a) and in Pakistan (MINFAL, 2007). However, understanding the complexity of poor people's livelihoods and their experiences and perceptions of service provision takes time and will require that such workshops be repeated. When time is short, participatory methods can be refocused on an iterative reviewing process engaging experts and ministries in the countries concerned in the formulation of policies, strategies and plans, while the involvement of pilot farms in this process can ensure the grounding of planning outcomes in reality. Such an approach has been piloted in Cameroon (MINEPIA, 2009). These examples are highlighted in Appendix 1.

One method that ensures participation in policy-making is the Delphi method. It recognizes human judgement as legitimate and assumes that the testimony of experts and "non-expert" stakeholders provides useful inputs in defining policy goals and identifying key factors and issues, as well as the means to overcome them (which will be part of the strategy) (Bunting, 2008). The Delphi method is an adaptive iterative survey method. It offers a number of advantages. First, during later rounds of the process, questions can be formulated based on replies given earlier. This enables all experts and stakeholders to explore issues they may not have considered before. Second, it is spatially separate and anonymous. This avoids the limitations of group decision-making, such as deference to seniors, or the domination of an "expert"/ stakeholder, thus avoiding peer-pressure or inhibitions stemming from hierarchical positions and culture. Every opinion may be given the same weight whatever the position or discipline of the expert or stakeholder.

The Delphi method has been applied to analyse a number of aquaculture issues. It has been used to develop criteria for aquaculture sustainability in the United States of America (Caffey, 1998), to explore the constraints behind the development of

⁷ Communication communities are groups of people with similar understanding and interests.

horizontally integrated aquaculture in eastern India (Bunting, 2008), and to evaluate the future direction of mariculture development in Europe (Stricker *et al.*, 2009).

The Delphi method has also been used to guide policy formulation. In Chile, it was used as a means of elaborating the Fisheries Plan (Ministerio de Economía, 2003). It enabled exploration of the prospects for existing as well as potential aquaculture species, and provided guidance to Chilean policy-makers for their aquaculture planning to 2010. The process produced a quantitative output target. A prospective analysis of global aquaculture development using the Delphi method was also undertaken by FAO to identify aquaculture opportunities, constraints and effective policy instruments to enhance the long-term sustainable development of the sector (Hishamunda, Poulain and Ridler, 2009).

There are other techniques for investigating stakeholders' interests and preferences in aquaculture planning. Among them are multicriteria decision-making procedures, including the Analytical Hierarchy Process and expected utility methods (FAO, 2008c; Pavlikakis and Tsihrintzis, 2003), which rank, in order of importance, issues at stake and alternative plans after public opinions and preferences have been obtained.

Each of the methods has its advantages and disadvantages, and the method used will depend on factors such as the literacy of stakeholders, the willingness of potential participants to state their true preferences, and the hierarchical structure of society. Some methods save on the expense of face-to-face meetings, but all are time-consuming both for participants and for the facilitator (the lead agency). Therefore, prior to starting the process, it is imperative that those involved in planning compare the different participatory methods for their applicability to the context of aquaculture development. They must also compare the different methods for cost-effectiveness in terms of budgets and time, and perhaps also skill requirements.

Summary of key questions for policy-makers

- Is government committed to an open process approach in which it may lose a degree of control?
- Has a stakeholder analysis been conducted to identify those that should be engaged in the planning process? If not, who could conduct such an analysis, and when?
- How much time is available to engage in the policy formulation process?
- Which is the most cost-effective method for ensuring participation of stakeholders in the culture and society where planning is to take place?

STEP 4: LEARN LESSONS FROM ELSEWHERE

Although much learning is experiential and comes from having been involved in previous planning processes, it is often useful to gain access to, and to review, lessons learned by other people and organizations that have been involved in similar processes. Literature reviews can be done by universities, academics and specialists with appropriate skills and access to relevant literature. University departments and their experts or private sector consultancy companies in the country are generally easily identifiable and/or already known to governments. Repositories of relevant information and experiences can also be held in international organizations (donors, NGOs, etc.) and be made available upon request as part of their knowledge-sharing and information-dissemination strategies.

Governments can request such groups and individuals to review the information detailing the experiences of others. Such literature may be local, national or international in nature. Known individuals willing to share their experiences may also be approached directly for advice and information.

Summary of key questions for policy-makers

- Has an appropriate institution or individual (or individuals) been identified to conduct a review of lessons learned in other policy processes? If not, what steps need to be taken to ensure that this is done?

- Have key lessons from elsewhere been recognized and incorporated into the planning process?

STEP 5: ACCEPT THAT CONFLICT MAY ARISE AND THAT HARD CHOICES MAY BE INEVITABLE

Given the array of issues that can arise in relation to aquaculture development, and the wide range of aquaculture and non-aquaculture stakeholders that can be operating in the same area, it can be difficult to satisfy everyone's needs and aspirations. Hence, trade-offs and hard choices may be inevitable. Conflicts can be: (i) within sectors (e.g. large-scale versus small-scale aquaculture operators); (ii) between sectors (e.g. between aquaculture and other sectors); (iii) between objectives (e.g. planning agencies with diverging objectives such as environmental protection, economic development or social equity); and/or (iv) between short-term and longer-term objectives (e.g. between research with long-term impacts into fish genetics and short-term research into markets) (FAO, 2005). Although these conflicts can appear at any stage of planning, they are more likely during the formulation when options will be identified and prioritized. For example, a conflict over efficiency and equity may emerge over reducing access to a floodplain to a few farmers in order to maximize efficiency at the expense of wider access. Similarly, a foreign-exchange constraint may encourage policy-makers to encourage aquaculture oriented to exports at the expense of an immediate reduction in the availability of fish for sale in local markets.

When some hard choices have to be made during the planning process, a list of realistic options should be presented before those decided upon are included in the strategy or the plan, as appropriate. Ideally, attempts should be made during the policy process to assess the costs and benefits (in economic, environmental and social terms) of trade-offs that might need to be made. This may involve both quantifiable and non-quantifiable elements, which can make such an assessment difficult and costly. Nevertheless, explicitly recognizing trade-offs and conflicts during planning are key steps. Again, transparency over trade-offs is a major issue for senior policy-makers as well as the poorest stakeholders. Workshops can be used to provide feedback and explain the key factors behind decisions, with special emphasis on the prioritization that took place and the accounting of issues and perspectives of all stakeholders (Haylor and Savage, 2003a). The aim is to encourage acceptance of the finalized policies and demonstrate policy-makers' commitment to their implementation.

Asymmetric information⁸ is one of the main causes of conflict between sectors (Brugère, 2006b). Therefore, a key mechanism in mitigating conflict is the provision of transparent and timely information to stakeholders about why, and how, decisions are made about policy implementation. This can be achieved with the establishment of electronic or conventional information mechanisms, such as Web pages or through aquaculture extension officers to prevent rumours and misinformation from spreading. However, collecting feedback and grievances from those concerned by the policy is just as important. Some countries have detailed conflict mitigation procedures specified so that, if conflicts arise, there is a transparent and accountable process for their resolution.

Participatory processes can also assist in reaching consensus over the trade-offs. Although unanimity among all participants may be impossible or even be undesirable if it encourages undue bargaining, and although it is important for the participatory processes under way to remain flexible to respond to specific circumstances, the desired level of consensus to be reached should be announced in advance and adhered to *ex post*,⁹ in full respect of the principles of transparency and accountability of good governance.

⁸ The term "asymmetric information" is used for information that is known to some people but not to others and that is used at the expense of other stakeholders.

⁹ This mirrors the principles for functioning institutional arrangements, as proposed by Dixit (2003).

Summary of key questions for policy-makers

- Have potential policy conflicts and trade-offs been identified and articulated in the prioritization process?
- Has sufficient care been taken to ensure that people are informed about the trade-offs and can contribute to the debates and decisions that affect their lives?
- Has a policy workshop been organized to present the findings and outputs of the policy process to all stakeholders directly and indirectly concerned by the policy change?

SUMMARY

Box 3 summarizes the lessons and issues that must be borne in mind prior to and during the planning process leading to the formulation of aquaculture policies and their implementation. Table 2 summarizes the five steps of improving such processes in order to complete policies and implementation strategies successfully.

BOX 3**Lessons and issues in planning processes**

1. Aquaculture policy formulation processes must complement other national planning activities.
2. Informal policy change such as ministerial statements or actions are often as important as formal policy documents, given the need for governments to react to, and deal with, changing circumstances. “Champions of change” may not need to wait for formal planning processes.
3. Issues and stakeholders from outside the sector often have a strong impact on the aquaculture sector. This implies the need for broad consultation when engaged in planning processes.
4. Ensuring that planning processes are participatory is often impeded by:
 - financial constraints;
 - difficulties in accessing large numbers of stakeholders in geographically scattered and remote communities;
 - weak representation of some groups, e.g. small-scale fishers/farmers;
 - low levels of educational status in some of the communities concerned, coupled with modern-day concepts involving sophisticated terminology (e.g. biodiversity, ecosystem-based management, precautionary approach to aquaculture decision making, globalization).
5. It is useful to document and monitor the policy formulation process, to assist both with lesson-learning for future planning processes, but also to ensure transparency and accountability. Obtaining feedback on the effectiveness and efficiency of planning is also a useful way to learn lessons and make improvements.
6. Well-conducted planning processes adopting consensus-building and participatory approaches can take considerable time and financial resources. Therefore, planners must make special efforts to balance “ideal” policy formulation processes against financial and time resources likely to be available. They must also recognize that trade-offs and hard choices may become necessary, although they should be supported by adequate and transparent justifications.

TABLE 2
Conceptual matrix of prerequisites and implications for aquaculture policy formulation and implementation

Prerequisites		Key means			Key implications		Suggested actions/ mechanism/tools
Understanding	Actors	Capacity building	Relationship building	Notes	Issues		
Understand contemporary social and institutional circumstances.	Policy-makers in a competent authority and stakeholders (perhaps farmers).	Policy-makers and stakeholders in policy formulation.	With other sectors and with groups within the sector.	1. Recognize a timely opportunity for (policy) change.	Review may be periodic or due to new circumstances.	Few initiatives will instigate policy change, so this may be reactive.	Review laws/regulations that impinge on aquaculture. Contact major stakeholders.
Understand administrative and jurisdictional responsibilities.	Lead agency or task force.	Policy-makers in legal and cost-benefit training.	With other departments and with stakeholders.	2. Ensure coordination and communications in planning.	Need widespread participation and transparency to ensure legitimacy. Widespread communications.	Decide which level of government can make efficient decisions.	Ensure communication with other government departments.
Understand the need to identify and communicate with stakeholders.	Flexible, team; stakeholders (officials, farmers, etc.).	Methods of participatory consensus building.	With stakeholders to develop trust in the competent authority.	3. Adopt a participatory approach.	Method will depend on issue and cost-effectiveness.	Throw away any blueprint. Must document and communicate the process carefully.	Make contacts and build trust with communities, and policy-makers.
Understand and have access to a wide range of literature, and potentially to individuals involved in other policy processes.	Researchers with wide access to literature and other information.	Research and analytical, writing and presentational skills.	Needs to relate to academic as well as development spheres.	4. Learn lessons from elsewhere.	Improved information increases the effectiveness of policy processes and content.	Need to build on lessons from elsewhere. Avoid reinvention, but must remain innovative.	Review literature including other sectors. Consider case studies.
Understand that consensus may be impossible.	Policy-makers and stakeholders.	Cost-benefit analysis of policy options.	Clarify options and implications with stakeholders.	5. Accept that hard choices may be inevitable, particularly in the choice of strategies.	Ensure that stakeholders are informed about decisions and the reasons.	Important to clarify options to decision-makers.	List options and identify their advantages and disadvantages and their implications for stakeholder groups.

Source: Adapted from Haylor and Savage, 2003b.

6. Policy implementation

The previous chapters described aquaculture and the broader policy context as well as key aspects of policy development and planning processes. This chapter considers an approach and the instruments that, chosen in the strategy and articulated in the plan, can be used towards the implementation of aquaculture policies.

A NOTE ON THE ECOSYSTEM APPROACH TO AQUACULTURE

The ecosystem approach to aquaculture (EAA) has been defined as: “A strategy for the integration of the activity within the wider ecosystem such that it promotes sustainable development, equity, and resilience of interlinked social-ecological systems” (Soto, Aguilar-Manjarrez and Hishamunda, 2008).

This definition is supported by three principles:

1. Aquaculture development and management should take account of the full range of ecosystem functions and services, and should not threaten the sustained delivery of these to society.
2. Aquaculture should improve human well-being and equity for all relevant stakeholders.
3. Aquaculture should be developed in the context of other sectors, policies and goals.

On these grounds, the EAA can be interpreted in two ways, which are not mutually exclusive: one as a way of thinking, a philosophy closely related to the principles of sustainability and sustainable development; and the other as a means or mechanism (a “strategy”) by which the policy goal of sustainable aquaculture development can be achieved. Therefore, using the EAA in policy implementation will enable the more comprehensive inclusion of all the stakeholders of the sector and the institutions they represent, in addition to those who are indirectly affected by the development of the sector, such as fisheries (capture and culture-based) and water resources management authorities. It will also allow all the factors that directly and indirectly affect the environmental, economic and social sustainability of aquaculture operations to be accounted for and enable them to be addressed in the relevant planning documents (strategy or plan). Therefore, this implies that formulating and implementing an aquaculture policy or an EAA may involve similar activities such as the use of scoping, iterative exercises, participatory methods (e.g. stakeholder consultations [as covered in Chapter 5]) and technologies such as geographical information systems. All together, these will lead to the building of a consensual and accepted understanding of the means by which aquaculture development should be achieved, with equity (perhaps in the form of “food security” and “poverty alleviation” as policy goals) and environmental sustainability as key considerations. It also implies that the instruments used to implement aquaculture policies (presented below) will need to be reviewed to ensure that the outcomes of their application are congruent with the principles of the EAA.

GENERAL ENABLING INSTRUMENTS

General enabling policy instruments are those that need to be in place to contribute to the good governance of aquaculture and to the creation of the enabling environment that was referred to in Chapter 2. They should help address, among others, uncertainty over property rights (e.g. through the clarification of claims for land, where land acquisition process may be long or fraudulent), corruption (e.g. through the simplification of procedures to obtain permits), and a weakening of institutional factors (e.g. through

the updating of bankruptcy laws and contract enforcement procedures) (Ridler and Hishamunda, 2001). Many of the instruments needed to improve governance are actually beyond the mandate of aquaculture planners but will influence the efficacy of the environment in which aquaculture development takes place. Aquaculture planners should be cognizant of this and cooperate with the government departments concerned in consequence.

Clear property rights are a very important target for government policy because they influence investment decisions directly, especially in operations that are land-intensive or water-intensive, as is the case for commercial aquaculture. Property rights also become fungible, easing access to loans because they can be used as collateral (De Soto, 2000). Similarly, macroeconomic growth and exchange rate policies are important. For businesses that market products or source inputs internationally, macroeconomic policies that prevent the real effective exchange rate from being overvalued can be critical, as an overvalued exchange rate hurts producers because it lowers the price of (competing) imported fish while raising export prices.

Table 3 lists some enabling instruments that affect all economic activities. Those listed can help address themes of the global policy agenda (Chapter 4) and, thus, contribute to the creation of the enabling environment needed for the sustainable development of aquaculture.

AQUACULTURE-SPECIFIC INSTRUMENTS

Sector-specific instruments focusing on the promotion of aquaculture and, within the sector, on commercial or subsistence-oriented aquaculture operations are also needed. These can be disaggregated into three broad categories: laws and regulations; macro-level policy instruments; and micro-level policy instruments. Education and training are likely to be necessary for the implementation of these instruments, and Chapter 7 details how a needs assessment of human capacity development can be carried out in relation to this.

It is important to give a time frame for the implementation of each instrument, with perhaps short-term being within five years, medium-term between five and ten years, and long-term more than ten years. There should also be an indication of the amount of resources needed for the implementation of each instrument. Even if there is no direct financial outlay, as for example with tax holidays, an identification of hidden costs (i.e. lost tax revenue) is useful.

TABLE 3
Examples of general enabling instruments

Global agenda theme	Examples of corresponding instruments ¹
General governance	Reform of property and use rights regimes. Development of public education programmes to tackle corruption.
Institutional factors	Reform of jurisdictions and responsibilities to eliminate overlaps and enhance the joint work of government institutions.
Macroeconomic conditions, including international trade	Reform of exchange rate regimes to prevent an overvaluation of the real effective exchange rate. Investment in research and development to maintain a comparative advantage.
Climate change and environmental sustainability	Compliance with multilateral climate change (and environmental) agreements. Preparation of national adaptation programmes of action (NAPAs) ² to address needs and concerns related to adaptation to the adverse effects of climate change.

¹ The list of examples is not exhaustive.

² National adaptation programmes of action are prepared by least-developed countries under the UN Framework Convention on Climate Change (UNFCCC) for urgent activities to cope with climate change.

Laws and regulations

Supportive legislation

The importance of legislation is underlined in the CCRE, which contains many articles referring to legislation.¹⁰ There is often debate about whether policy informs and determines legislation, or vice versa. It is often a little of both, and policy and legislation are closely linked in their support for each other. Legislation provides an enforceable framework to support policy implementation through the detail specified in such instruments, and through powers relating to enforcement and sanctions for those infringing the law. In addition, legislation formalizes the rights and responsibilities of individuals in the sector and helps the implementation of policies. Changes to established policies may require associated legislative change, and the implementation of a new policy direction is very likely to require an assessment of the extent to which current legislation needs to be changed/strengthened to support successfully the implementation of the new policy.

However, not all policy initiatives need to be supported and “hardwired” into formal legislation if, for example, there are well-established formal and informal rules and norms that support effectively the implementation of particular policy initiatives. Effective implementation of policy may also be best achieved through other means, for example by the use of economic instruments (although these may require enabling legislation) or support/promotion and ad-hoc programmes that do not necessarily require enforcement by the rule of law. However, legislation is often crucial, especially in terms of:

- stipulating powers for management and enforcement;
- ensuring that certain rights are enshrined that cannot be eroded through social, economic and political marginalization;
- creating certain obligations for individuals and authorities.

Not all countries have legislation specific to aquaculture, either because of the infancy of the sector or because of its marginality. Where there is no specific legislation, aquaculture is usually administered under regulations of the capture fisheries. This weak legislative framework can be a barrier to aquaculture development, as was suggested in a survey of nine Near East countries (El Gamal, 2000). An example of the positive impact of specific legislation is given by Myanmar. Its 1998 Aquaculture Act encouraged illegal operations to be registered, reducing conflicts and increasing the number of registered legal farms. Perhaps not coincidentally, Myanmar’s aquaculture output increased more than five-fold from 1998 to reach almost half a million tonnes in 2005 (FAO, 2007b).

Ideally, all relevant stakeholders (both within aquaculture and in other sectors) should be consulted during the process of developing legislation, even if the process can be a long one. Only by doing so can it be hoped that conflicts will be minimized and that legislation will have a measure of legitimacy. Processes for legislative development are different in all countries, but greater compliance can be fostered by legislation that involves all stakeholders in its development as stakeholders can then claim “ownership” over such laws. Although legislation has the potential to marginalize and create conflict, it can also provide a framework for implementing policies and managing conflict issues. Importantly, legislation is often not neutral in its impact on different socio-economic groups. Therefore, legislation must be carefully tailored to suit the needs and conditions in individual countries and situations. It may also be appropriate to have an overriding national framework/legislation, and then local community management norms/rules to reflect different situations.

Box 4 provides a summary of the important legislative issues that require consideration in order to support aquaculture policy implementation adequately.

¹⁰ Articles 2a, 2c, 3.2.b, 3.2.c, 6.13, 7.1.1, 7.6.6, 7.7.1, 8.3.1, 9.1.1, 10.1.1, 10.1.3, 10.2.5 and 11.3.

BOX 4

Key legislative issues of importance for aquaculture policy implementation

1. Non-aquaculture-specific legislation should be considered for its support or hindrance to aquaculture policy implementation, as well as for its relationship to aquaculture-specific legislation.
2. A legal framework supportive of policies, and supported by stakeholders, is more likely when stakeholders are involved in the process to develop legislation itself.
3. Aquaculture policies should ideally ensure that aquaculture legislation is supportive of them before commencing related activities, and if not, appropriate legislative changes should be sought.
4. Aquaculture legislation should contain dispute resolution mechanisms to deal with user conflicts, and to ensure that local rules/regulations do not conflict with national-level legislation and policies.
5. Aquaculture legislation should specify the extent to which local autonomy in developing management rules/legislation will be accepted.
6. National aquaculture legislation should provide for a broad and flexible framework that enables a choice over strategic options, with detailed mechanisms set out in regulations that can be changed if necessary.
7. National aquaculture legislation may need to contain specific reference to certain key concepts, e.g. ecosystem approach to aquaculture, or provide indirect support to key success factors that need legislative support (e.g. decentralization, definition of boundaries).
8. Aquaculture legislation needs to ensure the security and enforceability of a right, and the ability and opportunity for rights holders to seek redress for violation of security and interests in the rights allocated.

Source: Macfadyen, Cacaud and Kuemlangan, 2005.

Legal instruments

Legislation embraces all instruments having the force of law, such as acts, regulations, decrees, orders and local by-laws. These enable an orderly and sustainable development of aquaculture, either by reducing negative externalities, such as pollution or conflicts over land rights, or by encouraging positive externalities, such as the promotion of small-scale aquaculture operations around one large farm (e.g. as in Indonesia [below]). However, there is a danger that, by being overly prescriptive, these instruments become cumbersome and discourage investment into the sector. Overregulation destroys entrepreneurial initiative and motivation, the very ingredients necessary for successful commercial aquaculture. To keep an optimal balance in regulations and other instruments, policy-makers have a number of options. Periodic reviews of the legislative apparatus to assess its relevance and effectiveness lessen the likelihood of overlapping laws, regulations and jurisdictions that contribute to inefficiency and bureaucratic rigidity. Consultation with farmers and other stakeholders could also reduce the danger of overregulation. Another means of curtailing unnecessary legislation is to have a mandatory review of the costs and benefits of regulations prior to enactment, as is the case, for example, with federal regulations in the United States of America. This cost–benefit analysis would include any potentially damaging effect on incentives, and could be done by an independent agency.

In addition to the cost–benefit analysis of possible disincentive effects of regulations and other legislative instruments, the assessment should include the additional costs

of monitoring and enforcement. This is because the M&E of regulations and other instruments is time-consuming and expensive. In fact, the lack of enforcement of existing regulations (because of inadequate resources to do so) may be more important than weak legislation in explaining unsustainable practices in aquaculture (FAO, 1998).

Complying with the regulations governing aquaculture development at national levels should be “rewarding” for aquaculture entrepreneurs. However, indicators of time and cost to do so vary widely among countries, imposing a potential heavy burden on competitiveness. For example, the time taken to obtain a licence to farm salmon varies from an average of eight months in Norway to from five to seven years in Chile, and the cost from about US\$7 000 in Norway to at least US\$300 000 in Canada (Marine Harvest, 2008). Some reports, from Africa for example, suggest that almost one-quarter of the time of senior management is spent obtaining or negotiating licences and regulations (World Economic Forum, 1998).

In addition to simplicity and rapidity, transparency is also important. Corruption is inversely related to transparency. Thus, making the criteria for obtaining a permit clear reduces the discretion of officials (Alesina and Weder, 1999). It also reduces the transactions costs of entrepreneurs.

Economic incentives and self-policing

Alternatives to regulations include economic incentives and self-policing, and these may be feasible and perhaps more efficient within a given administration or ecosystem. Incentives act as signalling devices to encourage best practices. There are economic efficiency arguments for incentives rather than regulations, although they should be considered as complementary. This is the case, for example, with water pollution control, where aquaculture producers (as polluters) pay for much of the cost of the pollution they generate while taxpayers pay for the M&E costs of pollution control regulations. Emissions trading and carbon taxes are widely used in certain jurisdictions for air pollution because of their efficiency. By extension, nutrient trading and pollution taxes could be possible equivalents at an ecosystem level.

Self-policing is another option and is particularly applicable to aquaculture because of the sensitivity of the activity to exogenous factors and the incentive this creates for farmers to maintain optimal production conditions and enforce their own management codes. Fish farmers have more reason than many other producers to minimize pollution because it directly affects their own operations. In fact, there is evidence from salmon farming that there is a decrease in pollution as the industry develops (Asche, Roll and Tveteras, 2008). As such, self-policing, as with economic incentives, offers the means to internalize some of the negative externalities of aquaculture.

Summary of key questions for policy-makers

- Has the existence of non-aquaculture-specific legislation been assessed and considered as a potential constraint?
- Once a review has been undertaken, do changes to legislation need to be made to support the implementation of policy? If so, are such changes necessary at the national, state or local level? Which aspects of policy may also be effectively supported through rewards (economic incentives) rather than sanctions?
- In suggesting necessary legislative changes, have stakeholders been widely consulted?
- Has appropriate attention been paid to ensuring that legislation is as “fair” as possible to all groups/stakeholders?
- Are existing and proposed regulations overly onerous on farmers (and potential farmers), and should they be reduced?
- Can “best practices” found elsewhere be implemented or adapted?

- Has a cost–benefit analysis of proposed/ revised legislative instruments been carried out?
- Are there any economic incentives or self-policing instruments already in place? Could they be enforced or strengthened as alternatives to regulations?

Macro-level instruments

In addition to laws and regulations, there are macro-level instruments that can be used to address issues specific to the aquaculture sector as a whole. This list aims to be comprehensive but is by no means exhaustive. Macro-level instruments cannot be uniformly developed or applied but must be tailored to suit the particular administrative, legal and cultural environments where they will be implemented to support policies. Considerations related to their choice, as well as advantages and disadvantages (costs and benefits), are reviewed below.

Development of a reliable database

Aquaculture policy formulation is severely handicapped where there are insufficient data or where the data are unreliable. The statement “The collection of data and information is not an end in itself but is essential for informed decision-making” was made in the context of capture fisheries (Bonzon and Cochrane, 1997, p. 26), but it should encompass aquaculture in a similar way. However, developing a database that supports the needs for sectoral development planning and monitoring is a complex task. It entails accounting for existing administrative structures, allocating budgets, analysing human capacity and training needs, and piloting collection and analysis trials (FAO, 1999). There may also be a comparison of cost-effectiveness between methods, for example, between enumeration and sampling (Rana, 1997; FAO, 1999).

Data collection is critical to successful aquaculture policy formulation and implementation, for making accurate projections, for establishing realistic quantitative targets and for measuring progress towards these (monitoring). However, this is often overlooked. The method chosen for data collection will depend in part on trust in government, on the resources available and on the presence of decentralized administrations at the local level. Both enumeration, based on farmers’ own records or collected by government agents, and sample surveys have different benefits and costs that should be carefully evaluated before embarking on data collection, in particular in the light of the relative importance of the sector in the national economy.

Southeast Asia provides an illustration of different collection processes (Hishamunda *et al.*, 2009). In Cambodia, those engaged in aquaculture activities are required to record the pen, pond or cage area and the quantity of species fed, and submit this monthly record to the provincial fisheries administration. In turn, the Department of Fisheries estimates the total culture area. Other countries in the world (e.g. Costa Rica) also require farmers to provide data on production and sales, but while this individual reporting may be relatively inexpensive, concern by farmers over tax repercussions can reduce compliance or result in deliberate inaccuracies.

To obviate individual tax concerns, a compromise can be found with data collected in sampled villages, with reporting of quarterly production data and annual data on production area and aquaculture households to provincial governments via local authorities, for compilation and publication by higher instances (e.g. Directorate General of Aquaculture, as is the case in Indonesia). The information collected can be collected and channelled differently. In Malaysia, data are collected by aquaculture extension officers, who send village data to the State Fisheries Office, where they are compiled and vetted before being forwarded to the Fisheries Department for further verification.

Surveys are another means of data collection. In the Philippines, the Bureau of Agricultural Statistics surveys freshwater, brackish-water and marine-water

environments, estimating quarterly data on harvest volumes and value for each species, and generating information at the regional, provincial and national levels.

Promotion of foreign investment

Allowing foreign investment and the establishment of large companies can be a means to kick-start, or at least facilitate, the development of the aquaculture industry. This involves both benefits and costs that need to be carefully considered by the government prior to any action in this direction. It also requires a precise definition of the facilitation role of the government in terms of responsibility and scope of intervention, notably in relation to the extent to which it is willing to let market forces and private interests drive the development of the industry (at the expense of the protection of the environment and of vulnerable communities' interests).

Among the benefits of foreign investment are the capital and technological expertise that large, perhaps foreign, firms can bring. Infrastructure, including sophisticated processing plants that meet international standards, may be needed and only feasible through a large company, whose size may also help in achieving economies of scale in input production. This was the case, for example, with the Jamaican Broilers Group, which was encouraged by policy-makers to diversify from poultry to tilapia farming. Although policy-makers had failed in their attempts to stimulate small-scale fish farming, involving a large firm with an ability to produce feed was an alternative option to direct government assistance. By itself, the investing firm could make economies of scale in feed production and was able to establish high standards in export markets, which indirectly benefited other producers. Far from damaging small-scale production, the Jamaican Broilers Group encouraged "infant" farms, guaranteeing inputs and markets, and providing technical expertise (Hishamunda and Ridler, 2002). Indonesia adopted a similar policy in 2000 with the encouragement of business partnerships for nuclear shrimp and tilapia farms. In green belts, farms larger than 30 ha must develop along the "nucleus-estate" concept in which grow-out ponds are distributed to the landless for their eventual ownership under an approved financing plan. The large farm (nucleus) is expected to provide support to the farmers in terms of technology, inputs and marketing. The government's role has been to facilitate and to monitor these partnerships (Nurdjana, 1999).

Sometimes, these large farms have been foreign. This was the case for tilapia in Costa Rica, where Aquacorporacion was large enough to provide a market and stimulate a feed industry (Hishamunda and Ridler, 2002). In Honduras, the shrimp industry has grown because of foreign investment, but the incentives of tax holidays have reduced the beneficial multiplier impact for local communities (Stanley, 2003). In Viet Nam, with its ambitious plan to double aquaculture output by 2013, there is a need to increase domestic capacity in feed and avoid relying on imports. As a solution, Viet Nam has encouraged foreign direct investment in the feed sector with fiscal incentives such as tax holidays, and the number of foreign companies involved in aquaculture doubled every year between 1998 and 2003 (Hishamunda *et al.*, 2009).

However, in exchange for these benefits, foreign companies may request the right to repatriate capital and profit; they may also expect tax exemptions and other incentives. To mitigate such costs, some countries have limits on foreign ownership in aquaculture. In the Philippines, foreign participation is restricted in natural-resource operations (including aquaculture) to a maximum of 40 percent, although this may have been circumvented by using local people as "fronts". In Viet Nam, the proportion is 70 percent (Hishamunda *et al.*, 2009).

A further possible cost is resentment among the local population, particularly if the large farm is an enclave-type development, with managers hired from abroad, few backward linkages, little training provided, and research done elsewhere. The danger becomes greater as aquaculture products become commodities in a global market and

where economies of scale are realized, tending towards oligopolistic market structures. The world's largest producer of farmed salmon, Marine Harvest of Norway, is the largest producer in all four major producing countries (Norway, Chile, United Kingdom and Canada) (Marine Harvest, 2008). Having farms in different countries is a good business strategy for managing a global market. However, it can bring economic risks to vulnerable communities depending on the commitment of the foreign company to those communities and can prompt government interventions to redress the balance.¹¹

Promotion of producers associations

Enabling the formation of producers associations can increase the weight and visibility of aquaculturists' interests in decision-making processes and should be encouraged by the government. Producers associations can take many forms, ranging from local institutions (sometimes called "one-stop aqua shops") to sophisticated national organizations with formal membership (DFID, 2004b). Regardless of their form, they are frequently used as a means of exchanging information and diffusing technical knowledge. However, their role varies widely depending on the interests they represent and the purpose they are given. In Africa, producers associations have managed shared water supplies, and acted as financial intermediaries issuing credit (Ridler and Hishamunda, 2001). In Chile, the Chilean Salmon and Trout Growers Association acts as a marketing agent and as a monitor for environmental self-policing. It has also established the Salmon Technology Institute to fund demand-driven research and to encourage technology transfer to farmers. Producers associations can bring many benefits to the aquaculture industry at any stage of its development cycle. Moreover, they can do so at little, if any, cost to governments supporting their formation and willing to collaborate with them in their effort to promote aquaculture.

Facilitation of marketing and trade

Trade can generate large direct and indirect benefits, to which aquaculture can contribute (Béné, Macfadyen and Allison, 2007). However, it is increasingly recognized that there are "winners" and "losers" from both domestic and international trade. Although primarily falling within the domain and responsibility of the private sector and its associations, the marketing and trade of aquaculture products can benefit from government interventions where there are communications and marketing constraints and where the interests of small producers require specific consideration. Government support in marketing and trade is therefore indirect through a number of interventions that must be enabling and create a level playing field for all those involved in the aquaculture industry, regardless of their size and power.

Areas where government interventions are required include the setting of standards and hygiene for post-harvest handling, in particular to kick-start good practices in this domain. The establishment of a market for the hygienic handling and selling of fish through a state enterprise and its registered agents, as was the case with the Fish Marketing Organization in Bangkok (Thailand), allowed the marketing of aquatic products to develop on a sound basis before being gradually replaced by private markets and private fish agents (Hishamunda and Ridler, 2002; Piumsombun, 2001).

Another area of government intervention concerns compliance with food safety and quality standards and the promotion of aquaculture certification. Some aspects of aquaculture certification, such as food safety, are mandatory, regulated and implemented by governments, whereas others, such as eco-labelling, are voluntary and market-driven. The development of an aquaculture certification scheme typically falls within the remit of governments through the establishment of standard setting,

¹¹ As indicated earlier, these should be planned *ex ante* rather than imposed *ex post* and should be made known in the policy and strategy documents.

accreditation and/or certification bodies that will be mandated to comply with agreed guidelines.¹² In this regard, government support through the institutional strengthening of competent authorities and marketing organizations, and through the development of legislation dealing specifically with these issues, will be required.

Governments can also indirectly intervene in relation to transport. For producers, transport costs, as well as production costs, are critical in determining comparative advantage but can impede the export of fish. Load factors, competition and flight frequency are other factors that handicap airfreight from some regions, including Africa. In such circumstances, governments might consider strategies to ease high transport costs, such as a focus on a high-value species that could absorb the cost of freight to major markets in Europe, Japan or the United States of America, the promotion of a unique species (e.g. black pearl oysters) and the use of transport by ship rather than air (frozen or dried products), or the processing of a product to reduce its weight (e.g. filleting) before exporting it.

Promotion of research

Research, promoted through adequate public funding, can be a valuable instrument in ensuring the long-term viability of the industry by allowing it to evolve and progress with technical developments. The rationale for public-funded research, in particular in the early stages of the development of the industry, is that it will encourage the establishment of aquaculture farms and fish production from which society as a whole will benefit (Hishamunda and Ridler, 2002). In addition to the amount of money devoted to research, policy-makers can influence the efficiency of the money spent by targeting research areas identified as priorities in consultation with the industry and its associations. However, estimating research spending efficiency is a difficult task that requires calculating consumer and producer surpluses and attributing market changes to research, which themselves depend on the demand and supply elasticities of the species, on the commercial stage of the species and on the diffusion of research.

However, efficiency can be enhanced by international and regional cooperation among research institutes. This will transfer knowledge and reduce costs. Coordination of research efforts should also be sought to avoid duplications, and this role could be given to the designated lead agency/competent authority overseeing aquaculture planning and development, as was mentioned earlier. Another factor affecting research efficiency is the degree to which research is demand-led and considers the interests of producers (Entsua-Mensah, Lomo and Koranteng, 1999). This can be achieved with private-public research partnerships whereby companies make financial and in-kind contributions and are direct beneficiaries of research findings.

Once research results are known, it is important that they be widely disseminated, and governments can play a role in this. Although some results may be proprietary, they can be made available to extension workers in particular, who should be informed, perhaps through workshops, of the means to update their own knowledge and apply new findings at the farm level. Governments can also use communication tools, such as brochures and media broadcasts, to enhance the dissemination of results and farmers' information. This can be a two-way learning process. The farmer training centres in India not only disseminate technology to farmers, but also provide a communication channel to the researchers about field problems and indigenous technical knowledge.

Summary of key questions for policy-makers

- Has there been a thorough review of the constraints, opportunities, costs and benefits of the various aquaculture-specific macro instruments considered?

¹² At the time of writing, international technical guidelines for aquaculture certification were under review (FAO, 2008d).

- Has the role of the public and private sectors been clearly defined?
- Is the implementation of the chosen macro-level instruments realistic given the financial and human capacity constraints?
- What have been the “best practices” used elsewhere and can they be adapted?
- Have aquaculture stakeholders been involved in the choice and prioritization of the selected instruments?

Micro-level (farm-level) instruments

The choice and promotion of which fish species to produce are key decisions in the development of aquaculture both at the national level to bring about a country's competitive advantage, and at the farm level to meet food security goals. In addition, the major operating cost for most farms is feed, but other constraints to development include access to credit (and the interest rate charged) and the availability and quality of seed. Many instruments exist and can be implemented at the farm level to alleviate these constraints. However, some, such as direct assistance by governments through subsidies, are beyond the financial capacity of many developing countries, whereas others, such as indirect government assistance to farmers with the development of business plans, involve no outlay of public money. It is the latter kinds of instruments that are reviewed below.

Choice of fish species

Careful choice of fish species, including the decision to introduce and cultivate exotic species, is essential in the development of aquaculture, and guidance should be provided to farmers on this matter (although without pre-empting individual decisions). This will guide not only production decisions but also research priorities. The issue of species will hinge on the technical question of whether the species can be cultivated and on market considerations of whether it can be sold.

In this context, a holistic approach to selection is important and has been adopted in some countries. In Hawaii, the United States of America, prerequisites such as markets, social impacts, environmental impacts and political support were examined and factored into the prioritization process (State of Hawaii, 1993). In the State of Western Australia, Australia, the species prioritization reflects both market potential and technical considerations, and this has been a dynamic process with an Aquaculture Development Group Board reviewing aquaculture plans regularly to identify new priorities (Government of Western Australia, 2003).

Where there are no indigenous species with good market prospects and with technical possibilities, a choice may be made to import and cultivate an exotic species if environmental conditions mirror its original habitat (Funge-Smith, Briggs and Subasinghe, 2003). Economic benefits of the cultivation of exotic species in terms of foreign exchange and economic spin-offs have been significant in Chile with Atlantic salmon (*Salmo salar*), in Southeast Asia with Nile tilapia (*Tilapia niloticus*) and its improved strains such as the genetically improved farmed tilapia (GIFT) and with whiteleg shrimp (*Litopenaeus vannamei*) (Hishamunda *et al.*, 2009). Furthermore, with Pacific climate change and the gradual modification of ecosystems, species are likely to be able to grow outside their original range. This could turn the threat of climate change into an opportunity for adaptation and maintenance of production levels (De Silva and Soto, 2009).

However, as well as these benefits, there are costs. Escapees can change the ecosystem with long-term implications. The introduction of inland species can be particularly damaging. In Australia, the Pacific pearl oyster displaced Sydney rock oyster (Tisdell, 1998) and the introduction of diseased shrimp into Taiwan Province of China damaged the marine shrimp industry (Tu *et al.*, 1999). Therefore, the risks associated with the introduction of alien species in aquatic systems and the necessity of control measures

for their use need to be weighed against the reliance on indigenous species (Bartley *et al.*, 2005), in particular in terms of financial and environmental costs and benefits. Risk management would suggest that emphasis should be on precaution, with alien species being introduced only as a last resort and under close supervision (FAO, 1996; Leung and Dudgeon, 2008).

Capital and credit assistance

In many countries, government intervention in aquaculture at the farm level has included direct subsidies to producers to kick-start the industry. The argument for this kind of support is that industries learn by doing, so costs (and support) will decline with experience. With maturity come economies of scale and international competitiveness and, in theory, government assistance should end. Another argument for early government support is that financial institutions are naturally prudent and new industries such as aquaculture entail greater, or at least unknown, risks. There may also be a lack of quality business planning and, often for small-scale producers, difficulties in providing collateral (perhaps because of uncertain property rights). Providers of start-up fixed capital, as well as operating capital to cover cash-flow shortages, will therefore not give sufficient credit, or if they do, they will charge a risk premium (Hishamunda and Manning, 2002), hampering entrepreneurial initiatives and prompting governments for direct financial support. However, the limits of this kind of intervention have been repeatedly shown worldwide, with – a few exceptions apart – aquaculture operations declining to a complete stop when direct assistance has been withdrawn.

Less costly mechanisms that do not involve direct budgetary expenditures exist to trigger the initial development of entrepreneurial aquaculture operations regardless of scale, type or location: government loan guarantees (used in Europe), tax exemptions and holidays (used in Honduras), official assistance with business plans (used in shrimp farming in Madagascar), bonds (used in the United States of America), low-interest loans (used in shrimp farming in Viet Nam) (Ridler and Hishamunda, 2001). There may also be the potential for extending to aquaculture the same crop insurance available to agriculture; this would reduce the risk premium on bank loans and encourage banks to lend (van Anrooy *et al.*, 2006).

Overcoming feed and seed constraints

In some countries, the quantity and quality of feed and seed constrain the aquaculture sector. Feed is the principal cost in the cultivation of most species and this cost has tended to increase with the rising price of fishmeal (Hishamunda *et al.*, 2009). The quality of feed can also be an issue. Similarly, quality and shortages of seed can be a constraint.

Again, the idea here is to avoid direct and costly government interventions, and instead to stimulate the provision of feed and seed for aquaculture operations indirectly through the right farm-level instruments to encourage the private sector to engage in seed and feed production. In the case of fish seed, this typically implies moving away from government-run hatcheries. Availability of fish seed can be increased by offering tax holidays to private hatcheries (e.g. Malaysia). Soft loans, exemptions from value-added tax, and reduced land taxes (e.g. Viet Nam to increase marine seed production) are also possible (Hishamunda *et al.*, 2009). However, government funds could be made available to send students abroad to learn the technology of seed production or to promote seed research in public hatcheries, as has been the case in many countries. However, research can also be undertaken by private companies on-site, or in the case of the GIFT strain in the Philippines, in collaboration with a university (Hishamunda *et al.*, 2009).

In the case of feed, indirect farm-level instruments include explicit incentives to attract foreign investment (as was mentioned in the case of Viet Nam) and to entice

livestock companies to diversify into aquaculture and feed production (e.g. Jamaica). Other indirect ways of overcoming feed constraints include: the lowering of tariffs on imported feed (e.g. the Philippines); the promotion of large integrated operations (e.g. Zimbabwe); and the undertaking of research to substitute imported fishmeal with local ingredients (e.g. Malaysia) (Hishamunda *et al.*, 2009; Ridler and Hishamunda, 2001).

Summary of key questions for policy-makers

- Has there been a thorough review of the constraints, opportunities, costs and benefits of the farm-level instruments considered?
- Have government interventions been carefully considered to avoid direct support and minimize public spending?
- Are private aquaculture entrepreneurs aware of their responsibilities and of the limits of public support?
- What have been the “best practices” used elsewhere and can they be adapted?
- Have aquaculture stakeholders been involved in the choice and prioritization of the selected farm-level instruments?

Summary of instruments for aquaculture policy implementation

While the implementation of the policy instruments discussed so far can be an objective in itself, and thus belong to the “strategy”, other more practical and targeted instruments are actions towards the achievement of these objectives and, thus, belong to the “plan”, as defined in Chapter 3. In all cases, the instruments considered should comply with the three principles of the EAA outlined at the start of this chapter. Tables 4 and 5 clarify this and provide a summary of the macro-level and farm-level instruments that may be necessary – depending upon national circumstances – to address identified constraints to the development of aquaculture and achieve a country’s “vision” for the sector. Time frames for the implementation of actions are also indicated (as they belong to the plan). The constraints, objectives and actions indicated are generic. They are provided as examples only and will vary from one country to another. Furthermore, training and human capacity development have been intentionally omitted from these tables. Given their importance in underpinning the implementation of policies and the development of aquaculture itself, they are discussed in greater depth in the next chapter.

Finally, by way of summary, Figure 3 highlights the links among aquaculture development (achieved through the implementation of various instruments and access to various forms of capital [as defined in the Sustainable Livelihoods Framework]), sustainable livelihood outcomes (to which aquaculture can contribute), and governmental development goals (to which all factors can contribute).

TABLE 4
Summary of macrolevel constraints (including institutions, legislation and regulations) and how to tackle them, with examples of instruments and actions supporting policy implementation

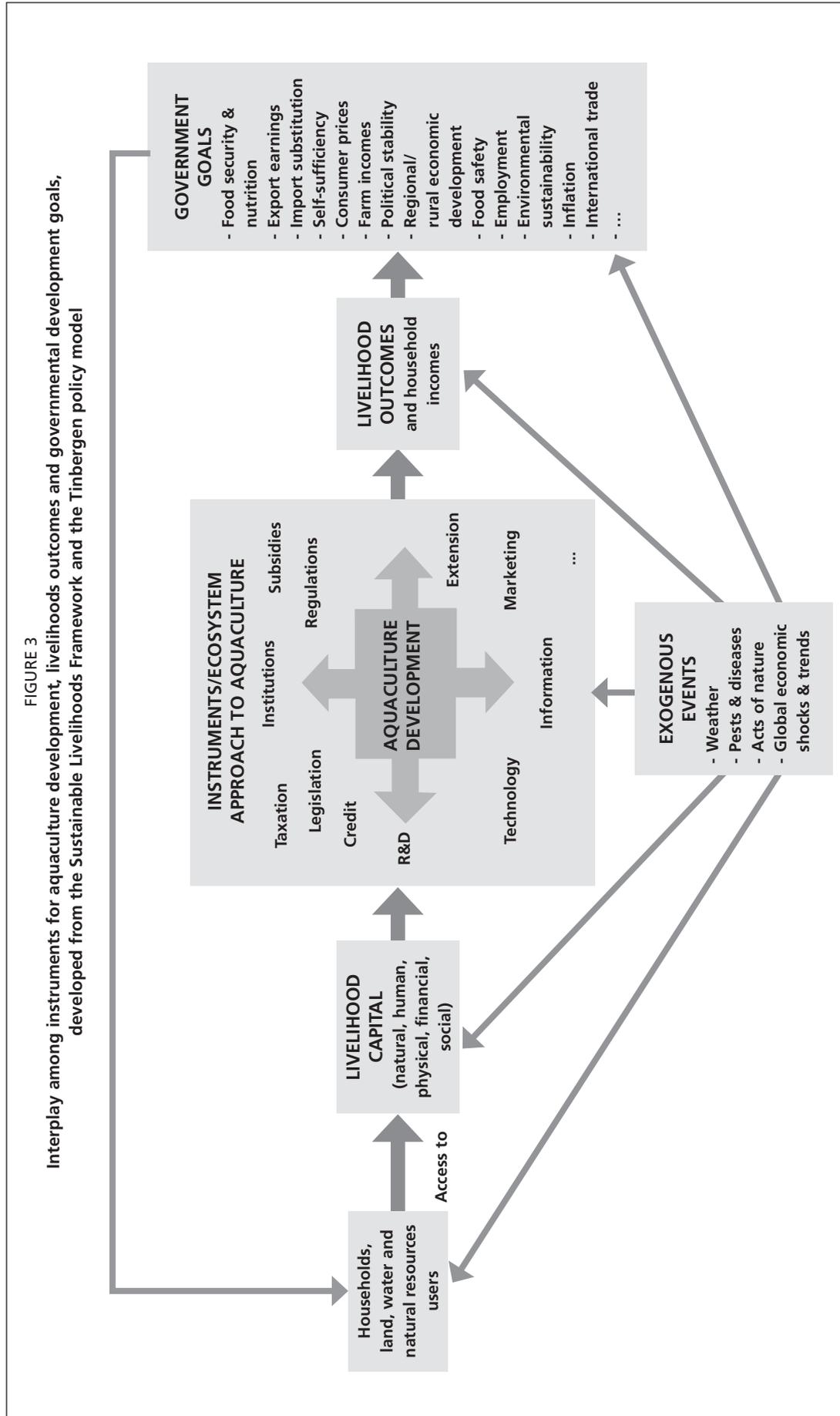
Category	Strategy		Plan	Indicative time frame
	Constrain/tri/nationale for tackling	Examples of objectives		
Institutions	Aquaculture "invisible" in administrative setup and handled by several authorities	Strengthen the visibility of aquaculture	Commission an institutional analysis	Short term
	Lack of clear property rights	Establish (or reform) a "competent authority" in charge of aquaculture development	Define mandate, role and responsibilities of the competent authority, and its <i>modus operandi</i> Encourage collaboration among ministries Review and reform property rights regimes in collaboration with relevant ministries	Short term Medium term Medium term
Regulations, acts, decrees, by-laws	Lack of review	Develop a "private investment-friendly" regulatory framework	Review existing legislation and propose amendments	Short term
	Constraint to investment	Promote self-enforcement	Reduce redundant regulations Assess the costs and benefits of proposed legislative instruments Rely more on producer associations	Short term Medium term Medium term
Licences and permits	Lack of qualified personnel	Promote compliance by all farms, regardless of size	Encourage self-policing	Short term
	Poor enforcement	Implement an effective licensing system for new farms.	Learn from "best practices" elsewhere Set up an online application system	Short term Short term
Product quality standards	Small producers' lack of compliance	Develop HACCP and fish quality standards	Designate a nationally recognized authority for certification/accreditation	Short term
	Cost of meeting standards	Implement aquaculture certification guidelines	Allocate sufficient funds for the compliance monitoring	Short term
Information and statistics	Outdated information and irregular data collection	Develop a national statistics database	Evaluate pros and cons of possible data collection systems	Short term
	Lack of national private investment capacity	Attract foreign (large) companies	Train enumerators	Medium term
Foreign investment	Low productivity and economies of scale		Implement financial and economic incentives for foreign investors (e.g. tax exemption, debt-equity swaps or agreements, tax holidays, interest rate subsidies)	Short term
	Lack of know-how		Encourage joint ventures between national and international companies Encourage forward and backward contracts between large and small producers	Short/medium term Short/medium term
Producers associations	Myriad of independent producers	Promote producers associations	Recognize the importance of producers associations	Short term
	High transaction costs		Provide information on the constitution of producers associations Encourage the representation of producers associations in high-level decision-making processes	Short term Medium term
Environment	Increasing environmental pollution	Reduce environmental impacts	Publicize environmental standards	Short term
	Competition for natural resources	Implement the ecosystem approach to aquaculture	Establish aquaculture-specific zones Implement the "polluter pays" principle Promote integrated/multitrophic aquaculture	Short term Medium term Medium term

TABLE 4 (CONTINUED)

Category	Strategy		Plan		Indicative time frame
	Constrain/rationale for tackling	Examples of objectives	Examples of actions required		
Market and trade	High transport costs	Promote export-oriented aquaculture	Improve logistics at airports		Short term
	Lack of market information		Promote farmers' attendance at trade shows and ascertain import details		Short term
R&D	Inadequate road network and absence of refrigeration	Support smallholder access to markets	Encourage producers cooperatives		Short term
			Develop local trading markets		Medium term
			Encourage linkages between large companies and small producers (e.g. through a buy-back system)		Medium term
			Improve road infrastructures in identified aquaculture zones		Long term
	Inadequate funding	Recognize the importance of research in aquaculture development	Fund public stations for research and demonstration on identified research priorities		Short term
No qualified staff	Develop national research capacity	Provide low-interest research credit to private companies		Short term	
Low broodstock and seed quality	Poor dissemination of research results	Improve extension	Acquire knowledge developed elsewhere		Short term
			Develop university courses		Medium term
			Learn from lessons and best practices elsewhere		Short/medium term
			Develop media broadcasts		Short term
			Provide regular development updates to government extension officers		Medium term
			Invest in "low-tech" communication tools for dissemination (e.g. radio programmes, pamphlets)		Short term

TABLE 5
Summary of farm-level constraints and how to tackle them, with examples of farm-level instruments and related actions for their implementation

Category	Constraint/rationale for tackling	Strategy	Plan	Indicative time frame
		Examples of objectives	Examples of actions required	
Fish species	Low productivity of indigenous species	Introduce an exotic species	Commission an environmental impact assessment	Short term
			Establish market potential of introduced species	Short term
			Implement a monitoring programme post-introduction	Medium/long term
			Comply with the precautionary approach (cf. ecosystem approach to aquaculture)	Medium/long term
Credit	Banks risk averse about aquaculture Collateral needed to borrow	Improve access to credit for smallholders	Provide loan guarantees	Medium term
			Encourage land entitlement	Long term
Seed	Inadequate availability Poor handling	Promote the development of small-scale private hatcheries	Lower tariffs on hatchery equipment	Short term
			Improve provision of technical advice to hatchery operators	Short/medium term
			Encourage linkages between hatcheries and grow-out producers	Short/medium term
			Privatize state-run hatcheries	Medium-term
Feed	Shortage of quality feed	Promote the development of private feed factories	Lower tariffs on feed ingredients	Short term
			Ensure that improved feed manufacture is among identified priority research areas	Long term



7. Overcoming challenges to implementation

After having reviewed the instruments needed to implement aquaculture policies, this chapter examines the challenges that may prevent their efficient use (e.g. human and institutional capacity, availability of financial resources) and emphasizes the need for monitoring. Means to address challenges should be included in the aquaculture plan. They have been singled out here to underscore their critical importance in the effective implementation of policies.

HUMAN CAPACITY DEVELOPMENT

One of the key aspects of policy implementation is the level of human capacity that is available to carry out the activities specified in the plan. This capacity is often limited, and it is likely that some level of “capacity development” will be required if a policy is to be successfully implemented.

Definition and importance

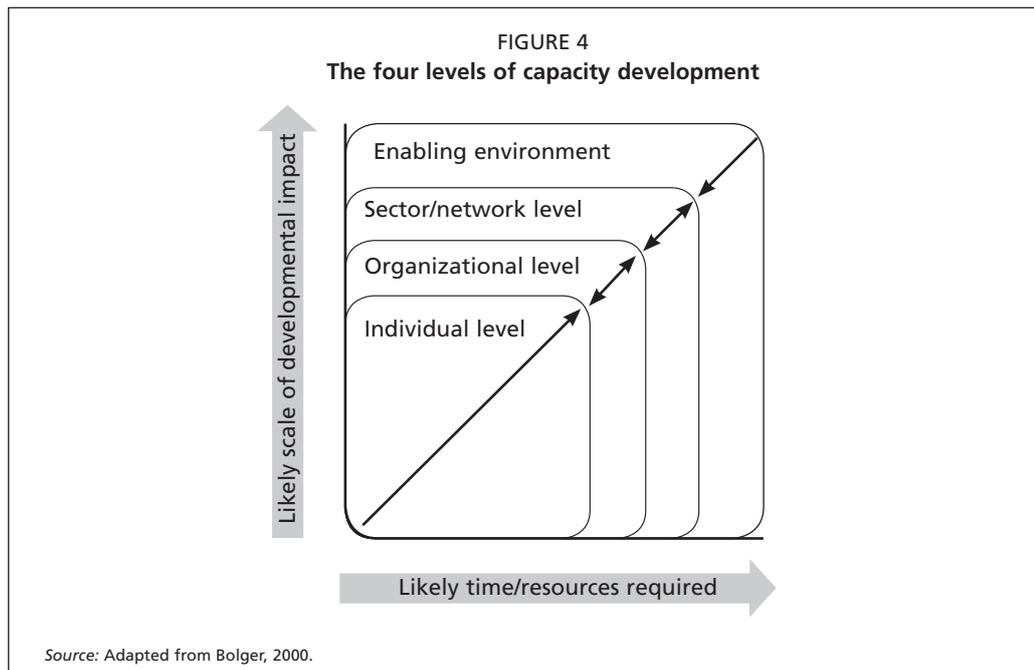
Many different definitions of capacity development have been proposed in the development literature (Chambers, 2005; Lusthaus, Adrien and Perstinger, 1999). However, a useful one, which serves to highlight important attributes of capacity development, has been adopted in the context of fisheries as (FAO/Advisory Committee on Fisheries Research, 2004, p. 2):

“The process by which individuals, groups, organizations, institutions, and societies develop their abilities – both individually and collectively – to set and achieve objectives, perform functions, solve problems and to develop the means and conditions required to enable this process”.

This definition requires a consideration of capacity development at four levels, as shown in Figure 4. Each level represents a level of analysis, and a possible entry point for initiatives aimed at capacity development. As capacity development extends from individuals to organizations, sectors and ultimately to a wider “enabling” environment, so do the time and financial resources required to carry out capacity development, but so does its impact. The definition also highlights that capacity development is a process and not a passive state, and that it must build on existing core capacities. Figure 5 shows that new learning and the abilities of individuals eventually feed into, and become embedded in, a collective unit, so that performance becomes less dependent on certain individuals.

In addition to the need for good levels of human capacity to define and implement an aquaculture policy, a special focus on human capacity development is important because of:

- an increasing number of new approaches to planning natural resources development, including aquaculture (such as the ecosystem approaches);
- changes in the international development context more generally (e.g. greater emphasis on sustainability and the environment, a move in public management towards decentralization, and an increasing emphasis on good governance);
- the realization that capacity development may be the overriding factor in addressing the bottlenecks that constrain aquaculture development.

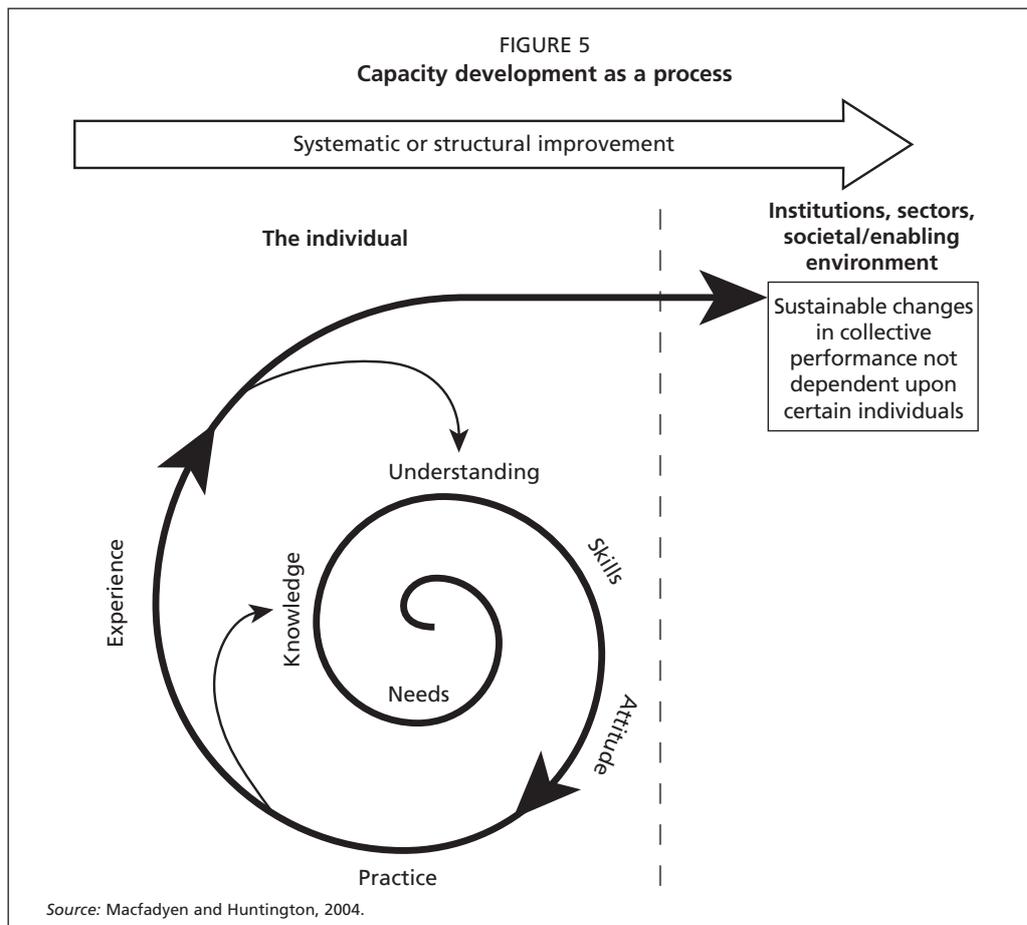


These changes demand levels of capacity and understanding that were not previously necessary.

Requirements for successful human capacity development

Some important questions that need to be answered when thinking about human capacity development requirements are:

- *What are the key problems, and which aspects of capacity development are most needed to solve these problems?* The need for capacity development will be determined by perceptions about the current problems in any given context and the extent to which these can be solved through capacity development. While recognizing that capacity development needs will be case/initiative-specific, it is possible to identify a range of capacity development areas that might require support. These can be grouped into “pillars” depending on whether they relate to: aquaculture science, research and development; aquaculture sector management; or wider non-aquaculture-specific societal skills and knowledge as part of the enabling environment. In aquaculture, greater emphasis is progressively being placed on capacity development in areas such as the ecosystem approach, the sustainable livelihoods approach, poverty assessments, and on issues of governance and wider generic, non-aquaculture-specific skills and knowledge.
- *Who defines the needs for capacity development?* Assessing what the key problems and associated capacity development needs are raises the question as to what extent the specification of needs should be demand-driven, and what the best ways are to involve target individuals or groups in this process. Lessons from the past suggest that the failure of many initiatives has been because the recipients of initiatives have not been sufficiently involved in the definition of capacity development needs.
- *What is it realistic to expect?* Capacity development should strive to bring about changes in understanding, knowledge, attitudes, behaviours, practices and skills, as shown in Figure 5. Different capacity development needs will result in a focus on different levels of this capacity development process. For example, if the need is primarily to acquire/provide basic knowledge or improve understanding, then appropriate tools may include training or information provision. If needs are more



pressing in terms of changing attitudes and providing practical experience, field-based support may be more appropriate. However, it must also be recognized that there are other factors that may be outside the realm of an aquaculture capacity development initiative itself. Examples include: shortages of funds, high turnovers of staff, external macroeconomic factors, natural/environmental factors, national-level policies or actions in other sectors affecting aquaculture. Any capacity development initiative must be cognizant of these external factors and the overall context in which the initiative is to operate.

- *Which level of capacity is the focus of assistance?* Capacity development needs, appropriate initiatives, and the likely time and resources required may be vastly different depending on whether capacity development is focused on individuals or groups of individuals, institutions, sector support, or efforts to create an enabling social environment. As Figure 4 shows, creating an enabling social environment is likely to require a longer period of initiative, whereas the provision of specific skills and knowledge to individuals may be achieved quickly and at a relatively low cost.
- *What are the current capacity levels, and who is the target group (or groups) within each capacity level, so that core capacities can be built on?* The changing development context described above means that many institutions need to alter radically the content and style of their management/research/teaching to reflect issues of interdisciplinary participation, etc. (Allison and McBride, 2003). Benchmarking the current approaches used by management, research and training institutions is necessary in order to compare such approaches with new developments and approaches gaining wider recognition. Similarly for individuals, what are the roles and responsibilities of the target group (or groups), and what knowledge, skills, attitudes and behaviours are they expected to have in order to

TABLE 6
Summary of key lessons learned from previous human capacity development initiatives

Capacity assessment	The process of human capacity development itself can add value to overall capability, as well as result in the improved performance of the individuals, groups and organizations.
	Initiatives should take account of, and be tailored to, existing levels of core capacities and involve a two-way process of knowledge transfer and acquisition.
	Human capacity development initiatives need to identify the individuals and organizations that will champion the process and can adopt and lead human capacity development.
	There is a need for better integration of human capacity development initiatives with national planning processes, and especially between policy, management and research.
Needs analysis	Capacity development initiatives should establish an adequate level of participation in their needs assessment, design, implementation and monitoring.
Delivery	Initiatives should provide adaptive, flexible and suitable learning pathways, taking into account the individual's work environment, lifestyle and aspirations.
	Incentives and mechanisms should be provided to support recipients of human capacity development.
Sustainability	Human capacity development is a long-term process that requires continued support through national initiatives and partnerships.
	Efforts should be made to retain capacity investment within the aquaculture sector. Those delivering human capacity development initiatives should themselves have the necessary knowledge, skills and abilities to provide human capacity development.
Enabling environment	Approaches to capacity development should take cognizance of the overall societal context and the political influence of supported institutions and sectors.
	Approaches should ensure an adequate focus on the social, economic and environmental context in which technical solutions are being implemented.
	Initiatives should capture and enable attitudinal changes and skills that are likely to result in a collective sense of purpose and progress.
	Initiatives should recognize the need for an enabling environment that provides the incentive to promote the use and development of the enhanced capacity.
	One size does not fit all – planning of human capacity development should take into account the realities of the overall environment under which capacity enhancement will take place.

Source: Macfadyen and Huntington, 2004.

be able to fulfil those roles? Are they required to have specialist technical skills, or general management ones? Are they government employees, university or research staff, private sector, NGOs? Identifying appropriate needs for different individuals/groups requires a benchmarking assessment of “knowledge, attitude, skills and ability” against a profile of what would ideally be required.

- *What is the time frame of the improvement required?* For assistance with immediate problems that need to be solved quickly, on-the-job training or workshops might be required. For medium/long-term improvements such as implementation of the ecosystem approach, it may be necessary and appropriate to change university curricula or research agendas to build up gradually the necessary awareness and capacity to implement such an approach to aquaculture development. The sort of capacity that is being developed may itself also have time implications. For example, it may be possible to provide training in specific farming techniques quickly, but training on effective policy development or on the implementation of the EAA may require much longer time periods for it to be successful because of the complexity and wide number of issues that would need to be covered.

Table 6 summarizes these issues and the lessons learned from capacity development initiatives worldwide.

Carrying out a human capacity development programme

Having considered the key factors above, one can then define and document a human capacity development programme. There is a wide range of possible delivery mechanisms that can be used for capacity development, and which can be usefully

categorized into “face-to-face” mechanisms and “remote” mechanisms. Face-to-face mechanisms include: classroom-based training, seminars, conferences and workshops, research programmes, exchange programmes, demonstration trials, and on-the-job training. Remote mechanisms include: budget/programme support, publications, manuals/training material, radio, mentoring, distance-based training/learning, and mechanisms based on information and communication technology. Almost all are being used in the fisheries/aquaculture sector, with increasing emphasis on remote, Internet-based approaches. However, traditional mechanisms remain vital, even if the way they are structured and delivered requires some change, especially with regard to participation from beneficiaries. It is being increasingly recognized that a combination of mechanisms may be appropriate, and that these mechanisms may need to be delivered through partnerships with service providers.

Summary of key questions for policy-makers

- Has a participatory needs assessment of human capacity development requirements been carried out, based on existing and desired “knowledge, attitude, skills and ability”?
- Have the recipients of initiatives been sufficiently involved in the definition of problems and capacity development needs?
- Has the human capacity development programme been specified and relevant documentation prepared, based on careful assessment of available resources and time?
- Does the capacity development programme use an appropriate mix of delivery mechanisms?

INSTITUTIONAL STRENGTHENING

Similarly to human capacity, functioning institutions are needed for the effective implementation of policies. Along with a human capacity needs assessment, it is recommended an institutional assessment be carried out, and the two are usually closely related. An institutional assessment should review the existing capacity of those institutions (and of their staff) that will be involved in aquaculture policy implementation in order to assess their strengths, weaknesses and requirements for capacity development.¹³ An institutional assessment may also reveal that, with no institution in a suitable position to oversee and support aquaculture policy implementation, the reform of existing institutions or the establishing of a new one may be needed. In the latter case, its form, mission, mandate and modus operandi should be determined.

Challenges to the functioning of institutions

Conflict, in all its manifestations, has been pointed to as the main sign of institutional failure in the context of natural resources use (Brugère, 2006b). It is often found that institutions do not “work” because of the following difficulties:¹⁴

- the problem of interdependence, i.e. the fact that the choice of one person/agency influences others and that the resulting incompatibility of interests creates conflict;
- ill-defined mandates, i.e. the fact that lack of clarity in roles and responsibilities hampers negotiation and bargaining (which is in turn linked to the problem of interdependence);

¹³ If sufficient time is available, assessments can also document the external environment in which institutions operate, and which often significantly affects them.

¹⁴ The difficulties listed here are extracted from the New Institutional Economics literature and authors such as Bardhan, Coase, Dixit, North and Ostrom who have researched in depth the functioning of institutions.

- imperfect (also called “asymmetric”) information, i.e. the fact that information is known to some people but not to others and is used to gain advantage in negotiations, bargaining and the pursuit of personal agendas;
- high transaction costs, i.e. the fact that money and time have to be spent to achieve transactions because institutions in place fail to achieve their primary role of facilitating transactions;
- the problem of “common agency”, i.e. the fact that those who have authority (called the “principals” in the New Institutional Economics literature) simultaneously try to influence those who have to respond to them (called the “agents”), creating confusion and inefficiencies because one agent may have to respond to several “principals” whose interests are not necessarily aligned.

These problems can be more or less pronounced depending on the specific context in which institutions operate and the remit of their purpose and activities. However, regardless of their severity, all these problems, considered singly or in combination, result in conflicts.

Carrying out an institutional assessment

Typically, an institutional assessment is based on an analysis of the functioning effectiveness (performance) of the institution in relation to its mission and its resources (human, financial and physical). Information sources on which such analysis is based usually include interviews with staff, examination of official and “grey” documentation and Web sites, complemented by an observation of facilities.

Key aspects on which the analysis should dwell include:

- mission and objectives, current mandates and powers, main activities/programmes;
- staff capacity, organization and responsibilities;
- financial capacity;
- physical infrastructure and technological assets;
- institutional processes and performance, in particular in relation to collaboration with other institutions (government departments, NGOs, civil-society groups, etc.).

Detailed information related to each of the above points and which can be used as a guide to the implementation of an institutional assessment is provided in Appendix 2. Bearing in mind institutional developments in other economic sectors (e.g. livestock) or in other countries can provide useful insights towards the establishment of a suitable institution.

Principles for the design or reform of institutions

A number of principles should be respected for the establishment (through new design or reform) of well-functioning institutions. They concern:

- Timing: It is better to set up new arrangements *ex ante*, i.e. before troubles arise, rather than in reaction to problems, i.e. *ex post*. In addition, the time it takes to implement new arrangements and make them fully operational should not be underestimated because of the need for capacity building and awareness raising, which are lengthy processes.
- Collaboration and organizational reform: This relates to the reallocation and grouping of complementary tasks, which can be done through either multisectoral integration, by bringing together all agencies with common objectives, or by structural integration when a new institution is created and is responsible for all development and policy measures related to a specific subject (fisheries and aquaculture development in the present case). The latter is sometimes more challenging given the traditional “territoriality” of ministries and agencies. Enhanced collaboration across disciplines and institutions should nonetheless be the underlying aim of organizational reform and has been underlined as a prerequisite (FAO, 2008a).

- **Conflict prevention and resolution:** Inbuilt mechanisms for conflict prevention and resolution are required in order to allow grievances and problems to be voiced and given adequate weight in the monitoring of the performance of the institution and its progress towards the achieving of its mission.
- **Information and communication:** Improved information and communication can be achieved when more information, both in quantity and quality, is collected and equally shared between the competent authority and its members, but also among its employees and various units, reducing the risk of information asymmetries.

To be effective, perennial and widely accepted, institutional arrangements need to be:

- visible, i.e. clear and unambiguous mechanisms of institutional functioning;
- credible, i.e. supported by reputational considerations;
- flexible, i.e. able to respond to changing circumstances but with conditions of application (if rules are to be bent) clearly stated at the outset.

Finally, decentralization is a very important aspect of administrations and governance regimes in many countries. It warrants special attention when new institutions and new institutional arrangements are being established in order to avoid the “explosion” of a central problem into many smaller yet similar problems (Brugère, 2006b).

Reforming or establishing new institutions is costly and it is worth anticipating and making provisions for the transaction costs arising from the implementation of new or modified procedures. However, these should decrease in the long term once operational processes become well established.

Budgets and resource mobilization

A key factor in ensuring that the specified aquaculture policy can actually be implemented is the allocation of appropriate budgets and resources. This is a two-way process in which:

- All activities should be costed with total cost estimates presented to the government/State treasury for inclusion in development and operational budgets for the fisheries/aquaculture sector.
- Once development and operational budgets have been approved, the list of activities to be conducted may need to be revised depending on how much funding has actually been provided. This may require a further iteration, and it should be borne in mind that some low-priority activities with low associated costs may need to be retained ahead of higher-priority activities with significant costs.

An important activity of the relevant aquaculture ministry should be to lobby for financial resources from the government. This can be facilitated by:

- careful presentation of the actual and potential benefits of the sector to the nation (e.g. income generation and added value, foreign exchange earnings, employment generation, multiplier effects, taxation, food security);
- demonstrating that the planning undertaken has followed a logical path and that all activities are essential to achieving the strategic objectives;
- demonstrating the effective and efficient use of previous funds provided to the sector so as to generate maximum value for money.

The issue of allocation of resources also requires careful consideration of the timing of budget allocations/release, and a match of the time-bound activities with the timing of the funds to be provided by the government. However, possibilities to attract donor funding to implement activities agreed upon in the aquaculture plan as part of a donor-funded programme should also be investigated.

In many countries, government resources are scarce. This places great onus on those in the sector to strive to use resources efficiently and effectively, and where possible to select low-cost options over high-cost ones. It also means that aquaculture practitioners should seek or lobby to bring in external donor funding where possible, which can then be used to support the development budget for the whole sector.

Summary of key questions for policy-makers

- Has the overall cost of implementing the policy been evaluated, based on an itemized costing of the various activities included in the implementation plan?
- If the budgets provided are not as great as needed, have activities/strategies been further prioritized, based on the efficiency of different activities in realizing strategic objectives, so to as to generate the greatest value for money?
- Has the ministry or department overseeing the development of aquaculture made appropriate representation to the government treasury to demonstrate why allocation of budgets to the sector will be well spent, and how it will result in significant benefits for the country as a whole?
- Has the timing of activities been matched to the availability of budgets?
- Have all attempts possible been made to generate external funding for the implementation of the activities?

MONITORING AND EVALUATION

This section considers both the main requirements for the effective use of monitoring and evaluation (M&E) indicators, or results indicators, and their main purpose, i.e. why M&E (and the use of indicators) are so important and can help towards overcoming the challenges of policy implementation by providing opportunities for timely re-orientation.

Monitoring indicators versus evaluation indicators

It is helpful to consider separately monitoring indicators and evaluation indicators. Although they are often referred to together (i.e. as M&E indicators), the purpose and characteristics of the two are rather different. Monitoring indicators should be used for the continuous or periodic (typically monthly, quarterly, semi-annual or annual) measuring of the extent to which the activities specified in the implementation plan are being successfully completed. Generally, managers with responsibility for policy implementation use indicators to assess outputs and progress. Monitoring indicators can then be used to suggest corrective action through appropriate feedback mechanisms, e.g. by highlighting that a specific activity is being carried out too slowly. Therefore, monitoring indicators can be viewed as “process indicators”. In terms of policy implementation, they would thus be used to monitor the extent to which the specified activities are being carried out. Typically, those responsible for policy implementation would collect monitoring indicators.

Evaluation indicators are used to measure results, impacts or benefits. They can be considered equivalent to “impact indicators”, and are generally strongly focused on performance (although some evaluation indicators can also be process indicators in certain instances). Usually, assessments of evaluation are made less frequently, and at the mid-term and final stage of a policy planning period, i.e. after 2.5 years, and again after 5 years, if a formal policy review process takes place every five years. Assessment of policy impacts may best be made by some external specialists with evaluation experience, rather than by those responsible for the policy specification and implementation.

Importantly, evaluation indicators should relate to both activities supporting policy implementation and results achieved, and they should be used to help answer a number of evaluation questions relating to the:

- efficiency/value for money (assessing the outputs in relation to inputs, looking at costs, implementing time, and economic and financial results);
- effectiveness (measuring the extent to which the objectives have been achieved or the likelihood that they will);
- impact (measuring both the positive and negative, foreseen and unforeseen, changes and effects on society caused by the activities under evaluation);

- relevance and coherence (assessing the extent to which the needs of the various interest and target groups are satisfied and gauging the degree to which the activities [and the strategy and policy to which they relate] at a given time are justified and fit within the global and national/local environment and development priorities);
- sustainability (measuring the extent to which benefits will continue from a particular activity – and policy – after its completion).

Given that evaluation indicators are used during mid-term evaluations to assess results up to that stage, they can also be crucial in providing the basis for any necessary re-design.

Designing a monitoring and evaluation plan

With increasing emphasis being placed on auditing and transparency as part of the thrust towards good governance, M&E activities have a crucial role to play and should be clearly specified in a detailed M&E plan. This plan should form an integral part of the policy implementation plan and should contain:

- detailed information on the chosen monitoring indicators and evaluation indicators (if possible, the method used to choose the indicators should be specified, and it should have relied on a degree of consultation);
- the frequency and timing separately for (i) monitoring reports and (ii) evaluation reports;
- specific M&E responsibilities for all relevant parties, i.e. who should be reporting to whom and when;
- the activities required to complete the M&E requirements (e.g. stakeholder consultation, fieldwork, reports);
- methods and tools to be used to collect information/data necessary for different indicators, i.e. the means of verification;
- technical issues related to specific indicators and their means of verification;
- dissemination components and techniques.

Typically, it is important that the M&E plan contain a requirement for monitoring systems to be established prior to starting the specified activities, and for the mid-term and final evaluations to be facilitated by the preparation of a detailed up-to-date report on activities and progress, prior to evaluations taking place. The M&E plan should also contain detailed information on the feedback mechanisms for M&E outputs to be used to make changes either to the strategy itself (and its objectives) or to the activities of the implementation plan.¹⁵ The M&E plan might also contain a supervision plan specifying the periodicity and make-up of supervision teams.

Baseline data and indicators provide the starting point against which all programme/project inputs, outputs, progress towards objectives and goals are measured. The baseline is the situation that exists at the beginning of the programme/project, prior to any activities. It is important to remember that indicators for which no baseline data are available should not be proposed, as there would be no way to measure progress. In many cases, it is often easier to think of a wide range of indicators than to obtain the related baseline data for them. Only if baseline data are available for a particular indicator, or if it is estimated that data will become available in the early stages of implementation, should it be included in the M&E plan.

Monitoring and evaluation practices must ensure the credibility, impartiality, transparency and usefulness of their outputs. Wide stakeholder consultation (e.g. with the scientific community, NGOs, governments, the private sector) and the installation of information technology management systems can help to ensure that this is the case.

¹⁵ Given the usually generic nature of policy goals, it is unlikely that these goals will have to be revised in the light of an M&E exercise.

Summary of key questions for policy-makers

- Has a detailed M&E plan been specified and duly included among the activities of the policy implementation plan?
- Has the development of the M&E plan relied on participation and consultation?
- Does the plan include the necessary information for effective analysis and decision-making (c.f. list provided above), including reporting responsibilities?
- Are reliable baseline data in support of every chosen indicator available?
- Has an appropriate information technology system been set up to assist with the implementation and reporting of M&E requirements? Where and who is best placed to host such a system?

8. Conclusions

The rapid growth of aquaculture globally, its interaction with other sectors and its impact on natural resources underscore the importance of planning for aquaculture development. In many national contexts, aquaculture policy formulation processes are not well developed, and implementation of policy is often poor. This document aims to share experiences, bring together published material and guide readers in improving future aquaculture planning.

Although some pointers were provided in earlier chapters, it is important to remember that there is no one blueprint for developing and implementing an aquaculture policy. There is some logic behind planning processes and there are theories and experiences from which those engaging in policy development should learn or seek inspiration, with a degree of adaptation. Each country, and within it the administration dealing with aquaculture development, may adopt a slightly different approach depending on individual context and priorities for the sector. Policy processes and implementation mechanisms need to be flexible and adaptive to different cultural, sectoral and temporal contexts.

Key aspects of planning highlighted in the preceding chapters include the importance of coherence in the stages of planning (from policy formulation to implementation through the elaboration of a strategy and an action plan), the importance of interdisciplinarity beyond sectoral remit through institutional collaboration, and the need for capacity development, underlined by participation, to ensure the soundness of formulation and implementation processes. These echo the contents that have been outlined by experts for technical guidelines on improving policy formulation and implementation for aquaculture development.

Whether commercially oriented or not, the approaches and instruments chosen to support aquaculture development need to be embedded in the principles of good governance and account for the interactions with other sectors. The power of good governance in aquaculture to achieve simultaneously poverty alleviation, food security and economic growth through the reform or establishment of responsive institutional setups and legal frameworks needs to be recognized and acted upon.

Although the planning processes that have been described are more likely to find an application within domestic contexts, governance issues related to aquaculture and the implications of the policies in place at national levels are likely to have implications beyond national boundaries. Aquaculture governance cannot be improved overnight. However, immediate steps could be: act coherently in terms of actions, decisions, agreements, etc. both within the domestic and international arenas; promote responsible aquaculture business activities and encourage the trading of fair and environmentally sound aquaculture products through appropriate certification or other schemes; and institutionalize mechanisms of consultation and consensus building regarding policy formulation and implementation for aquaculture development.

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APPENDIX 1

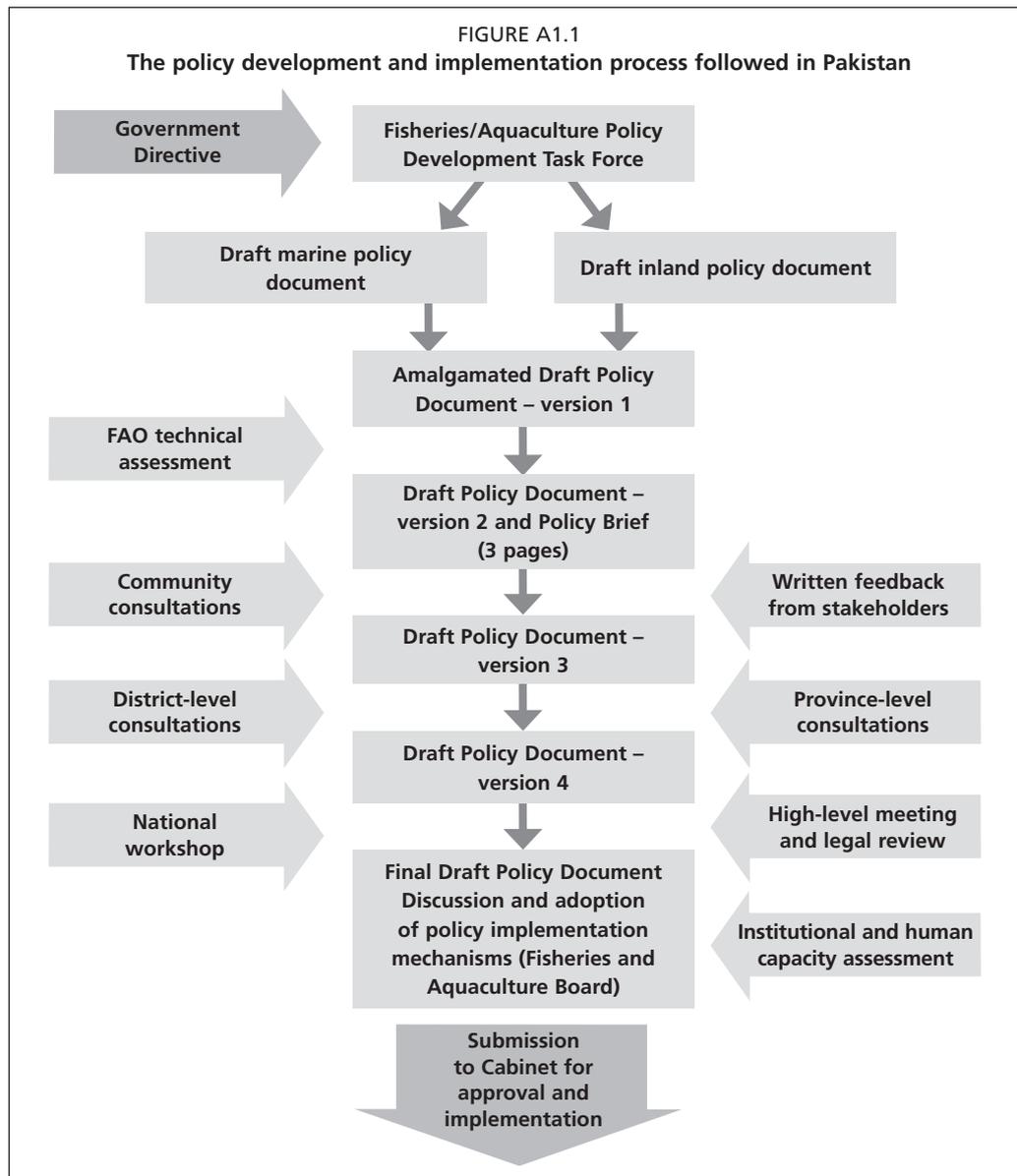
Examples of aquaculture planning processes

The planning and policy formulation approach chosen by Cameroon was different from the one used in Pakistan. The federal nature of Pakistan imposed a bottom-up consultative process that was undertaken to ensure the inclusiveness of the final policy and strategy at the national level. However, the administrative situation of Cameroon did not require this approach and resources were focused instead on immediate capacity building through extension and pilot sites. The planning process undertaken in Pakistan led to the production of policy and a strategy (and its plan) within the same frame of assistance. However, Cameroon adopted a two-step approach, focusing on the elaboration of a “Cadre stratégique” (strategic framework, equivalent to a policy). This was later followed by the elaboration of a development plan, built around the strategic axes of development identified by the Cameroonian authorities in the strategic framework. Both approaches are valid and illustrate the diversity of methods and pathways that are possible.

PAKISTAN: “NATIONAL POLICY AND STRATEGY FOR FISHERIES AND AQUACULTURE DEVELOPMENT IN PAKISTAN” (2006)

The fisheries and aquaculture policy formulation and implementation process undertaken in Pakistan is represented in Figure A1.1. This process was initiated by the Government of Pakistan and supported by FAO. It involved consultation on the various versions of the policy document that had initially been prepared by the Ministry of Food, Agriculture and Livestock (MINFAL) and FAO. The consultative process started in villages in the Provinces of Punjab and Sindh through a series of field-level community consultations and meetings that were held to obtain the views and feedback of fishing communities and fish farmers about the Draft National Fisheries Policy document. At each of the community meetings, the purpose of the consultation was outlined and respondents’ feedback on the draft policy was professionally facilitated. Importantly, meetings were facilitated to elicit the key problems and issues from the perspective of community members rather than providing comment on the summarized policy documentation. The meetings confirmed the problems already identified by the Government. They also brought to the attention of the Government additional problems as well as propositions of actions to mitigate these. These suggestions were incorporated in the document, which was then taken through a new round of consultation at a higher administrative level (district). Following the district-level workshops and appropriate revision of the draft document, provincial workshops were conducted on policy implementation to discuss implementation issues and priorities for putting into operation the “National Policy Framework and Strategy for Fisheries and Aquaculture Development in Pakistan”.

A national workshop was held in Islamabad involving federal-level and provincial-level government officials from the MINFAL and other line ministries. The objective was to have a final consultation to build consensus on the policy implementation plan and to generate options for policy implementation arrangements (i.e. propositions for the establishment of a competent authority able to oversee the implementation of the policy) based on the institutional analysis that had been carried out in parallel to the consultative process. These propositions resulted in the establishment of the Fisheries



and Aquaculture Board and in official approval of the finalized “National Policy Framework and Strategy for Fisheries and Aquaculture Development in Pakistan” by the Government Cabinet in 2007. Simultaneously, a number of concept notes for high-priority umbrella projects were formulated to strengthen the implementation of the policy. Care was taken to ensure that these projects were coherent with ongoing activities and programmes already in place in the country, and with the Government’s emphasis on agribusinesses approaches to the development of the fisheries and aquaculture sectors. This allowed specific activities envisaged under the plan to be targeted for immediate funding by the Planning Commission of Pakistan.

CAMEROON: “STRATEGIC FRAMEWORK FOR SUSTAINABLE AQUACULTURE DEVELOPMENT IN CAMEROON” (2003) AND “SUSTAINABLE DEVELOPMENT PLAN FOR SUSTAINABLE AQUACULTURE” (2009)

To capitalize on the country’s natural assets and recognizing the strategic importance aquaculture could have in increasing incomes and food security, the Government of Cameroon requested the assistance of FAO to prepare a strategic framework for the sustainable development of aquaculture. This framework was formulated in May 2003 by a team of experts from the Ministère de l’élevage, des pêches et des industries

animals (MINEPIA), the Institute of Agricultural Research for Development (IRAD), WorldFish Center and FAO. It was considered the first step in the process of elaborating a detailed development strategy and provided the skeleton to be fleshed out in the process of defining the strategy. The framework was elaborated over a period of ten days by a team of experts from the MINEPIA, FAO, the IRAD and the WorldFish Center who built on the outputs of meetings with policy-makers, government hatchery managers and fish farmers. The strategic framework proposed was presented for discussion and adoption at a national workshop. It laid out a number of key orientations, or “principles”, to promote the sustainable development of aquaculture in Cameroon, such as focusing assistance on identified high-potential aquaculture zones, and on capacity building and extension services through public–private partnerships and closer linkages between research and extension. Importantly, it clearly defined the roles of the public and private sectors and of producers organizations in achieving the country’s vision for aquaculture development. The operationalization of the strategic framework, i.e. the formulation of a practical development plan for the sector, is being undertaken with additional assistance from FAO under a technical cooperation project entitled “Mise en place d’un plan de développement durable de l’aquaculture” (Elaboration of a sustainable development plan for aquaculture).

The innovative approach used in the formulation of the development plan for the sector has lain in the iterative process undertaken, whereby draft documents have been successively reviewed and modified by multidisciplinary committees (including government officials) and groups of resource persons, experts in the field of aquaculture in Cameroon. The concomitant running of pilot sites and collection of farm data (technical and economic) and farmers’ feedback have ensured the inclusion of all perspectives and the technical relevance of the activities listed in the plan. Other activities have included the production of a detailed and critical sectoral review and the creation of a digital map for aquaculture in Cameroon to illustrate current aquaculture locations and identify areas with potential for development per province. The results of these activities have also fed into the elaboration process of the plan. The concomitant holding of training workshops on farming techniques including farmers, extensionists and government officials has proved particularly useful, highlighting the desire for knowledge and enthusiasm for the activity. It is a premise of the plan that capacity building will be a cornerstone in the successful development of the sector and that, through it, many of the sector’s current bottlenecks will be addressed.

The plan was formulated over the course of a two-year project of technical cooperation between the Government of Cameroon and FAO. Its objectives are coherent with the goals of the strategic framework and those of the country’s National Rural Development Strategy. The duration of the plan is five years. Its general objective is quantitative and targets a fish production increase. This target was determined on the basis of the activities carried out by farmers on pilot sites. The plan also includes five specific objectives related to: (i) the emergence of a critical mass of commercially oriented aquaculture farms in high-potential aquaculture zones; (ii) training and capacity building to stimulate entrepreneurship among fish producers; (iii) the strengthening of the institutional and economic environments; (iv) the promotion of public–private partnerships as part of improved governance of the sector; and (v) the study of new opportunities of development for aquaculture. Each objective is broken down into a number of actions that need to be implemented to achieve it. The plan includes monitoring and evaluation indicators of progress to the objectives halfway through and at the end of the implementation phase (at three and five years, respectively). A detailed investment programme relating to the costs and sources of funding (from private operators, the government and donors) for each envisaged activity is also provided as an integral part of the plan.

APPENDIX 2

Carrying out an institutional assessment

Typically, data sources for institutional assessments include:

- interviews with key senior officials, and a representative sample of more junior staff of the institution under investigation;
- documentation produced by the institution under investigation (e.g. official mission statements, reports/outputs);
- Web sites;
- observation of facilities.

Key aspects to be profiled for each institution should include:

- Background information. This usually includes collecting information on: key mission and objectives (Do they need re-focusing to new policy?); current mandates and powers (Are they sufficient, what are the problems?); and main activities/programmes (To what extent do these already measure up to those activities proposed in the policy, i.e. is there a huge mismatch at present and a re-focusing of activities necessary?).
- Staffing capacity. This is typically assessed by way of a review of:
 - organigram and overall structure (Is the structure appropriate for the new policy activities and focus? If not, how could it be improved/changed?);
 - current staff numbers (comment on gender balance. Are overall numbers sufficient/excessive?);
 - salary structure (Does it provide an incentive for staff to stay in terms of progression? How do salaries compare with private-sector and other government institutions? What are non-salaried benefits that might be important to staff?);
 - training (What is provided for staff? Do they have a career path mapped for them? Is training sufficient and effective? Following training, are records kept on feedback on its usefulness? If so what do they say?);
 - staffing skills. This should result in a staff profile for (a sample of) relevant staff in terms of:
 - their formal education,
 - key areas of competence from practical experience,
 - their formal terms of reference (Do they already measure up to activities of the policy or do they need redefining/refocusing?),
 - their perceptions about what skills/training they most lack for implementing policy;
 - staffing skills are then compared with the key skills required to implement policy. These may often be usefully grouped into (i) fisheries technical skills, (ii) wider technical skills (e.g. socio-economic, livelihoods), and (iii) broader management-type skills (e.g. communication). Any mismatch in current and required skills is a reflection of required training/capacity development.
- Financial capacity. This involves evaluating the financial means available to the institution to carry out its mission and work: What are institutional budgets (recurrent and development) and are these sufficient and appropriately focused?
- Physical infrastructure and capacity. What is the quality, type, and is it sufficient/appropriate?

- Technological assets and capacity. What is the quality, type, and is it sufficient/appropriate?
- Institutional processes and performance. The assessment should include:
 - planning processes (Are they participatory? How frequent are they? Is planning led by good leadership? Do they result in coherent and relevant content? Are they well thought out?);
 - quality of reports/outputs;
 - indicators (What indicators do institutions have to assess their performance and effectiveness, e.g. targets? Are they appropriate? Does the institution under investigation record data on other factors that by proxy indicate effectiveness, e.g. absenteeism, staff turnover?);
 - cooperation and coordination. This includes communication between provinces/centre, and cross-sectorally (Is such communication formalized and what form does it take?);
 - decentralization. The extent to which institutions are engaging with a decentralized process;
 - influence and reputation (How is the institution perceived by outsiders? What is its influence and reputation?);
 - relevance of the institution over time (What is the scope for adaptation of mission statement and mandate? To what extent do new research findings inform institutional activities/programmes?);
 - information dissemination. Comment on quality/frequency of communication/dissemination of outputs.
- Overall assessment of institution (or for sector as a whole?) to be summarized in a strengths, weaknesses, opportunities and threats (SWOT) analysis.

As the aquaculture sector grows worldwide, appropriate planning is becoming fundamental to sustain its growth and contribution to poverty alleviation and economic development. This document acts as a guide for policy-makers and those involved at all levels of planning to assist them in the formulation and implementation of sound aquaculture policies. It defines what constitutes a policy, a strategy and a plan, and sets aquaculture development in the broader agendas of international development and good governance. It also proposes practical steps to improve aquaculture policy formulation processes and instruments to support the implementation of policies, and suggests means for overcoming human, institutional and financial constraints to their implementation.

