Appendix 1: FAO International Plan of Action for the Management of Fishing Capacity (IPOA-IUU)

Introduction

1. In the context of the Code of Conduct for Responsible Fisheries and its overall objective of sustainable fisheries, the issues of excess fishing capacity in world fisheries is an increasing concern. Excessive fishing capacity is a problem that, among others, contributes substantially to overfishing, the degradation of marine fisheries resources, the decline of food production potential, and significant economic waste.

2. The Code of Conduct provides that States should take measures to prevent or eliminate excess fishing capacity and should ensure that levels of fishing effort are commensurate with sustainable use of fishery resources.

3. At its last Session in 1997, the Committee on Fisheries (COFI), requested FAO to address the issue of fishing capacity. FAO organized a Technical Working Group on the Management of Fishing Capacity in La Jolla, USA, from 15 to 18 April 1998. A subsequent FAO consultation was held in Rome from 26 to 30 October 1998, preceded by a preparatory meeting from 22 to 24 July 1998.

Part I - Nature and Scope of the International Plan of Action

4. The International Plan of Action is voluntary. It has been elaborated within the framework of the Code of Conduct for Responsible Fisheries as envisaged by Article 2 (d). The provisions of Article 3 of the Code apply to the interpretation and application of this International Plan of Action and its relationship with other international instruments.

5. This document is in furtherance of the commitment of all States¹ to implement the Code of Conduct. States and regional² fisheries organizations should apply this document consistently with international law and within the framework of the respective competencies of the organizations concerned.

¹ In this document, the term "State" includes Members and non-members of FAO and applies *mutatis mutandis* also to "fishing entities" other than States.

² In this document, the term "regional" includes subregional, as appropriate.

6. The International Plan of Action constitutes an element of fishery conservation and sustainable management.

Part II - Objective and Principles

7. The immediate objective of the International Plan of Action is for States and regional fisheries organizations, to achieve world-wide preferably by 2003, but not later than 2005, an efficient, equitable and transparent management of fishing capacity. *Inter alia*, States and regional fisheries organizations confronted with an overcapacity problem, where capacity is undermining achievement of long-term sustainability outcomes, should endeavour initially to limit at present level and progressively reduce the fishing capacity applied to affected fisheries. Where long-term sustainability outcomes are being achieved, States and regional fisheries organizations nevertheless need to exercise caution to avoid growth in capacity undermining long-term sustainability objectives.

8. The above objective may be achieved through a series of actions related to four major strategies:

i. the conduct of national, regional and global assessments of capacity and improvement of the capability for monitoring fishing capacity;

ii. the preparation and implementation of national plans to effectively manage fishing capacity and of immediate actions for coastal fisheries requiring urgent measures;

iii. the strengthening of regional fisheries organizations and related mechanisms for improved management of fishing capacity at regional and global levels;

iv. immediate actions for major transboundary, straddling, highly migratory and high seas fisheries requiring urgent measures.

These strategies may be implemented through complementary mechanisms to promote implementation of this international Plan of Action: awareness building and education, technical co-operation at the international level, and co-ordination.

9. The management of fishing capacity should be based on the Code of Conduct for Responsible Fisheries and take into consideration the following major principles and approaches:

i. *Participation*: The International Plan of Action should be implemented by States either directly, in co-operation with other States, or through FAO in co-operation with other appropriate intergovernmental organizations, including regional fisheries organizations. States and regional fisheries organizations, as appropriate, are encouraged to give effect to it and to inform FAO of actions taken to implement it. FAO will regularly provide information about its implementation.

ii. *Phased implementation:* The management of fishing capacity on the basis of national and regional plans should be achieved through the following three phases: assessment and diagnosis (preliminary analysis to be completed by the end of 2000), adoption of management measures (preliminary steps to be adopted by the end of 2002) and periodic adjustment of such assessment and diagnosed measures, as appropriate. States and regional fisheries organizations should complete these steps and progressively implement by 2005 the complementary measures specified in the International Plan of Action.

iii. *Holistic approach:* The management of fishing capacity should consider all factors affecting capacity in both national and international waters;

iv. *Conservation:* The management of fishing capacity should be designed to achieve the conservation and sustainable use of fish stocks and the protection of the marine environment consistent with the precautionary approach, the need to minimize by-catch, waste and discard and ensure selective and environmentally safe fishing practices, the protection of biodiversity in the marine environment, and the protection of habitat, in particular habitats of special concern.

v. *Priority:* Priority should be given to managing the fishing capacity in those fisheries in which there already unequivocally exists overfishing;

vi. *New technologies:* The management of fishing capacity should be designed so that it takes into account the incorporation of environmentally sound and evolving technology in all areas of capture fisheries.

vii. *Mobility:* The management of fishing capacity should encourage efficient use of fishing capacity and discourage mobility when it negatively affects sustainability and take due account of socio-economic performances in other fisheries;

viii. *Transparency*: The International Plan of Action should be implemented in a transparent manner in accordance with Article 6.13 of the Code of Conduct.

10. The implementation of the International Plan of Action should be based on the Code of Conduct, particularly Article 5, in relation to enhancing the ability of developing countries, to develop their own fisheries as well as to participate in high seas fisheries, including access to such fisheries, in accordance with their legitimate rights and their obligations under international law.

Part III - Urgent Actions

Section I: Assessment and monitoring of fishing capacity

Measurement of fishing capacity

11. States should support coordinated efforts and research at national, regional and global levels to better understand the fundamental aspects of issues related to the measurement and monitoring of fishing capacity.

12. States should support the organization by FAO of a technical consultation to be held as early as possible in 1999 on the definition and measurement of fishing capacity and the subsequent preparation of technical guidelines for data collection and analysis, noting that the result of this consultation should provide specific guidance for preliminary assessments of fishing capacity and excess fishing capacity at national, regional and global levels.

Diagnosis and identification of fisheries and fleets requiring urgent measures

13. States should proceed, by the end of 2000, with a preliminary assessment of the fishing capacity deployed at the national level in relation to all the fleets of principal fisheries and update this assessment periodically.

14. States should proceed, by the end of 2001, with the systematic identification of national fisheries and fleets requiring urgent measures and update this analysis periodically.

15. States should cooperate, within the same time frame, in the organization of similar preliminary assessments of fishing capacity at the regional level (within the relevant regional fisheries organizations or in collaboration with them, as appropriate) and at the global level (in collaboration with FAO) for transboundary, straddling, highly migratory and high seas fisheries, as well as in the identification of regional or global fisheries and fleets requiring urgent measures.

Establishment of records of fishing vessels

16. States should support FAO in the development of appropriate and compatible standards for records of fishing vessels.

17. States should develop and maintain appropriate and compatible national records of fishing vessels, further specifying conditions for access to information.

18. While awaiting the entry into force of the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (Compliance Agreement), States should support the establishment by FAO by the end of 2000 of an international record of fishing vessels operating in the high seas, following the model indicated in the Compliance Agreement.

Section II: Preparation and implementation of national plans

Development of national plans and policies

19. States should develop, implement and monitor national plans of action for managing fishing capacity, taking into account, *inter alia*, the effect of different resource management systems on fishing capacity.

20. States should develop the means to monitor fishing capacity systematically and accurately, and to regularly assess any imbalance with available fishery resources and management objectives.

21. States should develop, adopt and make public, by the end of 2002, national plans for the management of fishing capacity and, if required, reduce fishing capacity in order to balance fishing capacity with available resources on a sustainable basis. These should be based on an assessment of

fish stocks and giving particular attention to cases requiring urgent measures and taking immediate steps to address the management of fishing capacity for stocks recognized as significantly overfished.

22. States should give due consideration, in the development of national plans, to socio-economic requirements, including the consideration of alternative sources of employment and livelihood to fishing communities which must bear the burden of reductions in fishing capacity.

23. When it has been found that a national plan to manage capacity is not necessary, States should ensure that the matter of fishing capacity is addressed in an ongoing manner in fishery management.

24. At least every four years, States should review the implementation of their national plans to manage capacity for the purpose of identifying cost effective strategies for increasing effectiveness.

Subsidies and economic incentives

25. When developing their national plans for the management of fishing capacity, States should assess the possible impact of all factors, including subsidies, contributing to overcapacity on the sustainable management of their fisheries, distinguishing between factors, including subsidies, which contribute to overcapacity and unsustainability and those which produce a positive effect or are neutral.

26. States should reduce and progressively eliminate all factors, including subsidies and economic incentives and other factors which contribute, directly or indirectly, to the build-up of excessive fishing capacity thereby undermining the sustainability of marine living resources, giving due regard to the needs of artisanal fisheries.

Regional considerations

27. States should cooperate, where appropriate, through regional fisheries organizations or arrangements and other forms of co-operation, with a view to ensuring the effective management of fishing capacity.

28. States should strive to collaborate through FAO and through international arrangements in research, training and the production of information and educational material aiming to promote effective management of fishing capacity.

Section III: International considerations

29. States should consider participating in international agreements which relate to the management of fishing capacity, and in particular, the Compliance Agreement and the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks.

30. States should support co-operation and the exchange of information among all regional fisheries organizations in accordance with their procedures.

31. States should take steps to manage the fishing capacity of their vessels involved in high seas fisheries and cooperate, as appropriate with other States, in reducing the fishing capacity applied to overfished high seas stocks.

32. States should improve, through regional fisheries organizations where appropriate, and in collaboration with FAO, the collection of data on catches on the high seas as well as in the coastal area by their fleet.

33. States should recognize the need to deal with the problem of those States which do not fulfil their responsibilities under international law as flag States with respect to their fishing vessels, and in particular those which do not exercise effectively their jurisdiction and control over their vessels which may operate in a manner that contravenes or undermines the relevant rules of international law and international conservation and management measures. States should also support multilateral co-operation to ensure that such flag States contribute to regional efforts to manage fishing capacity.

34. States should be encouraged to become members of regional fisheries organizations or arrangements, or agree to apply the conservation and management measures established by such organizations or arrangements to their vessels.

35. States should promote, with the assistance of FAO, the exchange of information about the fishing activity of vessels which do not comply with conservation and management measures adopted by regional fisheries organizations and arrangements, consistent with Article VI of the Compliance Agreement.

36. Anticipating the entry into force of the Compliance Agreement, States should strive to apply the provisions of Article III of that Agreement.

37. States should ensure that no transfer of capacity to the jurisdiction of another State should be carried out without the express consent and formal authorization of that State.

38. States should, in compliance with their duties as flag States, avoid approving the transfer of vessels flying their flag to high seas areas where such transfers are inconsistent with responsible fishing under the Code of Conduct.

<u>Section IV</u>: Immediate actions for major international fisheries requiring urgent measures

39. States should take immediate steps to address the management of fishing capacity for international fisheries requiring urgent attention, with priority being given to those harvesting transboundary, straddling, highly migratory and high seas stocks which are significantly overfished.

40. Within the framework of their respective competencies, States should act individually, bilaterally and multilaterally, as appropriate, to reduce substantially³ the fleet capacity applied to these resources as part of management strategies to restore overfished stocks to sustainable levels considering, in addition to the other relevant provisions of the International Plan of Action:

i. the economic importance of the fleets catching overfished stocks and the need to limit these fleets to a level commensurate with stock sustainability and economic viability; and

ii. the use of appropriate measures to control the transfer of overcapacity to fully exploited or overexploited fisheries, taking into consideration the condition of the fish stocks.

³ The required reduction would vary from fishery to fishery; e.g. a 20 to 30% reduction was mentioned for large-scale tuna long line fleet (Report of the FAO Technical Working Group on the Management of Fishing Capacity. La Jolla, United States of America, 15-18 April 1998. FAO Fisheries Report No. 586).

Part IV - Mechanisms to Promote Implementation

41. States should develop information programmes at national, regional and global levels to increase awareness about the need for the management of fishing capacity, and the cost and benefits resulting from adjustments in fishing capacity.

Scientific and technical cooperation

42. States should support the exchange of scientific and technical information on issues related to the management of fishing capacity and promote its world-wide availability using existing regional and global fora.

43. States should support training and institutional strengthening and consider providing financial, technical and other assistance to developing countries on issues related to the management of fishing capacity.

Reporting

44. States should report to FAO on progress on assessment, development and implementation of their plans for the management of fishing capacity as part of their biennial reporting to FAO on the Code of Conduct.

Role of FAO

45. FAO will, as and to the extent directed by its Conference, collect all relevant information and data which might serve as a basis for further analysis aimed at identifying factors contributing to overcapacity such as, *inter alia*, lack of input and output control, unsustainable fishery management methods and subsidies which contribute to overcapacity.

46. FAO will, as and to the extent directed by its Conference, and as part of its Regular Programme activities, support States in the implementation of their national plans for the management of fishing capacity.

47. FAO will, as directed by its Conference, support development and implementation of national plans for the management of fishing capacity through specific, in-country technical assistance projects with Regular Programme funds and by use of extra-budgetary funds made available to the Organization for this purpose.

48. FAO will, through COFI, report biennially on the state of progress in the implementation of the International Plan of Action.

Substantive area of the IPOA– Capacity	FAO reports
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.
Measurement of fishing capacity	FAO. 2000. Report of the Technical Consultation on the Measurement of Fishing Capacity, Mexico City, Mexico, 1999. FAO Fisheries Report No. 615. Rome.
	Pascoe, S. and D. Gréboval (eds). 2003. Measuring Capacity in Fisheries: Selected Papers. FAO Fisheries Technical Paper No. 445. Rome.
	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. 433/2. Rome.
	Ward, J.M., Kirkley, J.E., Metzner, R. and S. Pascoe. 2004. Measuring and assessing capacity in fisheries. 1. Basic concepts and management options. FAO Fisheries Technical Paper No. 433/1. Rome.
	Pascoe, S., Gréboval, D., Kirkley, J. and Lindebo, E. 2004. Measuring and appraising capacity in fisheries: framework, analytical tools and data aggregation. FAO Fisheries Circular No. 994. Rome.
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 No. 386. Rome.
	Cunningham, S. and D. Gréboval. 2001. Managing Fishing Capacity: A Review of Policy and Technical Issues. FAO Fisheries Technical Paper No. 409. Rome.
	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.

Appendix 2: FAO reports linked to the IPOA-Capacity (1999–2007)

Substantive area of the IPOA– Capacity	FAO reports
	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.
Transitioning away from overcapacity	Metzner, R. and J.M. Ward. 2002. Report of the Expert Consultation on Catalysing the Transition away from Overcapacity in Marine Capture Fisheries. FAO Fisheries Report No. 691. Rome.
Regional capacity management case studies and reviews	Joseph, J. 2003. Managing Fishing Capacity of the World Tuna Fleet. FAO Fisheries Circular No. 982. Rome.
	Gréboval, D. and F. Poulain (eds). 2003. Rapport et documentation de l'Atelier de réflexion sur la gestion des capacités de pêche en Afrique de l'Ouest. FAO Fisheries Report No. 707. Rome.
	FAO/ADRIAMED. 2004. AdriaMed Seminar on Fishing Capacity: Definition, Measurement and Assessment. FAO-MiPAF Scientific Cooperation to Support Responsible Fisheries in the Adriatic Sea. GCP/RER/010/ITA/TD-13. AdriaMed Technical Document No. 13.
	FAO/FishCode. 2005. Report of the National Seminar on the Reduction and Management of Commercial Fishing Capacity in Thailand. Cha-Am, Thailand, 11- 14 May 2004. FAO/FishCode Review No. 13. Rome.
	FAO. 2004. Report of the Technical Consultation to Review Progress and Promote the Full Implementation of the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing and the International Plan of Action for the Management of Fishing Capacity. Rome, 24–29 June 2004. FAO Fisheries Report No. 753. Rome.
	Bayliff, W.H., de Leiva Moreno, J.I. and J. Majkowski (eds.). 2005. Second Meeting of the Technical Advisory Committee of the FAO Project "Management

Substantive area of the IPOA– Capacity	FAO reports
	of Tuna Fishing Capacity: Conservation and Socio- economics". Madrid, Spain, 15–18 March 2004. FAO Fisheries Proceedings No. 2. Rome.
Regional capacity management case studies and reviews	FAO Fisheries Department and FAO Subregional Office for Southern and East Africa. 2005. Report of the First Lake Victoria Fisheries Organization and FAO Regional Technical Workshop on Fishing Effort and Capacity on Lake Victoria. Dar es Salaam, United Republic of Tanzania, 12–14 December 2005. FAO Fisheries Report No. 796. Rome.
	FAO. (In preparation). Report of the Lake Victoria Fisheries Organization and FAO National Stakeholders' Workshops on Fishing Effort and Capacity on Lake Victoria (2006). FAO Fisheries Report No. 817. Rome.
	FAO. (In preparation). Report of the Lake Victoria Fisheries Organization and FAO Regional Stakeholders' Workshop on Fishing Effort and Capacity on Lake Victoria (2006). FAO Fisheries Report No. 818. Rome.

Appendix 3: Different management systems and their implications for capacity

Capacity management is one of the fundamental elements of fisheries management. As such, most fisheries management measures can be used for capacity management because no single management tool will likely prove successful if used in isolation. However, many management measures are often introduced to achieve other objectives and may have varying success when implement to achieve capacity management objectives, so it is important to know how they will also affect fishing capacity in a fishery.

Management measures that have been used for trying to manage fishing capacity may be classified as either incentive blocking or incentive enhancing systems. This refers to the impact on the incentives facing the fishers. Incentive blocking programmes impose direct restrictions on the fishers activity, thereby blocking fishers' activities that what would otherwise occur if unregulated. Incentive enhancing systems provide incentives for fishers to behave in a manor that is consistent with the objectives of the programme. These systems have both costs and benefits, as outlined in Section 5.2.

An outline of the key capacity management measures is presented below. This has been summarized from FAO Fisheries Technical Paper 433/1.

3.1 Incentive-blocking programmes

3.1.1 Limited entry

Restricting entry to a fishery is the first step in addressing the open access problem, but license limitation is not – by itself – a sufficient management measure to reduce capacity. It requires other mechanisms to control fishing capacity because increases in capacity will increase as a result of fishers:

- capital stuffing where the characteristics of a boats e.g. its power or horsepower, length, breadth, and tonnage are increased;
- changing in gear;
- changing in fishing periods or areas; and
- adopting technological innovations in fishing gear.

Licence limitation programmes can be modified to address the problems caused by capital stuffing by introducing transferable unitization systems and licence transferability. Licence transfers allow new entrants to come into a fishery when existing fishermen exit the fishery. While charges can be imposed for the issuance or transfer of licences that capture some of the rents generated by the stock, this does not prevent capacity from increasing over the long term. The rate of increase of capacity is reduced, but it continues to increase over time.

Unitization (or fractional licence) programmes assign each participant in a limited entry fishery a number of capacity units based on the physical characteristics of the vessel (e.g. length, engine power and/or fishing gear units), and the total number of units in the fishery is capped. Under such programmes, new and/or larger boats can only be introduced through purchasing the units from other owners. Penalties on the upgrading of boats through the forfeiture of units may also partially compensate for the increases in capacity but may have negative safety consequences because they penalize fishers' use of better technologies. Consequently, with unitization programmes the total number of units may be reduced over time, but the actual capacity of the fleet may remain constant or increase if the forfeitures do not offset the increases in efficiency.

3.1.2 Buyback programmes

Buyback programmes buy and remove boats, license s or vessel capacity units from a fleet as a means of decreasing capacity. While the programmes are designed to remove physical capacity (i.e. inputs), they are generally assumed also to reduce the harvesting capacity of the fleet – preferably by an equivalent amount. In some cases, they are also an implicit subsidy to the industry by creating a means for unviable firms to exit the industry and by helping remaining vessels become more economically viable, thereby providing economic assistance to the fishery and region.

Many countries have experience in operating buyback programmes, including Japan, the United States of America, Canada, Norway, Australia, those in the European Union, and Taiwan Province of China. Similar motivations and goals existed in each programme even though the mechanics differed. For example, some programmes purchased licenses instead of vessels, and others restricted license use or participation in commercial fishing.

The problem with buyback programmes is that the buyback programmes' potential to achieve their stated goals seemed very limited in actual practice (Holland *et al.*, 1999). In the short term, capacity may be reduced in a fishery. However, as long as (regulated) open access fishery incentives remain, improvements in stock abundance will attract additional capacity into the fishery. Thus, only if buybacks are used in conjunction with the implementation of rights-based management systems that correct market incentives will individual fishers be more likely to conserve their resource stocks including the stock of fish. In addition, the buyback programmes

would be more effective if the regulatory instrument that grants access to the fishery would also capture the resource rents.

Some vessel buyback programmes have worked very well, but those that have worked well have generally been introduced as an integral part of a rights-based management system. In this context, a buyback programme can provide a solution to the problem of what to do with surplus vessels in a situation of generalized overcapacity. Examples of this include the Australian south-east fishery, which incorporated a buyback programme with the introduction of an ITQ programme to facilitate adjustment to the new programme and the Bering Sea groundfish fishery. In both examples, the buyback programmes were industry funded.

3.1.3 Gear and vessel restrictions

Gear and vessel restrictions attempt to control capacity by controlling how fishers are allowed to use inputs in the production of fishing effort, and these are effort controls rather than capacity controls per se. Gear restrictions include minimum mesh sizes, restrictions on the number of pots or traps, limits on the length of longlines, or bans on the use of certain gears or fishing methods. Vessel restrictions specify the physical characteristics of vessels (e.g., hull, hold and engine sizes).

As a temporary measure, gear and effort restrictions can reduce fishing mortality to target levels. However, over time, fishers can generally circumvent the regulations by substituting other factor inputs or new types of gear for the inputs that have been restricted. For example, regulations restricting the length of a vessel can be circumvented by increasing the boat's beam or by increasing its engine power. As a result, they impose inefficiency on the vessels, resulting in lower levels of profitability than might otherwise be possible, and they are ineffective in the long term in containing harvesting capacity.

3.1.4 Aggregate catch quotas

Aggregate catch quotas are used to maintain or rebuild fish stocks by establishing a total allowable catch (TAC) for a fishery. Aggregate quotas are fished competitively rather than allocated to individuals.

If used in isolation, in virtually all situations TACs are more likely to speed up the growth of fishing capacity rather than reduce it (FAO, 1998). As stocks of fish recover because of reduced fishing mortality, rents appear and attract new capacity into the fishery through the entry of new fishers (if entry is not limited) or expansion of existing fishing effort. As a result, a race for fish or fishing derby develops, shorter fishing seasons are implemented to try to offset this, and harvesting costs are increased as fishers work to land the same amount of fish in the shorter period of allowable fishing time. When approaching the limits of a binding TAC, sufficient real-time data may be difficult to obtain to use as a basis to close the fishery, resulting in frequent overruns of the TAC.

These large landings over short time periods also frequently result in requiring excessive processing capacity to handle these peak loads of fish. The results is overcapacity in the fishing sector, idle capacity in the processing sector, and it can exacerbate the seasonality of employment in both of these sectors.

3.1.5 Non-transferable vessel catch limits

Individual vessel catch limits are a form of individual quota without transferability between fishers. As such, they partly address the property rights issue, but they do not allow any mechanism for capacity to adjust out of the fishery. As a consequence, the fundamental cause of overcapacity is not addressed, but the growth in additional overcapacity may be slowed. By restricting the amount of fish each individual fisher may land, the race for fish can be slowed. Staggered or tiered catch limits have been used in fisheries to allow full-time or specialist fishers higher catch limits than part-time or generalist fishers.

As with other regulations, fishers can circumvent these restrictions if it is worth doing so. Catch limits can be circumvented by landing fish at out-ofthe-way docks and ports or through misreporting actual landings in document-based monitoring systems. However, vessel catch limits can have applications if the social issue of widespread adjustment out of the industry is thought to be more problematic for these communities than the economic and market inefficiencies that such programmes effectively institutionalize.

3.1.6 Individual effort quotas

Individual effort quotas (IEQs) limit the fishing effort that a fishing craft can apply to a fishery and can be either transferable or non-transferable. Individuals have effort units – sometimes described in terms of a particular part of the fishing gear or other technological inputs such as allowable trawling time, time away from port, fishing days that the vessel can employ – which are used as approximate alternatives of percentages of a total allowable catch.

Non-transferable effort quotas often take the form of days-at-sea restrictions. These are effectively effort control measures that reduce capacity utilization rather than capacity. As with other effort controls, fishers are able to either modify their behavior or substitute other inputs over time, reducing the efficacy of the measure. Thus, while the number of days fished or trawl time of a boat may remain constant, its fishing power can be increased by substituting other factor inputs in the production process for the fixed effort variable, thus causing the effective fishing effort to increase. As a result, fleet capacity increases over the long term, requiring constant re-adjustment of the total allowable effort. Further, they impose inefficiency onto the vessels, reducing their profitability.

In contrast, *transferable* effort quotas can have some benefits through creating incentives for self adjustment and may be useful in fisheries where determining total allowable catches might be problematic.¹ While individual transferable effort (ITE) systems do not address the property rights issue directly, they do exhibit some of the features of other rights-based measures and therefore fall between the categories of incentive blocking and incentive adjusting programmes. Moreover, the transferability of ITEs gives fishers the possibility of purchasing and selling their units, and this transferability allows for the consolidation of fishing activities and, possibly, also for the reduction of overcapacity. However, the difficulty with ITE systems is the fact that technology advances (sometimes referred to as "technology creep") will require constant readjustments of these units.

Transferable effort quotas have been introduced in the European trawl fisheries of the North Sea as part of a stock recovery programme (and not for capacity management, per se), and have also been used in the Faroe Islands as a main management measure.

3.2 Incentive-adjusting programmes

Perhaps the most familiar descriptions of so-called rights-based fisheries can be found in the category of what are increasingly being described as share systems, designated access systems of catch rights, or designated access privilege programs (DAPPs). Some are communal (issued to communities), whilst others can be either for individuals, individual companies, harvest cooperatives, or other appropriate entities.

3.2.1 Group fishing rights

Community rights-based systems have been introduced in several countries with some success at controlling and reducing capacity.

Community Development Quota (CDQ) system instituted for Alaskan native communities is an example of an effective group fishing rights

¹ Instead of ITQs, ITEs have been implemented in some fisheries with highly variable fish stocks – such as shrimp fisheries – owing to the technical problem of determining an appropriate total allowable catch each year.

programme that has reduced capacity substantially whilst empowering local fishing communities. The CDQs, now referred to as Community Fishing Quotas (CFQs), were set up in the 1980s to explicitly allocate shares of the Alaskan Pollock stocks to the remote communities of Alaska.

For group fishing rights systems to be effective, the group must be able have:

- institution building capability,
- restricted membership, and
- the ability to enforce rights and rules.²

3.2.2 Territorial use rights

Territorial User Rights in Fisheries (TURFs), Management and Exploitation Areas for Benthic Resources (MEABRs), and Group Rights in Fisheries (GRFs) are rights-based systems that define who the participants are in a fishery in a particular area. Quite often these are communally-based and collective, although they may also be issued to individuals, single cooperatives, or single companies.

These systems represent another means to control capacity by causing fishers to behave as if property rights for a fishing ground exist. Access to, and use of, a particular fishing ground or site is restricted to a small group or an individual. This group or individual can determine how to harvest fish from the site.

3.2.3 Individual transferable quotas

Individual transferable quotas (ITQs) and individual transferable share quotas (ITSQs) explicitly limit the fish that a fleet can harvest from a fishery and assign tradable shares of the total catch to the participants in the fishery. Under these approaches, resource ownership remains with the management authority, yet the transferable harvest rights give fishers a financial incentive to reduce capital investment and labour used in harvesting the fish stock in order to increase individual profitability. As a result, ITQs have been found to have been effective at managing capacity in the fisheries to which they have been applied because they are self-adjusting with regard to capacity.

² Thus, the customary sea tenure (CST) or other customary tenure programmes that can also be considered as group fishing rights systems are at risk of not being respected by people outside the customary system – such as can happen when national, regional and global forces are brought to bear on the fishery and the CSTs are not reinforced by contemporary legal support.

ITQs have prompted objections regarding their use in the case of multicohort stocks, where there are concerns about high-grading catch (the discarding of less valuable cohorts when price is greatly affected by the size of the fish) or about discarding overquota catches, although several studies have found that overquota catch (and subsequent discarding) has been reduced in some fisheries as a result of ITQs. There are also concerns expressed about the possibility of a capacity cascade, displacement, or spillover of capacity that may occur if ITQs are sequentially adopted in a series of fisheries, and this concern is relevant when there is overcapacity in fisheries and entry into other fisheries is not already limited.

Nonetheless, and despite these concerns which are similarly relevant for many other management measures that are regularly applied, for the fisheries in which ITQs have been applied, substantial long-term declines in capacity have been observed.

One of the challenges for ITQs is in small-scale fisheries where there are potentially many boats, many landing sites, and localized fluctuations in stocks – situations in which group fishing rights may be more effective in terms of effectively monitoring and enforcing their rights.

3.2.4 Taxes, royalties, rent collection and management cost recovery

While a tax on landings is theoretically equivalent to ITQs in reducing capacity in a fishery, little empirical evidence of its actual impacts is available.

A serious problem in developing taxes is determining the optimal tax rate to apply to a fishery at a particular point in time. That is, the amount of capacity in a fishery depends upon the abundance of fish, the ex-vessel price, and the unit cost of fishing effort at each point in time. As costs, prices, and abundance fluctuate, capacity levels need to be adjusted by an appropriate tax adjusted on a timely basis.

With taxes, the governing authority has to determine the appropriate level of tax and has to decide when to change taxes to optimally control capacity. In contrast, with ITQs, these adjustments occur in the ITQ market automatically to determine the optimal capacity level.

In Asian countries, a tax on landings caused widespread protests among small-scale fishers and consumers who expected the taxes to result in higher prices.³ Landings taxes have also been proposed in United States fisheries to

³ FAO. 1998a. Report of the Technical Working Group on the Management of Fishing Capacity, La Jolla, USA, 15-18 April 1998. FAO Fisheries Report No. 586. Rome.

offset the costs of loans to fund industry financed vessel buyback programmes.

Royalties have a similar effect on reducing capacity, as they are effectively a form of tax. A fee paid per pound of fish landed or on quota holdings to a managing authority would theoretically reduce the ex-vessel price received by fishers, which would slow the rate of growth in harvest capacity in a fishery.

This method is in many countries for recovering rents in natural resource extraction activities (e.g. offshore oil leases or forestry "stumpage" charges) and could be employed in the management of fisheries.

A related mechanism that is not designed primarily for capacity management is management cost recovery charges. These internalize at least some of the costs imposed by the fishing fleet (e.g. enforcement, monitoring and research) that are otherwise borne by the broader community. Failure to recover these costs amounts to an effective subsidy of the industry, which itself contributes to some of the overcapacity.

Appendix 4: Capacity utilization and efficiency: a primer

Capacity utilization and efficiency are similar in concept as each represents the degree to which vessels are performing relative to other vessels using similar levels of inputs.¹ The capacity output of a vessel can be defined as the maximum level of output that it could be expected to produce under normal working conditions. Capacity output therefore takes into account periods of maintenance, poor weather, seasonal factors and other normal breaks in activity.

Capacity utilization is the degree to which the vessel is achieving its potential (capacity) output given its physical characteristics (i.e. fixed inputs such as size, engine power etc). Capacity underutilization may be a result of using fewer variable inputs (e.g. days fished, crew etc) that it otherwise could.

In contrast, *technical efficiency* is related to the difference between the actual and potential output given both fixed and variable input use. A vessel may be operating at below its capacity level due to underutilization of the fixed inputs, or the inefficient use of these inputs, or some combination of the two. Differences in efficiency may be related to differences in the skill of the skipper and crew, age of the vessel, differences in search and navigational aids, etc.

The two concepts are illustrated in Figure 4.1, in which a vessel of a given size is observed to be producing O_o level of output as a result of using V_o levels of inputs. If all inputs were fully utilized (i.e. using V_c rather than V_o variable inputs), and the vessel was operating at full efficiency, then the potential (capacity) output would be O_c . Even at the lower level of input usage, if the vessel was operating efficiently it would be expected to produce O_e level of output. Hence, the difference O_c - O_e is due to capacity underutilization; and the difference O_e - O_o is due to inefficiency.

The depiction of underutilized capacity in Figure 4.1 differs from that of Figure A4.1 largely as the former represents an individual vessel, while the latter represents the industry as a whole. That is, the short run production frontier in Figure A4.1 represents the level of output produced by a given vessel, and at a given stock level. The vessel is underutilized if it is not operating at its maximum, based on normal working practices. At the industry level, total output could also be higher if all vessels operate at full capacity, or, as illustrated in Figure A4.1, the same level of output could be taken by fewer vessels operating at full capacity.

¹ These concepts are different from that of overcapacity.



Figure A4.1 Capacity underutilization and inefficiency

The distinction between the concepts of inefficiency and underutilized capacity, while subtle, is important in terms of its consequence for fisheries management. A fleet that is inefficient but fully utilized would respond to management changes differently than one that is efficient but underutilized even though initial output levels may be similar.

Both capacity utilization and technical efficiency are relative measures. That is, the efficiency of one vessel, for example, is assessed against the other vessels in the fleet, the most efficient of which will be taken as perfectly efficient. It is conceivable that all vessels could be inefficient or underutilized relative to some idealized vessel, but if such a vessel does not appear in the data then the level of inefficiency or underutilized capacity will be underestimated.

These guidelines have been produced to supplement the FAO Code of Conduct for Responsible Fisheries and the International Plan of Action for the Management of Fishing Capacity (IPOA-Capacity). Because overcapacity is a key factor contributing to the decline of many of the world's fisheries, the IPOA-Capacity encourages States to manage fishing capacity so that it is commensurate with sustainable use of their fish stocks. The guidelines are intended to help stakeholders, fisheries managers and policy-makers in the development and implementation of National and Regional Plans of Action for the Management of Fishing Capacity. The guidelines outline the key concepts and techniques involved in monitoring, measuring and assessing capacity, and they provide information about the design and effects of different management programmes on fishing capacity. Given that the subject of managing fishing capacity is evolving, the guidelines are intended to be flexible and adaptable to changing circumstances or to new information. In addition, in order to present the capacity management process in all its complexity and diversity, the wording and structure of these guidelines do not follow strictly the language and the structure of the Code, but any differences in the terminology employed should not be understood as intending reinterpretation of the Code.

