

Report of the

**FOUR GEF/UNEP/FAO REGIONAL WORKSHOPS ON REDUCING THE IMPACT OF
TROPICAL SHRIMP TRAWL FISHERIES**

Lagos, Nigeria, 15-17 December 1999

Puntarenas, Costa Rica, 15-17 January 2000

Teheran, Iran, 28 February-1 March 2000

Denpasar, Bali, Indonesia, 6-8 March 2000



**Food
and
Agriculture
Organization
of
the
United
Nations**

Report of the

**FOUR GEF/UNEP/FAO REGIONAL WORKSHOPS ON REDUCING THE IMPACT OF
TROPICAL SHRIMP TRAWL FISHERIES**

**Lagos, Nigeria, 15-17 December 1999
Puntareñas, Costa Rica, 15-17 January 2000
Teheran, Iran, 28 February-1 March 2000
Denpasar, Bali, Indonesia, 6-8 March 2000**

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 2000

PREPARATION OF THIS DOCUMENT

After a preparatory process which was initiated in 1995 by the Fisheries Department of FAO, the Global Environment Facility (GEF) of the United Nations Environment Programme (UNEP) in December 1998 decided to fund a Project Development and Preparation Facility (PDF) of a project entitled “Reducing the impact of tropical shrimp trawling fisheries on living marine resources through the adoption of environmentally friendly techniques and practices”. In the process leading up to the project approval, several countries with important shrimp fisheries in tropical regions were invited to participate. Thirteen countries decided to participate in the project development phase.

A workshop involving the National Coordinators of each of the participating countries was held at FAO Headquarters on 17-19 March 1999 with the primary objective of agreeing on a common approach to development of a full project.

Each participating country conducted basic studies on the environmental impact of their shrimp fisheries. These findings were summarized in national reports developed in a common format. The national reports will be published in a supplement to this report.

To evaluate the impact of shrimp trawling in a regional context, four regional workshops were arranged in Nigeria, Costa Rica, Iran and Indonesia. These workshops also discussed priorities for project activities to be executed in each region in a full project.

This report provides a summary of findings and discussions in all four workshops. The text has been prepared by the FAO Secretariat based on notes taken at each of the workshops.

Distribution:

National Coordinators

Workshop participants

Fisheries Officers in FAO Regional and Subregional Offices

GEF Focal points in participating countries

Directors of Fisheries

UNEP

FAO.

Report of the four GEF/UNEP/FAO Regional Workshops on Reducing the Impact of Tropical Shrimp Trawl Fisheries. Lagos, Nigeria, 15-17 December 1999. Puntareñas, Costa Rica, 15-17 January 2000. Teheran, Iran, 28 February-1 March 2000. Denpasar, Bali, Indonesia, 6-8 March 2000.

FAO Fisheries Report. No. 627. Rome, FAO. 2000. 40p.

ABSTRACT

As part of the development of the project “Reducing the impact of tropical shrimp trawling fisheries on living marine resources through the adoption of environmentally friendly techniques and practices”, mainly funded by the Global Environment Facility (GEF), four regional workshops were conducted during the period between December 1999 and March 2000 in Nigeria, Costa Rica, Iran and Indonesia.

The main objectives of the workshops were to review the situation with regard to impact on the environment of shrimp trawling in each of the four regions and in the 13 participating countries in particular, and to discuss and agree on regional priorities and content of a possible main phase project.

Reports from baseline studies in each of the 13 countries were presented. The most serious problems identified were capture and discard of juvenile food fish and high discard levels of most non-shrimp catch. It was also reported that more and more countries are introducing regulations to reduce discarding of bycatch. In some countries collecting, landing, processing and selling bycatch has become a new and viable occupation for coastal communities. Reduced shrimp catches and different levels of management action, like seasonal closure and mesh size regulations were reported by some countries. Conflicts about the use of fishing grounds and resources between industrial and artisanal fishers was reported to be widespread. The impact of trawling on the bottom habitat is an area where little knowledge exists among the participating countries. It was, however, realized that such impact might be important for some areas and the need for research within this field was stressed. Some countries have in their regulations the mandatory use of the Turtle Excluder Device, but many of these reported low compliance with such regulations.

CONTENTS

| | Page |
|--|-------------|
| Introduction | 1 |
| I. Regional Workshop in Africa | 3 |
| II. Regional Workshop in the Caribbean and Latin America | 9 |
| III. Regional Workshop in the Persian Gulf | 15 |
| IV. Regional Workshop in Asia | 21 |
| Appendix 1: Agenda of the workshops | 29 |
| Appendix 2: Lists of participants | 31 |

Introduction

1. Within the preparatory phase of the project four regional workshops were conducted:
 - I. Africa: Lagos, Nigeria; 15-17 December 1999
 - II. Caribbean and Latin America: Puntareñas, Costa Rica; 15-17 January 2000
 - III. Persian Gulf: Teheran, Iran; 28 February-1 March 2000
 - IV. Asia: Denpasar, Bali, Indonesia; 6-8 March 2000
2. All workshops had similar objectives:
 - discuss and review the available information concerning the impacts of shrimp trawling at the national level;
 - to assess the impacts of the trawl fishery from a regional perspective and determine regional priorities for action in the main-phase project; and,
 - prepare an outline of elements to be included in the main-phase project, including development priorities and activities; strategy for participating institutions and industry, and networking requirements during the project.
3. The workshops were attended by the National Coordinators and in most cases also by representatives from fisheries administrations and the shrimp fishing industry (skippers, managers or technicians of shrimp fishing company, representatives from fishermen's organizations) from each of the thirteen countries which were officially participating in the project. In addition individuals from neighbouring countries involved in shrimp fishing, were invited to attend the workshops. Altogether 22 countries from the four regions were represented in the four workshops.
4. In addition to resource persons from FAO (from Headquarters and the Regional Offices), experts in bycatch reduction technology (Matt Broadhurst), shrimp fishery modeling (Juan C. Seijo), and financing (Messrs Jumbeli and Sing) participated in the meeting in Nigeria, Costa Rica and Indonesia, respectively. Representatives from UNEP participated in the workshops in Nigeria and Costa Rica.
5. The agenda of the four workshops was similar (Appendix 1) with slight adjustments to include specific aspects of the local situations and, to a certain extent, so that the regional consultations would complement each other. The workshops were chaired by someone from the region, usually the National Coordinator of one of the participating country in the concerned region..
6. A major session of each of the workshops was dedicated to a presentation of the shrimp fisheries situation in the participating countries. The National Coordinators of the countries officially participating in the Project Development and Preparation Phase provided summaries of their National Report on Shrimp Fisheries prepared according to a format agreed at the Coordination Workshop in March 1999. Participants from other countries of the regions were invited to briefly describe the situation with regard to shrimp fisheries and any environmental problems encountered in these fisheries.
7. As an introduction to discussions about technical possibilities and regional priorities, three general documents were prepared and presented by FAO staff:

- i Bycatch reduction technologies for shrimp trawl fisheries (John Valdemarsen, Fishing Technology Service, FIIT).
 - ii Alternative to trawl shrimp fishing methods (Joël Prado, Fishing Technology Service, FIIT).
 - iii Important elements concerning communication (Michelle Owens and Lydda Gaviria, Extension, Education and Communication Service, SDRE,).
8. In addition, there were at each of the workshops a brief presentation concerning "various vessel deck arrangements developed in Australia to separate shrimp and bycatch in the water tank and to accelerate the discarding of unwanted bycatch in the optimal conditions increasing the chance of survival to the discarded fish: "one of the options to reduce mid-term impact on living resources" (Matt Broadhurst (invited expert)).
9. As mentioned above, in order to extend the discussion to some other important aspects, two additional topics were added to the standard Agenda of two of the meetings: - "the factors affecting the strategy of fishing fleets, in general, those involved in shrimp fisheries, in particular, and proper management taking into account uncertainties and "externalities" (introduced and discussed at the regional workshop for the Caribbean and Latin America) and - "How to meet the costs related to the introduction of environmentally friendly techniques and practices toward responsible shrimp fisheries - the role of financial institutions, government and fishing industry" (a panel discussion during the regional workshop for Asia).
10. In the introduction of the agenda item dealing with possible elements of the main phase project, it was clearly stated by the organizers, FAO, that a commitment both financially and in policy from the participating countries is a requirement to be considered for participation in follow-up activities. It was also advised that GEF funding is restricted to so-called "incremental costs" meaning the cost of an activity beyond the national ones initiated to achieve an environmental objective.

I. REGIONAL WORKSHOP IN AFRICA Lagos, Nigeria, 15-17 December 1999

Introduction

11. The Workshop was held in Eko Meridian hotel in Lagos. The main working language was English, but an English-French interpreter translated most of the interventions. List of participants is shown in **Appendix 2a**.
12. The opening address from the host government was delivered by Mr V.O. Adebolu, Deputy Director of Fisheries on behalf of the Honourable Minister for Agriculture and Rural Development. He expressed the concern of the Hon. Minister about the significant loss of fish biodiversity and habitat degradation attributed to uncontrolled shrimp trawl fisheries worldwide. He concluded that Nigeria would be willing to adopt any environmentally friendly technique and practice recommended at the end of the workshop, believing it would not have much negative socio-economic impact on the artisanal fishermen or the industrial trawler operators and other stakeholders.
13. Mr Valdemarsen, FAO, addressed the meeting on behalf of his organization and among others stressed the importance of joining forces on a global scale to solve problems with bycatch and discards in tropical shrimp trawl fisheries.

Situation of the shrimp fisheries

14. The delegates from the three countries in Africa participating in the Project Development and Preparation phase, Cameroon, Nigeria and Tanzania gave brief presentations of the situation of the shrimp fisheries.
15. **Cameroon** has presently 65 licensed shrimp trawlers mainly operated by "Time Charter" companies, a kind of joint venture with foreign ownership. The official landings of shrimp are around 500 tonnes/year but this figure is believed to be an under-estimate as some of the "Time Charter" companies are not declaring the real quantities caught. The main shrimp targets are pink shrimp (*Penaeus notialis*) in 30-60 m depth and Guinea (brown) shrimp (*Parapenaeopsis atlantica*) together with grey shrimp (*Penaeus kerathurus*) in shallower 10-30 m depth. It was also reported recently that giant *Penaeus monodon* are captured in Cameroon waters. This is a shrimp species that is not native to the region and must thus have been transferred from other regions. In addition to industrial trawlers, approximately 200 fishing canoes are exploiting small estuary shrimp (*Nematopalaemon hastatus*) with very small meshed conical nets (ngoto). It was also reported that two-boat trawling is increasing in shallow waters, targeting mainly fish. Shrimp trawlers also catch large amounts of fish as bycatch. Some of the fish bycatch, including a certain amount of juveniles, is landed for the local market, but, undoubtedly, a significant amounts of low-valued fish and juveniles is also discarded at sea. It was concluded that: (i) the capture of juvenile food fish was a threat to a sustainable exploitation of demersal fish resources and (ii) trawling in shallow waters created serious conflicts with artisanal fishers.
16. **Nigeria** has the largest shrimp trawler fleet in the region with 264 (1999) licensed vessels catching approximately 10 000 tonnes/year. The target species are the same as in Cameroon, *Penaeus notialis* in deeper (15-60 m) and mainly *Parapenaeopsis atlantica* in shallower water

(7-15 m). As reported for Cameroon the non-native giant prawn *Penaeus monodon* is increasing in abundance. One company with 10 trawlers reported 2 tonnes catches of this specimen during recent fishing trips in 1999. Bycatch of fish is significant and a system of landing most of these catches has developed rapidly in the country. The shrimp trawlers freeze the valuable catch; many companies have in fact introduced cruise targets for catches of shrimp and fish: for instance, 10-12 tonnes of shrimp and 17-25 tonnes of fish for a 4-5 week trip in the season. The remaining fish bycatch is traded at sea through a system where motorized canoes buy the fish and transport it to shore where it is processed and marketed. This latter practice now involves a significant number of people who make a living from this activity (for some people, this kind of trade now replaces fishing); it is also a major source of income for the trawler crew who are poorly paid, less than US\$ 20/month, (it is worth observing that this business, out of the control of the vessel owners is, in general, badly perceived by them). The negative side of this practice is that shrimp trawlers now aim to catch as much fish as possible, often in shallow waters where fish and also juveniles are most abundant. As trawling for fish is often conducted in shallow waters, where the artisanal fleet also operates, conflicts including damage to gear is an increasing problem. The control of the operation of fishing vessels (MCS system) is poorly developed to combat this questionable fishing practice.

17. **Tanzania** has 20 licensed, foreign owned outrigger shrimp trawlers in 1999. The annual catch for this fleet is approximately 1000 tonnes, comprising of 66% white prawn (*Penaeus indicus*), 18% giant prawn (*Penaeus monodon*) and tiger prawn (*Penaeus semisulcatus*), 15% brown shrimp (*Metapenaeus monoceros*) and 1% of flower shrimp (*Penaeus japonicus*). The shrimp resources are also exploited by artisanal fishers using a variety of gears, like traps, seines and gillnets. Estimated landings from this fleet segment are 700 tonnes, including small sized shrimp species as well as juveniles. Trawling for shrimp in Tanzania is banned in December, January and February and night fishing (between 6 pm and 6 am) is prohibited. Bycatch of fish, including juveniles is considered a major problem also in the trawl fisheries in Tanzania. Some of the fish bycatch is transhipped/sold to smaller collector vessels at sea, but most of the unwanted bycatch is discarded at sea.
18. Industry representatives from Cote d'Ivoire, Senegal, Gambia and Ghana reported about similar problems with bycatch of fish, mainly juveniles, and an ongoing conflict between shrimp trawlers and artisanal fishers. The representative from Mozambique reported of about 13-14 000 tonnes annual shrimp catch, significant bycatch problems and likewise conflict between artisanal fishers and shrimp trawlers.

Summary of discussions

19. For most countries it was apparent that good data on the amount and composition of bycatch was lacking. It was, however, obvious that most countries considered catch of juveniles as a widespread problem. It was also noted that the problem with bycatch of juvenile fish was less for shrimp fisheries conducted in deeper waters. Some countries land most of the bycatch, and a socio-economic activity based on such products has developed, particularly in Nigeria.
20. Impact of trawling on the bottom habitat is an area where there is not much exact knowledge. Some participants argued that other elements have more severe impact on the bottom habitat than trawling e.g. dumping from ships and pollution from land based industries. Some even argued that trawling helped to increase marine production by

discarding captured biological material and by damaging benthos, which then enter the food chain.

21. Concerning change of fishing practice, Nigeria reported that the Turtle Excluder Device was made mandatory in the shrimp fishery. It was, however, indicated that the implementation of this measure was ineffective, as fishers experienced loss of shrimp catch while using TEDs and that the MCS is poor. It was also stated that turtles were seldom taken in a shrimp trawl and that other causes of harm to turtles, like egg removal from the beaches, were a more serious threat to the turtle populations. It was, however, recognised that the incidental catch of turtles should be fully avoided in shrimp trawls, and that appropriate technology should be introduced when such a bycatch exists.
22. All participating countries reported on problems with juvenile fish bycatch. Regulation until now has been based on mesh size of the codend. Nigeria reported promising results by a shrimp company using 60 mm mesh size, compared to the presently used 44 mm. Cameroon informed that 25 mm was the mesh size commonly in use, and that 35 mm was considered for new regulations. It was agreed that all countries in the region should strive to have similar mesh size regulations. Square mesh codends were considered as a possible option to reduce juvenile fish bycatch. The representative from Cameroon proposed that some fishing grounds should be made non-trawlable through deposit of ship wrecks. It was also proposed that closed seasons should be implemented to protect juvenile fish and shrimp.
23. Information was considered an important aspect for the success of a project aiming to reduce the environmental impact of shrimp trawling. It was stressed that FAO, as the executing agency, has a special responsibility to disseminate relevant information to all parties involved, and that creation of an internet Web-page was considered to be a useful tool in that regard. Nigeria offered to play an important role in the region, by providing research facilities and to coordinate research and other monitoring activities.
24. Incentives to modify fishing practice are often required. In the Nigerian shrimp trawl fisheries the capture of juveniles is, practically, encouraged by the high demand for fish bycatch by collector vessels. The socio-economic forces behind this practice are obviously so strong that it will require major incentives in many fields to change practices. Higher wages for trawler crews and alternative occupation for people who are involved in bycatch trading, processing and marketing are possible options. As trading of bycatch is often out of the control of the vessel owners there is probably a common interest between the vessel owners and the local authorities to regulate this activity.
25. Finally, participants of the shrimp fishing industry sectors, from Cameroon, Côte d'Ivoire, Gambia and Senegal presented a Resolution stating that they agree, in principle, to put into operation the appropriate bycatch reduction technologies (calling in this respect for cooperation in the field of information and training) but that governments and international bodies should have mechanisms to compensate for investments and incremental cost required for the implementation of responsible fisheries concepts, in general and should take into consideration the immediate negative social consequences resulting from such changes. These countries ask that, within the project, FAO take action to reduce the secondary effects on stakeholders resulting from the introduction and implementation of any measure aiming to reduce the environmental impact.

26. A group consisting of the national coordinators, supported by industry representatives from Nigeria and Cameroon developed through discussion a draft proposal of regional priorities of problems and solutions/activities to be addressed in a main phase project. The outcome, which is shown in **Table 1** was adopted in a plenary session. (The table has been slightly modified to harmonise it with the outcomes of the other workshops.)

Table 1 Identified problems and proposed activities to be included in the main phase project in the West African region

| Problem | Impact | Project activities | Output | Groups involved | Implementing/ funding agency |
|------------------------------------|---|---|--|--|---|
| I. Capture of juvenile fish | <u>Biological</u> - Recruitment failure - Biodiversity change - Collapse of fisheries | -Public awareness building (TV programmes, talk shows) - Local production of BRDs - Field testing of BRDs - Training of personnel - Survey and research | -Acceptance of the need for change in fishing practice - Adoption of fishing practice which reduces juvenile bycatch | - Fishers - Research institutions - National government - International experts | - National government - FAO - GEF - Fishing industry |
| | <u>Social</u> - Encourage trade in trash fish - Encourage shrimp trawlers to fish in shallow waters and thereby causing conflict with artisanal fishers | - Regular meetings between industry and artisanal fishers - Public enlightenment campaigns - Artisanal fisher development/empowerment programmes - costed group loan packages | - Reduced capture and trade of juvenile fish - Alternative occupations for people involved in collection of fish bycatch at sea | - Fishers - Fish bycatch collectors - Fish traders - Research institutions - National government | - National government - FAO - GEF - Fishing industry |
| | <u>Administrative/ Management</u> - Violation of non-trawl zones - Inadequately equipped MCS | - Regular meetings between industry/stakeholders and the administration at national level - Establish MSC where non-existing and strengthen existing ones -Harmonization of fishing regulation within the region | - An improved MSC - Common regulations for the region - Reduced conflicts between trawlers and artisanal fishers | - National government - Regional fishery body - Fishers - Fishing surveyors - International experts | - National government - FAO - GEF - Fishing industry |
| II. Degradation of the environment | -Destabilisation of the ecosystem and the food chain - Dislodgement of the benthic community | -Underwater surveys to evaluate the level of degradation of sea bottom and dislodgement of benthic fauna - Research on short and long term habitat degradation | - Knowledge about trawling impact on the bottom habitat | - Fishers - Research institution - Environmental groups - International expert - National government | - National government - FAO - GEF - Fishing industry |
| III. Overcapacity | Overexploitation of resources leading to collapse of some fisheries | - Stop licensing new vessels - Reallocation of fishing effort to exploit unharvested resources within the EEZ - Negotiation bilateral fishing rights in EEZs of other countries - Continue assessment of the resources | - Reduction of the numbers of shrimp trawlers - Increased production from the shrimp resources | - National government - Regional fishery body - Fishers | - National government - FAO - Fishing industry |

II. REGIONAL WORKSHOP IN THE CARIBBEAN AND LATIN AMERICA Puntareñas, Costa Rica, 15-17 January 2000

Introduction

27. The workshop was held in the Fiesta Hotel in Puntareñas. The main working language was English, but with an English-Spanish simultaneous interpretation. The List of Participants is shown in **Appendix 2b**.

Situation of shrimp fisheries

28. **Colombia** has shrimp fisheries on both sides of the country on the Pacific and the Atlantic coasts. On the Pacific coast operates 115 units, mainly small boats, 70% of them operating in coastal areas (where artisanal fishers also exploit shrimp and fish resources with other small meshed fishing gear). In 1996, 4 139 tons of shrimp were caught on the Pacific side. At the same time the Pacific fishery is developing quickly, it is estimated that the shrimp resources are over-exploited. Recent progress in technology has led to diversification of the fishing effort toward deeper shrimp species. Regarding bycatch, the estimate would be 14 664 tons of incidental catch (out of which many juveniles). Normally this bycatch is kept for the local market and in many fishing companies these are sold as a bonus for crewmembers. On the Caribbean coast the fleet consists of various sizes of vessels, but more than half are larger trawlers. The shrimp caught in the Caribbean in 1996 was 916 tons and it is estimated that the shrimp resource is over-exploited. The fishery is decreasing seriously in terms of catch. The bycatch on the Atlantic side would be almost 9 868 tons. It is indicated that 4 kg of bycatch is discarded for every kilogramme of shrimp.
29. **Costa Rica** has 73 trawlers ("Florida type" with outriggers) that operate on the Pacific side of the country. The annual shrimp catch amounts to approximately 2 000 tonnes. The estimate is a total amount of bycatch of 3 000 t/year, of which around 2 400 t are discarded. There would be around 7.5 kg of bycatch for 1 kg of shrimp. When fishing in coastal waters the use of a Turtle Excluder Device (TED) is mandatory in shallower waters less than 80 fathoms. A Vessel Monitoring System (VMS) exists. High discard rates, particularly of juveniles and overfishing of the resources in general, are reported
30. **Cuba** has a fleet of 51 fishing vessels involved in shrimp trawling activities, fishing mainly at night and 14 support vessels, which ensure a daily transfer of shrimp and incidental catch to the ports. The annual catch of shrimp is 2000 tonnes in addition to 11 000 tonnes of fish in a combined trawl fishery. The average trawl catch in recent years is close to 6 to 8 kg of fish for 1 kg of shrimp. There is no discard: approximately 22% of the non-shrimp catch are landed for human consumption, the rest is reduced to fishmeal or silage for animal consumption. The shrimp fishing grounds are well demarcated and there are fishing closures during recruitment seasons and other regulations exist for reducing fishing effort and the protection of areas with a known high density of juveniles or large quantities of small size fish.
31. **Trinidad & Tobago** has a fleet of 126 vessels, of which 19 are industrial trawlers (in 1998) operating, according to existing regulation, offshore in deeper waters while smaller boats fish in more coastal waters. The annual landings of shrimp (several species mixed) are

around 1 000 tonnes. A significant quantity of finfish, squid and crabs are caught as bycatch (certain species of finfish may be targeted according to market demand, or during the wet season when shrimp abundance decreases). According to estimates, the small trawlers discard almost all the bycatch, while larger industrial or semi-industrial trawlers normally keep around 40 % of their bycatch on board. In order to conform with US requirements for shrimp exporting nations, the large trawlers carry Turtle Exclusion Devices (TEDs) on board (The local Fishery Authorities give high priority to the development and introduction of a combined turtle and fish excluder). Existing regulations require a different size of mesh according to whether the trawler targets shrimp or fish. A major concern is overfishing and capture of juvenile (prespawning) shrimp. A conflict exists between trawling and other fishing methods (gillnets, pots, demersal longlining, and handlines), because artisanal fishers blame the trawlers for the depletion of the demersal fish stocks.

32. **Venezuela** has a fleet of 351 trawlers. In 1997, the landings of the shrimp trawlers amounted to 3 665 tonnes of shrimp and almost 20,000 tonnes of fish. The trawl fishery is a combined fishery for shrimp, molluscs and fish. The shrimp component represents between 2.5 and 6% of the general catch. Of the additional catch, 30-35% is normally landed, the remaining 60-65% (mainly fish, with an estimated 80% of juveniles from species of commercial interest) is discarded. In principle, Turtles Excluder Devices are used on board industrial trawlers (however, significant losses of fish and shrimp are reported). For administrative purposes, the fishing grounds are demarcated into zones with a portion of the fleets authorized to fish in each of them. Technological research has been carried out for a number of years to reduce the discards and assess the impact of the use of excluder devices fixed on the net. In addition, regular surveys are carried out to estimate the amount of by-catch produced by the vessels, its composition, size structure, and geographical distribution. Concern is expressed for overexploitation of shrimp resources, particularly in coastal areas, and capture of juvenile fish.
33. The shrimp fishing fleet of **Mexico** consisted (in 1996) in 2260 registred units (but only 1847 in activity), of which 1475 on the Pacific side and 785 in the Gulf of Mexico and Caribbea. For the 1994/1995, there were around 1,200 shrimpers in activity on the Pacific side and around 600 in activity in the Gulf of Mexico. Shrimp vessel are 21 - 27 m long, the most common is around 23 m long with more than 20 tons capacity for an authonomy of 14 to 30 days. The fleet is relatively old, with an average age of the vessels of 17-19 year. In coastal waters smaller boats are used (fiberglass or wooden) on both sides, 5 to 15 m long. The shrimp production is (in 1996) around 79,000 tons (around 5 % of the total fish production); its value is estimated to US\$ almost US\$ 300,000 million. 72% are from the Pacific side and 25 % are from the Gulf of Mexico, The industrial shrimp fishery produces (in 1996) around 39,000 tons. Repartition of the production from industrial sector: (in 1996): Sinaloa, 25.5%; Sonora, 23.6; Tamaulipas, 17.5; Campeche, 13.4 The average production per vessel would be around 15.8 ton of beheaded shrimp on the Pacific side and 18.5 ton in the Gulf of Mexico. TED was made mandatory in 1994 in the Gulf of Mexico and Caribbea, in 1996 for the Pacific side.

Summary of discussion

34. In addition to the standard introduction to the discussion about possible elements to be included in a main phase project by FAO (see Introduction) two presentation were given: "Shrimp bycatch, discards and utilization" (F. Teutscher, FAO) and "the factors affecting the strategy of fishing fleets, in general, those involved in shrimp fisheries, in particular, and

proper management taking into account uncertainties and "externalities" (Dr. Juan Carlos Seijo, invited expert).

35. It is observed that in most of the countries of the region, the overall catch of shrimp are levelling out or, in places, even decreasing, while the overall catch of "bycatch" is increasing.
36. The reason for the decrease of shrimp catch is not certain but could result from environmental factors combined with some over-exploitation. The increased bycatch can, to a certain extent, result from the fact that more bycatch is kept and therefore also appears in the official statistics.
37. The increased exploitation of bycatch and the development of market for such products, is mainly explained by the reduced catch of the target shrimps and an increasing demand of cheap fish products. The overall result of the above mentioned changes is that the former shrimp fisheries are practically becoming now more multi-species fisheries.
38. The shrimp catches also consists of smaller sized shrimp than previously, either small individuals of traditional large offshore shrimp or new smaller shrimp species from coastal waters. The problem is that separating small shrimp from fish could be difficult.
39. In general, there is serious lack of the necessary biological data concerning the fish stocks exploited, ecosystems and environmental factors (the last being assumed to be of particular importance in the sub-region of the Guyana-Brazil continental shelf). Efforts to reduce the uncertainties in this field should be given high priority.
40. It is observed that in most of the countries the bycatch from artisanal fisheries is very large, and discarding are often higher than in the industrial sector. Consequently, development of bycatch reduction technology should focus first on artisanal fisheries. However, the artisanal sector should be better documented.
41. A lack of proper organization of the artisanal sector is observed in several countries.
42. Fishermen participation is considered, in general, as crucial and even a pre-requisite for the introduction of any change within the industry. In this connection, the national or local professional organizations, where existing (such as the National Committee in Venezuela) should be strengthened, as well as structure for extension. It was also stated that when any contribution or information is required from industry (or any stakeholder), it is very important that the "contributor" get a feedback in return (regarding how his contribution or the information was used and any results from it).
43. In many cases, technology transfer is suitable and well appropriate. However, in most cases, adjustments of the technology are necessary (i.e. Mexican Bycatch Reduction Technology which was developed for a sandy bottom should, for introduction to fishing grounds of Venezuela, be adapted for a very soft muddy bottom).
44. In general, the situation varies much, in many aspects, from country to country. It is necessary, before starting a programme, to properly assess the situation in an individual country (as done with, as a first step, the preparation of detailed National Reports in each of the participating countries).

45. Concerning biological aspect, it is worth mentioning that mid-term perspectives considering the potential impact on the ecosystem are important regarding the intensive exploitation of small fish: in this respect, an acceptable compromise should be found between the value, in terms of food and money, expected from the marketing of bycatch and the possible medium-term impact on resources.
46. Regarding the development of bycatch reduction technology, the difficulty to combine on a trawl the imposed TED and, in addition, a new BRD (Bycatch Reduction Device), was pointed out by several participants (and poor results were reported in this respect: loss of fish (often large) and shrimp). With TEDs only after they were imposed, a loss of shrimp was observed.
47. In general, technological research for bycatch reduction is pretty well advanced in Mexico (in spite of the fact that the concerned industry does not seem very keen about any change!).
48. In this respect, the participants indicated that, in general, the shrimp fishing industry, is not very keen to reduce bycatch.
49. The degree of bycatch utilization varies much from country to country: very high in Cuba, low in Mexico. In this respect, it is worth mentioning that the situation in a given country should not, in any way, be taken, as such, as a model since the socio-economic situations may greatly differ.
50. In several countries the local fish markets are, to a certain extent, flooded with low value bycatch (i.e. Venezuela).
51. In Guyana, the fishery authorities require vessels to land 4000 lb per trip of by-catch to fulfil the increasing demand of fish food from the local population.
52. The value addition of the bycatch, including through technological transfer, should be considered.
53. It was pointed out by participants that the increased marketing of bycatch, in general, creates a risk for the existing local fish market.
54. At the end of the second day of the workshop, the participants started having more in-depth discussion regarding the various activities they consider would be important to include in the Main-Phase Project. **Table 2** summarizes the suggestions/recommendations prepared by separate sub-groups, each of them elaborating on specific subjects they chose. (The table has been modified to harmonise it with the outcome of the other workshops.)

Follow up activities

55. Regarding the overall process, the present phase of project development, as well as the execution of the larger project which may result from it, the crucial role of the FAO Regional Office was underlined to ensure proper coordination of the activities and related programmes carried out in the countries.

56. The representative from GEF stated that cash contributions as co-funding are required. This along with well-defined in-kind country contributions may be sufficient from the countries willing to be involved. In this connection, it was observed that a countries may be able to contribute from national budgets to national programmes more easily than to a regional one.
57. The participants insisted that the process be placed on fast forward. In this regard, they would like a preliminary draft proposal which would provide the context for discussions with the stakeholders in their respective countries and in seeking the participation and inputs of government and industry.

Table 2 Identified problems and proposed activities to be included in the main phase project for the Caribbean and Latin American region

| Problem | Impact | Project activities | Output | Groups involved | Implementing/funding agency |
|---|--|---|---|--|------------------------------------|
| I. Lack of information about bycatch level, species composition and discard level | - Impossible to access the magnitude of the problem - Problems to convince the industry about the need to change practice | - Observer training - Develop a field identification guide - Popularise scientific documents - Coordinated sub-regional observer programmes - Resource survey programmes | - Basic information required evaluation impact of a change of fishing practice. - Acceptance of a need for change of practice | - Fishing industry - Regional fishery organisation - Research institutes - FAO resource experts | National government FAO |
| II. Bycatch and discarding of fish, particularly juvenile food fish | - Wastage of fish as food - Reduced production of food fish species | - Develop suitable BRDs for all sizes of trawlers - Testing of alternative fishing methods for shrimp - Increased landings of unavoidable bycatch/ product development/marketing of bycatch | - Reduced capture of juvenile fish - BRDs widely used by the industry - More shrimp is captured with alternative methods - Increased landings and use of unavoidable bycatch | - Fishing industry - Research institutes - International fishing technologist | National government GEF FAO |
| III. Improper management aimed to reduce unwanted bycatch | - Bycatch fishing practice continues - Conflicts between trawlers and artisanal fishers | - Bio-economic as social analysis of management of industrial and artisanal fleets - Study of monitoring and enforcement costs - Space/time analysis of multi-fleet/gear bottom trawling | - Strategies for implementation of more responsible management options | - Fishing industry - Fisheries managers - Research institutes - Regional fisheries bodies - National fisheries departments | National government FAO GEF |
| IV. Possible damage of bottom habitats from trawling activities | - Possible alteration of biodiversity | - Training and information | - Awareness of any problems related to damage of bottom habitats | - Fishing industry - Information expert | National government FAO GEF |

III. REGIONAL WORKSHOP IN THE PERSIAN GULF

Teheran, Iran, 28 February-1 March 2000

Introduction

58. The Workshop was organised by the Fisheries Company of Iran (SHILAT). The main working language was English, but an English-Farsi translation was given for the interventions during the opening ceremony. The list of participants is shown in **Appendix 2c**.
59. An opening address was given by Mr Jalali, Deputy Minister and Managing Director of Shilat. He introduced the Iranian fisheries and stated clearly that reduction of bycatch in shrimp fisheries is a priority area for Shilat. He also stressed the importance of other Gulf countries having a similar agenda and that cooperative efforts should be promoted. The National Coordinator from Iran of the project introduced some of the issues related to shrimp fisheries. He noted that assistance provided by FAO in 1997 through practical testing and demonstration of Bycatch Reduction Devices (BRD), had been useful for development of such tools in the Iranian shrimp fisheries

Situation of the shrimp fisheries

60. The main contributions in the first working session were from the two core participating countries; Bahrain and Iran which provided detailed information on the shrimp fishing industry in the two countries.
61. **Bahrain** reported 2 571 tonnes of shrimp catch in 1997, which is 25.6% of the total catch in the country. During the period 1980-1997, the maximum shrimp landings of 3 565 tonnes were in 1996, while the lowest catch of 752 tonnes was recorded during the Gulf war in 1992. Shrimp trawling was developed in 1967, and the fleet consisted originally of outrigger trawlers towing two trawls. These have now been replaced by traditional vessels ("banoush") towing only one trawl. In the 1997/98 shrimp season there were 335 operational vessels of varying sizes, between 5 and 23 meters in total length. Although it has been known that a significant amount of fish bycatch is captured together with the shrimp, reliable data did not exist prior to the ongoing two-year survey aimed at monitoring such bycatch. Results from this survey have not been published yet. Bahrain has also conducted experiments with a bycatch reduction device during the 1999/2000 season. Indicative figures are a reduction of finfish by 50%, crabs by 10% and with no loss of shrimp catch.
62. **Iran's** catch of shrimp is approximately 7 000 tonnes, which is 1.67% of the total fish landings. Banana shrimp (*Penaeus merguensis*) is the main species in the Hormoagen province, Green Tiger Shrimp (*Penaeus semisulcatus*) in Boshehr province and *Metapenaeus Affinis* in the Khozestan province. The fleet consists of 39 industrial trawlers of 27 m length and 750 hp engines fishing with outriggers(two trawls), approximately 870 wooden vessels of 16 m average length and 100-220 hp engines (Dhows) and approximately 1 500 fibreglass boats of 7 m mean length with 25-45 hp engines. The shrimp trawler catch composition consists of 10-17% shrimp, 10-25% small fish, 40-60% juvenile fish (less than 30 cm in length) and 10-20 large fish. Most of the small fish and juveniles are discarded, more so at the start of the season when shrimp catches are good. In Hormozgan province discarding is banned and a collecting scheme for such bycatch is established. The shrimp

fishing season in each province is approximately six weeks, and opening and closing is based on the maturity and body length of shrimp and percentage (20%) of remaining stock.

63. Iran had developed a framework for a project aimed at reducing the environmental impact of shrimp trawling. This was presented and found to be a good basis for discussion of content of the main phase project.
64. Iran also reported on results from tests with various designs of BRDs onboard one of their outrigger trawlers. Based on 180 tows conducted in the 1998/99 season up to 75% fish bycatch reduction was reported without losing shrimp catch. These results were obtained with a combined BRD consisting of a NAFTED design plus a Fisheye behind (it is worth observing that such an arrangement is almost the same as the one which was initially tested in 1997 with FAO assistance).
65. Mr Hussain Mahmood Al-Foudari of **Kuwait** reported on the status of Kuwait's 1999/2000 shrimp fishery. The fishing season opened on 1 September 1999 and closed on 31 January 2000: 1 575 tonnes of shrimp were landed, which was lower than the long-term average of 2,068 tonnes. Compared with the preceding season this represented a 31% decrease in landings, but at the same time the effort increased by 34%, which resulted in a 49% reduction in catch-per-unit-effort. He informed that approximately 50% of the shrimp catch is caught by unlicensed dhow boats. At the start of the season most fish bycatch is discarded, whereas 82% of the total catch consists of fish at the end of the season. On average the catch is composed of 69% shrimp and 31% fish. Discard rates were not known.
66. Mr Al Mohammadi from **Qatar** informed about the shrimp fishing situation in his country. A shrimp trawl fishery was conducted in the 1960s and 1970s, but based on a recommendation from external experts shrimp trawling was banned from 1992, the reason being that the bycatch rates were too high. The fishery has not yet been open, but regular research is carried out to monitor the situation. It was indicated from previous experience that when trawling is permitted there might be a catch potential of 700 tonnes of shrimp in Qatar waters.
67. **Oman** shrimp fisheries. Only traditional fishing methods are allowed, mainly cast nets, involving 500-700 fibreglass boats. The fishing season is from 1 September to 31 December. There are plans to develop trawling for shrimp in deeper waters. Oman has therefore a serious interest in becoming aware of technologies that can minimize the impact of shrimp trawling.
68. An opinion survey was conducted in Bahrain, based on a questionnaire developed by FAO. The National Coordinator reported on the results: 166 questionnaires had been filled in by representatives from various fishermen's groups (vessels owners, shrimp fishing crew and other fishermen, fish traders, fish producers, fishery administration and environmental groups). The industry considers fish bycatch to be a problem but most of the fishermen are reluctant to use BRDs because of the additional workload. The fishing vessel operators also pointed out the need for improvement of fisheries management, in particular in consideration of the actual overfishing.

Summary of Discussions

69. During the discussions several participants noted that illegal fishing and poor management are considered to be a serious problem in the region. Another problem raised was that the industry was not fully aware of the increased catch potential of delaying capture of shrimp until it has grown to a larger size.
70. The representative from ROPME (Regional Organization for the Protection of the Marine Environment) expressed strong support for such a project and informed that the Gulf area is considered as a special area requiring special protection. Increased pollution and reduced water outflow to the Gulf from rivers were mentioned as possible sources for increased environmental stress in the area. ROPME also expressed concern about the impact of trawls scraping the bottom. Concern was expressed about the impact of trawling on the turtle population in the region which is known to have five sub-tropical endangered species.
71. The occurrence of turtles in the fisheries of various countries was reviewed. Bahrain presented data about the incidence of turtles in their shrimp fishery, which amounted to approximately 1 200 during a fishing season. It was, however, stated that most captured turtles were released alive, and therefore mortality was considered to be low, primarily because tow duration was relatively short. Kuwait reported a very low occurrence of turtles in their shrimp fisheries. Iran has limited information about the incidental catch of turtles in their shrimp fisheries but the representatives stated that this might be a problem, which they therefore suggested be included in the main phase project. We were informed that an island off Oman was the most important nesting site for loggerhead turtles in the world (approximately 30 000). As Oman had no shrimp trawling at present, the problem will only arise when and if such a fishery is developed.
72. The definition of bycatch was raised as a matter of concern. Different countries have a different understanding of this concept. It was noticed that many countries land part of the non-shrimp catch and this, to a large extent, depends on the time of season. At the beginning of the season when shrimp catches are good, most of the fish is discarded, whereas at the end of the season when shrimp catches are low, more of the fish bycatch is landed.
73. Iran has recently introduced a system of collecting bycatch at sea in one of its provinces (Hormozgan), which is used for making fish meal. The plan was to ban discarding all kinds of bycatch in shrimp fisheries in the country.
74. Regarding bycatch and discards, Iran and Bahrain noted that the composition and amount of bycatch is not well documented in most shrimp fisheries. However, it was also stated that on certain fishing grounds and during certain fishing periods, the fish bycatch during shrimp trawling is very small.
75. Uncertainties regarding distribution and migration of shrimp and fish make good management measures difficult.
76. The duration of the authorized shrimp fishing season is different in all the countries of the region: 6-7 weeks in Iran, 6 months in Kuwait and 9 months in Bahrain. Decisions regarding the opening and closure dates for each fishing area are very important in respect of the possible amount and composition of the bycatch. For this reason much attention is

paid to the decision process which is based on careful surveys at sea, scientific advice and consideration of the percentage of the marketable size of shrimp.

77. All countries stated that capture of juvenile fish was a major concern and that the project therefore should have reduction of such bycatch as the primary objective.
78. It was noted that some success had been achieved in experimental testing of bycatch reduction devices (BRD) in the fisheries of Iran and Bahrain. It was, however, recognised that further improvement is required and that the BRD technology has to be adopted to different types of vessels (dhows and fibreglass boats) and for various fishing grounds.
79. Some noted that many shrimp trawls used in the region were adaptation of fish trawl designs and that more tailored-made trawls for shrimp fishing should be developed.
80. A major challenge for implementing change in fishing practice and adoption of new technologies is the resistance to such changes among the fishermen. It was widely agreed that for any success there must be participation by the fishermen in all stages of such a project.
81. It was recognised that incentives might be necessary to gain acceptance for required changes. One suggested solution was to give a number of vessels an approved BRD for testing, and the importance of gaining experience prior to making any device mandatory was stressed.
82. It was observed that any process to reduce bycatch will somehow lead to an immediate loss of income for fishermen. It is still questionable if any increase in quantity or quality of the shrimp caught (possibly resulting from some improvement of the shrimp trawl or even from the utilization of some BRD) can compensate such loss.
83. A group consisting of representatives from Bahrain, Kuwait and Iran drafted a table of priority problems and activities to be conducted in the region during a main phase project. The draft proposal was presented in a plenary session. A version, modified to harmonise it with the outcomes of the other workshops, is shown in **Table 3**.

Table 3 Identified problems and proposed activities to be included in the main phase project in the Persian Gulf region (Priority list)

| Problem | Impact | Project activities | Output | Groups involved | Implementing/ funding agency |
|--|---|---|---|--|---|
| I. Capture of juvenile fish and turtles | - Non-sustainable capture of juvenile food fish - Incidental catch of endangered turtles | - Study seasonal bycatch composition - Select appropriate BRD - Testing the BRD - Evaluate the effect of BRD - Incentives for fishers to use BRDs | - Knowledge of species composition by area and season - Reduced bycatch of unwanted fish in shrimp trawls - Elimination of turtle bycatch | - Fishing industry - National government - Research institutes - National experts - International experts | National government FAO GEF Fishing industry |
| II. Lack of technical experience and awareness of the bycatch problem by fishers and researchers | - Incapability to introduce new technologies | - Awareness programme for fishers - Practical on site training of fishers in the use of BRDs - Technical training of fishing technologists | - Increased understanding for the need to change fishing practice - Increased compliance with regulations | - Fishing industry - Fishing technologists - International fishing technologists - Communication experts - Research institutes | National Government GEF FAO |
| III. Countries in the region use different methods and levels for collecting and analysing data | - Non-consistent management tools within the region | - Collect information about individual countries data collection and suggest standards - Training workshops | - Comparable data collection and analysis of data within the region | - Research institutions - Fisheries officers | National Governments FAO |
| IV. Trawling on nursery grounds | - High catch rates of juveniles | - Identify nursery grounds | - Maps of nursery grounds | - Research institutes - Fishing industry | National Government Fishing industry |
| V. Trawls are not properly designed to catch shrimp | - Trawls are efficient for fish but not optimal for shrimp catch | - Study impact on bottom - Introduce alternative trawl techniques | - Lower fish/shrimp ratio - Less harmful to the bottom habitat | - Fishing industry - Fishing technologists | Fishing industry GEF FAO |
| VI. Bycatch is discarded | - Wastage of fish as food | - Alternative use of bycatch | - Increased human food supply - Increased feed production | - Fish processors | National Government GEF |
| VII. Lack of regional co-operation in management | - Conflict between countries | - Establish a regional working group within RECOFI | - Coordinated management | - National governments - FAO (RECOFI) | National governments FAO |

IV. REGIONAL WORKSHOP IN ASIA Denpasar, Bali, Indonesia, 6-8 March 2000

Introduction

84. The Workshop was organised by the Directorate General of Fisheries of Indonesia. The list of participants is shown in **Appendix 2d**.
85. A welcome and inaugural address was given by the Director General of Fisheries of Indonesia, Mr. Untung Wahyono. He introduced the Indonesian fisheries, the recent re-organization of the Ministry and stated clearly that reduction of bycatch in shrimp fisheries is a priority goal. The Chief of Fishing, Sub-Directorate of Fisheries, Mr Gomal H. Tampubolon, acting as local secretariat, introduced some of the issues related to shrimp fisheries in Indonesia.

Situation of the shrimp fisheries

86. The main contributions in the first working session were from the two core participating countries; Philippines and Indonesia which provided detailed information on the shrimp fishing industry in the two countries extracted from the National Reports prepared within the Project Development and Preparation phase.
87. **Philippines's** catch of shrimp (excluding aquaculture production) is approximately 32 000 tonnes. White shrimp (*P.merguensis*), tiger shrimp (*P.semisulcatus*) and endeavor shrimp (*Metapanaeus ensis*) are the most important species together with the smaller Acetes species, which in weight constitutes 34% of the total catch. The fleet consisted, in 1997, of 445 trawlers (62% classified as small-commercial (i.e. 3.1 to 20 GT); 37% medium commercial (2.1 to 150 GT) and 1% large-commercial (150,1 GT and above). Although the trawl is the most common fishing gear for shrimp, it is also traditional to catch shrimp with gillnets.
88. Discard rates are unknown, but are likely to be relatively small as there is a market for most of the captured fish. Crab and shrimp with eggs are normally discarded. It is anticipated that significant proportions of fish bycatch consist of juveniles from valuable food fish species. Phillipines has developed a set of regulations, but enforcement of these was considered a problem. It was clearly stated by the National Coordinator that the local community needs to have stronger involvement in the development and introduction of a more responsible fishing practice for shrimp. The national committee, which was established to prepare the national report, suggested several activities aimed at improving the situation with shrimp exploitation in the Phillipines. These are to a large extent reflected in Tabel 5.
89. **Indonesia's** trawling for shrimp is restricted to the Arafura Sea (Eastern Indonesia) by a 1982 law. The shrimp catch from that area was approximately 20 000 tonnes in 1996, which is 10% of the total catch in that area. The remaining catch includes landed as well as discarded bycatches, mainly of fish. *Penauids* are the main component of the shrimp catches; Banana shrimp (*P.indicus,P.merguensis*) 35.1%; tiger shrimp (*P.semisulcatus*) 23.6 %; endeavour (*Metapaneus ensis*) 23.2 % represents the main share.

90. The trawler fleet consisted in 1996 of 431 vessels from 19 to 849 GT. Three types of trawl riggings are used; singel trawl towed from the stern of the vessel, outrigger twin trawls (two trawls) and outrigger quad trawls (four trawls). According the the presidential decree No. 085/1982 all units should be equipped with a Bycatch Efficiency Device (BED), which is a modified form of a Turtle Excluder Device (TED).
91. Generally, the shrimp/bycatch ratio is 1 to 8-15. The yield from shrimp has more or less levelled off for a long period of observation but fluctuation are observed from year to year. The catch of demersal and pelagic fish slightly increase. The estimate is, for 1998, around 200 000 tonnes of bycatch, of which 170 000 tonnes were discarded. Nearly 2/3 of the total landings consist of fish. A recent biomass estimates of shrimp indicates a total annual production of 48 000 tonnes. The need to improve the identification of fish and shrimp, particularly juveniles was stressed
92. In Indonesia much of the bycatch is discarded mainly because the fishing grounds in the Arafura Sea are very far from possible markets and while the collection of bycatch at sea has only recently been auhtorized. More recently an ordinance was put into force requiring vessels to bring all the catch to shore
93. An opinion survey among affected stakeholders was carried out regarding the different aspects of shrimp fisheries, problems and solutions concerning bycatch, fisheries mangement, related research, etc. The conclusions of this consultation with the industry show that more careful management of the fisheries is required, perhaps with closure of areas and seasons, and the industry should adopt technologies yielding reduced discards.
94. The participants from Malaysia, Thailand and India were invited to briefly present the situation of the shrimp fisheries in their countries.
95. In **Malaysia** there is a no-trawling zone inside 5 nm from the coastline. Gradually larger vessels are allowed to fish in the zone 5-12 nm and beyond. As most juvenile fish are found inside the 5 nm limit the problem of juveniles in the trawl fisheries was considered to be a minor problem.
96. In **India** a large number of small trawlers, less than 20 m long, known locally as "mechanized boats" carry out bottom trawling for shrimp and fish; many of them during day trips, not so far from the coast. As a result, there are now very serious conflicts with small-scale fishermen using passive gear. On-going discussions aim to define "zonations" for the various fleets and activities but a lack of enforcement facilities, which already seriously hinders the management of fisheries will make things difficult. A serious concern was expressed concerning the recent development of "mini pair trawling" by boats of 7 - 8 m, less than 19 hp, in very coastal waters. Turtle excluder or other bycatch reduction devices are not used in India; an on-going small GEF project aiming at the introduction of TED in Orissa was mentioned. It was suggested that a national workshop for industry and interested groups be organized in India to increase awareness in general and lead to relevant specific activities funded by industry. The enforcement of regulations in India is presently poor.
97. The representative from the **Southeast Asian Fisheries Development Center (SEAFDEC)** briefly reported on recent activities of the Center in the region for the development of bycatch reduction devices, such as Thai Turtle Free Device (TTFD) and Juvenile and Trash Excluder Devices (JTEDs). Experiments and demonstrations have been carried out so far in

Brunai, Indonesia, Malaysia and Philippines; others are planned soon in Vietnam. SEAFDEC has almost completed the preparation of a Training package for fishermen concerning the use of TED. With the objective of reducing juveniles in catches, the question is still what is the most promising option: an increase in meshsize in the codend or development of a specific device? In respect to the first option, it is worth reporting the experience in north Australia: the local Government had requested an increase in the meshsize, from 40 to 60 mm, with the guarantee that if no improvement in the yield was observed within three months, a return to the smaller mesh would be authorized; however, fishermen observed that trawling with larger mesh in the codend was more effective because, with less drag, the towing speed was higher (with the same fuel consumption) and the catch of large fish increased. In the Philippines, the utilization of square mesh seems promising. Participants were of the opinion that adjustment of mesh size is the best solution and the easiest to be controlled. It was observed that this choice between technical options depends not only on technical aspects but also means of control. The SEAFDEC expert observed that the critical point is the loss of income resulting from escapement through any BRD (which was calculated precisely, in commercial fishing conditions, during the development of the various devices). He also pointed out that another critical point is proper communication with industry to explain and motivate people. SEAFDEC informed the group that they will organize a Workshop on "Selectivity and the utilization of TED in Asia" by the end of November 2000.

Summary of discussions

98. It was observed that the mandatory meshsize for the codend of a shrimp trawl is in all countries of the region rather small: 27.5 mm in the Philippines, 30 mm in Indonesia and Malaysia.
99. Pushnet is a fishing gear very commonly used in several countries of Southeast Asia, in particular for fishing Acetes, a small sized shrimp. Very small meshes are used. In principle, pushnet are even banned in some coastal waters (Malaysia). Such pushnet fisheries for Acetes are a problem (which is, to a certain extent, similar to the one resulting from large utilization of stownet/bagnet, for instance in Bangladesh, India, Southeast Asia and China). Various solutions were considered: - making the fisheries more seasonal, issue of special authorization; - increasing the meshsize of the nets; - proposing alternative fishing gear. Regarding this last solution, it was emphasized that when a fishing gear widely used in small-scale fisheries is banned, it is very important that, at the same time, good alternatives are proposed for the sustainability of the livelihood of small communities.
100. Other fishing gears much in use for shrimp, large size in particular, are trammel nets and gillnets. While it is observed that the catch with such nets is normally much less than with a trawl (an estimate of half to one third), when the yield with trawl decline by the end of the season, it is in many cases profitable to use trammel nets or gillnets to target, often on the same fishing grounds, large, high value, shrimp. The selectivity of these fishing gear is in general considered pretty good but some bycatch (crab, shark) is observed.
101. In this connection it was observed that, in many areas, "shrimp trawling" is in fact more and more "multi-species fishing" and at the same time the distinction between "shrimp and fish trawl" is difficult.

102. Philippines stated that more data/information on resources and impact of fisheries is a prerequisite. A lack in this respect explains the lack of participation and poor implementation of management plans by local communities.
103. Indonesia called for an improvement of the management of the shrimp fisheries; Philippines for regulation enforcement and several participants insisted during the discussion on the need for a clear policy of local governments in respect to environment protection and sustainable fisheries. In connection to policy and strategy for its implementation, it was stated that there is a need, in several countries, to strengthen professional organizations as positive partners in negotiation with the authorities and as a guarantee for implementation.
104. The need for exchange and cooperation between researchers and fishermen was stressed as a condition for any introduction of new technology.
105. A panel discussion on **"How to meet the Costs related to the Introduction of environmentally friendly techniques and practices toward Responsible Shrimp Fisheries - the Role of Financial Institutions, Government and Fishing Industry."** was included in the Agenda of the Workshop. Investments in the fishery sector are in many cases supported by potential buyers of catch, fish traders and processors, by fuel suppliers, other sources, which may add, in certain cases, to a special grant from the Government willing to promote the development of certain fisheries and types of vessel. Fisheries are considered by bankers as high risk activities. Loans are given, in Thailand, preferably, on land property guaranty rather than vessel. The financing from banks seems restricted to large fishing companies having "good profit image". The interest rate in Indonesia was 18-22%
106. Similarly, in the field of insurance, companies are often reluctant to take risks in the fishery sector (while it was observed that the "business risk" is in many cases already covered by the support to investment provided by fish buyers or other suppliers).
107. It was stated that if a potential risk is perceived, high return can at the same time be expected. In Thailand, there would not be more profitable investment than in fishery! In Indonesia also, fishery is considered as a sector safe from the economical point of view. An evidence since a foreign country, Denmark, gave recently loans to private fishery sector (with a guarantee of the government).
108. No bank will ever support a loss of income but the Government which has not only economic but also environmental and social responsibilities should be in a position to support an adjustment of technology aiming at the safe sustainability of certain fisheries, possibly with international funds (as has been done on several occasions for the establishment of national parks). However, regarding the involvement of banks, the question was raised about the possibility of some kind of sponsorship for environment protection by large banks. Also, in order to prevent a potential social clash, banks may be invited to provide funds to ensure sustainability of the employment in the fishery industry when threaten by the non-sustainability of the resources.
109. When referring to the implementation of a new bycatch reduction technology, it was pointed out that the investment involved should not be too high and it is considered that the critical point is, to a large extent, to convince fishermen of the effectiveness of the technology and

of the potential (medium term) benefit of its utilization; once this is done, some incitement from the fishery authorities may be enough and fishermen may pay for the device itself. In connection to this a comparison was made between the people exploiting wood in forests who have to contribute to re-forestation and fishermen now catching juveniles with shrimp being invited to act to safeguard the sustainability of their activity. The possibility of a "shrimp tax", as already proposed for shrimp aquaculture, to clear environmental aspects was mentioned.

Main phase project

110. In the introduction of the agenda item dealing with possible elements of the main phase project, FAO clearly stated that commitments from the participating countries, both financially and in policy, is a requirement to be considered for participation in follow up activities. We also advised that GEF funding is restricted to so-called "incremental costs" meaning the cost of an activity beyond the national ones initiated to achieve a global environmental objective.
111. As already stated, it was suggested to consider seriously the increase of mesh size in the codend as an effective solution to reducing the impact in general (especially when this leads to increased catch of large fish compensating for the loss of small fish/juveniles).
112. The optimal utilization of unavoidable bycatch should also be considered, with some priority to the production of high quality products for human consumption.
113. National Committees exist in several countries (including those set up within the actual project) and the strengthening of such structures is considered as essential within the implementation process for the proposed project.
114. The representatives from Indonesia and from Philippines, with input from SEAFDEC, produced separate tables with the details of the activities they consider suitable, including, in most cases, a precise estimation of the costs and proposals for the funding of each of them (with contributions from governments and private sectors). Shorter versions of these tables are shown in **Tables 4 and 5**.
115. Indonesia considers that for the shrimp fishery in the Arafura Sea the effort should aim to reduce fishing effort in general and, possibly the utilization of bigger mesh. They recommended a strong involvement by the private sector, including a continuing consultation process, provision of feed-back to industry after activities have been carried out and evaluation of results.
116. Philippines among several other proposals, recommended testing of a quick sorting device to be installed on deck to decrease discards of dead fish and they proposed shrimp gillnets/trammel nets as alternative fishing methods to the trawl.
117. SEAFDEC indicated a strong interest in cooperating with FAO in the execution of the project now under development. Considering the capacities and on-going programme of this inter-governmental organization, such support is considered essential and SEAFDEC could play within the project a leading and coordinating role for the region.

118. Because of the amount of work to be achieved concerning various aspects, a number of participants estimated that to reach substantial results, the programme to be developed should last at least three or, even better, five years.

Table 4 Identified problems and proposed activities to be included in the main phase project for Indonesia

| Problem | Impact | Project activities | Output | Groups involved | Implementing/funding agency |
|---|---|---|---|---|--|
| I. High level of bycatch and discarding of unwanted catch | - Wastage of valuable fish for food - Recruitment failure of valuable food fish stocks | - Selection and testing of suitable technologies to reduce bycatch (BRDs, mesh sizes, square meshes, towing time and towing speed) - Collect, process and market more of the unavoidable bycatch | - Effective technologies to be implemented | - Fishing industry - Research institutes - International fishing technologist | National government GEF Fishing industry |
| II. Declining shrimp catch per unit effort | - Reduced profit from shrimp fishing | - Resource surveys using fishing vessels | - Total allowable catch (TAC) - Optimization of the fleet (number of trawlers) | - Fishing industry - Research institutes | National government Fishing industry |
| III. Habitat destruction | - Destruction of bottom habitats | - Surveys of bottom configuration | - Knowledge of bottom habitat condition | - Fishing industry - Research institutes | National government GEF |
| IV. Lack of information system an insufficient skill/awareness of stakeholders to apply management measures | - No implementation | - Establish and empower information system - Training - Workshops | - Data base and information system - Increased skill among fishers - Awareness and willingness to implement management measures | - Fishing industry - Research institutes - National government | National government GEF |

Table 5 Identified problems and proposed activities to be included in the main phase project for the Philippines

| Problem | Impact | Project activities | Output | Groups involved | Implementing/funding agency |
|---|------------------------------------|---|---|--|---------------------------------------|
| I. Capture of juveniles and discarding of bycatch | - Non-sustainable fishing practice | - Research and development for juvenile and turtle excluder device (design, testing, evaluation of results, formulation of regulations, introduction to the industry) - Introduction of alternative fishing gears (trammel net and gillnets) - Introduction of quick onboard in-water sorting device | - More sustainable shrimp exploitation | - Fishing industry - Bureau of fisheries and Aquatic Resource (BFAR) - SEAFDEC | National government GEF SEAFDEC |
| II. Disturbance of bottom habitat | - Bottom habitat destruction | - Survey of the impact on bottom habitat of the trawling activities | - Knowledge about the quality and degree of impact on bottom of trawling activity | BFAR | National government |

APPENDIX 1

**GEF/UNEP/FAO Project preparation and development phase on
Impact of shrimp fisheries (EP/INT/724/GEF)**

**Regional Workshop on Reducing the Impact of Tropical Shrimp Trawling
Fisheries on Living Resources**

Agenda

1st DAY

- 1. Opening of the Workshop** (Statements by host and FAO representative)
- 2. Presentation of the project - background, activities and expected outputs.**
(FAO) Global Environment Facility (GEF, UNEP)
- 3. Identification of regional problems related to shrimp exploitation (All)**
 - **Brief overview of the shrimp fisheries in the region** (FAO)
 - **National reports** (National coordinators)
 - **Summary of problems identified in other participating countries** (Country representatives)
 - **Identification, discussion and prioritising of regional problems** (All)
- 4. Review of technical measures which can reduce environmental impact**
 - **Technologies to reduce bycatch in shrimp trawl fisheries - a review of available options**
(FAO)
 - **Alternatives to trawls for shrimp fishing - a global review** (FAO)
 - **Separating shrimp and bycatch in water tank**
 - **Communication** (FAO)

2nd DAY

- 5. Possible elements for the main-phase project**
 - **Information requirements and how to improve the situation**
 - Need for information about the amount and composition of bycatch and how to address such a problem.
 - Need for information about impact of trawling on the bottom habitat.
 - Awareness of bycatch reduction technologies in the country, by administrators, scientists and fishers.
 - Observation programmes to collect information.
 - Continuous assessment of given fisheries and related environmental impact

- **Change of fishing gear/practice**
 - If a turtle problem exist, what are the preferred solutions in the country/region to reduce such catch and why?
 - If juvenile fish is a major bycatch problem, which technologies and practices are preferred (BRD, closure of areas/seasons, alternative fishing methods), and why?
 - Need for research and experimental fishing to evaluate the effectiveness of BRDs in local situations. Any specific recommendation?
 - Need for research/experiments to increase survival of discarded unwanted fish/shrimp (i.e. underwater sorting of the catch on the deck of the boat). Any specific recommendation?
 - Prospects of improved shrimp detection to reduce fish bycatch?
 - Landing of non-wanted catch by collector vessels or vessels modifications.
- **Information exchange/partnership arrangements**
 - Need, format and role of a global information system through FAO.
 - Regional networks (through regional bodies, project created, TCDC a.o.).
 - North-South twinning arrangements for transfer and/or local adaptation of technologies.
- **Incentives to modify fishing practices**
 - Reimbursement of cost for investment in selective devices.
 - Condition of licensing to use specified fishing gear/practice.
 - Pay-back schemes to limit harmful fishing practices.
 - Alternative income-generating activities.
 - Any market incitements?
- **Communication, awareness building activities**
 - Industry perception and attitude
 - Training/extention
 - Posters/videos

3rd DAY

6. Regional proposals for activities to be included in the main-phase project including sub-projects/pilot projects to be executed at sub-regional or national levels

(Based on the preceding discussion of the various elements to be included in the main-phase project, an important consideration for a successful implementation of the programme is that the various disciplines involved are appropriately integrated. It is also anticipated that the various activities will be executed in partnership with affected stakeholders. Other considerations when elaborating main-phase activities are modalities/structure, funding sources (including co-financing from the private sector) and responsibilities for execution.)

7. Closure of the meeting

APPENDIX 2a

LISTS OF PARTICIPANTS

Regional workshop for Africa**CAMEROON**

Jean Atangana
Société Camerounaise de crustacés et de leasing
maritime (ScIm/Camecrus)
Bp. 12541 Douala
Cameroun
E-mail: jean@cyberkokinet.
Tel/Fax: 420794/433993

Jean-Calvin Njock
Ministry of Livestock, Fisheries and Animal
Industries
Yaounde, Cameroon
Tel: (237)316049
Fax: (237)22.14.05
E-mail: njock@caramail.com
(National Coordinator for the project)

CÔTE D'IVOIRE

Sedji, Angbe Moise
Secrétaire général, groupement des armateurs à la
pêche
P.O. Box 01-BP 14, Abidjan 01
Côte d'Ivoire
Tel: (225) 257998
Fax: (225) 256512

GAMBIA

David Dodou Sinyan
Managing Director, Kendiaka Food and Fisheries
Int. Ltd
Gambia
Tel: 226084, 201104, 992368 (Mobile)
Fax: 370023

GHANA

F.K.Kwashie
Executive Chairman
Kaleawo Cold Stores Ltd.
P.O.Box 2475 Accra
Ghana
Tel 022206565 (Tema)

KENYA

Dixon Waruinge
FAO/UNEP Project coordinator
P.O. Box 40740 Nairobi
Kenya
Tel 254 2 622025
Fax 254 2 622788
E-mail: Dixon.waruinge@unep.org

MOZAMBIQUE

Silvestre Inacio Suluda
National Directorate of Fisheries
R. Consiglieri Pedroso, 343
Maputo Mozambique
Mozambique
Fax: (258-1) 420335
E-Mail: suluda@pesca.uem.mz

NIGERIA

J.C. Ogbonna
Federal Dept. of Fisheries
Chief Fisheries Officer
P.M.B. 135 Garki, Abuja
Nigeria
Tel. 09-5230191, 2344663
(National Coordinator for the project)

R.E.K Udolisa
c/o NIOMR
Fishing Gear Consultant
P M.B 12729
Victoria Island, Lagos, Nigeria

T.O. Olusanya
Asst. Director, Fed. Dept of Fisheries
Nigeria

B.B. Solarin
Asst. Chief Research Officer
NIOMR
P M.B 12729
Victoria Island, Lagos, Nigeria

Parcy Abohweyere
Asst. Chief Research Officer
NIOMR, P.M.B 12729
Victoria island, Lagos, Nigeria

Aderemi O. Abioye
Assist. Chief, Fed. Dept. Of Fisheries
P.M.B. 135, Abuja, Nigeria

M.A. King (Dr, Mrs)
Principal Research Officer (Fish Technology
Section)
NIOMR
P.M.B.12729
Victoria Island, Lagos, Nigeria
E-mail: niomr@hyperia.com

Prof Anetekhai, M. A.
Executive Secretary, Nigerian Trawler Owners
Association
Nigeria
Tel: 5453726

V. O. Adebolu
Deputy Director, Fed. Dept of Fisheries, Abuja
Nigeria

G. R. Akande
Research Officer (Fish Technology)
NIOMR
Victoria Island, Lagos, Nigeria
Tel: 234-2619517
E-mail: niomr@linkserve.com.ng or
niomr@hyperia.com

T.O. Esan (Mrs)
Asst. Chief Fisheries Officer Fed. Dept of
Fisheries
Victoria Island, Lagos
Nigeria

A.A. Aderounmu
Fisheries Consultant
P.O. Box 74371
Victoria Island, Lagos, Nigeria

A.V. Amire
Asst. Director Fed. Dept. Of Fisheries
Victoria Island, Lagos, Nigeria.

E.E. Arribrose
Researcher (Fishing Technology)
Nigerian Institute for Oceanography and Marine
Research (NIOMR)
Victoria Island, Lagos, Nigeria
niomr@linkserve.com.ng

A.B. Williams
Research Officer
Nigerian Institute for Oceanography and Marine
Research (NIOMR)
Victoria Island, Lagos, Nigeria
Tel: 234-2619517
E-mail: niomr@linkserve.com.ng or
niomr@hyperia.com

Edward Ajado
Senior Research Officer
Nigerian Institute for Oceanography and Marine
Research (NIOMR)
Victoria Island, Lagos, Nigeria
Tel: 234-2619517
E-mail: niomr@linkserve.com.ng or
niomr@hyperia.com

J.A. Adetayo
Asst. Chief Research Officer
Nigerian Institute for Oceanography and Marine
Research
Victoria Island, Lagos, Nigeria
Tel. 234-2619517
E-mail: niomr@linkserve.com.ng or
niomr@hyperia.com

C. Isebor
Fisheries Biologist
Nigerian Institute for Oceanography and Marine
Research
Victoria Island, Lagos, Nigeria
Tel. 234-2619517
E-mail: niomr@linkserve.com.ng or
niomr@hyperia.com

A.O.A. Olaniyi
Fisheries and Marine Consultant
Fisheries Society of Nigeria
9A Aerodrome Road, Apapa, Nigeria
Tel.. 5452938
E-mail: amosolanlyl@hotmail.com

P. A. Taggert
 Assistant Director, Federal Department of
 Fisheries
 Victoria Island, P.M.B. 12529, Lagos
 Nigeria
 Fax/Tel: 01616247

K. Thomas
 Managing Director, Honeywell Fisheries
 13 Agoro Odiyian Street
 Victoria Island, Nigeria
 Tel: 01-613153, 2616277
 Fax: 2616498, 7740331

SENEGAL

Coulibaly Dougoutigui
 Secrétaire général, Groupement des armateurs et
 industriels de la pêche au Sénégal (GAIPES)
 B.P. 2138 Dakar
 Sénégal
 Tel: (221) 8214981
 Fax: (221) 8219506
 E-mail: gaipes@telecomplus.sn

TANZANIA

W.V. Haule
 Fisheries Division, Ministry of Natural Resources
 & Tourism
 P.O. Box 2462
 Dar-es Salaam, Tanzania
 Tel: 255-51-122930, 255-811-211 368
 Fax: 255-51-110352
 (National Coordinator for the project)

FAO

John W. Valdemarsen
 Chief, Fishing Technology Service
 FAO, Rome Italy
 E-mail: john.valdemarsen@fao.org
 Tel.: (39) 06570 56449
 Fax: (39) 06570 55188

Joël Prado
 Fishery Industry Officer
 Fishing Technology Service
 FAO, Rome, Italy
 E-mail: joel.prado@fao.org
 Tel: 39.06.57054931, Fax: 39.06 57055188

Michelle Owens
 Extension, Education & Communication Officer,
 FAO-Africa Regional Office
 P.O. Box 1628, Accra, Ghana
 E-mail: michelle.owens@fao.org

W.Q-B. West
 Senior Fisheries Officer
 FAO Regional Office for Africa
 P.O. Box 1628, Accra, Ghana
 E-mail: wariboko.west@fao.org
 Tel: 233-21-7010930
 Fax: 233-21-244076

INTERNATIONAL EXPERT

Matt Broadhurst
 Fisheries Scientist
 Depto. de Pesca, Universidade Federal Rural de
 Pernambuco
 Ave. Dom Manuel de Medeiros,
 Recife-PE, Brazil
 E-mail: fhvhazin@truenet.com.br
 Tel: 55 81 4417276

APPENDIX 2b**LIST OF PARTICIPANTS****Regional Workshop for the Caribbean and Latin America****COSTA RICA**

Ricardo Gutiérrez Vargas
 Director General Técnico
 INCOPECA
 Apartado 333-34500
 Puntarenas, Costa Rica
 Tel. 661 3020, 661 3269
 Fax: 661 0748
 e-mail: incopesc@sol.racsaco.cr/
rrgutierrez@hotmail.com
 (National Coordinator for the project)

Francisco Guevara Huete
 Directivo de Incopesc
 Puntarenas, Costa Rica
 Tel: 663 0221
 Fax: 661 0089

Victoria Domingo Mora
 Observadora,
 Secretaria Camara de Pescadores Artesanales
 Puntarenas, Costa Rica
 Telefax: 661 2182

CUBA

Luis F. Font Chàvez
 Biologo Pesquero
 Ministerio de la Industria
 Centro de Investigaciones Pesqueras
 5ta Ave y 248, Barlovento, Sta Fe
 Playa, C. Habana 19 100, CUBA
 Tel: 53 7 298055, 53 7 297875
 Fax: 53 7 249827
 E-mail: cubacip@ceniai.inf.cu
 (National Coordinator for the project)

Pedro Orlando Castro Estrada
 Ing. Mecanico en Pesca Industrial
 Vice Director Tecnico y Producción
 Asociación Pesquera de Clenfuegos
 Carretera a Fertilizantes
 O'Bourke, Clenfuegos, Cuba
 C.P. 55 100
 Tel: 432 23262
 Fax: 432 22812

GUYANA

Phillip Bruce Viera
 Managing Director
 B.E.V. PROCESSORS INC.
 Area K - Houston,
 East Bank Demerara,
 Guyana
 Tel: 02 52111, 65738
 Fax: 02 67173

MEXICO

Juan Carlos Seijo
 Rector, Centro Marista de Estudios Superiores
 Km. 7 Antigua Carretera Wrida-Progreso
 X Av. Marcelino Champagnat
 Merida, 97110 Yucatán, Mexico
 Tel: (99) 41 0302
 Fax: (99) 41 0307
 E-mail: iseijo@cemaes.marista.edu.mx

Daniel Aguilar Ramirez, M.Sc.
 Jefe Departamento de Artes
 Métodos y Embarcaciones Pesqueras
 Instituto Nacional de la Pesca
 Pitagoras # 1320 6' Piso
 Mexico, D.F. C.P. 03310
 Tel. (5) 6 88 90 01
 E-mail: daguilar@inp.gob.mx

TRINIDAD & TOBAGO

Dexter Khan
 Trawler Owners Association
 Production Avenue,
 Sea Lots, Port of Spain
 Tel/fax: 001 868 625 5305

Ragindra Bachan
 Orange Valley Fishing Association
 No.72 Orange Valley
 Couva, Trinidad and Tobago
 Tel: 001 868 636 1351

Sita Kuruvilla
 Fisheries Biologist
 Fisheries Division
 Ministry of Agriculture, Land and Marine Resources
 NHA Bldg., South Quay Tel: 868 634 4504/5
 Port of Spain
 Fax: 868 634 4488
 E-mail: mfau2fd@tstt.net.tt
 (National Coordinator for the project)

VENEZUELA

Luis A. Marcano R.
 M.Sc. Biología Pesquera
 Av. Carúpano
 Caiguire Apdo. 236
 Cumaná 6 101
 Venezuela
 Tel/fax: (58 93) 317557
 E-mail: ciapes@sucre.udo.edu.ve
 (National Coordinator for the project)

UNEP

Monica Borobia
 United Nations Environment Programme
 P.O. Box 16227
 2500 BE The Hague
 The Netherlands
 Tel: 0031 70 311 4468
 Fax: 0031 70 345 6648
 E-mail: m.borobia@unep.nl

CFRAMP

Terrence C. Phillips
 RAU Leader/ Biologist
 Shrimp & Groundfish Resource Assessment Unit
 LP # 123 Western Main Rd, Chaguaramas
 Trinidad & Tobago
 Tel: (868) 634-4528/4530
 Fax: (868) 634-4549
 E-mail: tphillips@wow.net

FAO

Bisessar Chakalall
 Regional Fishery Officer/ Secretary of WECAFC
 FAO Subregional Office for the Caribbean
 P.O. Box 631-C
 Bridgetown, Barbados
 Tel: 001 246 42 67 110
 Fax: 001 246 42 76 075
 E-mail: Bisessar.Chakalall@fao.org

Frans Teutscher
 Fish Technologist
 Fishery Industries Division (FII)
 FAO
 Viale delle Terme di Caracalla, 00100 Rome, Italy
 Tel: 0039 06 5705 6739
 Fax: 0039 06) 5705 5188
 E-mail: Frans.Teutscher@fao.org

Joël Prado
 Fishery Industry Officer
 Fishery Industries Division
 FAO
 Viale delle Terme di Caracalla, 00100 Rome, Italy
 Tel: 0039 06 5705 4931
 Fax: 0039 06 5705 5188
 E-mail: Joel.Prado@fao.org

Wilfried Thiele
 Senior Fishery Industry Officer
 Fishery Industries Division
 FAO
 Viale delle Terme di Caracalla, 00100 Rome, Italy
 Tel: 0039 06 5705 5836
 Fax: 0039 06 5705 5188
 E-mail: Wilfried.Thiele@fao.org

Lydda Gaviria
 Communication Officer
 Extension, Education and Communication Service
 FAO
 Viale delle Terme di Caracalla, 00100 Rome, Italy
 Tel: 0039 06 5705 3990
 E-mail: Lydda.Gaviria@fao.org

APPENDIX 2c

LIST OF PARTICIPANTS

Regional Workshop for the Persian Gulf

BAHRAIN

Ali Rashed Ali
Fisherman
Ho.2070 R.5747 Alzalaq 1057
Tel: 631390

Ebrahim Abdulrahim Abdulqader Researcher
Bahrain Center for Studies and Research
Fax: +973 754822
Tel: +973 754 757
E-mail: Eabdulqader@bcsr.gov.bh
(National Coordinator for the project)

Jaffar Ahmad Mansoor
Fisheries Technician
Directorate of Fisheries, Bahrain
Fax: 728459
Tel: 729595

IRAN

Lotfollah Saeedi
Deputy for Fishing & Fishing Ports
Iranian Fisheries Co.
Fax: +98-21-6702868
Tel: +98-21-6719732
E-mail: Shilat@neda.net

Hassan Mohammadi
Coordinator of ROPME
P.O.BOX: 26388, Safat 13124, Kuwait
Fax: 5324172/5335243
Fax: +98(21) 6702868 +98(21) 6717096
Tel: 5312140-1-2-4
Tel: +98(21) 6713206 (Iran)
E-mail: ROPME@qualitynet.net

Mojahedi Ali Asghar
Vice-Deputy of Fishing, Fisheries Port
No: 77 Kark Ave, Teheran
Fax: 6702868; Tel: 6713206
E-mail: Shilat@neda.net

Seyed Aminollah Taghavi
Teheran/Iranian fisheries Co,
Tel: (021) 6703211

Ebrahim Nikfetrath
General Directorate of Extension
and Fishing Technology
Tel: (021) 6719732

Hussein Ostad Mohammadi
Director, Expert in charge of
Fishing Technology
Khark St. Enghelab Ave.,
Teheran, Iran
Fax: +98(21) 6702868
Tel: +98(21) 6713206
E-mail: Shilat@neda.net

Seyyed Yousef Peighambari
Fishing technologist
Iranian Fisheries Co,
Teheran, Iran
Fax: 6702868
Tel: 6719732-6713206
E-mail: Shilat@neda.net

Vahid Tofighi Mohammadi
Director of International Affairs
#52, Naderi St., Keshavarz Blvd.
Teheran, Iran
Fax: +98-21-658229
Tel: +98-21-651601, 650510
E-mail: Vahid-tofighi@hotmail.com
Shilat-intl@neda-net

Nasrallah Shirazi
Deputy GD of International Affairs &
Coordinator
52, Keshavarz Blvd.
Teheran, Iran
Fax: +98-21- 658229
Tel: +98-21-651603
E-mail: _Shilat-intl@neda.net

Kaymaram Farhad
Head of Stock Assessment Department
Iranian Fisheries Research Organization
(IFRO)
No:11th Alley, Mir-Emad Str
Ostad Motahari Ave.
P.O.BOX 14155-5116
Teheran, Iran
Fax: 8751495
Tel: 8752870-8754042
E-mail: KAY@ifro.neda.net.ir

Toorj Vallinassab
Head of Marine Biology Department
IFRO
Fax: +98(21) 8751495
Tel: +98(21) 8752870- 8754042
E-mail: Valinassab@IFRO.neda.net.ir

Shahram Ghasemi
Head of Crustacea and Molluscs
Iranian Fisheries Research Institute (IFRI)
24-11th Alley - Mir-emad St.
Teheran , Iran
Fax: +98(21) 8751495
Tel: +98(21) 8752870-8754042
E-mail: Ghasemi@ifro.neda.net.ir

Bahram Ansary Tary
Expert of Management Shrimp Fisheries
Iranian Fisheries Co.(Shilat)
No. 77 Enghlan st., Bldg. 2
Teheran, Iran
Fax: +98(21) 6702868
Tel: +98(21) 6703211&98(21) 6705808)
E-mail: shilat @neda.net

Abdolhassan Tangestani
Shilat Expert in Fishing Technology
Iran/Busher-Shilat Main Office

Fariborz Rajae
Director of Training & Fishing Technology
Fishing Dept, GD Shilat in Homozgan
Province Bandar Abbass,Iran
Fax: +98- 761- 32579,81
Tel: +98-761-41804,5

Gholam Hosian Mohtashmi
Expert of Fishing Department.
GD of Shilat in Hormozgan Province
Bandar Abbass
Fax: +98-761-32579,81
Tel: +98-761-41804,5

Gholam Hossine Mohammadi
Head of Crustacean
Khoztan Province Fishery Research Center
Fax: 0611 338662
Tel: 0611 338205

Hussein Shadkami
Shilat Expert in fishing Technology
GD of Shilat in Bushehr
Iran
Tel: +98(771)23460, 1

Mahmoudnegad Mansour
Expert (Fisheries)
No: 77 Khark Ave, Teheran
Fax: +98(21) 6702868
Tel: 67213208

Manoocher Bigaga
Head of Extension Dept.
Fishing Dept., Brame, Abadan, Iran
Fax: +98-631
Tel: +98-631-33088,33099

KUWAIT

Hussain Mahmood Al-Foudari
Researcher
Kuwait Institute for Scientific Research
P.O.Box :1638
Salmiya 22017, Kuwait
Fax: +965 5711293
Tel: +965 5722963/242
E-mail: Hmohamad@Kiser.edu.KW

OMAN

Ali Al - Orimi
 Director of Agriculture and Fisheries
 Department, Al -Wasta
 Ministry of Agriculture and fisheries
 Fax: 696381
 Tel: 9318743

QATAR

Abdel Rhaman Sadeek Al-Ben Ali
 Resarcher
 P.O.Box: 13800
 Doha, Qatar
 Fax: +974 431181
 Tel: 336505

Jassim Saleh Almohammedy
 Head of Fisheries Dev. Section
 P.O.Box :8441
 Doha, Qatar
 Fax: +974 431181
 Tel: 336505

FAO

John Willy Valdemarsen
 Chief, Fishing Technology Service
 Fishery Industries Division
 Viale delle Terme di Caracalla
 00100 Rome, Italy
 Fax: 390657055188
 Tel: 390657056449
 E-mail: John.Valdemarsen@fao.org

Joël Prado
 Fishery Industry Officer
 Fishing Technology Service
 Fishery Industries Division
 FAO
 Viale delle Terme di Caracalla
 00100 Rome, Italy
 Fax: 39-06-57055188
 Tel: 39-06-570 54931
 E-mail: Joel.Frado@fao.org

Mohammad Saif Abdullah
 Senior Fisheries Officer
 FAO Regional Office for the Near East
 11 EL-Eslah El Zerai St., Dokki
 P.O. Box 2223
 Cairo, Egypt
 Fax: (202) 7495981
 Tel: (202) 3316141
 E-mail: mohammad.saif@fao.org

APPENDIX 2d

LIST OF PARTICIPANTS

Regional workshop for Asia

INDIA

V. Vivekanandan
South Indian Federation of Fishermen
Societies, Karamara
Trivandrum 695002
Tel: 91-471-343711
Fax: 91-471-342053
E-mail: vivek@siffs.org
Gomal H. Tampubolon

INDONESIA

Gomal H. Tampubolon
Chief, Sub-Directorate of Fishing
Directorate General of Fisheries
Jl. Harsono Rm No.3
Tromol Pos No.: 1794/JKS
Jakarta. 12550,
Indonesia
Tel. 7804116-119
Fax. 7803196

Daniel Monintja
Bogor Agricultural University
Tel: 62-0251-624706
Fax: 62-0251-621171
E-mail: danipb@indo.net.id

Fifi Rifiani
Directorate General of Fisheries
Jl. Harsono RM. No. 3 Ragunan, Pasar
Minggu
Jaksel
Tel: 021 7811672

Untung Wahyono
Directorate General of Fisheries
Jl. Harsono RM. No. 3 Ragunan, Pasar
Minggu
Jaksel
Tel: 021-7811672

Sugiri Elon
Director, Fish Production Development
Directorate General of Fisheries
Jl. Harsono RM. No. 3
Tromsol Pos. No. 1794/JKS
Jakarta 12550
Tel: 021-7811672
(National Coordinator of the project)

M. Jumbeli
Head section, loan and grant ID
Tel: 62-021-3865330
Fax: 62-021-3812859

Ie Tjie Sing
Jl. Asemka 27-30 Jakarta
Tel: 021-6901771
Fax: 021-6901823
E-mail: tjie_sing@hotmail

Pangihutan Simanjuntak
Jl. Harsono Rm. No. 3 Ragunan, Pasar
Minggu Jaksel
Tel: 021-7811672

MALAYSIA

Alias Man
Fisheries Research Institute, 11960 Batu
Maung Penang
Tel: 604-6263925
Fax: 604-6262210
E-mail:aliman01@yahoo.com

PHILIPPINES

Jonathan O. Dickson
 Bureau of Fisheries & Aquatic Resources
 860 Quezon Ave., Quezon City
 Metro Manila 3008
 Tel: (632) 372-5051
 Fax: (632) 372-5056
 E-mail: bfarmfd@info.com.ph
 (National Coordinator for the project)

Romeo S. Sengco
 234 C. Arellano St. Conception Malabon
 Manila
 Tel: 281-5598 (Res)
 281-1864 (office)

THAILAND

Wicharn Sirichai Ekawat
 National Fisheries Association of Thailand
 Tel: 66-2-4520571-2
 Fax: 66-2-4550573
 E-mail: N_FAT@USA.NET

Bundit Chokesanguan
 Head of Training Division
 PO Box 97
 Phrasamutchedi Samutprakarn 10290
 Tel: (662) 4258040-5 Ext 105
 Fax: (662) 4258561, 4259919
 E-mail: bundit@seafdec.org

Kanokporn Sapraser
 National Fisheries Association of Thailand
 Tel: 66-2-4520571-2
 Fax: 66-2-4550573
 E-mail: N_FAT@USA.NET

FAO

John Willy Valdemarsen
 FAO
 Viale delle Terme di Caracalla
 00100 Rome, Italy
 Tel: (39) 06 57056449
 Fax: (39) 06 57055188
 E-mail: John.Valdemarsen@fao.org

Joël Prado
 FAO
 Viale delle Terme di Caracalla
 00100 Rome, Italy
 Tel: 39.06.57059931
 Fax: :39.06.57055188
 E-mail: joel.prado@fao.orgPrado J.

Oemi Praptanto
 FAO Jakarta
 Jl. Thamrin No. 14 Jakarta
 Tel: 021-3141308
 Fax: 021-3922747
 E-mail: oemi.fao@undp.org