

Policy options

This section aims to identify feasible policy options that target key components identified in the Causal chain analysis in order to minimise future impacts on the transboundary aquatic environment. Recommended policy options were identified through a pragmatic process that evaluated a wide range of potential policy options proposed by regional experts and key political actors according to a number of criteria that were appropriate for the institutional context, such as political and social acceptability, costs and benefits and capacity for implementation. The policy options presented in the report require additional detailed analysis that is beyond the scope of the GIWA and, as a consequence, they are not formal recommendations to governments but rather contributions to broader policy processes in the region.

Definition of the problem

The GIWA region Indonesian Seas is at the centre of the world's marine biodiversity, supports a rapidly growing coastal population, and has rapidly deteriorating marine ecosystems with the likely imminent collapse of many of its coral reef and pelagic fish populations. As detailed in the Assessment section above, destructive fishing contributes to overexploitation as well as habitat loss and modification (McManus et al. 1997). The two major forms of destructive fishing in the Indonesian Seas region, poison and blast fishing, are already illegal, with the overall management of fish stocks overseen by the Directorate General of Fisheries under the Ministry of Fisheries and Marine Affairs (Kahn & Fauzi 2001) (see also Annexes III-V).

Management is, in accordance with national policies and objectives:

- To raise income and standard of living of small-scale fishermen and fish farmers;
- To increase productivity of fishing effort and to boost national fish production;
- To increase fish consumption;
- To increase export of fish products;
- To have better control of the utilisation and management of fish resources.

However, these objectives are not necessarily the most appropriate for either long-term ecological and economic sustainability or conservation of habitats, as demonstrated by a recent analysis by The Nature Conservancy presented in Annex VII.

Important policy issues

- There are already severe environmental and socio-economic impacts from unsustainable exploitation of fish, and particularly destructive fishing, in the region as a whole.
- The environmental and socio-economic impacts are expected to continue to worsen over the next 20 years, except in the few well-managed MPAs (e.g. Komodo National Park, Bunaken National Park), where strong surveillance, enforcement, education and alternative income generation programmes are already being implemented.
- The human population is growing rapidly, with widespread religious and cultural traditions fostering large family sizes, exacerbated by inadequate policy focus towards developing and implementing population stabilisation strategies.
- There are more than 16 million fishermen in the region and many coastal people rely on subsistence level fishing for survival.
- There is widespread continued use of inappropriate (destructive) fishing methods and clear evidence of impending collapse in the ecological sustainability of the reef fisheries sub-sector.

- Most of the target reef fish populations are transboundary, occurring on reefs throughout the central and western Indo-Pacific, many of which have also already been severely overexploited, leading to major reductions in effective population sizes and overall reproductive output and local extinctions.
- As elsewhere, the political situation is focused strongly on the short-term (5 year cycles) rather than on developing longer term strategies.
- Recent political instability, fuelled in part by religious conflicts and separatist movements, with related civil strife and increased poverty levels, has further reduced the institutional capacity to address destructive fishing in particular and environmental issues more generally.
- At present, environmental concerns are of less importance than development pressures, some of which are explicit government policy (e.g. expansion of fisheries, Annex VII), and many of which are counter-productive to ecological and socio-economic sustainability.
- There are major opportunities for improved understanding of the real status and future potential of the fisheries in government, particularly in relation to long-term ecological and economic sustainability.
- There is an urgent need to better integrate fishery-related sectors in policy, with linkages among food security - poverty - natural resources - environment pressures - market forces and governance, with major opportunities for improvement in the political situation and from private sector and national/international NGOs.
- Most forms of destructive fishing are already illegal in national and provincial legislation but are not adequately enforced, including some corruption across the various enforcement and legislative agencies.
- Contributing to the illegal practices, most national and provincial laws and regulations are either not known or not well accepted by local populations.
- There is an urgent need to strengthen local levels of governance and policing, particularly in relation to implementation of the existing provincial and national legislation addressing destructive fishing.
- As with other nations in the region, a 'critical mass' of expertise and frameworks for change are developing, involving government and NGOs, academia and the private sector.
- Local to large-scale interventions by government and NGOs (e.g. WWF, TNC, IUCN) have the potential to slow the rate of deterioration significantly, provided these receive adequate political, fiscal and logistic support.

Construction of the policy options

At present, policy and legislation are neither sufficiently well developed nor integrated to facilitate implementation of the most urgent remedial measures, particularly in relation to co-management of renewable marine resources and protected areas. Addressing the synergistic impacts of population growth, political instability and widespread poverty (Djohani 1998, 1999) among coastal populations in an integrated way (Kusumaatmadja 1999) is at the core of developing successful policy options (McManus 1988, Chua 1989, Chua & Garces 1994) and implementing interventions to address the developing fisheries crisis.

Towards this goal, the Directorate General of Fisheries of the Ministry of Marine Affairs and Fisheries (PKA) has recently implemented a project "Study on Fisheries Development Policy Formulation", under the Japan Bank for International Cooperation (JBIC Loan No. IP-403). The goal was to formulate a new policy for Indonesian fisheries based on principles of sustainability, taking into account the needs of the poor as well as to implement the Precautionary Approach to Management and the FAO Code of Conduct for Responsible Fisheries, to which the country subscribes (Pet pers. comm.). The project listed the following policy recommendation to the Government of Indonesia: "Create, build and arouse awareness to change the perception and mindset of the people to stop romanticizing that the country's seas have over-abundant or overflowing resources, in particular fisheries resources".

The project also provides the following policy advice on marine protected areas (MPAs): "It is definitively in the country's economic and environmental interests to set aside at least 10% of its 81 000 km coastline and 5.8 million km² marine territory as marine protected area to conserve and protect its remaining rich marine bio-diversity. There are clear benefits to be gained from investment establishing more marine protected areas in Indonesian waters, not only as a tool to manage and conserve the fisheries and its rich genetic resources but also equally for mariculture as a source of seed and broodstock".

In light of the above, recommended policy options from the present GIWA analysis, from the broad-scale to the fine-scale, for the supply-side of the issue within Indonesian Seas, include:

- Improved integration of local - provincial - national laws and regulations, to maximise effectiveness of the legislative instruments to control destructive fishing at local - national levels, and to better encompass all sectors and meet obligations under international conventions and treaties.



Figure 20 Collecting fish from holding cages for live fish market, Kapoposang Island, Sulawesi.
(Photo: J. Oliver, Reefbase)

- Much-improved surveillance, enforcement and effective policing of laws to reduce the illegal fishing practices, including development and effective implementation of export quotas, catch and fish size limits.
- Ongoing and expanded community education programmes.
- Improved incomes for fishermen through generation of ecologically viable alternative/additional income (e.g. well planned and ecologically-sustainable mariculture).
- Development of alternative legal supply lines for live fish, particularly through mariculture, with increased supply of such maricultured species to supplement reductions in wild-caught stocks.
- Expand research and development to 'close' the reproductive cycles of the key mariculture species in captivity, and to develop ecologically sustainable food sources for mariculture species, with opportunities for increased regional collaboration.
- Major expansion of the MPA network, with improved management, including major focus on community co-management, with development of 'no-take' zones, and protection of spawning aggregation sites.

National surveillance strategies, with participation from all levels of government, NGOs and local communities may be the best way of bridging the gaps between formulation, legislation and enforcement of regulations. This may be best focused on the ports themselves, where large holding pens for live reef fish are often established and where initial catch quotas and fish size limits can be enforced at the initial points of sale and export.

Recommended policy options for the demand-side of the issue, mostly outside Indonesian Seas, include engagement of the live food and

aquarium fish industries themselves in the management process e.g. with strategies like the international Marine Aquarium Council (MAC) certification-accreditation system (MAC 2004).

The United Nations Environment Programme's World Conservation Monitoring Centre (UNEP/WCMC) has conducted the first detailed global assessment of the state of the marine aquarium trade in its report "From Ocean to Aquarium: The Global Trade in Marine Ornamentals" (Wabnitz et al. 2003). The report analyses data provided by exporters and importers from around the world who are working with the MAC and WCMC to ensure accurate information on the trade is available. In the accompanying UNEP press release, UNEP Executive Director Klaus Toepfer noted that the collection of tropical fish fuels an important, and mostly legitimate, industry, and highlighted the fact that the global trade in marine species has great potential as a source of desperately needed income for local fishing communities. UNEP/WCMC Director Mark Collins also noted that with effective management, the aquarium industry could support long-term conservation and sustainable use of coral reefs in regions where other options for generating revenue are limited.

Most recently, the Indonesian Ministry of Marine Affairs and Fisheries signed a memorandum of understanding (MoU) with the MAC in July 2003, formalising the strong government support for the MAC's work in Indonesia. At the field level, progress towards MAC Certification is being made. The recent MoU regarding collection and export of ornamental aquarium fish can also provide a useful model for the live food fish industry. The industry, when well managed and with the destructive fishing elements controlled, has great potential as an ecologically sustainable and economically viable industry for the region and indeed for the region as a whole.

Without such measures, the 'business as usual' scenario will result in the continued local extinctions of the target aquarium and food fish species from much of their distribution ranges, perhaps surviving in small numbers in the few effectively-managed reserves. These small populations themselves will be at high risk of extinction from catastrophic events. Indeed, several of the most sought after food fish species (e.g. Napoleon wrasse *Chelinus undulatus*) are already considered as 'vulnerable' in much of their distribution ranges. This major depletion in target species abundance will be accompanied by the continued widespread collateral damage to incident reef communities from the application of poisons. Such a scenario is of no long-term benefit to the fishers themselves, and will ultimately cause total collapse of the wild-stock live food fishery.

On the positive side, there are many national, regional and international “players” actively pursuing sustainable development initiatives, and best use of this developing network should be made during future policy implementation. Government projects such as COREMAP and MCREP and NGO programmes such as the Wallacea Bioregion (WWF), Komodo National Park Management Plan (TNC 2000) and other projects provide useful models for future improvements in fisheries and habitat protection.

Because of the major international driving force of market demand for live reef fish, mostly by Chinese consumers of food fish and more widespread aquarists, policy issues also have a major transboundary aspect. This is focused, in the case of live food fish, on the major consumer cities of Asia, notably Hong Kong, Shanghai, Taipei and Singapore, and to a lesser extent most cities with significant Chinese populations. For aquarium fish, the market is extremely broad and diffuse across the developed world. Thus, policy options also need to address the demand side of the poison fishing issue.

Identification of recommended policy options

A wealth of information has been developed since the mid-1990s detailing the various policy options and remedial/mitigatory measures that could be adopted in relation to poison fishing (see e.g. Johannes & Riepen 1995, Pratt 1996, Bentley 1999, Cesar et al. 2000, and the journal “SPC Live Reef Fish Information Bulletin” for details). Johannes (1996) made eight key recommendations in this respect, some of which are now beginning to be implemented, and all of which are worth reiterating here:

- Convince government regulatory agencies that the live fish trade is a distinctive form of fishery requiring special controls. (Significant progress has been made).
- Provide villagers with the incentive to protect their marine resources by giving them the legal right to exclude outsiders from their fishing grounds - or where that right already exists, provide stronger government backing. Train, deputise and support village fishermen as fish wardens. (Some progress, notably in community-based MPAs).
- Ban the possession of dynamite on boats and the use of cyanide as Papua New Guinea has done. (Some progress - blast and poison fishing are now illegal but rarely enforced).
- Commission a study to determine the kinds of research and development needed to raise selected grouper species and hump-head (maori) wrasse from the egg commercially in order to reduce the demand for wild-caught fish. (Some progress).
- Where logistics permit, set up cyanide detection laboratories (in import destinations such as Hong Kong as well as source countries) in order to monitor live reef food fish and marine aquarium fish operations, as pioneered in the Philippines. (Little if any progress).
- Support research on the effects of cyanide on corals and coral reef communities to get a better idea of their vulnerability and the magnitude of the clear-cutting effect. (Little published to date).
- Carry out research to improve non-destructive methods of catching species targeted by the trade. (Significant progress, particularly in relation to aquarium trade).
- Work multi-laterally with the governments of Indonesia, Thailand, Philippines, Vietnam, Malaysia and China to ban the use of cyanide in the electro-plating industry and thus reduce its availability, as has already been done elsewhere. (Little progress).

In the years since Johannes’ recommendations, some progress has been made. However, many of the recommendations remain key to addressing the issue. Considerable capacity building is still required, both in policy development and on-site in education and awareness, surveillance, policing and other interventions. These measures must be accompanied by alternative income generation strategies for the fishers themselves. In these regards, there has been recent convergence in views among scientists and resource managers on the crucial importance of MPAs and MPA network strategies as tools for sustainable fisheries management and resource protection (Box 11 and Annexes VII and VIII).

Box 11 Benefits of a well managed Marine Protected Area in Komodo National Park.

The major conclusion on the current status of Indonesia’s fisheries sector is that a shift in objectives of fisheries management should occur. To assure that maximum benefits accrue from the fisheries, the objectives must change from increasing landings to assuring sustainable exploitation and survival of the resources. More investments are needed to produce more fish. But such investments must not expand fishing capacity but increase the capacity to manage the remaining fisheries resources. Today, protective management of Indonesian fisheries is no longer a matter of choice. Protective management through implementation of a network of marine protected areas (MPAs) is inevitable if the remaining fisheries are to be sustained for the present and future generations. While MPAs are often designed to provide for a range of uses, it is extremely important to reserve an adequate area in “no-take zones” providing full protection to the resources. Only such fully protected MPAs can offer the full range of benefits including protecting biodiversity, enhancing fisheries, boosting tourism, providing economic opportunities and reducing conflict. Successful reserves require a great deal of effort to establish followed by long-term commitment from stakeholders and decision makers to maintain effective protection. This can only be achieved by designing and implementing effective co-management structures with the capacity to process essential inputs from stakeholders depending on the survival of the resources. The development of innovative co-management structures is essential to ensure the highest quality staff involved in management and protection of the resources. Rather than administrative commitments to marine protected areas, the single most important factor underlying whether or not a MPA will be successful and beneficial is the presence of a dedicated individual or group of individuals to carry it forward.

(Source: Pet pers. comm. also see Pet & Djohani 1996)

Policy recommendation

Networks of well-designed and well-managed MPAs should form the core of the fisheries management (and marine conservation) strategies. There is extreme urgency for the development of a functional MPA network and an immediate need for the establishment of substantial 'no-take' replenishment zones, with the development of policy and legal frameworks that will facilitate the process. As noted above, the benefits from an MPA to fisheries are through two key biophysical processes:

- Spillover: the export of adults and juveniles of target species to the fishery;
- Larval export: the distribution of propagules of the target species into settlement areas, from where they will eventually recruit into the fishery.

The third key benefit to be derived from fisheries sanctuaries is 'enhanced fisheries stability' (Pet pers. comm.). Sanctuaries provide the basis for a more precautionary management strategy for fisheries.

The successful establishment and effective management of a functional MPA network offering best returns to fisheries will require improved integration among government departments, international donor agencies and NGOs. Better allocation and use of government funds and continuing international donor assistance are urgently required in the short-term. Continuation, expansion and better integration of the various local, provincial, national and international programmes identified herein will help to ameliorate the severe environmental and socio-economic impacts from destructive fishing and other forms of unsustainable exploitation of Indonesian Seas.

This will also require a high degree of local intervention and community-based support, including application and local enforcement of the no-take replenishment areas and protection of fish spawning aggregation sites, and also reliable stock assessment and monitoring. These need to be founded in the 'ecosystem approach', with an improved understanding of the population biology of the target species, synecology and issues of ecological scale and connectivity in relation to replenishment, including:

- Catch volumes and CPUE;
- Traditional knowledge (e.g. locations of spawning aggregation sites of major commercial species), for development of protection measures;
- Natural changes in diversity, distribution and abundance of major commercial species, in relation to seasonality effects, predator-prey relationships, and recruitment fluctuations.

Cheung et al. (2002) provide a comprehensive list of Priority Actions for success, reiterated here:

- Update and complete the national inventory of all existing and proposed MPAs and protected areas and verify their official and management status.
- Review the designation of existing MPAs, and revise these to accommodate traditional uses and sustainable development where appropriate.
- Define clear boundaries in the establishment of new MPAs and revise boundaries and zonation of existing MPAs where necessary (also see Annex VIII). Manage adjacent and linked MPAs as one and emphasise buffer zone planning and management.
- Considering the vulnerability of MPAs to external influences (including terrigenous processes and hydrological forces that may carry pollutants from outside), employ integrated coastal zone management, incorporating integrated buffer zones linking land and sea, and improve communication and cooperation between authorities responsible for land and sea.
- Switch the emphasis on small, isolated, highly protected MPAs to a system of MPAs allowing multiple-use principles and networking.
- Conduct strategic assessment of manpower requirements during the planning and management of individual MPAs and the MPA system.
- Develop unified survey and monitoring procedures, mapping, GIS and database systems within the Directorate General for Forestry Protection and Nature Conservation (PKA) to facilitate overall planning of, and exchange within, the MPA system.
- Strengthen NGO capabilities in community conservation programmes.
- Consider the need for more, and more effective, marine protected areas where these are least represented, especially in the centre of coral reef diversity in the world (East Sulawesi), and also the Indonesian waters between east and west Malaysia, where destructive fishing is also high and the Strait of Malacca.
- Continue to pursue the goal of PHPA (PKA) to establish a 30 million ha network of marine protected areas.
- Other priority action points as identified in UN (2002).

In light of all of the above, two major foci for action are apparent:

- The urgent need for effective management of the existing MPA network (also see Annexes VII-IX).
- Careful planning and continued support for expansion of the network in terms of integration, particularly of cluster and transboundary MPAs in Indonesia and with neighbouring nations in the region and particularly in relation to the increasing effects of global change (also see Annex X).



Figure 21 Local boat, Kaposang Island, Sulawesi.
(Photo: J. Oliver, Reefbase)

Performance of the chosen option

Effectiveness

The chosen option has had demonstrable success in several major MPAs where support across the different levels (international - local) has been developed, notably Komodo National Park and Bunaken National Park (see Annex VIII). However, other MPAs have been far less successful (e.g. Kepulauan Seribu National Park, Jawa Sea) (Brown 1986, Hutomo et al. 1993, Alder 1996, DeVantier et al. 1999), and overall effectiveness of the policy option is thus rated as medium (also see Chua 1989, Chua & Garces 1994, Crooks & Foley 1995). Levels of environmental and socio-economic impact are expected to increase in most of the region to 2020, despite present and planned interventions, including protected areas and improved surveillance and enforcement. Effectiveness can be improved markedly with more equitable use of funds and continuing donor, government and NGO support. Effectiveness correlates with basic management activities such as enforcement, boundary demarcation, and direct compensation to local communities, suggesting that even

modest increases in funding would directly increase the ability of protected areas to minimise destructive fishing, restore harvested species and protect tropical biodiversity.

If management of the existing MPAs can be improved markedly, as recommended herein, there already exists a well distributed network covering all major IUCN biogeographic divisions except Division 1, with more MPAs in the larger and more complex Divisions II and III, and some concentration in Jawa (Cheung et al. 2002). Furthermore, with future gazettal and effective management of the proposed MPAs (see also Assessment, Habitat and community modification), the major biogeographic gap (west Sumatra) will be filled.

Importantly, at least 10 of Indonesia's MPAs are rated as regionally or globally significant (Cheung et al. 2002) providing strong support for continued international assistance in developing effective management.

Efficiency

The efficiency is rated as medium to high, because of the clearly prioritised objectives and goals and the development of transparent systems for implementation, but with major remaining impediments of corruption across all levels from local to national, and unresolved political instability (e.g. separatist movements) in parts of the region. Clearly, efficiency is linked closely with effectiveness, and thorough evaluation of efficiency will require expansion of future policy assessments beyond standard cost-benefit analysis, particularly considering the impact of social capital on the costs of managing fisheries.

As Rudd et al. (2003) conclude: "In the short term, the amount of social capital that communities possess and the capacity of the state to support the rights of individuals and communities will affect the relative efficiency of marine reserves. Reserves may be the most efficient policy option when both community and state capacity is high, but may not be when one and/or the other is weak. In the longer term, the level of social capital that a society possesses and the level of uncertainty in ecological and social systems will also impact the appropriate level of devolution or decentralisation of fisheries governance. Determining the proper balance of the state and the community in tropical fisheries governance will require broad comparative studies of marine reserves and alternative policy tools".

Equity

Equity is rated as medium to high, with increasing stakeholder involvement and major education and awareness campaigns occurring. The special circumstances of local subsistence fishers are now beginning to be addressed explicitly in MPAs.

Political feasibility

Political feasibility is rated as low to medium, with unresolved gaps in jurisdiction among the various government levels placing serious impediments on resolution of some of the key environmental and socio-economic issues in MPAs (also see Crooks & Foley 1995). Current decentralisation policies have yet to prove to be effective in empowering local government authorities.

Implementation capacity

The implementation capacity is rated as low to medium, with significant capacity-building required among government, NGO and community groups for effecting change, but with considerable international donor support and some excellent models (see Annex VIII). There is also increasing recognition among the communities themselves that interventions are crucial to their longer term sustainability. However, Indonesian Seas are very large and poorly known, with

insufficient biodiversity and fisheries assessments and monitoring undertaken to date. There remain serious deficiencies in capacity in 'on the ground' implementation, including unresolved difficulties in effective surveillance and policing (see Annexes IX and X), providing challenges for implementation, and at present, levels of funding for these initiatives are not assured. For the successful implementation of effective management, the key root causes of overpopulation, poverty and market demand, compounded here by differences in cultural - religious beliefs, need to be addressed.