

POLICY RECOMMENDATIONS AND STRATEGIC PLANS OF ACTION

Fishery Resources Enhancement through Habitat Improvement and Management

Issues/Challenges	Recommendations	Strategic Plan of Action
Artificial Reefs Management	<ul style="list-style-type: none"> ➤ Best practices on installation of artificial reefs (ARs) should be promoted to ensure the protection of aquatic species during their life cycle and allowing them to reach optimum size. ➤ Planning and deployment of ARs should be undertaken, taking into consideration the following: <ul style="list-style-type: none"> • Clear purpose of ARs, <i>e.g.</i> resources enhancement; • Results from relevant feasibility studies, including cost-benefit analysis, socio-economic analysis, financial analysis, among others; • Involvement of researchers, policy makers, fishing communities, local government units and other stakeholders in the planning process; • Results of site suitability evaluation, <i>e.g.</i> existing corals/fishes, seabed conditions, oceanographic conditions, water circulation patterns; • Choice of AR design(s) that should suit seabed conditions and purpose; and • Certainty that installed ARs does not create pollution to the marine environment. ➤ ARs should be regularly monitored (over time, and seasonally) using appropriate parameters, <i>e.g.</i> conditions of ARs, primary productivity, abundance and diversity of aquatic species (fish, macro benthos, etc.). The impacts of ARs on environmental conditions, <i>e.g.</i> water current, turbidity, and sedimentation among others should also be monitored. ➤ Regular monitoring and evaluation of the effectiveness of AR programs should be conducted (for short-medium and long-term) by comparing various indicators before/after or within/outside ARs. Correlation of the abundance of species inhabiting the ARs and other environmental factors, <i>e.g.</i> bottom condition, water current/condition, should also be established. 	<ul style="list-style-type: none"> ➤ Developing Regional Guidelines on Best Practices for Installation of the Artificial Reefs (ARs)

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	<ul style="list-style-type: none"> ➤ Cost-benefit analysis of AR deployment program(s) should be conducted, taking into consideration the resources, environmental and socio-economic benefits that could be gained from the program(s). Data to be collected could include investment costs (ARs construction and deployment), fisheries production by fishing gear and fishers' incomes before and after ARs deployment, and other ecosystem services. ➤ Implementation of AR program(s) should be integrated with other fisheries management measures, <i>e.g.</i> fishing regulations that include among others, prohibition of encroachment of commercial fishing activities, establishment of conservation/fishing zones, to ensure that resources are utilized in sustainable manner. Stakeholders' consultations on the management of ARs should be conducted to elaborate responsibility of stakeholders and fishers in the management plan. ➤ AR programs could be implemented in the coastal and offshore (if necessary) areas to ensure that the life cycle of both of demersal and pelagic species is sustained. ➤ A list of expertise on ARs and available resources should be compiled for reference and usage by the countries. 	<ul style="list-style-type: none"> ➤ Integrating fisheries management measures/principles in AR management programs ➤ Integrating ARs in policies and plans for coastal and offshore fisheries resources conservation, management and development
Integrating Fisheries and Habitat Management	<ul style="list-style-type: none"> ➤ Fisheries <i>refugia</i> could be implemented to complement the existing conservation/management measures, by integrating it with the fisheries objectives of protecting critical life cycle, <i>e.g.</i> spawning, nursing, broodstock aggregation, and migratory routes of species targeted for management. 	<ul style="list-style-type: none"> ➤ Promoting the establishment of fisheries <i>refugia</i> as a tool for integrating fisheries and habitat management
	<ul style="list-style-type: none"> ➤ Selection of site(s) for fisheries <i>refugia</i> should be based on scientific information and local knowledge especially in identifying the areas that are natural habitats for critical stages of the life cycle of species targeted for management, <i>e.g.</i> spawning, nursery grounds, broodstock aggregation, migratory routes. The area of the Fisheries <i>Refugia</i> should be manageable by concerned stakeholders. ➤ Regulations on fishing activities in the <i>refugia</i> (<i>e.g.</i> restriction of harvestable size, fishing seasons, fishing gears/methods) should be enforced taking into account up-to-date scientific data (<i>e.g.</i> spawning season, size at maturity, larval study), which should be relevant and correspond to the activities of host communities. 	<ul style="list-style-type: none"> ➤ Conducting scientific research programs and stakeholders consultation to support the identification of suitable sites and establishment of fisheries <i>refugia</i> for target species, and coming up with scientific evidence that harmonize with local knowledge to serve as basis for developing appropriate management measures

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	<ul style="list-style-type: none"> ➤ Community participation should be optimized for the establishment and management of fisheries <i>refugia</i> (e.g. identification of suitable sites, establishment/implementation of management measures including MCS) and collaboration with relevant government agencies at local/national levels should be strengthened so that the fisheries <i>refugia</i> could be as self-sustaining as possible. 	<ul style="list-style-type: none"> ➤ Ensuring the sustained participation of key stakeholders in the planning, sites selection and development of management measures for fisheries <i>refugia</i>
	<ul style="list-style-type: none"> ➤ Sub-regional cooperation should be strengthened for the establishment of fisheries <i>refugia</i> for management of trans-boundary species (e.g. Indo-pacific mackerels) that move across the EEZs of more than one country. 	<ul style="list-style-type: none"> ➤ Enhancing regional and sub-regional collaboration for the establishment of fisheries <i>refugia</i> system for transboundary fish stocks management
<p>Degradation of (fish) habitats in the Southeast Asian region</p>	<ul style="list-style-type: none"> ➤ Fish habitat restoration priorities in different water resources in the region should be reviewed. ➤ Effectiveness of habitat restorations and resources enhancement in inland water resources such as lakes should be determined through the following methodologies: <ul style="list-style-type: none"> • Conduct of baseline studies • Harmonization of legal and juridical mandates of authorized agencies, including local governments responsible for water resources • Pooling of government funds and resources • Mobilization of local communities and/or other stakeholders • Application of technical tools to reconstruct the fisheries • Improvement of buffer zones ➤ Habitat restoration should be implemented through suitable co-management arrangements taking into consideration the importance of the ecosystem ➤ The “Satoumi Concept” could be considered as one of the Integrated Coastal Management approaches for habitat restoration. <p>Remarks: Developed by Japan, the “Satoumi Concept” is a form of unified management system for land and sea, where management mechanisms for coastal waters move inland, one step away from integrated coastal management so that land and sea are brought under a unified management policy. In short, the “Satoumi Concept” is meant for environmental conservation of coastal areas in harmony with human interaction on land.</p> 	<ul style="list-style-type: none"> ➤ Making habitat restoration a priority at national levels ➤ Developing the best practice guidelines on habitat restoration for different water resources such as inland and marine, in conjunction with fisheries resources enhancement programs

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	<ul style="list-style-type: none"> ➤ Enhancement of fish populations in restored habitats could be carried out by applying appropriate techniques such as installation of ARs, establishment of fisheries <i>refugia</i>, restocking, and/or mangrove reforestation, etc. 	<ul style="list-style-type: none"> ➤ Rebuilding sustainable fish populations in restored habitats
	<ul style="list-style-type: none"> ➤ Since indigenous knowledge is crucial for habitat restorations, applicable only in most cases for specific areas and the culture of local communities, science and indigenous knowledge should be combined to ensure the effectiveness of habitat restorations. 	<ul style="list-style-type: none"> ➤ Undertaking baseline studies based on indigenous and scientific knowledge
	<ul style="list-style-type: none"> ➤ Impact assessment of lost natural habitats (<i>i.e.</i> coral reefs, sea grass and sea beds) due to human activities (irresponsible fishing or pollution) should be conducted as well as raising the awareness of stakeholders on the importance of habitats to humans and fishes. 	<ul style="list-style-type: none"> ➤ Conducting impact assessment of lost natural habitats, and raising the awareness of stakeholders on conservation and protection of the natural habitats

POLICY RECOMMENDATIONS AND STRATEGIC PLANS OF ACTION

Fishery Resources Enhancement through Artificial Propagation and Stock Release

Issues/Challenges	Recommendations	Strategic Plan of Action
<i>Potentials and Limitations of Stock enhancement and Restocking</i>		
<ul style="list-style-type: none"> ➤ Selection of species and release area considerations <ul style="list-style-type: none"> • Lack of species and site specific protocols/guidelines for successful stock enhancement/restocking • Techniques (specific to stock enhancement) for ex-ante impact assessment and monitoring (biological, environmental, social and economic) are not available ➤ Strategy to ensure sustainability of activities and gains/benefits achieved from stock enhancement is not yet developed ➤ Although benefits from stock enhancement and restocking are urgently needed and appreciated, the technical capabilities and financial resources of most Member Countries could be limited 	<ul style="list-style-type: none"> ➤ Stock enhancement and restocking activities should take into consideration the following: <ul style="list-style-type: none"> • Development of species- and site-specific strategies to ensure success of activity; <ul style="list-style-type: none"> - Give high importance to availability of scientific information/biology of the target species. - Ensure appropriate choice of species – benthic over pelagic and migratory species - Provide adequate preparation/rehabilitation of receiving habitats to ensure likelihood of success. - Give preference to marine reserves as release sites for managed monitoring and harvesting. • Active involvement of the local people (especially the fisherfolks) in the planning, implementation and monitoring activities, with understanding that the objectives of the activity and its long-term sustainability will largely depend on their continuous active involvement and participation; • Well-defined governance arrangements, and access and harvest rights through consultations with various stakeholders in enhancement/restocking activities; 	<ul style="list-style-type: none"> ➤ Developing Regional Guidelines or criteria for feasibility assessment and improvement and disseminating the Guidelines to Member Countries <p>[Note: the Guidelines will take into considerations the elements for higher success of restocking and stock enhancement covering the technical (choice of species, biology/life cycle of species, sustainable supply of quality seeds/stocks), environmental (suitability of site), social/institutional (involvement and strong support of local communities, local government agencies and research institutions), and economic aspects (funds)].</p> ➤ Formulating a ‘Strategy or Framework for Sustainability of Stock Enhancement Initiatives’ and disseminating this Framework to Member Countries

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<i>Potentials and Limitations of Stock enhancement and Restocking</i>		
	<ul style="list-style-type: none"> • Conduct of cost-benefit analysis of release and stock enhancement activities; • Implementation of long-term planning with all stakeholders to ensure availability of sufficient funds and manpower resources; • Participation of the local government units and their assured commitment to adopt and sustain stock enhancement initiatives (with donor funds) beyond project completion date; • Creation of supplemental and alternative livelihood strategies to encourage fisherfolks' participation and compliance to regulations; • Promotion of multi-stakeholder involvement and embedding conflict management in all phases of stock enhancement activity (including planning for and prioritizing a bottom-up approach in policy & regulation formulation); • Implementation of regulations and networking with enforcement agencies for protection of released stocks and management of recaptures; and • Implementation of activities, in conjunction with other management and conservation measures, to ensure that resources are utilized in sustainable manner. 	

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<i>Release strategies and ecological interaction with natural stocks</i>		
<p>➤ Lack of release protocols/guidelines (specific to stock enhancement)</p> <p>Capacity of Member Countries on ecological risk assessment and effective monitoring needs to be assessed and strengthened</p>	<p>➤ Assess the initial status of the community structure of the release site and monitor over time to determine the effects of interaction with the released stocks</p> <p>➤ Determine the appropriate size of release of stocks to ensure high survival, avoidance of predators and economic efficiency</p> <p>➤ Conduct proper behavioral conditioning of stocks prior to release</p> <p>➤ Promote regular and long-term continuous monitoring to determine effectiveness</p> <p>➤ Develop effective marking techniques for stock enhancement</p> <ul style="list-style-type: none"> • Determine appropriate tags for proper identification of released stocks and for effective long- term monitoring <p>➤ Based on needs of Member Countries, enhance their capacity on the application of decision-making tools for stock release (<i>e.g.</i> ecological risk assessment tool)</p>	<p>➤ Establishing release protocols/guidelines based on scientific findings and in accordance with existing policy instruments/ regulations</p> <p>➤ Implementing effective institutional frameworks, policy instruments for the release of stocks, monitoring and enforcement mechanisms at national and local levels</p> <p>➤ Developing and implementing capacity building programs on the application of decision-making tools for stock release</p>
<i>Aquaculture-based Enhancement and Restoration</i>		
<p>➤ Genetic, health and biodiversity considerations</p> <ul style="list-style-type: none"> • Indiscriminate stocking or translocation of non-indigenous species/stocks poses adverse genetic and health risks 	<p>➤ Importance of the genetic and health information of species should be well recognized to minimize genetic effects, transfer of diseases and protect biodiversity</p>	<p>➤ Formulating mechanism that will ensure that stocks for release are healthy/disease-free (for instance, thru health certification) and will not pose genetic risks</p>

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<i>Aquaculture-based Enhancement and Restoration (cont'd)</i>		
<ul style="list-style-type: none"> ➤ Lack of seed production techniques and facilities intended for enhancement and restocking activities 	<ul style="list-style-type: none"> ➤ Increase government investments and solicit donor contributions for aquaculture R&D and related facilities to support wide-scale and high-impact stock enhancement and restocking initiatives 	<ul style="list-style-type: none"> ➤ Strengthening IEC (information, education and communication) activities to enhance public awareness on genetic and health risks related to stock release and the need for precautionary measures following relevant Guidelines developed and promoted by FAO ➤ Fostering strong collaboration among R&D institutions, national and local government, and local communities on initiatives that will support wide-scale and high-impact stock enhancement and restocking initiatives