
KEY PRINCIPLES FOR AQUACULTURE DEVELOPMENT



Aquaculture is an expanding and a productive industry that has potential to significantly contribute to food security, economic growth, coastal livelihoods and poverty alleviation. These benefits can only be fully realised if aquaculture development activities are integrated with other coastal activities, take into account traditional uses and are undertaken in an environmentally and socially sustainable manner, within the environmental carrying capacity. An enabling environment with strong and long term collaboration among governments, industry and local communities is essential for ensuring environmental and economic sustainability and equitable sharing on benefits of coastal aquaculture development.

1. Integrated aquaculture development policy that takes into account both socio-economic objectives and need for environmental sustainability is a prerequisite

Countries should develop and regularly update national coastal aquaculture development strategies and plans that promote ecologically sustainable development, equitable sharing of benefits and rational use of natural resources shared by aquaculture and other coastal activities. National aquaculture development plans identify where aquaculture should be developed, how the development will take place, and the intensity, time frame and resources required. Aquaculture policies should authorise and enable strong collaboration among government, industry and local communities.

- 1.1 Has a National Aquaculture Development Plan that establishes the policies and plans for the aquaculture sector been prepared? Is it regularly updated?
- 1.2 Does the plan identify optimum levels of aquaculture development and areas that are important for future aquaculture activities?
- 1.3 Does the plan recognise that there should be equitable sharing of benefits arising out of aquaculture?
- 1.4 Does the plan reflect the responsibilities of all parties concerned?
- 1.5 Does the plan recognise the need for and define mechanisms for collaboration among government, industry and local communities.
- 1.6 Does coordinated sectoral planning that considers the impacts of aquaculture activities on other economic sectors including plans for food security and rural development and vice versa occur at the national/regional levels?

2. Appropriate legal and administrative frameworks are necessary to facilitate responsible coastal aquaculture development.

In support of defined policies, countries should develop practical and enforceable legal arrangements and establish appropriate administrative frameworks. Governments must efficiently oversee the planning and authorisation of aquaculture operations through mechanisms such as permits or licences, environmental impact assessments and by providing adequate guidance to the industry. A variety of planning and management tools and economic instruments should be utilised to encourage the industry to select

options that promote efficient use of resources, environmental performance and social equity. Consultation with relevant stakeholders is important to ensure that the intended provisions are understood and the stakeholders have a role in implementation thus facilitating enforcement.

- 2.1. Is there an authority or authorities competent and empowered to effectively promote, support and regulate responsible aquaculture development?
- 2.2. Is the aquaculture sector adequately regulated and protected by legal instruments such as laws and regulations and 'Codes of Conduct' (soft law)? Are these regulations implemented?
- 2.3. Are the legal instruments and 'Codes of Conduct' in a form readily understood by those undertaking activities within the aquaculture sector and are they communicated to them and are they enforced?
- 2.4. Does the existing legislation require the developer to obtain a permit prior to initiating the project?. Has the developer been provided with the required information regarding the permit procedure?
- 2.5. Is the Polluter/User Pays Principle accepted as a principle for national environmental management? Are the costs of water pollution and habitat impacts integrated into the costs of aquaculture operations?
- 2.6. Does the developer schedule meetings with the local community to exchange information?
- 2.7. Are formal mechanisms available for meaningful and active participation of all interested parties in the decisions making process during all stages of aquaculture planning and development?
- 2.8. Is decision-making regarding coastal aquaculture activities open and transparent?
- 2.9. Are there formal and equitable mechanisms for conflict resolution?
- 2.10. Is there adequate awareness of both public institutions and the general public about aquaculture, its potential and limitations/possible impacts?

3. Institutional capacity to define and implement policy and regulatory provisions should be enhanced.

Whilst there is a clear need for improving government oversight of aquaculture development, strengthening institutional capacity targeting both the public and the private sector is crucial. Capacity for education and training, research and technology development, planning (ex. E.I.A, land use zoning) and enforcement need to be enhanced. Mechanisms for sharing of information on policies, legislation and best practices are important as they promote optimum use of financial, human and information resources.

- 3.1. Is there adequate institutional capacity at national, provincial and local levels to oversee the planning and development of aquaculture?
- 3.2. Have the capacity building needs within the state and private sector organisations at national and local levels been identified?
- 3.3. Have capacity building programmes relevant to resource use planning (resource assessment, EIA, monitoring methodologies, conflict resolution etc.) and to operation at the farm level been established?
- 3.4. Have networks and other mechanisms for promoting the sharing of information and expertise been established?
- 3.5. Are adequate financial resources allocated on a long term basis for capacity building and development of innovative technologies?

4. Aquaculture development should occur within broader integrated management frameworks such ICZM and integrated river basin management.

Integration of aquaculture development into planning and management of other key coastal sectors (e.g. tourism, fisheries, housing, agriculture) and into rural development is necessary to ensure that aquaculture development is within the local and regional carrying capacity and conflicts with other users are minimised. Approaches such as ICZM and integrated river basin management provides a framework for such integration and enhance the understanding that aquaculture is an integral part of coastal development having an impact on the entire coastal environment and cannot occur in isolation.

- 4.1 Is there co-ordination and consultation among agencies responsible for aquaculture planning and the agencies responsible for planning and implementation of ICZM projects.
- 4.2 Is the aquaculture sector identified as a major stakeholder in ICZM projects?.
- 4.3 Do the coordinating mechanisms established for ICZM include a representative of the aquaculture sector?
- 4.4 Is the aquaculture project consistent with local/ district ICZM plan?
- 4.5 Does the aquaculture industry respect the continued access of artisanal fishers to their resources and continued livelihoods of local communities?
- 4.6 Do aquaculture developments operate so as to not displace and marginalize traditional communities that depend on coastal wetlands?

5. States should establish effective environmental impact assessment (EIA) procedures specific to aquaculture at appropriate levels

Strategic and project level environmental impact assessment enable the integration of environmental, social, technical and economic considerations during planning, decision making process for allocation of land, water and other natural resources and operation of aquaculture facilities. Project level EIA procedure calls for early discussions among the project proponent, the regulatory agencies and the stakeholders and allows the evaluation of alternative sites, designs and management measures before resources are committed. Strategic or sector level environmental assessment is essential in managing cumulative impacts of a number of small farms. An environmental management plan (EMP) that defines the impact mitigation measures to be adopted during construction and operation and a monitoring plan is a central part of EIA.

- 5.1 Does the existing legislation call for an EIA to be prepared for new aquaculture projects?
- 5.2 Are there formal opportunities for the local community and other interest groups to express their views on the project proposal?
- 5.3 Has a detailed assessment of the site according to recognised EIA guidelines been carried out?
- 5.4 Does the site evaluation survey the existing flora and fauna; endangered/threatened species; and the use of the site by migratory birds or other species during nesting, reproductive, or other critical life stages?
- 5.4 Has the EIA considered the suitability of the soil, topography, and the ecosystem for siting of ponds?
- 5.5 Does the evaluation also examine the long-term climate record to determine the risk of storms, flooding, storm surges, and droughts?
- 5.7 Does the EIA assess alternatives to the proposal which could mitigate the adverse and unavoidable environmental and social impacts?
- 5.8 Has an environmental management plan(EMP) and a monitoring plan been prepared as a component of the EIA process?
- 5.9 Is there adequate guidance to assist the developer to prepare an effective EIA?

6. Land use zoning provides an effective mechanism to minimise physical alteration and degradation of coastal habitats as well as socio-economic conflicts that arise from ill conceived siting of development

Siting of aquaculture operations must take into account sustainability of ecological functions, environmental capacity, as well as technical, managerial and social considerations. Adverse impacts of aquaculture activities on coastal habitats, spread of disease, impact of farm effluent can be minimised and farm production enhanced by well-conceived site selection. Land use zoning that aims at maintaining the main functions of the local environment can address multiple uses of land to accommodate competing demand and activities and limit cumulative impacts.

- 6.1. Are land-use plans at appropriate levels available?

- 6.2. Do clear standards exist for selection of suitable sites for coastal aquaculture activities that possess characteristics compatible with long-term sustainable operations and acceptable ecological effects?
- 6.3. Have project proponents and authorities determined the carrying capacity of the coastal ecosystem to assimilate products from the aquaculture activity?
- 6.4. Is the proposed aquaculture development sited in a location(s) suitable for sustainable production and income generation?
- 6.5. Does the proposed aquaculture development avoid siting in mangroves or other coastal wetlands or especially sensitive habitats ?
- 6.6. Does the aquaculture industry pay for the costs of rehabilitation or restoration of mangroves when old shrimp farms, originally located in mangrove areas, close or are abandoned?
- 6.7. Does the project avoid significant loss of flora and fauna, as well as loss of habitat corridors?
- 6.8. Do project developers locate ponds and support facilities in developed areas where roads already exist, preferably in existing buildings?
- 6.9. Are the aquaculture facilities located away from the beach and low-lying dynamic coastal areas?

7. Adopt innovative approaches during design, construction and operation phases to limit environmental impacts.

Improved planning and management practices during design, construction and operation phases could significantly increase environmental performance and helps to achieve a balance between high production and environmental integrity. Particular attention to limiting physical alteration, efficient systems of water management and discharge of effluent, maintenance of effluent standards, minimising undesirable levels of sedimentation and preventing introduction of alien species is called for. The environmental management plan (EMP) prepared within the framework of the EIA should be adhered to.

- 7.1. Do clear standards aimed at mitigating environmental impacts during design, construction and operation of aquaculture facilities exist?
- 7.2. Have the mitigatory measures identified in the EMP been incorporated in the design, construction and operation of the facility
- 7.3. Are erosion control techniques and measures to minimise sediment mobilization used during the construction phase?
- 7.4. Does the design of embankments (height, width and slope) and canals prevent or minimize erosion, seepage, damage from floods and provide for mixing of pond waters by winds?
- 7.5. Is the facility designed so as to prevent salinization of freshwater and groundwater supplies, alteration of natural water flow and mixing of water supply and effluent?
- 7.6. Does the project propose to establish and maintain vegetative buffer zones, riparian buffer zones, and vegetative cover on exposed land and earth?
- 7.7. Do the facilities incorporate settling ponds and sediment traps to remove suspended solids from effluents before release to the environment?
- 7.8. Do pond design and siting take into consideration storms, flood levels, and the highest high tides and, consequently, attempt to minimize the risk of damage to infrastructure from these climate events?
- 7.9. Are best available methods including good feed management practices and appropriate effluent treatment and disposal methods being used so as to prevent degradation of the water quality of adjacent receiving waters and to prevent release of exotic species to the natural environment?.
- 7.10. Is there adequate capacity for rapid diagnosis and treatment of disease?

8.1. State and private sector investment in the development of innovative and appropriate technologies that improve environmental performance is indispensable.

Private sector investment in technology development should be supported by government investment especially in areas such as in capacity building, institutional development, sharing of information and experience, and incentives that promote environmentally responsible development. Both the state and

private sector should collaborate in multidisciplinary research and development efforts that link research to the needs of the industry and improve environmental performance.

- 8.1. Has the capacity building needs within of the state and private sector organisation at national and local level been identified?
- 8.2. Are there regular training programmes aimed at enhancing skills within the state and private sector on sustainable aquaculture development?
- 8.3. Are the ongoing research efforts in various institutions linked to improving environmental management and identifying good management practices?
- 8.4. Are the results of research programmes widely published in a manner that those engaged in the industry can benefit from the results?
- 8.5. Have networks, newsletters, publications and other mechanisms for promoting the sharing of information and expertise been established?
- 8.6. Are adequate financial resources allocated on a long term basis for capacity building and development of innovative and technologies?

9. Sustained monitoring programmes at national and farm level are indispensable

A broad range of monitoring activities is essential to provide information on the success or failure of aquaculture operations, environmental mitigation measures adopted at farm level and of the national policy in general. A practical and effective monitoring plan is an integral component of the operational procedures and will enable the monitoring of pre-defined outcome and process indicators. It is equally important to pre-determine management responses (in the event of significant deviations from predicted levels), reporting and evaluation procedures.

Involvement of all stakeholders in monitoring will encourage and ensure shared responsibility for meeting the objectives of the monitoring plan.

- 9.1 Have programmes to monitor the site specific impacts and general trends in the industry been established?
- 9.2 Do the national or provincial agencies responsible for planning and management of the sector utilise the results of monitoring of individual projects to evaluate the performance of the sector?
- 9.3 Is monitoring an essential part of the operational procedures?
- 9.4 Is the monitoring plan submitted with the EIA being implemented?
- 9.5 Are the results of the monitoring programmes incorporated in the evaluation and reporting procedures?

10. Enhanced regional and inter-regional co-operation can help achieve environmentally sustainable Aquaculture development

Regional and inter-regional organisations that promote aquaculture and those that deal with the protection of coastal and marine environment offer the opportunity to improve the environmental performance of the aquaculture industry. These organisations must give priority to transfer and adoption of technological innovations, capacity building including sharing of knowledge and experiences, and generating 'best management practices', guidelines and codes of conduct and facilitating co-operation at regional and global level.

- 10.1 Do the regional and inter-regional organisations assist and support governments in the development of national strategies for sustainable aquaculture development?
- 10.2 Do regional and inter-regional programmes support the development and application of guidelines, best management practices and 'codes of conduct'?
- 10.3 Do regional and inter-regional organisations promote transfer of environmentally sound technologies, practices and management tools adapted for the aquaculture sector and disseminate information on these to governments and the aquaculture industry?

10.4 Do regional and inter-regional organisations facilitate capacity building in sustainable aquaculture development?



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