FAO/GOVERNMENT OF JAPAN
COOPERATIVE PROGRAMME MEETING REPORT No. 2

MANAGEMENT OF TUNA FISHING CAPACITY:
CONSERVATION AND SOCIO-ECONOMICS GCP/INT/851/JPN

REPORT OF THE

Second Meeting of the Technical Advisory Committee (TAC) GCP/INT/851/JPN

Madrid, Spain, 15-18 March 2004

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, April 2004

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1. OPENING

On behalf of the Food and Agriculture Organization (FAO), Jacek Majkowski, Coordinator of the Project on the "Management of Tuna Fishing Capacity: Conservation and Socio-economics", welcomed participants to the Second Meeting of the Technical Advisory Committee (TAC), and thanked them for their attendance and technical input, particularly for the documents prepared for the Meeting. The Meeting was organized by the Project, which is being implemented by FAO.

Jacek Majkowski indicated that FAO and, in particular, its Project are grateful to the International Commission for the Conservation of Atlantic Tuna (ICCAT) for its support and help with the organization of the Meeting. In this respect, he mentioned the assistance provided by Victor Restrepo, TAC member affiliated with ICCAT. Jacek Majkowski also thanked another FAO project, COPEMED, which is based in Madrid, Spain, for its administrative and logistical support. He expressed special gratitude to the Government of Japan for financing the Project and stated that the objective of the Second Meeting of TAC is to:

- critically review the progress of the research carried out by the Project;
- make recommendations, particularly on the Project's future activities, and
- prepare a TAC Statement for use mainly by the Project, FAO in general and institutions affiliated with TAC.

2. INTRODUCTION OF PARTICIPANTS

The Chairman, Robin Allen asked participants of the Meeting to introduce themselves, indicating their institutional affiliation (Appendix B).

3. ADOPTION OF THE PROVISIONAL AGENDA

The draft Agenda was adopted without any changes (Appendix A).

4. LOGISTIC ARRANGEMENTS FOR THE MEETING

The logistic arrangements for the Meeting were described.

5. REPORT OF THE MEETING AND A STATEMENT OF TAC: CONTENT AND ARRANGEMENTS

The Report of the Meeting would be coordinated by Ignacio de Leiva and Jacek Majkowski. A draft outline of the TAC Statement for consideration by TAC was proposed (final version see Appendix D), which could be used by the Project, FAO in general and other international institutions represented at the Second Meeting of TAC, as deemed appropriate. The Statement should outline the progress achieved by the Project, its tentative outcome, future progress expected and recommendations of this Meeting.

Ulf Wijkström explained that the Statement might be presented as an information document to the Technical Consultation to Review Progress and Promote the Full Implementation of the IPOA to Prevent, Deter and Eliminate IUU Fishing and the IPOA for the Management of Fishing Capacity (Rome, 24-29 June 2004).

The Meeting agreed that the preparation of the Statement would be useful for the institutions affiliated with TAC, assigning the preparation of the first drafts for parts of the Statement to different participants for their review by the Meeting (see Agenda Item 9).

6. OVERVIEW OF THE PROJECT IMPLEMENTATION

Presentation

Referring to Documents Inf. 5 and Inf. 6, Jacek Majkowski stated that the ultimate objective of FAO's Japan-funded Project on the "Management of Tuna Fishing Capacity: Conservation and Socio-Economics" is to improve the management of tuna fisheries on the global scale. Its immediate objectives are to:

- provide technical information necessary for the management of tuna fishing capacity on a global scale, and
- identify, consider and resolve technical problems associated with the management of tuna fishing capacity on a global scale, taking into account conservation and socio-economic issues.

Immediately after the commencement of the Project in December 2002, FAO established its internal Task Force, composed of Officers from various Services mostly within FAO's Fisheries Department. The Officers assigned provide expertise and are involved in various activities of the Project of a multi-disciplinary nature. In order to foster the collaboration of the tuna fishery bodies and other major Intergovernmental and Non-Governmental Organizations involved in tuna fishing, fisheries research and management, the Project created an external Technical Advisory Committee (TAC) composed of technical experts affiliated mostly with these Organizations.

The First TAC Meeting reviewed the methods used for the estimation of fishing capacity and its value (optimal from a conservation and socio-economic perspective), as well as their data requirements (see Document Inf. 4). During the Meeting, TAC recommended the implementation of those studies proposed by the Project regarding: (i) tuna fisheries and resources, (ii) characterization and estimation of tuna fishing capacity, (iii) tuna fishing industry, and (iv) tuna fishing capacity management options and implications. These studies are available as documents which were presented and critically reviewed by the Meeting.

7. PROJECT'S STUDIES: PROGRESS AND RESULTS

A1: Tuna Fisheries and Resources

"Historical Developments of Tuna Fisheries and their Catches"

Presentation

Referring to Document Ag. 7.1. A1.1, Peter Miyake reviewed: (i) the historical trends of catches of the major commercial species of tunas in the world; (ii) technological developments of fishing vessels, gears and fishing procedures, and (iii) the historical developments of major fisheries (large-scale longline, purse seine and baitboats (pole and line)). The total world catch increased steadily from a half million in 1950 to the peak of almost four million tonnes in 1999, the largest quantity being skipjack, followed by yellowfin tuna. The most important changes included: super cold temperature freezers and the consequent deployment of deep longline gears for longline fishery; the invention of the hydraulic power block, increasing the holding capacity of vessels, and the use of Fish Aggregating Devices (FADs) for purse seine fishing; and the development of closed, refrigerated circulation of live bait tank for baitboat fishing. Many other improvements such as the use of satellite navigation systems, bird radars, and sonars are also discussed.

"Tuna Data in FAO's Fisheries Global Information System (FIGIS)"

Presentation

Referring to Document Ag. 7.1. A1.2, Ignacio de Leiva mentioned that since 1952 FAO has been collecting annual catch data for all marine and freshwater species including tuna and tuna-like species. These data, grouped by fishing country and FAO statistical area, are mostly being obtained directly from fishing countries.

The Marine Resources Service (FIRM) of the FAO Fisheries Department has independently been collating from the tuna fishery bodies and other regional and national institutions:

- annual catch data for principal market tunas by stock and fishing gear (since 2001), and
- catch data for principal market tunas and some billfishes by fishing gear, 5° x 5° square and quarter of year (since 1997).

These statistics are not necessarily official, but are regarded by these institutions as the most representative.

All the abovementioned data are available from FAO´s Fisheries Global Information System (FIGIS) in the form of individual values, their plots and maps. In general, the two data sets of tuna nominal catches are very similar. The discrepancies between them and the 5° x 5° catch data are the result of: (i) the latter data only accounting for longline, pole and line and purse seine fishing; (ii) not including catches of unknown or poorly known locations in the latter data (e.g. many artisanal and some commercial fisheries), and (iii) from the exclusion, in the latter data, of those catches that were available not by weight but by number of fish.

Discussion

It was suggested that, given the increasing importance of longtail tuna catches, these catches should be monitored more closely by the Regional Fishery Organizations (RFOs).

"Status of Tuna Stocks and its Implications for the Fishing Capacity"

Presentation

Jacek Majkowski stated that the objective of Document Ag. 7.1. A1.3 was to provide information on the status of 23 principal market tuna stocks and its implications for the management of the fishing capacity from a conservation perspective. For each stock, information on its structure and its status, as well as the outlook for future catches, was obtained mostly from publications and home pages of the tuna fishery bodies and some other regional organizations. This information refers to data available at the end of 2003. On the basis of this information, particularly the reference points found by the authors, the size of and the fishing mortality for each tuna stock were classified by the authors to summarize their status on the global scale in a simple way.

The current status of the principal market tuna species varies depending on the stock and region. World stocks of skipjack tuna are not considered to be fully exploited. In contrast, southern and Atlantic bluefin tuna are considered to be overexploited. In general terms, the remaining species are somewhat above or below the management targets. Because of increased fishing pressure, there is growing concern about the possibility that bigeye tuna stocks are becoming overexploited. However, due to the multispecific nature of tropical tuna surface fisheries, it is difficult with the current fishing technology, to reduce catches of bigeye tuna without foregoing substantial catches of other tuna species.

Relatively little information is available to precisely determine, on the global scale, the implications of the tuna stock status for the fishing capacity even only from the conservation perspective. Significant additional research is required to substantiate the available information.

Discussion

TAC discussions focused on stock status classifications and the capacity implications thereof and noted that consistency needed to be applied in the classification of the various tuna stocks according to biomass and fishing mortality levels. In particular, the classification of Indian Ocean bigeye tuna (large stock size, moderate fishing mortality) and the implication that capacity could be increased seem to be conditional on the reduction of purse seine catches of juvenile bigeye. For other stocks, classifications are made assuming a continuation of current conditions. Most RFOs have reviewed the classifications and capacity implications of stocks under their jurisdiction, however this still needs to be done consistently according to agreed ground rules (such as assuming the continuation of current fishery conditions). The existence of current management measures and how these may or may not restrict fishing capacity could also be usefully noted. For several species (e.g. Pacific bluefin, North Pacific albacore), review by the Interim Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean (ISC) should also be sought.

The TAC felt that recommendations for fishery management responses to stock status classifications, currently expressed in terms of fishing capacity changes (with quantitative decreases or increases given in some cases), may be more appropriately framed in terms of fishing effort or fishing mortality changes. It was also felt that quantitative recommendations for increases in fishing capacity (or fishing effort or mortality) are not appropriate in most cases; a qualitative indication that some increase would be possible on biological grounds should be sufficient.

A2: Characterization and Estimation of Tuna Fishing Capacity

"An Analysis of the Fishing Capacity of the Global Purse Seine Fleet"

Presentation

Referring to Document Ag. 7.2. A2.1, James Kirkley and Dale Squires, presented an analysis of fishing capacity in four purse seine fisheries for tuna: (i) Atlantic Ocean; (ii) Indian Ocean; (iii) Eastern Pacific Ocean, and (iv) Western and Central Pacific Ocean. The estimation of fishing capacity was based on Data Envelopment Analysis (DEA). The species or species groupings included in the analysis were yellowfin, skipjack, bigeye, albacore and others. Available data however were limited for all four fisheries relative to years of coverage and variables believed to be important determinants of fishing capacity – this was particularly the case for the fisheries of the Atlantic and Indian Oceans. Estimates indicated excess capacity in all four fisheries. Technical inefficiency and technical change were determined to be major reasons for the presence of excess capacity. Inadequate utilization of variable inputs (e.g. number of sets and fishing days) however was found to also be responsible for fishing vessels not producing the capacity output in the Eastern Pacific Ocean purse seine fishery.

Discussion

Initially the discussion focused on data problems and the nature of the excess capacity of the fleet. The discussion brought out the fact that DEA analysis aiming at establishing "excess capacity" can be carried out without referring to stock data, as the excess data reflects the apparent unused fleet capacity. It was also recommended, however, that the inclusion of important resource characteristics would improve the precision of the estimates of capacity. In the case of the Atlantic and Indian Ocean fisheries, information on resource characteristics were not available and, thus, the estimates of average annual capacity were likely better measures of capacity than were the estimates for each year. The estimates for the Eastern

Pacific and Western and Central Pacific Oceans included measures of resource stock conditions and environmental influences.

It was concluded that, in order to be of use in public sector fisheries management, the excess capacity estimates must be confronted with data about the state of the stocks exploited by fleet(s) having excess capacity. In this context, more work on estimates of capacity related to target yields would be useful. It was agreed that the reliability of results could be much improved if additional data could be obtained. Using quarterly data – instead of yearly – would be one way of increasing the amount of data available. In addition, economic data could be used to improve this type of analysis. Examples of useful data included: input/output prices, returns to labour (wages/share payments), fuel bills and anything that would establish profits or net returns.

If the economic concept of capacity was estimated for a multioutput technology or multispecies fishery, it would most likely indicate that there would be huge excess capacity for some species. The analysis has been limited to obtaining an estimate of the current situation. The discussion also made clear that DEA is not limited to one fleet fishing one species in one geographical area.

"The Feasibility of Applying DEA to Measure the Fishing Capacity of Global Longline and Pole and Line Fleets, Given Available Data"

Presentation

In summary, the presentation focuses on whether or not there was sufficient data available to use DEA to estimate fishing capacity for the pole and line and longline fleets. Based on a limited survey of data available from various agencies responsible for managing and monitoring tuna fishing activities, it was concluded that the available data were extremely limited, particularly for the Atlantic and Indian Ocean fisheries and the Western and Central Pacific Ocean fisheries. It was also concluded, that adequate data for the Eastern Pacific Ocean fisheries might be available, but additional work needed to be done to ascertain the availability and appropriateness of the data. It was also concluded that additional effort be expended to determine if more detailed data, necessary for estimating capacity, might be available.

Discussion

It was concluded that it is not possible to perform DEA analysis for all pole and line and longline fisheries. In the short discussion that followed, it was pointed out that suitable aggregate data is available at least for the large-scale longline fishery. It was agreed to carefully specify the data needed for DEA on longline and pole and line fisheries.

"Review of Longline Fleet Capacity of the World"

Presentation

Referring to Document Ag. 7.2. A2.3, Peter Miyake explained that the fleet size of the large-scale longliners, defined as those fishing for "sashimi" market fish and equipped with freezers, was estimated to be 1622 vessels. The estimates were based on the positive lists developed by various Regional Tuna Management Organizations and the Organization for the Promotion of Responsible Fisheries (OPRT) list. Large-scale longliner tuna catches in 2001 were estimated to be approximately 400 000 tonnes, with average catch per boat per year being 240 tonnes. The catch by other longline vessels was estimated as approximately 200 000 tonnes. It seems that the fleet has the potential of catching more tunas under current fishing patterns. Any increase in longline fishing capacity from the current level would have a negative impact on tuna stocks. On the other hand, the same level of catches can most likely be made even with a smaller fleet size. A reduction of the fishing fleet size would improve the fisheries

competitive power against other fisheries, if the other fisheries stay the same as now. However, in reality the reduction would only benefit the competitive fisheries e.g. purse seine and small-scale longliners.

At the end of his presentation the author added some analysis not included in the document. He stated: "If all large tuna long-line vessels fish in the full capacity, their catch could be more than the current level." The author speculated that it might partly be due to the fact that the species they are currently targeting has a lower hook rate and partly due to the fact that boats operate less days than they can. It is not likely to be explained by IUU vessels as these are now believed to number no more than 30 and most of them are inactive.

He further reported that the future of this particular segment of the long-line fleet is threatened by the present practice of constructing long-line vessels that are just below 24 m. This size category does not have to be listed in the positive list of RFOs and countries that are members of the organization therefore cannot control imports of tuna caught by these vessels. These vessels are being fitted with super cold storage, this means that they are being built to supply the sashimi market – the same market as that being supplied by vessels of over 200 GRT.

Discussion

The Meeting noted that the terminology used to distinguish a section of a tuna fleet from another differed from that used in several tuna management bodies. Already the First TAC had suggested that work needed to be done on terminology and it was agreed to devote some time to the terminology used for identifying tuna fishing fleets. The Meeting discussed the classification of scales of tuna fishing, adopting the classification included in Appendix G.

"Global Study of Non-Industrial Tuna Fisheries"

Presentation

Robert Gillett presented a study of non-industrial tuna fisheries, referring to Document Ag. 7.2. A2.4. As part of FAO's study on the management of world tuna fishing capacity, a study was undertaken of non-industrial tuna fisheries to describe what these fisheries are, where they occur and their relative importance.

The following categories of tuna fishing were used in the study:

- Industrial scale - mechanized purse seining, conventional freezer longlining, distant-water fishing, and most baitboat fishing.
- Very small scale: includes all handlining, trolling from open vessels, rod/reel fishing, sportfishing, all kinds of tuna fishing from vessels which are undecked, unpowered, or use outboard engines or sail and most "unclassified surface gear".
- Medium scale: Operations of a larger scale which fall between the definitions of industrial and very small scale given above.

Using the above scheme, estimates of the catches of the principal market tuna by non-industrial fishing were made in 148 countries and a closer examination was undertaken of tuna fishing in the Philippines and Indonesia. The results of this study show the amount of tuna caught in the world by very small-scale fisheries is about 320 000 tonnes, or about 8 percent of the global catch. It was not possible to make a similar compilation for the medium-scale tuna fisheries – in most regions, the readily available information did not allow certain gear types to be broken down into industrial and non-industrial components.

The accuracy of the estimates of catches by the non-industrial tuna fisheries could be greatly improved by scrutiny by specialists with knowledge of national tuna fisheries. It is especially important for those

experts to resolve the uncertainty associated with whether certain fisheries belong to the medium-scale or to industrial-scale categories.

Discussion

The author concluded that by concentrating efforts on some countries, where very small-scale tuna fishing is important, the quality of the estimates of landings could probably be much improved. Indonesia and the Philippines were covered during the study but Ecuador, Mexico, Brazil and Yemen should receive special attention in the future.

The author felt that it would be possible, through some dedicated efforts, to develop an estimate also for landings by medium-scale tuna fisheries. In the Pacific, he estimated that medium-scale tuna fisheries provided about twice the amount produced by very small-scale tuna fisheries. The Meeting noted the possibility of very large under-reporting of tuna catches in Indonesia and possibly also for other countries or regions.

General Discussion of A2

In opening the discussion, the Chair noted *inter alia* that the Meeting had so far discussed capacity mainly in output terms and that progress had been made with regard to capacity measurements for purse seine fleets, although less so for long-line fisheries. While the previous TAC Meeting had suggested that capacity be measured both in output and input terms, so far the Second TAC had only discussed capacity in terms of output measures. The Meeting noted that if a capacity measure was available in output terms, in most instances it would be possible to convert that estimate into input terms (that is into numbers and type of vessels). However such an exercise would only be useful once the goals, or objectives, for fleet management had been specified.

Several participants drew attention to the absence of a link between the status of stocks on the one hand and the existence of excess capacity on the other (where excess capacity in this usage is the difference between capacity output and catch). It was noted that as the purse seine fishing fleet expanded in the Indian Ocean, excess capacity was a permanent feature, even during the initial period when stocks could withstand considerable increase in fishing effort. This brought home the fact that an estimate of excess capacity, when defined in this manner, only measures the degree to which fishing capacity is used or not used. It is a 'neutral' measure. It does not convey any information about the state of the resource.

It was then pointed out by Dale Squires and James Kirkley that estimates of capacity should include resource and environmental conditions and that, in fact, NMFS and FAO have developed an alternative definition of excess capacity (termed "overcapacity"). In addition, two upcoming FAO reports provide external discussion about how to assess capacity related to desired target resource levels, which can vary according to the status of the stocks. Moreover, such estimates have been done using DEA, including those presented at this Meeting for the Eastern Pacific and Western and Central Pacific Oceans.

Before management action – aiming to maintain stocks at levels that permit sustained use – can be determined for a fleet that shows excess capacity (where excess capacity is defined, in this instance, as the difference between capacity output and the target capacity level), it is necessary to agree on target capacity levels. These targets will fluctuate depending on the biological status of the stocks. Only if stocks are healthy will the targets be in the neighbourhood of MSY.

In this context the TAC was reminded of the effects of technological change; even with an unchanged fleet size (in terms of numbers of vessels and their size) capacity will increase. Experience shows that an increase of 3 percent per year is not unreasonable. Therefore the target capacity (in input terms) has to be continuously re-estimated, and not only because of technology change, market developments and input prices will also determine fleet behaviour and capacity.

Some participants advanced the view that the analysis should focus on how to control the industrial tuna fisheries. Management of capacity of small-scale tuna fisheries presented both practical and political problems. For instance, limiting small-scale tuna fisheries in the Maldives was considered to be unrealistic due to the fact that the tuna from these fisheries is a major economic activity.

The Chair summarized the discussion pointing out:

- the need to refine capacity input and output measurements;
- the continued concern about capacity in the longline fisheries and the possibility that some capacity measurement could be carried out on these fisheries using DEA methodology, and
- so far the TAC had spent little time on discussing small-scale fisheries and how they are changing, but it is important to incorporate them (at least some sectors) in the capacity management.

A3/4: Tuna Fishing Industry

"The World Tuna Industry – an Analysis of Imports, Prices, and of their Combined Impact on Tuna Catches and Fishing Capacity"

Presentation

Referring to Document 7.3. A3/4.1, Camillo Catarci explained how tunas are among the most important fish commodities in the world. According to FAO data, global catches of commercial tuna species increased from 402 000 tonnes in 1950 to 3.7 million tonnes in 2001. World imports of fresh, chilled and frozen tuna increased from 435 000 tonnes in 1976 to 1.5 million tonnes in 2001 and imports of canned tuna increased from 89 000 tonnes in 1976 to 836 000 tonnes in 2001. Prices of tunas for sashimi are declining due to increased availability of sashimi commodities (e.g. tuna from farming) while prices of tuna raw material and canned tuna are declining due to an oversupply of raw material that international and national agencies are trying to contain. The final aim of the document presented was to assess the influence of the tuna market (import and prices) on tuna catches. Furthermore, the data and information provided by the document will be used as an input for the calculation of the optimum tuna fishing capacity from a socio-economic, as well as an environmental point of view.

Discussion

Because of its comprehensive coverage of such a large global industry with diverse components, a peer review and streamlining of the document was recommended. Some refinement in the use of the term "capacity" was also suggested.

The TAC noted the present downward trend in tuna prices. In discussing the various factors that have affected prices for important tuna commodities, the sashimi market appears to be strongly affected by the state of the Japanese economy, with the supplies from tuna farming becoming an important factor only recently. Prices in the canned tuna market appear to be driven by supply, as demonstrated by the large purse seine production in the Western Pacific causing a significant price drop in recent years. The World Tuna Purse Seine Organization (WTPO) action leading to a reduction in purse seine effort appears to have an effect on prices, especially during periods when the market is over-reacting to increased supplies.

It was suggested that when analysing demand for tuna products, it may be useful to take a long-term perspective, in line with the recent FAO study which examines demand for fish in the years 2015 and 2030.

A general feature of the tuna industry in the present period is declining prices. Relating the discussion of tuna prices to fishing capacity, the capacity of high cost producers is decreasing, while the capacity of low cost producers is expanding. Declining prices will therefore not necessarily result in a net decrease in

capacity. Other factors, such as the anticipation of capacity controls, can also increase capacity despite the movement in prices.

"Economic and Social Impact of Tuna Industry: What Still Needs to be Studied"

Presentation

Helga Josupeit described how, during the last decades, tuna fishing and processing have been transferred to low-cost producing countries. In fact, both production and exports of tuna from developed countries have stayed stable, with a declining trend, while all the increase in tuna supply worldwide originates in developing countries. This transfer potentially creates social problems in the traditional tuna producing and processing countries. Any reduction in tuna catch capacity will likely result in loss of employment. The document suggested to study this link, bringing a social and also economic dimension to the discussion on capacity reduction.

Discussion

In addition to the social and economic impacts mentioned in the presentation, it was noted that the use of crew from developing countries on tuna vessels from developed countries is a major change in the industry. The movement of fishing capacity to developing countries will have an interaction with small-scale fisheries operating in the area.

The TAC noted that, although the Project's planned studies dealing with social and economic impacts of the tuna industry have not yet started, these are important and should not be ignored, especially the study of features that have impacts on vulnerable groups.

A5: Tuna Fishing Capacity Management Options and Implications

"Past Developments and Future Options for Managing Tuna Fishing Capacity with Special Emphasis on Purse seine Fleets"

Presentation

Jim Joseph used Document Ag. 7.4. A5.1. to illustrate how recently regional tuna fisheries management organizations, governments and the tuna fishing industry have expressed great concern for the excess fishing capacity in the world's tuna fleets. Such a state could lead to overfishing of some tuna populations such as yellowfin and bigeye, and to harvests of skipjack in excess of demand, resulting in reduced ex-vessel prices. Analyses have shown that fishing capacity for the world's purse seine fleet, measured as the ability of a vessel or fleet to catch fish, is greater than needed to sustain current levels of harvest. Although similar analyses have not been conducted for other gear types, the longline industry has initiated measures to reduce capacity of large-scale longline fleets by 20 percent. There have been a number of efforts by regional tuna fisheries bodies to implement measures to limit the capacity of some tuna fleets operating in their respective regions. The most comprehensive of these has been the Regional Vessel Register of the Inter-American Tropical Tuna Commission (IATTC).

In the present study, two categories of options for managing fishing capacity, particularly for purse seine fleets, are presented: (a) open-access and common property-based options, and (b) limited-entry and rights-based options. The first category discusses the option of: (i) maintaining the status quo, and the option of (ii) reducing capacity by closing off a vessel's fish-storage space, but not it's fishing power. Neither of these options is considered a desirable means of addressing the capacity problem. The second category discusses (i) a regional vessel register modelled after the IATTC approach, but with a vessel buy-back option, (ii) a self-regulating measure which assigns individual quotas, and (iii) licensing schemes, including fractional licenses and the use of auctions for the sale and transfer of licenses.

It is concluded that the common-property and open-access nature of tuna fisheries has been a major cause of excess capacity in these fisheries, and that by moving away from these concepts towards rights-based management schemes, the problems of excess capacity might be resolved.

Because the process of developing acceptable measures to effectively reduce capacity will be slow and difficult to achieve, it is recommended that regional tuna bodies strengthen and/or implement as soon as possible measures to place a moratorium on the growth of capacity in all industrial-scale tuna fisheries. It is also recommended that the regional tuna management bodies work together to establish a list of all medium- and large-scale tuna vessels including the appropriate vessel characteristics and specifications needed to monitor world tuna fishing capacity.

Discussion

There was substantial discussion on the competence of RFOs to implement capacity controls affecting non-members on the high seas. Because of the complex legal issues involved, it was agreed that there was the need for legal clarification of this issue.

During the discussion it was agreed that the management of fishing capacity was just one of the components required for good fisheries management. It was agreed that there was the need to account for the multi-species nature of the fisheries, and the fact that individual vessels often participate in two or more fisheries in the management of fishing capacity. Managing the capacity of the longline and purse seine fleets, that harvest most of the market tuna species, will only address part of the problem. Most RFOs have a vessel size limit below which they exert no management control, and the other fishing methods, such as pole and line and troll are not regulated at all.

"IUU and Capacity Issues on the Tuna Fishery"

Presentation

Miwako Takase used Document Ag. 7.4. A5.2. to explain the nature of the illegal, unreported and unregulated (IUU) fishing problem, emphasizing that, once fishing capacity is controlled, excessive capacity finds loopholes to enter the fishery.

Until almost 1960, Japanese longliners for tuna expanded all over the world. During the course of the expansion of tuna longline fishery, the Japanese Fisheries Authority had substantially improved fisheries management ability. Since the late 1980s, Taiwan Province of China expanded its longline fishing capacity at a very rapid pace. In cooperation with Japan, the control ability of Taiwan Province of China was strengthened in the mid-1990s. It resulted in Taiwanese fishermen obtaining foreign registry outside the Taiwanese fisheries authority's control. In 1999 the Japanese Government started consultations with both fishing industry and authority of Taiwan Province of China and both sides agreed to set up programmes to scrap old Flag of Convenience – Large-Scale Tuna Longline Vessels (FOC-LSTLVs) and to put those LSTLVs under strict control.

Recently, a new problem of overcapacity has emerged in purse seine fishery. The following four actions are recommended to be taken promptly:

- FAO should establish a global record of tuna fishing vessels, compiling the existing records of tuna fishing vessels of relevant RFOs.
- Developed states, parties and fishing entities should stop construction of new tuna fishing vessels except for those replacing the existing licensed vessels with equivalent fishing capacity whatever flag is used.
- FAO should request RFOs to establish, as a matter of priority, a system to transfer fishing capacity from developed states, parties and fishing entities to developing states smoothly.
- A nation, party or fishing entity whose residents caused rapid expansion of fishing capacity in the recent years should cut at least that expanded portion of fishing capacity.

Discussion

Substantial discussion ensued on the issue of developing "positive vessels lists" for the different Oceans and globally. There was consensus that developing both a global list and individual RFO lists would be desirable.

General Discussion of A5

Excess fishing capacity has often been the impetus for IUU fishing in the past. The vigorous fleet reduction programmes implemented by Japan and Taiwan Province of China have resulted in a substantial reduction in the longline fleet capacity of the latter entity and a substantial reduction in IUU fishing for tunas by this sector. IUU fishing appears not to be a large problem in the purse seine fleet. However, the number of new, large purse seiners being built in several shipyards provided the possibility for an increase in fishing capacity by this sector. There is also the potential for increases in fishing capacity by vessels that fish on the high seas in non-regulated areas.

8. REPORTS ON EXTERNAL ACTIVITIES OF RELEVANCE TO THE PROJECT

"FAO activities related to the management of fishing capacity"

The Meeting was informed of the many and varied activities undertaken by FAO since the adoption of the International Plan of Action for the Management of Fishing Capacity (IPOA – Capacity) in 1998. The principal aim of these activities, which included Workshops and Expert Consultations, was to foster common understanding of the problem and suggest possible solutions (see Appendix E). Some of the activities are still in progress. FAO noted that no country had applied for technical assistance in support of the implementation of the IPOA – Capacity. However, extrabudgetary funds (about US$ 0.5 million) for the implementation of the three IPOAs had recently become available and some work was earmarked for collaboration with OSPESCA in Central America.

FAO informed on activities in areas related to the IPOA – Capacity. In particular, a Technical Paper introducing fishing subsidies, a guide for assessing subsidies to fisheries aimed at officers in national administrations, and a series of studies reviewing the fleet economics.

Other activities related to the management of fishing capacity

The participants were informed that the IATTC will consider a Regional Plan for the management of fishing capacity in the Eastern Pacific Ocean in June 2004. It will provide a regional framework to prevent further expansion of tuna fisheries in the area. IATTC is also compiling a Regional Register of vessels authorized to catch tunas by member countries and some non-contracting parties. The size of vessels in the Register, however, will not be standardized as different limits are applied by countries in reporting. The Positive List of longliners identified China, Taiwan Province of China, the Republic of Korea and the European Union as cooperating non-member countries, whose longliners are authorized to fish in the Eastern Pacific Ocean.

The participants were informed that National Marine Fisheries Service of the United States (NMFS) has made available in the public domain an inventory of purse seine tuna vessels with more than 400 m^3 of carrying capacity operating in the Western and Central Pacific Ocean. In connection with a study on bycatch, a survey was conducted on the swordfish longliners for the United States' West Coast.

IOTC adopted a Resolution on fishing capacity including the freezing of the numbers of the fleets of those parties that have more than 50 vessels in the register and is studying a reduction plan for other parties based on their projections of fleet growth in the next two years.

The WTPO has recently adopted two resolutions promoting the limitation of construction of new purse seiners.

OPRT has implemented its buy-back programme for large longliners.

At a recent meeting, the Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) recommended that capacity of tuna fleets in the area should not be further increased.

The TAC was made aware of a number of new seiners being built, some of which employ advanced technology for ultra low temperature freezing that may affect sashimi markets.

9. FUTURE RESEARCH

A1: Tuna Fisheries and Resources

Three activities under this component of the Project that could potentially benefit from follow-up work were identified: (i) the fishery documentation work undertaken by Peter Miyake; (ii) database maintenance and development of the user interface for FIGIS, and (iii) refinement of the status of stocks report.

With respect to (i) above, the report is essentially completed and the only further work required is for review and publication of the report. However, it was noted that some information gaps remain, particularly for longline vessels <24 m and for the various small-scale fleets identified in the Gillett study. A project to address tuna fishery data gaps in Indonesia and the Philippines is currently being considered by participants in the Western and Central Pacific Preparatory Conference, and the TAC encourages the countries concerned to give favourable consideration to this proposal.

Regarding FIGIS, further database updating and software development will be undertaken within FAO's regular work programme. This is an ongoing programme that will continue to provide valuable information on the status of tuna stocks and fisheries.

For the status of stocks report, it was agreed that:

- Terminology regarding biomass and fishing mortality levels should, where possible, refer to "targets", e.g. in the case of biomass, the classification could be "below the targeted level", "near the targeted level", and "above the targeted level". RFOs and the Secretariat of the Pacific Community (SPC) should be consulted on this and encouraged to provide assessments in a consistent way.
- A summary table should be produced that lists various fishery- and stock-based information for each of the tuna stocks. This table could introduce the appendix of more detailed stock-specific information and include page references to the section of the appendix concerned with stock.
- If possible, the appendix should be condensed ideally to consist of one page per stock.
- The introduction to the report should clearly acknowledge the sources of information (the RFOs and SPC).
- The report should attempt to draw qualitative conclusions regarding global levels of fishing effort in the major gear type categories on the basis of the status of stocks information presented.

A2: Characterization and Estimation of Tuna Fishing Capacity

FAO, the RFOs and SPC should collaborate on methods to make the link between status of stocks and fishing capacity in a more quantitative way, taking into account the multispecies nature of the major fisheries. A multidisciplinary working group might be created to progress this issue.

Seven proposals were made aiming to establish whether various tuna fleets have sufficient or too much capacity, given the status of the various tuna stocks. These proposals aimed to carry out research on:

- tuna purse seine fishing capacity;
- longline fleet fishing capacity;
- longline fleet fishing capacity accounting for sea turtles;
- technological change and increases in fishing capacity;
- relating fishing capacity to ex-vessel prices of tunas;
- the capacity of the very small- and medium-scale artisanal tuna fisheries, and
- engineering estimates of capacity.

The first five proposals were estimated at US$ 90 000. They are elaborated in Appendix F.

In the following discussion it was pointed out that in addition to turtles, sharks and sea birds might be worthwhile including if a study is to be made. Doubts were also expressed about the wisdom in expanding work to include bycatch as the work on capacity estimates had not been finalized. Therefore, this project was not recommended.

A3/4: Tuna Fishing Industry

With respect to future work, it was suggested that the document on the world tuna industry be enhanced with respect to the link between prices and capacity, be peer reviewed, and be put into a form ready for publishing.

To carry out a socio-economic study of the impact of tuna fishing capacity changes encompassing country perspectives, and the tuna fishing/processing subsectors would require about seven months and US$ 75 000. The required resources could be reduced by limiting the geographical coverage.

There was mention of a need for an analysis of the long-term world demand for tuna products. Such a study could build on the ongoing work of FAO in this area and would require about US$ 10 000 and two to three months to complete.

It was pointed out that the socio-economic issues do not drive the process of fishing capacity changes, but rather are a consequence of the process. However, the view was expressed that the study of such socio-economic consequences is an important part of the Project (as indicated by the title of the Project) but have not yet been addressed.

A5: Tuna Fishing Capacity Management Options and Implications

The TAC agreed that Document A5.1 provided a comprehensive analysis of the options available for managing fishing capacity and that no further research was required on this topic within the current Project.

10. THE PROJECT'S FUTURE MEETINGS (OF TAC AND/OR THE EXPERT CONSULTATION ON THE MANAGEMENT OF TUNA FISHING CAPACITY)

The TAC Meeting recognized that all foreseen Project activities had not been completed, and that amongst those that had been undertaken some work remained to be done, so some results were not definitive. In particular, the Project had not yet compared capacity estimates with target harvest levels (recommendation 20 of the First TAC Meeting). Therefore the Project had not yet attempted to establish, through a quantitative analysis, the presence or absence of overcapacity in world tuna fishing fleets.

The Meeting noted that a third meeting of the TAC should be organized only if additional research has been undertaken by the Project. No Expert Consultation to be funded by the Project is foreseen.

11. FUNDS AND LOGISTIC ARRANGEMENTS FOR THE PROJECT'S FUTURE ACTIVITIES

The TAC suggests that the peer review of Project reports be undertaken by FAO following its normal practice. However, in order to ensure good understanding and readability of Project reports, the TAC suggested that reviewers represent a range of disciplines, appropriate to the subject matter of the reports, but wider than that of the author(s). The TAC noted that some of the documents presented at the Meeting are very long, suggesting to shorten them. Alternative ways of publishing the documents were discussed.

12. RECOMMENDATIONS

The TAC is making two types of recommendations: those aiming to bring the Project to a satisfactory end and therefore directed at FAO and those expected to be channelled by FAO to the world at large.

Completion of the Project

It was agreed that the findings, conclusions and recommendations of the various research activities should be combined in one document. This document could be modelled on the statement produced by the Second TAC Meeting. It should be drafted by FAO and TAC members should be given an opportunity to comment on this document before it is finalized. A final draft should be available before the end of the year.

The TAC recommends that a number of research programmes be carried out. They are intended to make it possible for the Project to achieve the outputs established for the Project. However, the resources available to the Project in March 2004 are few and do not allow for more than finalizing already started activities. Thus the research programme outlined below would require additional fundings.

The following research Projects were recommended:

A1 Tuna Fisheries and Resources

- Elaboration of target yields for major tuna fisheries (no estimation).

A2 Characterization and Estimation of Tuna Fishing Capacity

- A workshop to review the implications of the status of stocks for the management of capacity (US$ 35 000).
- Tuna Purse Seine Fishing Output Capacity (US$ 25 000).
- Longline fleet fishing capacity (US$ 25 000).
- Technological change to increases in fishing capacity (US$ 25 000)
- Relating estimates of fishing capacity to ex-vessel prices of tuna (US$ 25 000).
- A study to develop a useful input capacity measurement for tuna longline fisheries.
- Update input capacity estimates for purse seine fleets.

A3/A4 Tuna Fishing Industry

- A study on the socio-economic effects of management of capacity in tuna fisheries (US$ 75 000).
- A study of the long-term outlook of demand and consumption of tuna products (US$ 10 000).

A5 Tuna Fishing Capacity Management Options and Implications

- A short note explaining the concepts-terminology used to measure capacity, including specifying how capacity can be measured (input) in purse seine and longline fisheries.

General recommendations through FAO

The TAC recommends that FAO:

- Promote efforts to provide external support for better information on tuna fishing in countries where small-scale tuna fisheries account for a large part of fishing activities, *inter alia* the Philippines, Indonesia, Ecuador, Mexico, Brazil, Yemen.
- Encourage countries to collect information on the characteristics and operations of tuna fishing vessels/fleets.
- Promote the consolidation of a global record of tuna fishing vessels.

Furthermore the TAC recommends that FAO promotes the following tuna management measures:

- It is recommended that a moratorium on the entry of additional large scale tuna vessels into these fisheries be implemented, until an efficient, equitable and transparent management system of fishing capacity is achieved.
- Within the constraints of capacity limits, RFOs should have a system for allowing the transfer of fishing capacity.
- Any country or fishing entity which has expanded or is expanding its tuna fishing capacity should strengthen its management of capacity along the lines recommended above.
- RFOs should collect information on the numbers, capacities and vessel characteristics for other tuna vessels such as pole and line and trollers to determine if excess capacity exists for these fleets.
- Rights-based management of tuna fisheries should be considered, where appropriate, as a long-term solution for the management of excess fishing capacity.
- Mechanisms for managing tuna fishing capacity need to be backed up by monitoring, surveillance and control systems.

13. OTHER MATTERS

On behalf of FAO and its Project, Jacek Majkowski thanked all participants of the Meeting, particularly the presenters of the papers, for their valuable technical input to the Meeting. He expressed particular thanks to:

- Robin Allen, Chairman of the Meeting for very efficiently leading the discussions;
- the rapporteurs and the drafting committee for the preparation of first drafts of the Report of the Meeting and the Statement of TAC, respectively, and
- Sarah Gindre and Ignacio de Leiva for their effort and efficient work.

14. ADOPTION OF STATEMENT OF TAC

The Statement of TAC was adopted by the Meeting on 18 March 2004.

15. ADOPTION OF THE REPORT

The Report was adopted by the Meeting on 18 March 2004.

Appendix A

Agenda

Monday, 15 March 2004

1. Opening

2. Introduction of Participants

3. Adoption of the Provisional Agenda

4. Logistic Arrangements for the Meeting

5. Report of the Meeting and a Statement of TAC: Content and Arrangements

6. Overview of the Project Implementation (Jacek Majkowski)

7. Project's Studies: Progress and Results

7.1. A1: Tuna Fisheries and Resources

- "Historical Developments of Tuna Fisheries and their Catches" by Peter Miyake
- "Tuna Data in FAO's Fisheries Global Information System (FIGIS)" by Fabio Carocci, Adele Crispoldi, Ignacio de Leiva and Jacek Majkowski
- "Status of Tuna Stocks and its Implications for the Fishing Capacity" by Ignacio de Leiva and Jacek Majkowski

7.2. A2: Characterization and Estimation of Tuna Fishing Capacity

- "An Analysis of the Fishing Capacity of the Global Purse Seine Fleet" by Chris Reid, James Kirkley and Dale Squires
- "The Feasibility of Applying DEA to Measure the Fishing Capacity of Global Longline and Pole and Line Fleets, Given Available Data" by Chris Reid, James Kirkley and Dale Squires
- "Review of Longline Fleet Capacity of the World" by Peter Miyake
- "Global Study of Non-Industrial Tuna Fisheries " by Robert Gillett

Tuesday, March 16 2004

7.3. A3/4: Tuna Fishing Industry

- "The World Tuna Industry – an Analysis of Imports, Prices, and of their Combined Impact on Tuna Catches and Fishing Capacity" by Camillo Catarci
- "Economic and Social Impact of Tuna Industry: What Still Needs to be Studied" by Helga Josupeit

7.4. A5: Tuna Fishing Capacity Management Options and Implications

- "Past Developments and Future Options for Managing Tuna Fishing Capacity with Special Emphasis on Purse seine Fleets" by Jim Joseph
- "IUU and Capacity Issues on the Tuna Fishery" by Miwako Takase

8. Reports on External Activities of Relevance to the Project (all participants)

- "FAO activities related to the management of fishing capacity" by Ulf Wijkström
- Other activities related to the management of fishing capacity

9. Review of the First draft of the Statement by TAC without the Recommendations Section

Wednesday, 17 March 2004

10. Future Research

- *A1: Tuna Fisheries and Resources*
- *A2: Characterization and estimation of tuna fishing capacity*
- *A3/4: Tuna fishing industry*
- *A5: Tuna fishing capacity management options and implications*

11. The Project's Future Meetings (of TAC and/or the Expert Consultation on the Management of Tuna Fishing Capacity)

12. Funds and Logistic Arrangements for the Project's Future Activities

13. Recommendations

14. Other matters

15. Review of the Second draft of the Statement by TAC

Thursday, 18 March 2004

16. Adoption of the Statement by TAC

17. Adoption of the Report

Appendix B

List of Participants

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Appendix C

List of Documents

Working Documents

A1: Tuna Fisheries and Resources

Paper Second TAC/Ag. 7.1. A1.1. Historical Developments of Tuna Fisheries and their Catches by Peter Miyake

Paper Second TAC/Ag. 7.1. A1.2. Tuna Data in FAO's Fisheries Global Information System (FIGIS) by Fabio Carocci, Adele Crispoldi, Ignacio de Leiva and Jacek Majkowski

Paper Second TAC/Ag. 7.1. A1.3. Status of Tuna Stocks and its Implications for the Fishing Capacity by Ignacio de Leiva and Jacek Majkowski

A2: Characterization and Estimation of Tuna Fishing Capacity

Paper Second TAC/Ag. 7.2. A2.1. An Analysis of the Fishing Capacity of the Global Purse Seine Fleet by James Kirkley, Chris Reid and Dale Squires

Paper Second TAC/Ag. 7.2. A2.2. The Feasibility of Applying DEA to Measure the Fishing Capacity of Global Longline and Pole and Line Fleets, Given Available Data by James Kirkley, Chris Reid and Dale Squires

Paper Second TAC/Ag. 7.2. A2.3. Review of Longline Fleet Capacity of the World by Peter Miyake

Paper Second TAC/Ag. 7.2. A2.4. Global Study of Non-Industrial Tuna Fisheries by Robert Gillett

A3/4: Tuna Fishing Industry

Paper Second TAC/Ag. 7.3. A3/4.1. The World Tuna Industry – an Analysis of Imports, Prices, and of their Combined Impact on Tuna Catches and Fishing Capacity by Camillo Catarci

Paper Second TAC/Ag. 7.3. A3/4.2. Economic and Social Impact of Tuna Industry: What Still Needs to be Studied by Helga Josupeit

A5: Tuna Fishing Capacity Management Options and Implications

Paper Second TAC/Ag. 7.4. A5.1. Past Developments and Future Options for Managing Tuna Fishing Capacity with Special Emphasis on Purse Seine Fleets by Jim Joseph

Paper Second TAC/Ag. 7.4. A5.2. IUU and Capacity Issues on the Tuna Fishery by Miwako Takase

Information Documents

Paper Second TAC/Inf. 1.	Provisional Agenda
Paper Second TAC/Inf. 2.	Provisional List of Documents
Paper Second TAC/Inf. 3.	Provisional List of Participants
Paper Second TAC/Inf. 4.	Report of the First Meeting of the Technical Advisory Committee (TAC) for the FAO Project Management of Tuna Fishing Capacity: Conservation and Socio-Economics. Rome, Italy, 14-16 April 2003
Paper Second TAC/Inf. 5.	Implementation of the FAO Project on the Management of Tuna Fishing Capacity: Progress and Future Activities by Jacek Majkowski (presented at the First Meeting of the TAC)
Paper Second TAC/Inf. 6.	Overview of the FAO Project on the Management of Tuna Fishing Capacity by Jacek Majkowski (presented at the First Meeting of the TAC)

Other Relevant References

- Managing Fishing Capacity of the World Tuna Fleet by Jim Joseph.
- Historical Trends of Tuna Catches in the World by Peter Miyake, Nauzumi Miyabe and Hideki Nakano.
- International Plan of Action for the Management of Fishing Capacity.
- International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing.
- Implementation of the International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated Fishing.

Appendix D

Statement by the Technical Advisory Committee (TAC) for the FAO Project on the Management of Tuna Fishing Capacity: Conservation and Socio-Economics (GCP/INT/851/JPN)

18 March 2004

Background

This FAO Project aims to identify, consider and resolve technical problems associated with the management of tuna fishing capacity on a global scale, taking into account conservation and socio-economic issues. This multidisciplinary Project created an external Technical Advisory Committee (TAC) composed of technical experts affiliated mostly with tuna fishery bodies and other major Inter-Governmental and Non-Governmental Organizations involved in tuna fishing, fisheries research and management. This Statement was prepared by the TAC in order to provide the 2004 FAO Technical Consultation on the Implementation of IPOA-Capacity with relevant feedback (Rome, Italy, 24-29 June 2004).

The Importance of Tuna Fisheries

Tuna and tuna-like species are the target of important fisheries in both developed and developing countries. They are also very important globally because of their high economic value and their intensive international trade for the canned tuna and sashimi market. The estimated value of tuna and tuna-like species at the landing site in 2001 was US$ 8.3 billion. From the quantity and value point of view, albacore, bigeye, Atlantic bluefin, Pacific bluefin, skipjack, southern bluefin and yellowfin are the principal market tuna species. In 2002, the catch of the principal market species was approximately 4 million tonnes with an export value of US$ 5 billion, which represents almost 65 percent of the total catch of all tuna and tuna-like species.

Many tuna fisheries are multigear and multispecies, which makes it difficult to assess and manage each stock independently of the others. Notably, tropical tunas (composed of skipjack, yellowfin and bigeye) are caught together by surface gears such as purse seine and pole-and-line; bigeye and yellowfin are also targeted by longline fleets.

Tuna catches have increased historically for almost all species in all regions, although there are now some signs of stabilization. Historical trends in catches may vary depending on species and fishing gear. An increase in purse seine catch since the 1980s is particularly noticeable for tropical tunas.

The catch of some longliner fleets is not well monitored and reported. There are also multiple gears used in small-scale[1] fisheries; preliminary estimates suggest that their catches may account for 8 percent of the total global tuna catch of principal market species.

The tuna market is international in nature. Therefore there are strong interactions between supply, demand, price and fishing capacity. The decline in prices since the mid-1990s in the sashimi market was driven primarily by changing economic conditions in Japan and exacerbated by increased production from tuna farming. For the canned tuna market, increasing demand has resulted in increasing fishing capacity in order to meet that demand, but when demand could not meet excess of supply, prices declined

[1] Definitions of the various scales of tuna fishing were adopted by the TAC and are given in the report of the Second Meeting. In summary, small scale tuna fishing is defined as handlining, trolling from open vessels, rod/reel fishing, sportfishing, and all kinds of tuna fishing from vessels usually under 12 m which are undecked, un-powered, or use outboard engines or sail. Medium scale is largely fishing from decked vessels without mechanical freezing which are mainly between 12 and 24 m. Large scale is fishing from vessels which usually have mechanical freezing and which are generally longer than 24 m.

(i.e. supply of skipjack in excess of demand in 1999-2000 resulted in ex-vessel prices declining to the lowest level in 30 years).

Status of Tuna Stocks

The current status of the principal market tuna species varies depending on the stock and region. World stocks of skipjack tuna are not considered to be fully exploited. In contrast, southern and Atlantic bluefin tuna are considered to be overexploited. In general terms, the remaining species are somewhat above or somewhat below the management targets. Because of increased fishing pressure, there is growing concern about the possibility that bigeye tuna stocks are becoming overexploited. However, due to the multispecific nature of tropical tuna surface fisheries, it is difficult, with the current fishing technology, to reduce catches of bigeye tuna without foregoing substantial catches of other tuna species.

Evaluation of Tuna Fishing Capacity

The Project conducted preliminary analyses to examine fishing capacity but these require further investigations. These further investigations should include information on status of tuna stocks.

Examination of the potential capacity in the global tuna purse seine fleet revealed unused capacity in all fisheries for all major tuna species. With the exception of the Eastern Pacific, unused capacity was primarily caused by technical inefficiency; but in the Eastern Pacific unused capacity was found to be associated with both technical inefficiency and low utilization of the variable inputs (i.e. number of sets). Technical change was also determined to be a major contributor to the growth of fishing capacity and unused capacity over time.

For large longline vessels, analysis similar to that done for purse seine was not completed, due to the lack of data. However, an alternate preliminary examination of current large longline vessels suggested that they can produce more than their present catch.

The fleet of small- and medium-size longliners is growing and its catch is increasing. The available data with which to examine the fishing capacity for this fleet is limited. Similar data are also missing for the other fleets, such as pole-and-line fleets. There is a need to monitor and collect data from these fleets in order to conduct similar analyses.

Overcapacity has often been the impetus for IUU fishing in the past. In response to concern over increasing fishing capacity, regional management bodies, governments, and some sectors of the tuna industry have taken action to address the problem. IATTC, ICCAT and IOTC have adopted certain measures to limit the number and capacity of tuna fishing vessels. The Japanese Government and the international longline industry (OPRT) carried out a buy-back program in which large-scale longline vessels were scrapped in order to eliminate IUU longliners. IUU fishing appears not to be a large problem in the purse seine fleet.

However, the number of new, large purse seiners being built in several shipyards provide the possibility for an increase in fishing capacity by this sector. There is also the potential for increases in fishing capacity by vessels that fish on the high seas in non-regulated areas. The international purse seine industry (WTPO) has expressed an interest in limiting expansion in the international tuna purse seine fleet.

Management of Tuna Fishing Capacity

The status of some tuna stocks requires either a reduction or no increase in the utilization of fishing capacity. Various Regional Tuna Organizations as well as industry have expressed concern about growing fishing capacity. Some analyses were conducted to examine fishing capacity.

Open access has been a major cause leading to overcapacity[2] in most fisheries. A move to rights-based management in tuna fisheries can provide the basis for maintaining fishing capacity in balance with the productive capability of tuna stocks. Rights-based options may be useful for managing tuna fishing capacity. Options including, *inter alia*: (1) a regional vessel register with provision to allow vessels to transfer flag within the register; (2) country allocations and/or transferable individual vessel quotas; (3) licensing schemes, including the option for issuing fractional licenses, should be examined for their practicality and to ensure there are no international legal constraints to their implementation. For each of these options buy-back mechanisms can be an effective means of reducing fishing capacity. Any option(s) chosen must allow for the possibility of new entrants, if necessary by replacement of the existing participants. The multispecies and multigear nature of tuna fisheries, the relative differences in exploitation rates among species, the differences of fish sizes taken by different gears and the differences in characteristics of tuna fisheries among nations, must be considered in the development of many of these measures to limit fishing capacity. These schemes, coupled with other control mechanisms such as catch limits, can ensure sustainable tuna fisheries.

Information on purse seine and large-scale longline vessels is available for the development of measures to limit fishing capacity; similar information for other gear types is not, but is urgently required if effective management is to become a reality. Because of concerns over recent increases in fishing capacity in many tuna fisheries, it is recommended that a moratorium on the entry of additional large-scale tuna vessels into these fisheries be implemented, until an efficient, equitable and transparent management system of fishing capacity is achieved. With respect to long term solutions, consideration might be given first to options directed to the vessel level, e.g. the regional vessel register. It is also urgent that for all gear types, all medium- and large-scale tuna fishing vessels are identified and included in a regional list, and these lists be coordinated among the regional tuna bodies in order to monitor vessel capacity and facilitate the management of fishing capacity in the world tuna fisheries. For these options to be successful, effective monitoring and enforcement will be required. The effectiveness of such monitoring and enforcement would be enhanced by close cooperation among the regional tuna bodies; therefore, to achieve this cooperation, it might be desirable to establish a permanent coordinating body among the regional tuna management organizations.

Recommendations

Rights-based options may be useful for managing tuna fishing capacity. Options including, *inter alia*: (1) a regional vessel register with provision to allow vessels to transfer flag within the register; (2) country allocations and/or transferable individual vessel quotas, and (3) licensing schemes, including the option for issuing fractional licenses, should be examined for their practicality and to ensure there are no international legal constraints to their implementation.

It is recommended that a moratorium on the entry of additional large scale tuna vessels be implemented, until an efficient, equitable and transparent management system of fishing capacity is achieved.

[2] A level of fishing capacity beyond target levels.

Appendix E

FAO Involvement in Activities Linked to the IPOA - Capacity, 1999 – 2003

Substantive Area of the IPOA – Capacity	FAO Activities
definition of fishing capacity	▪ Gréboval D. (ed.). 1999. Managing fishing capacity: selected papers on underlying concepts and issues. *FAO Fisheries Technical Paper. No. 386*. Rome: FAO. ▪ FAO/SEAFDEC Regional Workshop on the Management of Fishing Capacity, Penang, Malaysia, 2000. *Initial Guidelines for the Management of Fishing Capacity in South Asia*.
measurement of fishing capacity	▪ MOFI/ALMRV/SEAFDEC/FAO. 2001. Regional Technical Consultation on Indicators for Sustainable Fisheries Management in the ASEAN Region, Haiphong, Vietnam. ▪ FAO. 2000. Report of the Technical Consultation on the Measurement of Fishing Capacity, Mexico City, Mexico, 1999. *FAO Fisheries Report No. 615*. Rome: FAO. ▪ Ward, J.M. and J. Kirkley. (in press). Fish Harvesting Capacity and Related Concepts in Fisheries. *FAO Fisheries Technical Paper No. 433 (v1)*. Rome: FAO. ▪ Pascoe, S.; J.E. Kirkley, D. Gréboval and C.J. Morrison Paul. 2003. Measuring and Assessing Capacity in Fisheries: Issues and Methods. *FAO Fisheries Technical Paper. No. 433 (v2)*. Rome, FAO. ▪ Pascoe, S. and D. Gréboval (eds). 2003. Measuring Capacity in Fisheries: Selected Papers. *FAO Fisheries Technical Paper No. 445*. Rome: FAO.
technical assistance *supporting the implementation of the IPOA – Capacity* & ***cooperation*** *with regional fisheries bodies* for promotion of the implementation of the IPOA – Capacity	▪ FAO/Commission Sous-Régionale des Pêches (CSRP) Workshop on the management of Fishing Capacity in West Africa. FAO, Saly Portudal, Senegal, September 2001. ▪ Gréboval, D. and F. Poulain (eds). 2003. Rapport et documentation de l'Atelier de Réflexion sur la Gestion des Capacities de Pêche en Afrique de l'Ouest. *FAO Fisheries Report No. 707 (FR)*. Rome: FAO. ▪ FAO/ADRIAMED Workshop on the Monitoring, Assessment and Management of Fishing Capacity in the Adriatic Area of the Mediterranean. Fano, Italy. October 2002. ▪ MFRDMD / SEAFDEC Regional Technical Consultation on the Identification of Indicators for the Sustainable Development and Management of Capture Fisheries in the ASEAN region, Kuala Terengganu, Malaysia, 2002.

Substantive Area of the IPOA – Capacity	FAO Activities
effects of fisheries management strategies on capacity	▪ Gréboval, D. and G. Munro. 1999. Overcapitalization and Excess Capacity in World Fisheries: Underlying Economics and Methods of Control. *In* Dominique Gréboval (ed.), *Managing Fishing Capacity*. *FAO Fisheries Technical Paper 386*. Rome: FAO. ▪ Cunningham, S. and D. Gréboval. 2001. Managing Fishing Capacity: A Review of Policy and Technical Issues. *FAO Fisheries Technical Paper No. 409*. Rome: FAO. ▪ Gréboval, D. (comp.) 2002. Report and documentation of the International Workshop on Factors Contributing to Unsustainability and Overexploitation in Fisheries. Bangkok, Thailand, 4-8 February 2002. *FAO Fisheries Report. No. 672*. Rome, FAO. ▪ Provision of capacity reduction management options to the Inter-American Tropical Tuna Commission (IATTC) 6th meeting of the Working Group on Fleet Capacity *Eastern Pacific Ocean Tuna Fisheries: Options for achieving the 2005 target*. March 2002 ▪ Ward, J.M. and R. Metzner. 2002. Fish Harvesting Capacity, Excess Capacity, and Overcapacity: *A Synthesis of Measurement Studies and Management Strategies*. *FAO Fisheries Report No. 691*. Rome: FAO. ▪ ASEAN/SEAFDEC Regional Workshop on Innovative Fisheries Management Approaches in Southeast Asia: Rights-based Fisheries & Decentralization. Phuket, Thailand. 2003. ▪ Gates, J.M. (in press). Vessel Buyback Programs: Problems and Prospects. *FAO Fisheries Technical Paper No.* Rome: FAO.
transitioning away from overcapacity	▪ Metzner, R. and J. Ward. 2002. Report of the Expert Consultation on Catalyzing the Transition away from Overcapacity in Marine Capture Fisheries. *FAO Fisheries Report 691*. Rome: FAO ▪ FAO Expert Consultation on Catalyzing the Transition away from Overcapacity in Marine Capture Fisheries. FAO Headquarters, Rome, Italy. October 2002.

Appendix F

Characterizing and Estimating Capacity in Tuna Fisheries - Future Research

PROJECT 1. Tuna Purse Seine Fleets Fishing Capacity

1. Update existing estimates of fishing capacity reflect overcapacity in the Eastern Pacific, Western and Central Pacific, Indian, and Atlantic Oceans fisheries.
    a. Obtain existing estimates of MSY or long-term target or desired yields for each of species considered in the existing analyses.
2. Obtain more temporally disaggregated (quarterly) data for the Indian and Atlantic Oceans' fisheries.
3. Apply Data Envelopment Analysis (DEA) to obtain estimates of capacity, including resource conditions, and compare to target yields or MSY.
4. Prepare report summarizing resource levels and estimates of overcapacity.

TIME: Three months.

PROJECT 2. Longline Fleets Fishing Capacity

1. Estimate fishing capacity and overcapacity in the Western and Central Pacific Ocean using logbook data from Secretariat of the Pacific Community.
2. Estimate fishing capacity and overcapacity in the Atlantic, Indian, and Eastern Pacific Oceans using available data, which may be more aggregated than the Western and Central Pacific Ocean.
3. Apply DEA to obtain estimates of capacity, including resource conditions, and compare to target yields or MSY.
4. Relate overcapacity analysis to that for tuna purse seine fleets.
5. Prepare report summarizing resource levels and estimates of overcapacity.

TIME: Four months.

PROJECT 3. Longline Fleets Fishing Capacity Accounting for Sea Turtles

1. Extend Project 2 to include incidental takes of sea turtles (as an undesirable output).
2. Other than the U.S. Atlantic, Pacific, and Hawaiian longline fleets, sources of data on sea turtle interactions in other longline fisheries of the world will have to be researched.
3. Requires writing of specialized software.

TIME: Three months.

PROJECT 4. Technological Change and Increases in Fishing Capacity

1. Estimate changes in fishing capacity when there are technological innovations, after disentangling changes in resource abundance from changes in technology.
2. Apply to tuna purse seine fleets in the Atlantic, Indian, Eastern Pacific, and Western and Central Pacific Oceans.

TIME: Three months.

PROJECT 5. Relate Estimates of Fishing Capacity to Ex-Vessel Prices of Tunas

1. Use time series econometric techniques (Granger causality and co-integration) to evaluate whether or not changes in fishing capacity impact ex-vessel prices for tunas, or whether ex-vessel tuna prices impact fishing capacity, or whether they simultaneously impact each other in both the short-run and long-run.
2. Obtain and compile data in user-friendly format.
3. Explore the impact of a composite price for both skipjack and yellowfin tunas.
4. Project is in collaboration with FAO.

TIME: Four months.

Appendix G

Suggested Categories for Scales of Tuna Fishing

Considerations:

- Categories oriented to management purposes.
- Categories determined largely by functional characteristics.
- Avoidance of terms that have large difference between regions (e.g. "artisanal").
- Universally applicable characteristics are not possible, therefore use of "generally", "usually".

Small scale

- Handlining, trolling from open vessels, rod/reel fishing, sportfishing, and all kinds of tuna fishing from vessels which are undecked, unpowered, or use outboard engines or sail.
- Generally vessels are less than 12 m in length.
- Fishing trips are usually less than three days within a nation's EEZ.

Medium scale

- Vessel/gear characteristics:
  - Longline – Decked vessel with an ice hold
  - Seine – Decked vessel without power block
  - Pole/line – Decked vessel using no mechanical freezing
  - Gillnet – Decked vessel with mechanical net hauling gear
  - Troll – Decked vessel
  - Trapping – Multiple vessels
  - Other – Decked vessel
- Generally vessels are between 12 and 24 m in length.
- Fishing trips are usually less than two weeks within a nation's EEZ and neighbouring zones.

Large scale

- Vessel/gear characteristics:
  - Longline – Mechanical freezing
  - Purse seine – Use of power block
  - Pole/line – Mechanical freezing
- Generally vessels are greater than 24 m in length.
- Vessels are usually capable of distant overseas trips lasting more than a month.