

7. PROCESSING AND MARKETING OF MARINE FISHERY PRODUCTS

The processing of marine fishery products is undertaken by both family-scale operations and on a much larger commercial level. Family-scale processing mainly involves the manufacture of pastes and dried products. This includes shrimp paste and dried shrimp, squid, shark, and the fish bycatch of trawling. Touch and Todd (2002) estimate that about 480 mt of these processed marine items worth 1 131 500 US\$ were produced in 2000. Navy (2002) states that most of this production is for family use, but significant amounts are sold commercially. Although the final product is generally of low value, this simple-technology processing is able to accommodate large amounts of raw product during peak landing periods.

On a larger commercial scale, fish sauce is an important processed product of marine fisheries. The traditional product is made from anchovy, but as the catches of this fish have declined in recent years, so has the production of the sauce. Although there were several marine fish sauce factories in the country a decade ago, presently there are only three, one in Kampot and two in Sihanoukville.

Larger-scale processing includes a crab meat operation in Kep, a fishmeal factory outside Sihanoukville, and a few facilities in Sihanoukville for the freezing and export of shrimp and fish.

Most of the production of family-scale processing is for domestic use. The marine fish sauce is largely for sale within Cambodia. Most other commercial marine fishery products are for export. The population of Cambodia mainly resides in inland areas and traditionally there is a consumer preference for inland fish species. In addition, O'Brien (2003) points out that the coastline is physically isolated from much of the rest of the country and years of political instability has resulted in the lack of infrastructure development to allow for fresh marine fish to be distributed throughout the country.

Touch and Todd (2002) estimate the volumes and values of Cambodia's exports of marine fishery products in 2000 (Table 5).



*Processing of marine fishery products: the crab processing plant in Kep (top left); vats for producing fish sauce from anchovy in Kampot (bottom left); bottles of fish sauce (upper right)
[Photos: R. Gillet]*

Table 5. Exports of marine fishery products in 2000

Items	Export volume (mt)	Total export value (US\$)
Chilled shrimp meat	500	875 000 to 1 000 000
Chilled crab meat	500	2 250 000
Frozen peeled shrimp	320	3 000 000
Frozen squid/octopus	140	250 000
Live ornamental fish	10	29 000 to 31 200
Live mantis shrimp	10	66 000
Live short neck clam	5 000	2 500 000 to 2 750 000
Live blood cockle spat	500	475 000
Dried seaweed	120	72 000
Total	7 100	9 500 000 to 9 900 000

Source: DoF (2002).

Other important post-harvest features of Cambodia's marine fisheries are the:

- recent decline in the number of large-scale processing facilities, including those for fish sauce, shrimp, fishmeal;
- large portion of marine fish catches not landed in Cambodia and therefore not reflected as exports (Table 5 above);
- large increase in the exports of live undulated surf clams to Thailand (export of live food fish, mainly coral reef fish to China, has also increased);
- elimination of the requirement to export fishery products through the Kampuchea Fish Import and Export Company (KAMFIMEX), a Government enterprise;
- problems created by illegal activity (collusion at the border, smuggling, and unofficial facilitation payments that several reviews of the fish export situation in Cambodia have mentioned); and
- lack of recognition by many Government officials and participants in the seafood industry of the importance of HACCP (Hazard Analysis and Critical Control Point) requirements in seafood importing countries.

8. STATISTICS AND STOCK ASSESSMENT

Much of the descriptive information in this report (Sections 2 to 7 above) relies to some extent on the statistics produced by the Department of Fisheries. Numerous authors point out the deficiencies in the system, mainly emphasizing that :

- important elements of marine fisheries are not included, such as catches by subsistence fishers⁹ and catches by Cambodian and foreign vessels (both licensed and illegal) which are landed outside Cambodia;
- due to methodology, the estimates for even those components covered by the statistical system could be quite inaccurate;
- the statistical system is oriented to collection of production information while even the most basic indicators useful for stock assessment (e.g. catch per unit effort) are not included.

To be fair, it must be acknowledged that collecting fisheries statistics is inherently difficult and expensive in a location such as the coast of Cambodia. In this respect, the situation in Cambodia may be similar to that of many neighbouring countries. A study on inland fisheries statistics across Southeast Asia (Coates, 2002) came to a conclusion that seems to be applicable to the marine fisheries statistics of Cambodia:

⁹ APIP (2001b) concludes that in Cambodia "family-scale and subsistence fisheries dominate marine fisheries".

“...the countries of Southeast Asia in general struggle with limited resources to compile information that, in many cases, they do not themselves trust, need, or use. At the same time, most of those countries are aware of what information it would be more logical to collect, but lack the methods and support to obtain it.”

According to provincial level fisheries officials, the fisheries production statistics are made by enumerating the number of vessels of each gear type, and estimating the average daily catches and number of days fished. Discussions with individuals involved with the collection of marine fisheries statistics leads to the impression that important underlying principles are not well-understood at the working level and that there are considerable differences in methodologies between the four coastal provinces and municipalities.

Possible improvements to the statistical system are discussed in Section 16. At this point it can be concluded that information from the present system has only very limited applicability for stock assessment purposes. Indications of the condition of marine fisheries resources must therefore come from other sources.

Many authors have made the observation that there is no stock assessment information for marine fisheries in Cambodia. While this is generally true, there are some exceptions. In addition, research conducted in neighbouring countries could have some applicability to certain fisheries in Cambodia. For example:

- Anon. 1986. Reports on Soviet fisheries research in Cambodia in the early 1980s concluded that the stock of commercial fisheries in Cambodia's economic zone is 50 000 mt and the optimal annual harvest is estimated to be 20 000 mt;
- based on Thai fishing data, it has been estimated that the MSY for anchovy in the Gulf of Thailand is about 110 000 to 120 000 tonnes per year (FAO, 2000);
- senior officers cite several case studies in which CPUE declined during the observation period;
- for other fisheries in the Gulf of Thailand, a considerable amount of stock assessment work has been done, some of which is relevant to Cambodia. FAO (1997) summarizes the available results as follows: “Demersal fish have been overfished in the Gulf since 1973, short mackerel has been fully exploited since 1984, sardines have been overexploited since 1988, and small tuna fully exploited since 1988.”

Despite the paucity of stock assessment information on Cambodia marine fisheries resources, several projections of future yield and comments on potential have been made.

- Csavas *et al.* (1994) state that substantial potential for increasing production in the marine fishery exists.
- The Strategic Plan for Coastal and Marine Environment Management states that due to the lack of Cambodian vessels fishing offshore, there is the perception that those areas are underexploited (ADB 1999).
- The draft Master Plan for Fisheries states that marine capture fisheries are at or above their sustainable limits. The 36 000 mt produced in 2000 is projected to decline to 33 893 mt in 2006 and 32 232 in 2011.
- The Planning and Accounting Office (2001) states that marine fisheries are not yet fully exploited and projects that the marine fisheries catch of 37 000 mt in 2001 could be increased to 50 000 mt in 2005.
- APiP (2001c) states that in 2010 and 2020 it is possible that the annual production from marine fisheries could be 45 000 and 60 000 mt, respectively.

In considering the available stock assessment information and the above projections, the following observations can be made:

- considering the scarce information on the condition of Cambodia's fishery resources, it is difficult to understand how some of the more exact projections can be made. The present fisheries statistics are insufficient for predicting potential or future production;
- Gulf of Thailand stock assessment data and information on the foreign fishing fleets in the area suggest that Cambodia's offshore fishing areas are heavily exploited;
- anecdotal information from small-scale fisheries and the decline of fish processing industries (anchovy, shrimp) generally suggest a condition of overexploitation;
- increases in the catches by Cambodian fishers, if any, are likely to come from displacing foreign fishing vessels.

Community perceptions of the condition of adjacent fishery resources can provide valuable information for fishery management purposes. ADB (1999) gives the results of a survey of Cambodia's marine communities. The report states that declining marine resources is a prevalent theme in most of the communities surveyed. Many villages include long lists of natural resources that were commonly seen and are now becoming increasingly rare. Several marine species are reported to have already disappeared in some locations. Many villages estimate that marine resources are declining at a high rate. For example, a village in Kampot Province cites a 60 percent decrease since 1995.

9. FISHERIES LEGISLATION

9.1 The Fiat Law on Fisheries Management and Administration

The basic fisheries law in Cambodia is the Fiat Law on Fisheries Management and Administration which came into force in March 1987. The Law's 44 articles include definitions, exploitation of inland fisheries, aquaculture and processing of freshwater fishery products, exploitation of marine fisheries, aquaculture and processing of marine products, competent authorities for solving fishery violations, and penalties. Important features of the Law relevant to marine fisheries are:

- a fishery resource is defined as a live animal or vegetable which reproduces itself and lives in the fishery domain;
- the marine fishery domain is defined as the area from the coastline to the outer border of the economic zone;
- fishers, except family-scale fishers, have the obligation to contribute revenue to the Government;
- all fishing, except family-scale operations, must be licensed. In addition, if fishing takes place from a vessel, that vessel must be licensed by both the fisheries agency and the police;
- fishers must record on a daily basis the quantity of fish caught and report this monthly to the provincial/municipal fishery agency;
- foreign fishing activity must have the approval of the Council of Ministers;
- fortifying fishing gear so that it interferes with the passage of vessels is prohibited;
- mackerel fishing is prohibited during the period 15 January to 31 March;
- trawling between the shore and the 20 metre depth line is prohibited;
- certain fishing gear is specifically prohibited: all kinds of explosives, electrical fishing gear and modern fishing gear not yet mentioned in a Ministerial proclamation.

It is important to note what the law does *not* specify. There is no provision in the present law for limiting fish catches or fishing effort. In effect, the basic fisheries law of Cambodia does not cover what is presently the most important fishery issue – namely, the need to address overfishing.

In various reviews the Fiat Law on Fisheries Management and Administration has been described as inadequate (ICLARM, 1999), not addressing the current fisheries situation in Cambodia (Flewwelling, 1999), and lacking consideration of environmental, ecological and socio-economic issues (FAO, 1997). Alternatively, some studies have put forward the view that it is “not the shortcomings of the legal framework which have brought about the present anarchy”, but rather “lack of enforcement of the existing legal provisions” (EC, 2002). Another type of difficulty associated with the law is described by APIP (2001a): “it is probably not well understood by most fishers and perhaps even by some fisheries officials”.

9.2 Other legislation relevant to fisheries

The Fiat Law on Fisheries Management and Administration is one component of the Cambodia fisheries legislation. ICLARM (1999) reviews the legislative hierarchy in Cambodia as follows:

- constitution – Supreme law of Cambodia;
- law – determined by the National Assembly;
- kram – promulgation by the King;
- royal decree – used by the King in the exercise of his constitutional powers;
- decree – signed by the King upon proposal of the Prime Minister;
- sub-decree – signed by the Prime Minister and counter signed by relevant minister;
- declaration – used by ministries in the framework of their regulatory powers.
- decision – individual decision by Prime Minister, minister, or governor in the framework of their regulatory powers;
- circular – used by Prime Minister or other ministers to explain or clarify;
- arete – used by provincial governors within the geographic limits of their provinces.

According to Swan (1999), sources of fisheries law include the Fiat Law, two sublaws, seventeen Proclamations, one Circular, two Council of Minister’s Decisions, and one Director’s Decision. EC (2002) gives the evolution of the legal framework in fisheries since the French colonial regime.

An important legal instrument is Declaration No. 1470 on the Organization and Functioning of the Department of Fisheries, made by the Ministry of Agriculture on 26 March 1990. According to ADB (1999), the declaration states that the Department has responsibilities to:

- develop and implement plans and legal instruments for fisheries;
- prepare, enhance and maintain fishery areas;
- conduct scientific research and disseminate fisheries, scientific and fish processing information;
- build a material base for fisheries and train fishery staff;
- search for and investigate fishery abuses, solve violations, and arrest violators;
- ensure fish production circulation inside the country and for export;
- lead and instruct provincial and municipal fishery offices in terms of technique and control over their law enforcement.

Legislation in other sectors also has major impacts on fisheries. The most important is the Law on Environmental Protection and Natural Resource Management, and subsidiary legislation establishing protected areas.

Cambodia is a signatory to several international treaties relevant to fisheries. These include the United Nations Convention on Law of the Sea (UNCLOS), the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), the International Convention on the Prevention of Marine Pollution from Ships (MARPOL), and

the Convention on Biological Diversity (CBD). As is the case with many developing states, the ability of Cambodia in terms of financial and other resources to meet the obligations of these treaties is questionable.

There are presently two important pending legal instruments: a draft fisheries law and a draft subdecree on community fisheries. The draft fisheries law was formulated with the assistance of a World Bank project and is in the process of being discussed and revised, with some NGO assistance. The concept for a subdecree on community fisheries is partly in response to the Government decision in late 2000 to reduce inland fishing lot concession areas and encourage participation of communities in adjacent fishery resources. The intention is to provide a legal framework for what is now a nebulous situation of the rights, responsibilities, and institutional arrangements for fisheries management by communities. As with the draft law, the draft subdecree is presently undergoing a process of extensive consultation and modification.

10. THE MANAGEMENT OF MARINE FISHERIES IN CAMBODIA

For a discussion of fisheries management, it is essential that there is some common understanding of the term. In many developing countries, including Cambodia, the English term “fisheries management” is used rather loosely to cover a wide variety of action in the public administration of fisheries. For the purpose of this report, “fisheries management” will be taken to mean “controls that Government places on fisheries activities in support of specific agreed objectives”.¹⁰

This definition stresses the importance of objectives in fisheries management. The Fiat Law on Fisheries Management and Administration does not specifically cite the objectives of fisheries management in Cambodia. The intended objectives of marine fisheries management which can be inferred from the Law’s provisions are:

- generation of Government revenue;
- production of information on the quantity of fish caught;
- avoidance of obstructing the passage of vessels;
- protection of mackerel;
- protection of the gear of inshore fishers and/or bottom habitats; and
- elimination of the use of destructive fishing gear.

10.1 Characteristics and weaknesses of the present management regime

The present marine fisheries management regime is characterized by open access; there are no legal restrictions on any Cambodian to enter any fishery. In addition, there are no limits placed on the amount of gear that can be used, the amount of time that can be spent fishing, or on the quantity of fish that may be captured.

Viewing the management regime from the perspective of intended objectives may offer important insight. The fisheries management objective of generating Government revenue is attained by taxing fishers. Other fisheries management objectives alluded to in the Fiat Law are to be achieved by the statistical system and by gear restrictions, area closures, and time closures. Management objectives other than those in the Fiat Law exist and are attained by other means. For example, the protection of the blood cockle resource¹¹ is achieved by restricting the export market.

¹⁰ It is recognized that this definition is different from that given in FAO’s Technical Guidelines for Responsible Fisheries. Although not challenging that definition, there are advantages in Cambodia of a definition of fisheries management that is simple and clear, yet conveys some basic concepts.

¹¹ Information from Ing Try (personal communication, March 2002).

There are also objectives of the present management regime that are not specifically articulated in the Fiat Law nor mentioned often in fisheries management planning documents. Probably the most important of these is preserving the opportunity for all Cambodians, especially those too poor to enter other economic sectors, to participate in all marine fisheries. The importance of this should not be underestimated in a country that has been torn by decades of civil war and that has very limited economic opportunities for an expanding population. Although this objective obviously has negative implications for any marine resource sustainability objectives, the political reality is that, at this point in Cambodia's history, it is very difficult to deny poor people access to what is perceived to be a low entry cost occupation. Although the legitimacy of this poverty alleviation is not disputed here, an important point should be made namely: if the fisheries management system is charged with the responsibility for assuring economic opportunities for a very large number of poor people, major restrictions are placed on the achievement of other management objectives.

Other important aspects of the present management regime which merit discussion are:

- difficulties with carrying out the provisions of the present regime;
- fundamental problems with the present regime.

The major difficulty with carrying out the provisions of the present regime concerns enforcement. Although only a very few types of management action (e.g. banning of trawling from inshore areas, requirement for fishing licence) are available to achieve objectives, for various reasons the enforcement of those provisions is quite weak. For example:

- despite the fact that there is a great amount of illegal inshore trawling, in 2002 no trawler operators were prosecuted¹²;
- despite licensing being one of the few management tools available, the requirement for a fishing vessel licence is often disregarded. Fisheries officials in one province estimate that less than 10 percent of vessels in their area are licensed¹³.

A second important point about the present management regime for marine fisheries in Cambodia concerns its inherent problems. Even if the regime were to fully function as envisaged (i.e. complete compliance by fishers with gear restrictions, with area/seasonal closures, and with requirements for licenses, taxes, and information on catches), there would still be serious difficulties. In fact, what is undoubtedly the major problem in Cambodia's marine fisheries, declining catches due to excessive fishing effort, cannot be addressed by the present system of open access with no catch or effort limits.

The difficulties of Cambodia's marine fisheries management regime could be described as "open access plus" i.e. open access by all Cambodians to fisheries resources, no controls on the output of fisheries and weak enforcement of the few input controls.

Nao Thuok *et al.* (1999) arrived at a comparable conclusion: "...fisheries are under threat of overexploitation due to poor management and inefficiency of MCS". Similarly, ADB (1999) stated that there is no effective control and management of the use of coastal and marine resources. Everett (1999) stated that in Cambodia a combination of poor management and development practices, environmental degradation, and a lack of MCS and enforcement over the past two decades has left inshore marine capture fisheries in a depleted state.

¹² According to senior Department of Fisheries officials, in 2002 of the 54 violations resulting in prosecution (defined as cases in which documentation is forwarded by provincial/municipal authorities to the Department of Fisheries) none involved trawling in water shallower than 20 metres.

¹³ Koh Kong fisheries officials, March 2003.

10.2 Management reform

The recognition of the poor state of fisheries management in Cambodia has resulted in a movement for reform. This has been centered largely on inland fisheries but improvements are now being made for the management of coastal fisheries as well. Recent reform initiatives which are focused on, or relevant to, coastal fisheries include:

- *Reform-oriented reviews of MCS.* Reviews by Nao Thuok *et al.* (1999) and Flewwelling (1999) have been undertaken.
- Major interest in using sanctuaries as a fisheries management tool. Plans are underway with the DoF for several marine fish sanctuaries, including one for Koh Rong.
- *Fisheries management planning.* To encourage a more systematic approach to fisheries management, major initiatives to prepare fisheries plans and policies have been undertaken, including the Master Plan for Fisheries 2001-2011 (APIP, 2001c) and the National Policy for Marine Fisheries Management, Conservation, and Development (O'Brien, 2003).
- *Community-based management.* Started as an initiative for inland fisheries, the concept is being extended to marine fisheries.

The topic of community-based management deserves further discussion. The need for greater community input into management measures has been recognized for some time. Major progress was made in mid-2000 when the Government reallocated about half of inland fishing lots for the use and management by inland fishing communities. Communities are to commence management by a process which has come to be known as “establishing community fisheries” thus creating an institutional structure at the community level for management, articulating the management rights and responsibilities of community institutions, and obtaining local Government recognition.

As of March 2003, about 250 inland community fisheries have been established and the model is being extended to marine fisheries. Presently 12 marine community fisheries have been established and approved. To clarify many details of how the communities should operate, a subdecree on community fisheries has been drafted and extensively discussed.

11. FISHERIES INSTITUTIONS

11.1 Department of Fisheries and Provincial Fisheries Offices

The Department of Fisheries (DoF), under the Ministry of Agriculture, Forestry, and Fisheries is the designated custodian of Cambodia's living aquatic resources. It is responsible for administering the country's fisheries and aquaculture (Master Plan for Fisheries 2001-2011).

The DoF was established as a separate entity in the Ministry of Agriculture in 1960 and has undergone restructuring on several occasions during the past four decades. In July 2001 the current institutional structure was adopted. Presently there is a Director and three Deputy Directors. EC (2002) states that DoF has eight management and administrative units, four fisheries inspection units, a fisheries research station, two fishing units, and state enterprises dealing with commercial fisheries.

One of the three major functional divisions of the DoF is primarily concerned with marine fisheries. That division has units covering exploitation, inspection, aquaculture, and fisheries domain, as well as serving as the DoF contact point for seven of Cambodia's provinces (some of which are not coastal) and several international organizations such as the World Bank, CITES, the Asian Development Bank (ADB), the Southeast Asian Fisheries Development Center (SEAFDEC) and the Intergovernmental Organization for Marketing

Information and Technical Advisory Services for Fishery Products in the Asia-Pacific Region (INFOFISH).

DoF's Marine Inspection Unit in Sihanoukville has 56 staff. APIP (2001a) states that the work of a DoF inspection unit includes inspection of fisheries exploitation, transportation, storage, and selling activities and arresting those people involved with illegalities.

The DoF's Community Fisheries Development Office (CFDO) has an important role in the management of coastal fisheries. With the movement to have greater community input into management measures, in February 2001 the Government established the CFDO within the DoF. CFDO's role is to facilitate the establishment of community fisheries, and approval of their legality, and monitoring of their activities (CFDO, 2003).

Each of Cambodia's four coastal provinces/municipalities has a fisheries office under the provincial Ministry of Agriculture, Forestry, and Fisheries. The larger offices have a structure with units for administration, inspection, fisheries domain, aquaculture, exploitation, and conflict resolution. In March 2003 the staffing levels of these offices were: Kep 4 staff, Kampot 34 staff, Sihanoukville 47 staff, and Koh Kong 27 staff.

In 2000 there was a total of 1 557 staff at various levels in the DoF and Provincial Fisheries Offices. Table 6 gives staff numbers and their qualifications.

Table 6 Staffing and qualifications of DoF and fisheries provincial agencies in 2000

Qualification	Department of Fisheries (DoF)	Provincial/Municipal fisheries offices (PFO)	Total
Master's Degree	30	3	33
Bachelor's Degree	217	93	310
Diploma	137	135	272
Certificate	59	150	209
Skilled staff	6	15	21
Subtotal	449	396	845
Unskilled worker	253	459	712
Total	702	855	1 557*

Source: APIP (2001a).

* Total staff 1 557: male 1 323 and female 235.

The draft National Policy for Marine Fisheries Management, Conservation and Development (O'Brien, 2003) lists some of the important institutional constraints in marine fisheries. These include:

- corruption and lack of DoF staff accountability;
- lack of administrative management within provincial fisheries offices;
- lack of fisheries management capacity within the DoF;
- role of DoF staff is not focused on client service;
- unclear responsibilities between MAFF and other Government Ministries, especially Ministry of Environment;
- very limited budget resources for staff capacity building, fisheries management and aquaculture promotion;
- lack of regional fisheries management in the Gulf of Thailand.

11.2 Other institutions

Apart from the above fisheries agencies affiliated with the Ministry of Agriculture, there are several other institutions in Cambodia that are involved with, or are relevant to, the management of marine fisheries. The major ones are:

- Department of Environment (DoE) – Responsibilities include the management of marine protected areas and environmental protection. The DoE hosts the large DANIDA-funded project on environmental management in the Cambodian coastal zone that has assisted the establishment of several community fisheries along the coast;
- National Coastal Steering Committee – Overseas coastal zone management. The membership is comprised of representatives of the Government units having a stake in the coastal zone, including the governors of the four coastal provinces/municipalities;
- Management Committee for Cambodia/Thai Overlap Zone – Formed by a Royal Decree in August 2000, the Committee is headed by the Governor of Koh Kong Province, the membership includes the military and fishery inspection units, and the main role is to manage the overlapping sea zone with Thailand.

A large number of NGOs are active in supporting reform in the management of Cambodia's fisheries resources. Both the International Development Research Centre (IDRC) and American Friends Service Committee (AFSC) have assisted in the establishment of community fisheries in the coastal areas.

Regional and international institutions are also important in the management of Cambodia's fisheries. According to DoF officials, the most important ones are:

- The Association of Southeast Asian Nations (ASEAN) with its Sectoral Working Group on Fisheries;
- SEAFDEC with its Marine Fishery Resources Development and Management Department;
- ASEAN-SEAFDEC Consultative Group.

Internationally, institutions which have done important work relevant to the management of coastal fisheries are:

- Food and Agriculture Organization of the United Nations (FAO)
- International Center for Living Aquatic Resources Management (ICLARM)
- United Nations Environment Programme (UNEP)
- Global Environment Facility (GEF)

12. PREVIOUS REVIEWS OF THE MARINE FISHERIES OF CAMBODIA

Although Cambodia's marine fisheries have not received as much attention as the country's inland fisheries, there have been some significant reviews. As a basis for understanding the present management requirements, it is important to have a knowledge of past studies, including:

- Csavas, I., Doulman, D., Petr, T., Prado, J. & Debas, L. 1994. Cambodia – Rehabilitation and development needs of the fisheries sector.
- Flewwelling, P. 1999. Report on travel to Cambodia. Mission Report No. 25, FishCode Project MCS, FAO, Rome.
- ICLARM. 1999. Management of Fisheries, Coastal Resources, and the Coastal Environment in Cambodia: Institutional, Legal, and Policy Perspectives.
- APIP. 2001b. Marine Fisheries Review.

- Touch, S.T. & Todd, B. (2002). The Inland and Marine Fisheries Trade of Cambodia.
- EC. 2002. Support to the Fisheries Sector in Cambodia.
- Fox, M. 2002. Cambodian Coastal Fisheries Communities.
- Try, I. 2003. Fish Stocks and Habitats of Regional, Global and Transboundary Significance in the South China Sea, Cambodia.

A short summary of the important findings of each of the eight studies is given in Appendix 2.

13. LIMITING FISHING EFFORT

In Section 4 and Section 10.1 of this report it was noted that excess fishing effort and the resultant decline in catches are arguably the most serious problems affecting marine fisheries in Cambodia. Rapid population increases in coastal areas, largely fuelled by job seekers, indicate that the causes of overfishing are likely to grow. To safeguard the sustainability of the fisheries resources, some form of effort limitation is essential; however this is made extremely difficult by the inadequacies of the present fisheries legislation to deal with excess fishing effort, coupled with political sensitivities of limiting livelihood opportunities for the poor. In short, the fishery managers are in a very difficult position of balancing their role as guardians of the resource with the current political realities in Cambodia.

The threat to the fishery resources posed by excessive fishing effort is acknowledged by senior DoF officials. A Deputy Director reports: “A continued uncontrolled harvest will most likely lead to the decline and possible collapse of Cambodia’s marine fisheries” (Try, 2003). The present DoF strategy for dealing with excess fishing effort falls into two categories:

- opportunity-led encouragement to exit fisheries: promotion of livelihood activities outside the fisheries sector (e.g. raising livestock), and aquaculture of various species.
- the use of marine fish sanctuaries.

In reconciling the need to reduce fishing effort with realities in Cambodia, there are some important considerations to be taken into account:

- given the large number of marine fishing units and the difficulties associated with monitoring and controlling small-scale fisheries, output controls (i.e. catch limits) are not practical in Cambodia for limiting fishing effort.
- although the present efforts to deal with excess fishing effort (alternative livelihoods, sanctuaries) should certainly continue, worldwide experience suggests that they should be viewed as a complement to the more direct effort limitation by controlling access, rather than as a replacement. In other words, the present efforts should not be viewed as an answer to the problem of excess effort, but rather as a contribution to the solution;
- while a policy of not denying any groups of Cambodians access to fisheries resources certainly has short-term political appeal, in the longer term it is likely to lead to a condition of severely depleted resources which provide few benefits to any group, including the poor. While the difficulties associated with commencing the limitation of access are considerable, it must be realized that an evolution away from the present open access system is essential for the medium- and long-term.

Even though many DoF officials are extremely reluctant to advocate a change away from the present open access regime, the conclusion reached in the paragraph above is consistent with that from other sources:

- The fisheries management guidelines in support of the FAO Code of Conduct for Responsible Fisheries relate effort limitation to open-access: “Worldwide experiences

with fisheries and other free-range resources have shown that open access systems, where anyone who wishes to has a right to exploit the resource, can have severe consequences. In the absence of control, open access systems will invariably lead to overexploited resources and declining returns for all participants. This has been found to occur in virtually all fisheries under open access, from small-scale artisanal fisheries to large-scale industrial fisheries whether national or international, and has been dubbed the ‘Tragedy of the Commons’”.

- Csavas *et al.* (1994) state: “In formulating management policy options it should be recognised that open-access commercial fishing is fundamentally inconsistent with the goal of sustainable resource use. Given the importance attached by the administration to this objective and related food security issues, effort limitation must be addressed within the context of fisheries management.”
- Although EC (2002) was primarily focused on inland fisheries, there are some observations on marine fisheries and some of the conclusions are equally applicable to both marine and inland fisheries. It was concluded “Uncontrolled access will in the long-term deplete the resource and create endless conflicts among users, destabilizing emerging user organizations. Therefore in the medium and long-term, access limitation will be vital.”
- The draft Master Plan for Fisheries states “It consequently becomes imperative that DoF during the coming years seek to reduce fishing effort exerted on the living aquatic resources and fragile habitats. That cannot be done without limiting the entry into Cambodian fisheries.”

A major conclusion of the present study is that an evolution away from the present open access system will be difficult but necessary. This will pose great leadership challenges for DoF. Although the specific mechanisms to move forward for the medium- and long-term are best known to senior officials of DoF, it is suggested that in the near future gradual change be instituted, starting by limitations which are not likely to generate controversy. This could include the not unreasonable steps of a tightening of the present licensing requirements, a ban on construction of new trawlers, and granting community fisheries some power to restrict access by commercial fishers from outside the community, or those outsiders with no heritage of using the community’s area.

In the longer term, a solid licensing regime could lead to a selective limitation of the number of licenses, and subsequently the possibility of a reduction in that number in certain fisheries.

14. PROMOTION OF COMMUNITY FISHERIES MANAGEMENT

For various reasons, there is presently much enthusiasm in Cambodia concerning community management of fisheries resources. Several initiatives are underway and many are being planned. The strategy for promoting community fisheries management in Cambodia therefore deserves some additional attention.

Worldwide experience on devolving management authority to communities may help put Cambodia’s situation in proper perspective. Using ICLARM’s extensive global experience with co-management, Pomeroy and Williams (1994) make a statement which has considerable relevance to Cambodia:

The advantages of co-management, versus a centralized top-down approach could include lower management and enforcement costs, improved data reliability, a higher degree of acceptability and compliance with management measures, greater participation of fishers in management, and improved social cohesion and community development. Co-management is, however, not a panacea for fisheries management. The development of co-management systems is not automatic or simple; it can be costly to establish, require long-term effort, and have limited guarantee of success.

Government administrative arrangements and fisheries laws and policies will generally require restructuring to support co-management.

14.1 Observations on the existing situation

The removal in 2001 of 54 percent of inland fisheries areas from concession management arrangements was the impetus for much of the present interest in community participation in the management of fisheries resources, both for inland as well as coastal areas. There is the expectation that a sub-decree will be issued by the Government to clarify the situation, especially in regard to the major vehicle for promoting community management: the establishment of “community fisheries”¹⁴.

A major feature of the present situation is the uncertainty. The precise nature of the management authority being devolved to communities is unknown and likely to be undergoing a process of evolution in the formulation and finalization of the sub-decree on community fisheries. Various stakeholders in the process have very different ideas on what authority should be transferred in the establishment of community fisheries, ranging from community management of resources through the acquiring of property rights to the much different concept of community management of fishing enterprises.

With this uncertainty, there are two views on establishing community fisheries during the period before the legal basis is articulated. There is the opinion that the legal and policy details should be clarified by the Government before proceeding. Alternatively, there is the view that the legal vacuum creates an opportunity to establish effective systems on which subsequent legislation and policies could be based. The present level of enthusiasm, donor support, community interest, and directives from the highest level of Government indicate that the more pro-active second approach has been adopted, with the result that about 250 community fisheries have been established despite the “fuzziness” of the legal situation.

The promotion of management of fisheries resources by communities is much more advanced in inland areas than along the coast. About 95 percent of the 250 community fisheries established to date are inland and therefore, to some extent, tend to be the model for those to be established in coastal areas. Some aspects of the model may not be appropriate for coastal areas, but nevertheless many inland lessons could be valuable for coastal areas. These include:

- One of the major problems in promoting the increased participation of communities in fisheries management is the low capacity of the staff of the various Government fisheries agencies. This is thought to be lower than that in the forestry sector.
- Members of the communities involved frequently did not understand the sudden fisheries management reforms.
- Management plans formulated in a participatory manner by the communities are an essential ingredient of the process of management devolution.
- Three issues of contention in the promotion of community fisheries management between senior officials in the DoF and those working at the project level concern: (a) allowing community members to enforce management rules, (b) the controlling of fishers from outside the community, and (c) the generation of income for management activities.

¹⁴ “Community fisheries” is the English term used in Cambodia to denote the prescribed community-level institutional structures for fisheries management.

EC (2002) makes an important point about the establishment of inland community fisheries that has considerable relevance for future coastal community fisheries:

The dominant role of external assistance, especially by the NGOs, has limited the degree of village ownership of emerging community management institutions. The people-based village institutions which have emerged following community fishing 'reform' are less demand than donor driven.

Based on limited observations of community fisheries along the coast in February and March 1998 and discussions with senior Government officials, a number of comments can be made that are relevant to future community management promotion activities.

- the community members had a wide range of perceptions of their powers to exclude outsiders and enforce rules in "their" area;
- to address the major fisheries issue of excess fishing effort, there is a large degree of reliance on a single fisheries management tool: alternatively livelihood activities outside the fisheries sector are sought (e.g. livestock rearing);
- most, if not all, of the community fisheries established in coastal areas have been done with support primarily through the Ministry of Environment and/or NGOs. These initiatives have generally had objectives broader than those of a fisheries management initiative;
- Government fisheries agency staff in coastal areas have limited experience in community development work and generally have not been in the role of service providers.

14.2 Sustainability of "community fisheries"

Sustainability is an important issue in the establishment of community fisheries. According to observations and discussions, after a community fishery has been established, lack of resources to patrol the area (money for boats, fuel, guardhouses) is the most often cited constraint to a community's ability to continue the management arrangements without outside assistance. Another point with respect to sustainability is that the many agencies presently active in coastal community fisheries promotion do not have well-articulated exit strategies – how the management efforts will continue when donor support withdraws. A number of ideas have been suggested to ensure sustainability of management activities. These include:

- the registering and charging of fees to community members;
- as donor fatigue sets in, attracting a sequence of other donors;
- charging outsiders' fees to fish in the community's area;
- increasing community prosperity by promoting alternative livelihood activities (e.g. livestock raising) with the idea that communities can eventually afford to pay for management activities; and
- allowing the community management institutions to engage in commercial activities to generate income to support management activities.

Some comments should be made on the above list. Considering just the 192 coastal communities, it may be extremely difficult to attract donors and maintain their interest indefinitely. It is suggested that donors should be viewed as catalysts for establishing appropriate models and not a mechanism for perpetual support.

It may be somewhat naïve to think that the promotion of alternative livelihood activities could be the solution to recurrent costs of management activities. However appealing the concept is, it is uncertain that these activities will lead to a remarkable improvement in community prosperity. Even if such a transition were to occur, it is uncertain that the prosperity would be channelled into resource management activities.

The concept of involving the community resource management institution in commercial activities to produce money for management activities should be considered carefully. There is the possibility that the institution's role as an exploiter of the resources could conflict with the critically important role of a guardian of those resources.

If support for patrolling is the major expense, then management models that lower these costs should be given greater consideration. In this regard, assigning property rights or use rights to communities could result in incentives for all community members to participate in surveillance and enforcement activities. Members get tangible benefits from discouraging fishing by those that do not have the rights. The concept of restricting access to fishery resources is, according to various perspectives, politically very difficult in Cambodia (discussion with DoF senior staff) or alternatively, required for resource sustainability (e.g. EC, 2002, draft Policy for Marine Fisheries, draft Master Plan for Fisheries, some DoF staff). This seems to suggest the need for some rebalancing of the importance of political acceptance with the realities of depleted resources.

14.3 Concepts and considerations

For community management of fisheries resources to be successful, there must be incentives and real management power must be transferred. A system in which community members are only allowed to formulate and enforce management rules on themselves is not likely to succeed as there is little incentive to limit one's own group when outsiders are not subject to the rules. In this situation, benefits of the self-restraint of community members flow to outsiders and is a reverse incentive to conserve resources for the future.

Assuming that complete transfer of property rights to coastal community fisheries and associated ability to exclude all outsiders is not possible in Cambodia at this point in time, there remain several "half-way" measures that allow some transfer of power to communities and contain some incentives for management. In increasing order of power transfer (and probably decreasing ease of departure from the status quo) this continuum is:

- granting to communities the power to enforce higher level law in their area;
- granting to communities the power to make and enforce rules for their area which are equally applicable to both community members and outsiders;
- granting to communities the power to restrict access by:
 - a) charging outsiders a fee for access;
 - b) excluding new outsiders (those with no heritage of fishing in the area);
 - c) excluding commercial activity by outsiders;
 - d) excluding all outsiders.

In formulating the desirable level of power to be granted in the process of establishing coastal community fisheries, DoF officials must balance departure from the political acceptability of the status quo, the increasing community incentives on the above continuum, and management objectives related to poverty reduction (Section 10.1), bearing in mind that depleted resources produce little benefit for any group, even the poor.

The limitations of community management should be acknowledged. In the coastal areas there are many difficulties that cannot be addressed by community action alone. These include interaction with offshore fisheries, illegal foreign fishing activity, and some of the problems caused by trawling. Many of the issues that communities can address will still require technical input from fisheries officials. This includes providing stock assessment information and giving guidance on the effectiveness of various management interventions. The establishment of community fisheries should not be viewed as elimination of the need for management activities by fisheries officers but rather a change in the form that officers are

involved in fisheries management. A major challenge for the officers will be the transition to being service providers.

14.4 Thoughts on future efforts

It is important that efforts to establish community fisheries in the coastal areas take advantage of the experience in the more advanced inland situation: learning from the successes and difficulties but being aware of how the inland and coastal areas are different from a management perspective. The value of community management plans and the constraints due to poor fishery officer capacity are especially important. Differences between inland and coastal areas that could affect management activities include importance of seasonality, present, degree of commercialization, and the surveillance/enforcement effectiveness.

Mechanisms to achieve a shared vision of where the community fisheries process is going should be developed. There are presently major differences in opinions of the various stakeholders concerning even the basic mechanisms of management. These differences occur between communities, Government ministries, and donors. It is especially important for the Government to clarify the fundamental issue of property rights of community fisheries, and do so by using the experience from community fisheries which have been established with a view to exploring this feature.

In addition to the inland experience, the community fisheries supported by other agencies in coastal areas provide a basis for much more DoF involvement in the establishment of coastal community fisheries. The DoF should consolidate this experience and move forward. This should involve increased cooperation with DoE and NGOs to “get it right” at a limited number of coastal communities. By focusing substantial resources at a few coastal sites, the DoF should be able to produce a good model, aspects of which could be used at many communities along the coast. The initial sites could provide valuable training opportunities for fisheries officers in promoting the establishment of community fisheries and in assuming a role as a service provider.

15. IMPROVING ENFORCEMENT

In Section 10.1 above it was shown that, despite the very few management restrictions/requirements in coastal fisheries in Cambodia, the enforcement of those measures is quite weak. This claim is consistent with several previous studies including the recent Fox (2002), O'Brien (2003), and Try (2003) reports.

Several reviews have offered detailed suggestions on how to improve enforcement (e.g. Thuok *et al.*, 1998; Flewwelling, 1999). While not disputing those recommendations, it should be pointed out that some conditions in Cambodia have changed since that work was done. Most notable, is the Government policy in 2000 of devolving at least some management authority to communities through the establishment of community fisheries. As those communities could do much to improve the enforcement situation, there is a need to focus additional resources on enhancing the enforcement capability of village- level institutions. This could include assuring that the legal basis provides communities with proper incentives to enforce, clarifying community rights and responsibilities with respect to enforcement, training community fishery members in enforcement, and awareness campaigns to the broader public on local and national fishery rules.

As the enforcement situation is considerably worse in Cambodia fisheries than in many developing tropical countries, an examination of some special circumstances in Cambodia may provide some insight. Aside from difficulties which cause enforcement problems in many

countries (e.g. need for equipment, training), the Cambodian situation needs to be understood with reference to the following features and problems.

- The country has been subjected to decades of civil war lawlessness during which law enforcement was difficult or impossible.
- The draft National Policy for Marine Fisheries Management, Conservation and Development states: “Corruption is common and is mostly due to low Government wages that are insufficient for sustaining their families. As a result, some staff allow the use of illegal fishing methods in return for generous payments. Illegal fishing is an opportunity for Government staff to earn wages through bribes and ‘special permission’ payments”.
- There appears to be genuine compassion on the part of fisheries officers for poor people, hence the attitude that it is inappropriate to enforce many requirements when it involves poor people.
- Consistent with the above attitude towards the poor, subsistence activities are exempt from many requirements. Difficulties in distinguishing between subsistence and larger commercial activities have resulted in “creeping exemption” and no enforcement on some fishing activity of a larger scale.
- Due to the delicate political situation in the country, there is not much interest in enforcing legislation in the period leading up to an election.
- In areas such as national parks, overlap in jurisdiction of other ministries has created a situation confused to the point that no enforcement occurs by either ministry.
- The situation of jurisdiction in offshore areas is complex, involves disputes with Cambodia’s neighbours, and during patrols Cambodian fisheries enforcement officials have been apprehended/incarcerated by Thai enforcement vessels.

It is apparent that some of the above features and problems extend beyond the fisheries sector and therefore direct DoF control. To mitigate certain constraints, Government action is required on a broader front. For those problems that can be directly addressed within the fisheries sector, improvements are likely to require DoF policy changes and/or clarification. These observations suggest that technical interventions alone (i.e. equipment and training related to enforcement) are not likely to obtain the desired improvement in enforcement.

Some of the “concern for the poor” arguments for non-enforcement do not seem to hold up under close scrutiny. Although the fishery law bans trawling in the area between the shore and the 20 metre isobath, the enforcement of this provision is very weak or non-existent. Fisheries officers often cite concern for the poor trawler owners as the reason for the poor enforcement. Observations along the coast suggest that those that suffer the effects of non-enforcement are the small-scale inshore fishers who appear even poorer than the trawl fishers.

Enforcement of the requirement for a licence to fish requires some special attention. It is suggested in Section 13 above that one of the steps that could be taken to make progress on the very large problem of excessive fishing effort is much improved enforcement of present licensing requirements. The present fisheries law requires that all fishing, except family-scale operations, must be licensed. The important fisheries management tool of licensing is constrained to the point of being almost useless by lax enforcement. For example, in Koh Kong Province fisheries officials estimate that only about 10 percent of all fishing operations are licensed, with the difficulties of distinguishing between family fishing and larger scale operations cited as the reason. Flewwelling (1999) suggests that the law be changed so that all fishers be required to obtain a license with a provision that it be free for family fishers. The new draft fisheries law (late 2002 version) still contains an exemption for family scale fishing.

Important points are that:

- the requirement for a license could be made “poor friendly” by not charging for a family fishing license;
- enforcement of the requirement for a license could be fairly straightforward and would not require substantial extra equipment/training;
- the integrity of the licensing system is critically important in fisheries management especially for future effort control.

Considering these factors, DoF should make enforcement of the requirement for a license the top priority in its efforts to improve the enforcement of fisheries legislation. To do this, it is important to extend the legal requirement for license to all fishers.

In fine, a strategy for improving the enforcement of fisheries legislation should include the following elements:

- careful consideration and implementation of past reviews of fisheries enforcement in the country;
- allocation of additional resources to enhance the ability of community fisheries to carry out enforcement;
- attention to important policy changes and/or clarification affecting fisheries enforcement; and
- greatly enhanced attention to licensing requirements as the centerpiece of new efforts to improve fisheries legislation.

16. IMPROVING INFORMATION ON MARINE FISHERIES

Although there have been several initiatives to review and improve the collection and analysis of inland fisheries statistics, no similar work has been undertaken on the marine side. This being the case, some of the lessons learned from the study of inland statistics may offer insight on that for improvement in marine fisheries.

The inland fisheries review work pointed out serious problems with the statistics prior to 1999 when major improvements were made. As the marine fisheries statistical system in Cambodia did not undergo such revision, it appears there is room for much improvement.

Coates (2002) after reviewing the inland fisheries needs of several Southeast Asian countries, made a sensible conclusion that is quite relevant to marine fisheries in Cambodia: “Countries should first consider what information they actually need. Only then should they worry about how to collect it”. The difficulty in Cambodia is that there is no consensus on what types of information should be collected from the marine fisheries. A close examination of the various statements made on marine fisheries statistics shows great differences in opinion:

- It has been pointed out by some reviews that the marine fisheries statistical system should be upgraded as was done for the inland statistics. Alternatively, there is the view that improvements to the present statistical system may not necessarily be what is required. The present system is oriented to obtaining gross production data. Several authors have pointed out that this information is not very useful for stock assessment purposes.
- With respect to stock assessment, some reviewers of the Cambodia marine fisheries situation suggest that detailed stock assessments are necessary for the estimation of maximum sustainable yield which is to be subsequently obtained by management interventions. Alternatively, there is the view that undertaking quantitative stock assessment research on various species to determine the optimum yield will do little good in a situation like Cambodia where there is no hope that fisheries managers can

“fine tune” the amount of effort to achieve an optimum level of catch. Managing most inshore fin fisheries in tropical developing countries to achieve some optimal yield, whether it be biological, economic, or social, has been called an “unattainable dream” (Johannes, 1998).

- Although it is often argued in Cambodia that biological information should be the objective, or at least a priority, for collection, there is the view that in a country such as Cambodia, economic information on the fisheries is critical and may determine important developments, including how much attention the Government and donors focus on the sector.

The above differences highlight the need for a careful assessment of the objectives of information collection, the types of information required to meet those objectives, and finally the best methods for obtaining the required information. Although a study of this nature is beyond the scope of the present review, it is flagged here as being an important element in improving the management of marine fisheries in Cambodia.

It is critical that such an information assessment pay careful attention to the realities of quantitative stock assessment in developing countries (i.e. Johannes, 1998) and new approaches concerning fisheries information developed for Cambodia’s inland fisheries (i.e. Anon., 2003), especially the use of information from outside the fisheries sector and judicious use of specialized research.

17. THE MANAGEMENT OF OFFSHORE FISHERIES

In previous sections of this report some information on offshore fishing is given. It has been mentioned that there are few, if any, Cambodian vessels fishing in the offshore areas of Cambodia’s 55 000 sq km EEZ. By one estimate, from 167 to 226 Thai fishing vessels were licensed to fish in Cambodian waters in late 2002. Annual catches from the licensed Thai vessels have been estimated to be from 26 500 mt to 37 500 mt. It is very difficult to assess the number of illegal foreign vessels, but the large fleets in neighbouring countries, depleted fishery resources in those locations, and Cambodia’s very limited offshore surveillance capability, suggest that the number of illegal foreign vessels could be large. Gulf of Thailand stock assessment data and information on the foreign fishing activity in the area, suggest that Cambodia’s offshore fishing areas are heavily exploited.

Because there are areas offshore disputed with Thailand and Viet Nam, agreed overlapping zones with these two countries, and a zone in which Thai vessels can be licensed, Touch and Todd (2002) conclude that Cambodia’s offshore marine territory is complicated. The sensitive relations between Cambodia and Thailand in early 2003 add further complexity to the situation.

It appears that DoF is involved only to a limited extent in managing the offshore fisheries. This contention is based on lack of management plans or stated management objectives for the offshore fisheries, limited or no offshore patrolling capability, and the fact that many important decisions concerning foreign fishing activity in the zone are taken by a committee headed by the Governor of Koh Kong Province and the Ministry of National Defense.

Discussions with senior DoF and other Government officials suggest that desirable objectives of fisheries management in the offshore areas include:

- prevention of unlicensed fishing activity;
- protection of offshore fishery resources from overexploitation;
- obtaining reasonable benefits from the licensed foreign fishing activity;
- attaining greater national participation in offshore fishing.

The prevention of unlicensed fishing activity was addressed by Flewwelling (1999). With the exception of those initiatives overtaken by donor activity, the 14 recommendations in the report remain valid and many are applicable to illegal offshore fishing activity.

The protection of the offshore resources is obviously related to patrol capability. In addition, an essential prerequisite is a knowledge of the resources, especially the trends. Although many fisheries officials have the view that this is best obtained by dedicated donor-supported research efforts, there are other options. Many countries obtain valuable offshore resource information at little or no cost from observers on foreign fishing vessels. Although this has occurred to a limited extent in Cambodia, there is much opportunity for expanding these efforts. In addition to obtaining very important information for management as well as development, an observer programme provides an excellent training opportunity for junior fishery officers and can signal to the operators of foreign fleets that Cambodia is getting serious about foreign fishing in its zone. Another important mechanism for obtaining information on offshore resources was mentioned in Section 8 namely, that much research conducted in neighbouring countries could have applicability to certain fisheries in Cambodia.

To assess whether Cambodia is obtaining reasonable benefits from the licensed foreign fishing activity requires a good estimation of the quantity and value of the catch, and the revenue generated by the license fees. Although the foreign vessels operating in the zone can be required to furnish catch and effort information, to verify such data and or obtain independent estimates of catches is, to a large extent, dependent on the offshore patrol capability and observer work mentioned above. DoF has information on revenue from licensed foreign fishing, but it does not appear to be in a form that can be readily compared to catch estimates. Finally, to objectively assess whether the general policy of allowing fishing is worthwhile, the transaction costs in the licensing process, expenses of monitoring the foreign vessels, and any negative impacts (e.g. reduced availability of fish to domestic vessels, gear interaction, adverse environmental impacts, etc.) must be assessed. It does not appear that this information is readily available to DoF officials.

Attaining greater national participation in offshore fishing is a fourth possible objective of the management of Cambodia's offshore resources. For such activity to occur, potential participants require many conditions, including information indicating whether or not fishery resources are abundant enough to result in profitability, assurances that depletion by foreign fleets would not occur, protection from piracy, and a favourable business environment. The enforcement and observer programmes mentioned above could again play a major role in promoting national participation. Touch and Todd (2002) indicate that business conditions could be improved by: (a) new fisheries policies that favour local and foreign investment in the sector; and (b) "elimination of the requirement for unofficial 'facilitating' and 'gratuity' payments to authorities through anti-corruption legislation and enforcement". A final point on offshore fisheries is that there is a distinct possibility that through years of overexploitation and/or destructive fishing, many of Cambodia's offshore fishery resources are not commercially attractive.

The above discussion leads to two important points:

- one possibility for increasing DoF involvement in the management of offshore fisheries is to use the above four objectives and required action as the basis for formulating a management plan which could be subsequently used to guide the offshore management efforts of the DoF and other agencies.
- offshore enforcement capability and an observer programme could make a valuable contribution to attaining many of the objectives of management of Cambodia's offshore fisheries.

A final point with respect to the offshore fisheries concerns delineation of the Cambodia's marine boundaries with Viet Nam and Thailand. The "overlap zones" should be viewed as temporary solutions. Although their use in defusing tensions is not questioned, they do create some uncertainty and are presently another deterrent to domestic involvement in offshore fishing.

18. INEXPERIENCE WITH THE PROCESS OF FISHERIES MANAGEMENT

Many reviews have noted the low capacity for fisheries management in Cambodia. A decade ago Csavas *et al.* (1994) noted "Cambodia's primary need is for personnel who can operate effectively as fisheries managers". More recently, ICLARM (1999) stated that there was a lack of "know-how to implement sustainable management of fisheries". EC (2002) indicated that DoF lacks the "human capacity to meet today's challenges of sustainable resource management". Touch and Todd (2002) cite "weak management capacity". Quite recently and with specific reference to the management of marine fisheries, the draft National Policy for Marine Fisheries Management, Conservation, and Development (O'Brien, 2003) states "There is very little marine management and technical expertise within DoF, particularly within the fisheries activities staff."

The findings of the present review of marine fisheries are in general agreement with the above observations. Key Government staff dealing with marine fisheries are inexperienced with the process of fisheries management.

It is not difficult to imagine how such a situation arose. The marine fishery, and particularly its management, has not been a priority of the Government. What limited resources existed within the DoF for fisheries management were focused on the markedly more important inland fisheries. Similarly, the externally-funded fisheries projects (the origin of much of the fisheries management expertise in the country) were almost exclusively dedicated to the inland fisheries. The present staff with responsibilities for marine fisheries management have largely biological backgrounds and much of their experience and interest is in biological research. Due to lack of DoF financing, many projects in coastal areas are externally financed and reflect the priorities of the donors involved. In recent years this has included research on coral, seagrass, marine mammals, turtles, endangered species, and taxonomy of marine species.

Considering these circumstances, it is understandable that key fisheries staff perceive that a major constraint for the enhancement of marine fisheries management is lack of data on important species. For example, the conclusions of two recent reports dealing with Cambodia's marine fisheries suggest the way to enhance marine fisheries management is the establishment of an "institute for marine science covering all aspects of marine biology".

While not downgrading the importance of biological research, the constraints to improved fisheries management in Cambodia should be carefully analyzed. The findings of the present study suggest that a lack of fisheries management experience is a far greater obstacle than the lack of data on key species. A similar sentiment is expressed by a study of constraints in fisheries management covering several developing tropical countries:

The key management question should not be 'what data do we need to make sound management decisions?' but rather, 'what are the best management decisions to make when such data are unobtainable?' (Johannes, 1998).

In Cambodia there is a need to move away from the notion that lack of information for "data-hungry" management models is preventing fisheries management interventions.

The well-intentioned, hard-working DoF staff with major responsibilities in the management of marine fisheries are handicapped by the lack of substantial experience in the complexities of managing fisheries. Furthermore, they do not enjoy the learning benefits of working with veteran fishery managers, nor do they have appropriate management models on which to base new management efforts.

Valuable experience in the management of marine fisheries could be provided to key DoF staff by giving them exposure to:

- the successful management of small-scale fisheries by communities (e.g. Samoa);
- the management planning process for commercial scale fisheries (e.g. Bali Strait sardinella fishery);
- the successful management of a large marine reserve (Komodo National Park, Indonesia);
- the complexities of managing foreign fishing activity (Papua New Guinea).

Other possibilities for upgrading the fisheries management skills of the key staff responsible for marine fisheries include:

- Having an experienced fishery manager establish a management regime for one of the important marine fisheries in Cambodia. This would serve as a model for other fisheries.
- Compiling a reference manual that summarizes management-related information on Cambodia's important marine fish species. For each species or species group this would include: an overview, biological information, status of exploitation, status of stocks, potential for further exploitation/development, and management options. In many cases where Cambodia-specific information is not available, relevant information could be obtained from similar fisheries in nearby countries.

19. SUGGESTIONS FOR DONOR ASSISTANCE

Much capacity building is required for the effective management of the marine fisheries in Cambodia. Accordingly, a suite of initiatives that would address the deficiencies of marine fisheries management in Cambodia is proposed. Each component would contribute to improving management and could be financed and implemented independently. Alternatively, all the components together could be considered a project and be financed and implemented by a single donor. The suite of initiatives includes:

- Establishment of a model Fisheries Community to serve as a template for the future work of DoF in *village level* fisheries management, with special attention paid to: (a) institutional sustainability; (b) lessons learned by DoF in inland areas; and (c) lessons learned by the NGOs in coastal areas.
- An exercise in which a skilled fishery manager and senior DoF staff address a single commercial-scale fishery with significant problems as a model for the future work of DoF in *commercial-scale* fisheries management.
- Preparation of a reference manual on the major fishery resources for DoF fisheries officers (fishery resource profiles).
- Study tours by relevant fisheries officers to fisheries in other countries to observe four types of fisheries management: (a) The successful management of small-scale fisheries by communities; (b) The management planning process for commercial scale fisheries; (c) The successful management of a large marine reserve; (d) The complexities of managing foreign fishing activities.
- In-service courses for DoF staff in marine fisheries management (including a component on the Code of Conduct) and a concurrent effort to sensitize senior

Government officials of the need for, and benefits of, management of the marine fisheries.

- Refurbishment of DoF buildings in Sihanoukville so that they could serve as a teaching centre for marine resource management, with the intention that this facility could evolve into a marine fisheries management centre to target a variety of stakeholders, i.e. Government officers, community members, and the military.

In addition to efforts focused on capacity building for effective fisheries management, other interventions are worthy of donor support. A thorough examination should be made of systems of exploitation and distribution of marine products at the village level, followed by a socio-economic analysis of value adding along the chain to determine profitability, beneficiaries of the profits, and constraints, with a view to identifying opportunities for improving practices. These include improvement of the availability of fisheries statistics and other information through assessment of needs/objectives, and the identification of appropriate mechanisms to collect information using tools both inside and outside the fisheries sector. In this connection, the MRC experience, sustainability, and cost-effectiveness should all be borne in mind.

20. SUMMARY AND CONCLUSIONS

Excess fishing effort and associated declines in abundance of target species are the most serious problems in Cambodia's marine fisheries. The major causes appear to be population increases coupled with a sluggish economy and the Government's open access policy.

The difficulties of Cambodia's marine fisheries management regime could be described as "open access plus": open access by all Cambodians to fisheries resources, no controls on the output of fisheries, and weak enforcement of the few input controls. The recognition of the poor state of marine fisheries management in Cambodia has resulted in a movement for reform. This was initiated for the inland fisheries but improvements are now being made for the management of coastal fisheries.

To work towards sustainability of the fisheries resources, future reforms should include some form of effort limitation. This review and other studies of the situation in Cambodia's marine fisheries have concluded that effort limitation requires restrictions on access to the fishery resources.

A major conclusion of the present study is that an evolution away from the present open access system will be difficult but necessary. This will pose great leadership challenges for the Department of Fisheries. Although the specific mechanisms to move forward in the medium- and long-term are best known to senior officials of DoF, it is suggested that in the near future gradual change be instituted, starting by steps towards effort limitation which are not likely to generate controversy, especially a tightening of the present licensing system.

The promotion of community management through the establishment of "community fisheries" could represent a significant step in addressing weaknesses in coastal fisheries management in Cambodia. DoF's efforts in establishing community fisheries could be enhanced by focusing additional attention on:

- the property rights issue;
- how the management efforts will continue after any donor support withdraws;
- the amount of dependence on alternative livelihood activities for both supporting management activities and for effort reduction;
- difficulties which may arise from the commercial activities of the community management institution;

- the desirable level of power to be granted to communities, bearing in mind that the range of possibilities has varying degrees of political acceptability and community incentives;
- increased cooperation with DoE and NGOs to “get it right” at a limited number of coastal communities which could serve as models for future communities along the coast.

Despite the very few management restrictions/requirements in coastal fisheries in Cambodia, the enforcement of these measures is quite weak. It is suggested that a strategy for improving the enforcement of fisheries legislation in marine areas should include:

- careful consideration and implementation of past reviews of fisheries enforcement in the country;
- dedication of additional resources to enhance the ability of community fisheries to carry out enforcement;
- attention to important policy changes and/or clarification affecting fisheries enforcement;
- greatly enhanced attention to licensing requirements as the centerpiece of new efforts to improve fisheries legislation.

With respect to information from the coastal fisheries, there is a need for a careful assessment of the objectives of information collection, the types of information required to meet those objectives, and finally the best methods for obtaining that information.

It appears that DoF is involved only to a limited extent in managing the offshore fisheries. One possibility for increasing such involvement would be to use some suggested objectives as the basis for formulating a management plan which could be subsequently used to guide the offshore management efforts of the DoF and other agencies.

Government fisheries officials with major marine fishery management responsibilities exhibit an impressive commitment to their work and are making important contributions to improving DoF efforts in this field. They are, however, handicapped by the lack of substantial background in the complexities of managing important fisheries. They could gain valuable experience by visiting successfully managed fisheries in other countries and by participating in the establishment of a management regime for an important marine fishery in Cambodia.

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PEOPLE MET DURING THE CAMBODIA MISSION

Phnom Penh:

Jean-Claude Levasseur
FAO Representative in Cambodia

Sao Sopheap
Assistant FAO Representative

Soy Seung
FAO Programme Clerk

Nao Thuok
Director General, Department of Fisheries

Ing Try
Deputy Director, Department of Fisheries

Ouk Vibol
Deputy Chief, Fishery Domain Office

Poum Sotha
Chief of Marine Inspection Unit

Jennifer O'Brien
Policy Officer, Marine Fisheries Unit

Kim Sour
Project Monitoring and Evaluation Officer, World Bank APIP Project

Thay Somony
Acting Chief, Community Fisheries Development Office

Matt Fox
Community Fisheries Development Officer, Community Fisheries Development Office

Minerva Gonzales
Fisheries Co-Management Expert, Community Fisheries Development Office

Bouy Roitana
Fisheries Biologist

Gorm Jeppesen
Team Leader, Danida Coastal Zone Management Project

Chris Price
Rural Livelihoods Adviser, U.K. Department for International Development

Melissa Marschico
Participatory Management of Mangrove Resources

Craig Leisher
WWF Cambodia Conservation Program

Nicolaas Van Zalinge
Cambodian Freshwater Capture Fisheries Project

Paul Van Im
Asian Development Bank

Kep:

Community fishery members from Thmey Village, Prey Commune

Tith Sara, Chief of Fisheries Office, Kep Municipality

Operations Manager, crab processing factory

Kampot:

Fishers from Kbal Romeas Village, Tropeang Commune

Fishers from Kdat Village

Fishers from Tro Peng Ro Poav Village

Officials from Kampot Province Department of Fisheries Office: Song Lun, Thay Saman, King Sophany

Operations Manager, Fish sauce factory

Sihanoukville:

Neou Ratana, Director of Department of Agriculture, Forestry and Fisheries of Sihanoukville

Sin Satharath, Vice Chief, Fisheries Office of Sihanoukville

Touch Seang Tana, Undersecretary of State, Cabinet Council of Minister

Operations Manager, Ngou Hout Fishmeal Factory

Veng Seng, owner, Steung Hau fish landing site

Heng Sovannara, Research Associate, Wildlife Conservation Society

Prak Sarawatt, Chief of Fishery Section, Prey Noup

Kop Mom, member of Reim Community Fishery

Fish traders at four markets

Koh Kong

Hourt Thong, Director, Department of Agriculture, Forestry, and Fisheries, Koh Kong Province

Ney Ol, Chief, Provincial Fisheries Office of Koh Kong

Lang Kiry, Vice-Chief, Provincial Fisheries Office of Koh Kong

Prum Sambath, Provincial Fisheries Office of Koh Kong

Officials of Koh Srolav Village Community Fishery: Ly Sovanna (Chief), Sok Yona (Vice-Chief), Tan Chheng Hour, and five others

Officials of Koh Kang Village Community Fishery: Vong Dara (Chief) and nine others

Chey Pichrathma, Provincial Teamleader, Participatory Management of Mangrove Resources

Yut Phouthong, Governor of Koh Kong Province

Siem Reap

Patrick Evans, Team Leader FAO Participatory Natural Resource Management Project

Bangkok

Kelvin Passfield, Fishery Specialist, UNEP/GEF Project “Reversing Environmental Degradation Trends In The South China Sea and Gulf of Thailand”

Simon Funge-Smith, Aquaculture and Inland Fisheries Specialist, FAO Regional Office for Asia and the Pacific

PREVIOUS REVIEWS OF MARINE FISHERIES

Although Cambodia's marine fisheries have not received as much attention as the country's inland fisheries, there have been some important reviews. It may be informative to summarize the findings of those studies which have taken place in Cambodia during the previous decade and which have produced findings relevant to the management of marine fisheries.

The reviews include:

- Csavas, I., Doulman, D., Petr, T., Prado, J. & Debas, L. 1994. Cambodia – Rehabilitation and Development Needs of the Fisheries Sector.
- Flewwelling, P. 1999. Report on travel to Cambodia. Mission Report No. 25, FishCode Project MCS, FAO, Rome.
- ICLARM. 1999. Management of fisheries, coastal resources, and the coastal environment in Cambodia: institutional, legal, and policy perspectives.
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- Touch, S.T. & Todd, B. 2002. The inland and marine fisheries trade of Cambodia.
- EC. 2002. Support to the fisheries sector in Cambodia.
- Fox, M. 2002. Cambodian coastal fisheries communities.
- Try, I. 2003. Fish stocks and habitats of regional, global and transboundary significance in the South China Sea, Cambodia.

Csavas *et al.* (1994)

This was a general review by FAO of the fisheries sector, covering marine, inland and aquaculture components. The findings which are relevant to the management of marine fisheries are:

- Marine fisheries hold major promise for development and are capable of making a significant contribution to national food security.
- The activities of the private sector are regulated only to a limited extent. Disregard for management measures and the non-compliance with administrative requirements is: (a) affecting the sustainability of fisheries production; and (b) denying the administration taxation revenue.
- With respect to human resource development, Cambodia's primary need is for personnel who can operate effectively as fisheries managers.
- In inland fisheries and the inshore component of the marine fishery the principal management constraint is excessive fishing effort.
- In formulating management policy options it should be recognized that open-access commercial fishing is fundamentally inconsistent with the goal of sustainable resource use. Given the importance attached by the administration to this objective and related food security issues, effort limitation must be addressed within the context of fisheries management. Effective introduction of effort limitation programmes necessitates tight licensing control of fishers and vessels to ensure they are implemented consistently and with vigor.
- In the marine sector, management policies and strategies should focus on achieving a better spatial distribution of fishing effort within the country's territorial sea and EEZ. A policy predicated on replacing some, if not all, foreign fishers operating legally (in waters adjacent to the Koh Kong Province) and illegally, in offshore areas, is required.

- The proposed introduction of marine reserves and parks, control on the development of intensive aquaculture, and measures to prevent further destruction of mangroves, might be expected to have a positive impact on the sustained productivity in the inshore capture fishery. Such conservation benefits should reinforce the beneficial effects of effort limitation.
- Regular data collection from inshore and offshore marine fisheries is essential to determine the level of allowable sustainable pressure on fish stocks.

Flewwelling (1999)

This was an FAO-sponsored review of MCS in marine and inland fisheries. The major findings relevant to the management of marine fisheries are:

- The offshore area of Cambodia is relatively non-exploited by Cambodian fishers, although foreign fishers operate with ease in these areas. There is no offshore patrol capability in the Fisheries Department and consequently there is little enforcement of the fisheries legislation and thus free fishing for foreign vessels.
- The lack of political will for sustainable management capability is evidenced by lack of funding.
- The Inspection Division should be strengthened considerably to address MCS operations. The crux of the suggestions is to reduce the number of people reporting to the Director, leaving him/her free for management planning decisions. The second emphasis is to bring all operational control mechanisms under one central authority, instead of having them dispersed throughout regional, provincial, and national offices.
- To strengthen Cambodia's MCS, recommendations are made, including a follow-up on the legislative review, 15 types of training, establishment of a national fisheries communications network, acquiring of equipment, implementation of vessel marking, considering the registration of all fishers (free for family fishers), seeking information and assistance to encourage offshore fisheries to reduce coastal/inshore fishing pressure, and participation in regional MCS activities to strengthen international ties.
- Fisheries management without attention to MCS can result in management planning without any implementing capability.

ICLARM (1999)

This was a study sponsored by the International Center for Living Aquatic Resources Management to identify the gaps, strengths, and weaknesses of the legal and policy framework for managing fisheries, coastal resources, and the coastal environment. The major findings relevant to the management of marine fisheries are:

- A top down approach is still the predominant mode of managing natural resources in the country.
- Available policies on natural resource management in Cambodia are too demanding in relation to available financial resources.
- The main constraints to the protection, conservation, and management of coastal and environmental resources are lack of implementation of policies and the unclear responsibilities among local authorities on how these policies are to be implemented.
- The Fisheries Law of 1987 is inadequate as it has no provisions, among others, on size limits of harvestable marine fish and it does not prohibit mechanized push gear which destroys the seabed.
- Improved knowledge and skills among Government personnel in natural resource management is emphasized.

APIP (2001b)

This was a general review of marine fisheries in Cambodia by the World Bank's Agriculture Productivity Improvement Project.¹⁵ The major findings relevant to the management of marine fisheries are:

- Since 1988 marine fisheries production has grown robustly to reach 36 010 tonnes in 2000. This growth can be attributed to a number of reasons including: (a) the availability of external markets; (b) initiatives by the DoF to assist small-scale fishermen to increase their output; and (c) a focus by the administration on generating foreign exchange.
- By 2010 and 2020, it is possible that the annual production of the marine fishery could be 45 000 and 60 000 tonnes, respectively, although it is likely that a significant proportion (between 40-50 percent of the production) of high-value species will continue to be exported.
- The absence of natural resource policy and lack of updated law and legislation for environmental protection and natural resource conservation leads to poor enforcement and collusion among state bureaucracy and authority. This has encouraged rampant anarchic natural resource exploitation affecting serious natural environmental deterioration.
- Family-scale and subsistence fisheries dominate marine fisheries. The fishers are largely depending on middle agents, who provide fishing boats and fishing gears and in return buy the catch at a low price. The low acceptance of marine fish has led to a hardly-developed commercial fishery. The lack of proper monitoring, control, and surveillance has invited foreign fleets to exploit Cambodia's marine resources.
- The biggest constraints in developing the marine fisheries sector were identified as the lack of knowledge about the ongoing fishing activities and their potential for further development. To overcome these knowledge gaps, the DoF has requested the establishment of an institute for marine science, covering all aspects of marine biology to assist in developing an appropriate management plan of the marine aquatic resources under the umbrella of an overall approach to further develop and manage the coastal areas.

Touch and Todd (2002)

This was an NGO-sponsored, comprehensive review of the inland and marine fisheries trade of Cambodia. The major findings relevant to the management of marine fisheries are:

- The marine fishery today satisfies mainly the export market, rather than being primarily for domestic consumption. Marine products are exported through both legal and illegal channels.
- The DoF keepers of marine fishery production statistics can only speculate on the catches of the Thai fleet licensed to operate in Cambodian waters.
- While civil society is returning to many parts of Cambodia, resource extraction remains under the influence of powerful people and organizations.
- In the 1990s the fishery management system was almost destroyed by corruption, collusion, and anarchic disturbance.
- Export markets cannot become the saviour for fisheries development without sustainable management of declining fishery stocks and elimination of high and unpredictable "hidden costs".
- Traditional as well as modern processing has declined due to declining stocks and the competition posed to processing by smuggling raw product.
- Several of the important coastal fisheries are in a state of decline: mackerel (due to demands of Thai/Viet aquaculture industries), anchovy (due to Thai/Viet seiners using attracting lights), squid (overfishing, disruption by trawlers). Associated commercial-scale processing is also declining: fish sauce, fishmeal, frozen shrimp/fish.

¹⁵ A US\$27 million loan project which began in 1997.

- Family-scale processing mainly involves the manufacture of pastes and dried products. This includes shrimp paste and dried shrimp, squid, shark, and the fish bycatch of trawling. About 480 mt of these processed marine products worth US\$1 131 500 were produced in 2000.
- Mollusc harvesting, especially blood cockles and undulated surf clams, have recently entered into the marine fishery to replace part of the deteriorating shrimp and fin fishing.
- To enjoy more of the economic benefits of the fish trade, fishers may need to assume some of the roles and risks of the middlemen, perhaps by forming cooperatives.

EC (2002)

Although this study was primarily focused on inland fisheries, there are some observations on marine fisheries and some of the conclusion are equally applicable to both marine and inland fisheries. The major findings relevant to the management of marine fisheries are:

- It is not the shortcomings of the legal framework that have brought about the present anarchy in inland fisheries, but rather the lack of enforcement of the existing legal provisions.
- At the village level there are no traditional, locally-evolved resource management structures upon which community-based natural resource management could be founded.
- The dominant role of external assistance, especially by the NGOs, has limited the degree of village ownership of emerging community management institutions. The people-based village institutions which have emerged following community fishing “reform” are less demand than donor driven.
- Presently neither fishing communities nor Government structures have the means to effectively manage the resource. Uncontrolled access will in the long-term deplete the resource and create endless conflicts among users, destabilizing emerging user organizations. Therefore in the medium and long-term, access limitation will be vital.
- For marine fisheries, data are unavailable and/or inconsistent, but it is widely recognized that the sector is subject to indiscriminate and destructive exploitation by local and foreign power groups. The mission feels that pressing problems like the illegal intrusion of foreign vessels, large-scale sell off to and deforestation of mangrove habitats by shrimp culture ventures and destruction of coral reefs should be addressed urgently by comprehensive donor community support.

Fox (2002)

This was a study by an individual from the DoF’s Community Fisheries Development Office on the opportunities and constraints for the establishment of community fisheries in Cambodia’s coastal zone. The major findings relevant to the management of marine fisheries are:

- Coastal fishers identified as threats to their livelihoods conflict between fishing sectors, debt, increasing number of fishers, low return on catches, land ownership, regulation, and illegal/unsustainable fishing practices.
- With regard to establishment of community fisheries, key constraints for DoF operating at the provincial level are lack of appropriate vehicles/vessels, funding for field work, staff trained in facilitation, legislative framework, information on community-based management, coordination within Government departments, and trust within communities of DoF staff.

Try (2003)

This was a general review of Cambodian marine fisheries and was promoted by the UNEP project “Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand”. The major findings relevant to the management of marine fisheries are:

- The system and methods for collecting marine capture fisheries data have not yet been developed and the Department of Fisheries is still looking for NGOs or other agencies to help with this issue.
- So far very little is known of the status of fish stocks in Cambodia's marine waters. There are concerns of stock depletion in the marine fishery, although with no substantial stock assessments conducted, the status of the resource is largely unknown.
- Catch statistics have varied substantially reporting 1 200 tonnes in 1980, 39 900 tonnes in 1990, and dropping to 29 800 tonnes in 1997. While harvest data is collected by the Department of Fisheries from commercial fishers, there are concerns relating to the accuracy of these figures as they do not include catches from illegal fishing vessels, both foreign and domestic, and other fishing vessels' landed catch outside the country. Nor are there any reports of the amounts caught by subsistence fishers.
- There is currently no cap in place on fishing effort for subsistence fishers or licensed small and middle scale fishers. As such, there appears to be a growing number of fishers participating in the marine fishery and this is likely to increase further with increases in rural populations. The low initial investment and open access are attractive for impoverished people to begin fishing for their livelihood.
- There is increasing competition for access to the resource, improved gear technology and increases in the numbers of fishers and in their upgrading of fishing capacity. A continued uncontrolled harvest will most likely lead to the decline and possible collapse of Cambodia's marine fisheries.
- The educational level of fishers and their families is very low, and it is important that information about marine ecosystems and biodiversity is disseminated to these people. Increased community participation in fisheries management requires that stakeholders make informed decisions, and this is only possible if the stakeholders have all the available information.
- It is recommended that collaborative research in the Cambodian section of the Gulf of Thailand be initiated. Areas of specific importance are reproductive biology, population dynamics and ecology of commercial fish species. Also, quantitative studies of benthic and pelagic invertebrates, which constitute the food for commercial species, should be given high priority.
- As overfishing is already rampant in Cambodian waters, measures should be taken to regulate catches through closed periods (during which fishing is prohibited), closed areas ("no-take zones"), or regulating the number of licenses. If steps are taken to control or reduce the number of subsistence fishers, alternative income sources should be explored.