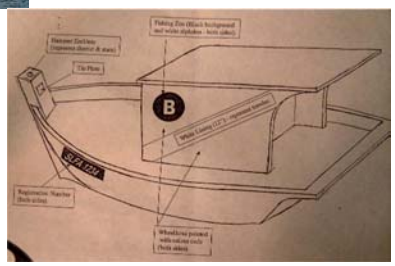
Guide to monitoring, control and surveillance systems for coastal and offshore capture fisheries



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Monitoring, control and surveillance systems guide for coastal and offshore capture fisheries

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PREPARATION OF THIS DOCUMENT

This paper is intended as a second in a series of technical references for all Fisheries Administrators. It is an update of FAO Technical Paper 338, *An introduction to monitoring, control and surveillance for capture fisheries*. It includes updates on new legal agreements and management principles, coastal MCS and fishers safety-at-sea. It is hoped that it will contribute to efforts to implement coastal and offshore fisheries management and MCS schemes using new and emerging strategies and internationally accepted principles for responsible fishing in accordance with the FAO Code of Conduct for Responsible Fisheries.

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Finally, appreciation and memories go to Capt. Peter Derham, the well respected "elder brother" and advisor to many of us in the MCS field, for his advice and leadership in support of sustainable and responsible fishing.

COVER PICTURES FROM TOP TO BOTTOM are as follows: (i) Thailand patrol vessel (65ft); (ii) Canadian private sector fisheries patrol aircraft; (iii) Indonesian small coastal patrol vessel; and (iv) the Malaysian vessel marking schematic.

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ABSTRACT

The paper has been designed as a handbook for fisheries administrators for their consideration when establishing, or enhancing, monitoring, control and surveillance (MCS) systems in support of fisheries management initiatives. The paper is an update of FAO Technical Paper No. 338, *An introduction to monitoring, control and surveillance for capture fisheries,* Rome 1994. This paper covers important new issues not dealt with in FAO Technical Paper 338. Such issues include discussions of several recent international legal agreements and new concepts such as responsible fisheries; the emerging trend for coastal MCS to involve participatory management; preventative and deterrent MCS strategies; and the importance of safety-at-sea for fishers.

The paper is divided into seven chapters to:

(1) introduce MCS;
(2) provide an overview of the purpose of the paper;
(3) define MCS;
(4) discuss relevant international legal agreements and accepted norms that impact on fisheries management and MCS;
(5) propose design considerations for MCS systems;
(6) present options for consideration in MCS operations; and
(7) address emerging coastal MCS strategies.

Annexes provide further details of operational issues and options for MCS system design and implementation.

ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
ALC	Automatic Location Communicator
APFC	Asia-Pacific Fisheries Commission
ASEAN	Association of South-East Asian Nations
CARICOM	Caribbean Community
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CECAF	FAO Fishery Committee for the Eastern Central Atlantic
CFRAMP	Caricom Fisheries Resource Assessment and Management Program
CIDA	Canadian International Development Agency
CMM	Northwest Africa Sub-Regional Fisheries Commission's Chief of Maritime Mission
Code of Conduct	FAO Code of Conduct for Responsible Fisheries adopted by the 28th Session of the FAO Conference on 31 October 1995.
CB CRM	Community-based Coastal Resource Management
CRM	Coastal Resource Management
DWFN	Distant Water Fishing Nations
EU	European Union (formerly the European Economic Community)
EEZ	Exclusive Economic Zone
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
FAD	Fish Aggregating Device
FAO	Food and Agriculture Organization of the United Nations
FAO Compliance Agreement	FAO Agreement to promote compliance with international conservation and management measures by fishing vessels on the high seas.
FFA	South Pacific Forum Fisheries Agency
FFV	Foreign Fishing Vessel
GEF	Global Environment Facility
GNP	Gross National Product
GPS	Global Positioning System
GRT	Gross Registered Tonnage
ICM	Integrated Coastal Management
ICOD	International Centre for Ocean Development
ILO	International Labour Organization
IMO	International Maritime Organization of the United Nations
IOFC	Indian Ocean Fisheries Commission
IOMAC	Indian Ocean Marine Affairs Co-Operation Program
IPFC	Indo-Pacific Fisheries Commission
IPOA	International Plan of Action
IPTP	Indo-Pacific Tuna Program
IRCS	International Telecommunications Union Radio Call Signs

ITQ	Individual Transferable Quota
ITU	International Telecommunications Union
IUU Fishing	Illegal, Unreported and Unregulated Fishing
Lacey Act	US Code: Title 16, Chapter 53 sections 33, 71 e*t seq*.
LIMA	International Flag Signal Letter "L" Meaning "You Should Stop Your Vessel Instantly"
LOA	Letter of Agreement
LUX-DEV.	Duchy of Luxembourg Development Program
m	metre
MARPOL 73/78	International Convention on the Prevention of Pollution from Ships
MCS	Monitoring, Control and Surveillance
MTC	FFA's Minimum Terms and Conditions of Fisheries Access
NAFO	Northwest Atlantic Fisheries Organization
Niue Treaty	Niue Treaty on Co-operation and Fishery Surveillance and Law Enforcement in the South Pacific Region
nm	nautical mile
NOAA	USA National Oceanic and Atmospheric Administration
OECS	Organization of Eastern Caribbean States
SEAFO	South East Atlantic Fisheries Organization
SFA	Seychelles Fishing Authority
SOLAS	International Convention on the Safety of Life at Sea
SOPAC	South Pacific Applied Geoscience Commission
SQ3	Flag Signal - "Stop or heave to, I am going to board you"
The 1982 UN Convention	United Nations Convention on the Law of the Sea, of 10 December 1982
UK	United Kingdom
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UN Fish Stocks Agreement	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.
USA	United States of America
USSR	Former Union of Soviet Socialist Republics
VMS	Vessel Monitoring System

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CHAPTER 1:

INTRODUCTION

The Food and Agriculture Organization of the United Nations (FAO) has lent assistance to fisheries administrations in many countries for several years to address the issues they confront in managing and developing fisheries. This paper is intended to enhance and update FAO technical paper, number 338, entitled *An introduction to monitoring, control and surveillance for capture fisheries,* Rome 1994. Since the writing of this earlier paper, many new legal concepts and agreements have been forged in the international community and new management trends have emerged that impact on monitoring, control and surveillance (MCS) policies, planning and operations. This document is intended to present these changes to encourage fisheries administrations to update their practices accordingly.

Many developing countries have growing concerns about: their current inability to control fisheries in their Exclusive Economic Zones (EEZs), lack of effective regional structures to address migrating stocks and regional fisheries issues, the apparently high costs of doing so, and the failure of some of the traditional MCS strategies to adequately address these concerns. In many countries there are no established systems for monitoring, control and surveillance of maritime zones to conserve their marine fisheries and associated habitats, and to meet legal commitments and obligations under international agreements to which they are a party. Many countries focus only on coastal resource management with offshore fisheries left to military organizations for boundary surveillance only. Furthermore, there are still several countries that maintain an "open access" policy for fisheries and coastal resource management, despite many demonstrations of the negative consequences of such a policy. These countries need assistance in addressing the reasons behind the decision to maintain "open access" to be able to move to the more appropriate "limited access" strategies.

Although there is much written about MCS in individual papers, there are few sets of comprehensive guidelines which seek to present options and guidelines for decision-making to fisheries administrators on how to introduce or strengthen the MCS capability of their country, sub-region or region. This technical paper is intended to further expand on the literature in this fisheries management component and provide references for more detailed advice in certain areas. It focuses on MCS for coastal and offshore fisheries and deals with both national and foreign-owned fleets. This publication discusses: (i) the definition and context of MCS; (ii) the legal basis for MCS activities and how this can be strengthened and enforced; (iii) design considerations for the components of an MCS system; (iv) MCS operational procedures; and (v) emerging MCS issues for coastal resource management.

CHAPTER 2:

OVERVIEW – STATUS AND CHALLENGES

Monitoring, control and surveillance has often been seen as self-explanatory and not requiring much consideration, as it is perceived as "simply the policing of the various maritime zones controlled by the State". This technical document attempts to clarify this erroneous view of MCS and to demonstrate how monitoring, control and surveillance are important to the implementation of any oceans related policy, in particular for fisheries management. MCS is really the executive arm of fisheries management.

The subject of monitoring, control and surveillance came to the fore in international and national fishing fora during the 1990s as a consequence of rapidly depleting fish stocks, global initiatives to respond to this crisis, and technological developments which facilitate the remote monitoring of vessels. One of the most significant developments during the last decade from the perspective of MCS was the coming into force of the 1982 United Nations Convention on the Law of the Sea in November of 1994. This once again raised the profile of the *obligations* which States have with respect to the assessment of their fishing stocks, the allocation of that portion of the total allowable catch that is surplus to national needs to third parties; and the further obligation to conserve their fisheries, other marine living resources and the marine environment.

The United Nations Convention on the Law of the Sea, of 10 December 1982 (the 1982 UN Convention) forms the backbone of the international legal framework for fisheries management. It sets out the powers, duties and obligations of coastal, port and flag States in respect of each of the main maritime zones recognised by international law, namely the territorial sea, the exclusive economic zone and the high seas. It also deals with a range of other important and related issues including setting out the legal regimes applicable to internal waters, archipelagic waters, the contiguous zone, the continental shelf, and the right of innocent passage and passage through international straits. These matters are discussed more fully in Chapter 4.

Other important international developments relevant to MCS during the 1990s included: the International Maritime Organisation's port State control initiatives for the merchant fleet; and the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in Brazil. Chapter 17 of Agenda 21 which was adopted at UNCED emphasises the urgent requirement to preserve our marine/fisheries environment on a global basis.

The FAO has taken the lead role in relation to fisheries and coastal resource management and conservation. Among other things, the FAO has:

- published fishing vessel marking and identification guidelines;
- encouraged countries to extend port State control principles to fishing vessels;

- played a leading role in developing and negotiating 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 (the UN Fish Stocks Agreement), the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (the FAO Compliance Agreement), and the Code of Conduct for Responsible Fisheries; and

- developed international plans of action (IPOAs) to address pressing international issues.

In addition, the FAO has encouraged and facilitated the adoption at the national level of the agreements, principles and concepts contained in the Code of Conduct for Responsible Fisheries, the FAO Compliance Agreement and the UN Fish Stocks Agreement, by publishing a number of technical guidelines for fisheries management, including this technical paper. It is now widely recognised that all States with fisheries resources will require MCS systems to implement these obligations and that it is essential for all States to work together to conserve the marine environment and its living resources.

The ideal situation, and a logical approach to implementing the terms of the 1982 Convention and the more recent agreements, would be the development of an "oceans policy" for each coastal State. Such a policy would establish government priorities and the strategy for the conservation and sustainable use of all marine resources within the maritime zones over which the State exercises sovereignty or sovereign rights as well as efforts towards co-operative management control outside these zones. From this oceans policy would flow the integrated oceans planning and management framework under which fisheries management would be developed. Most countries see this as a long-term development initiative, and to shorten the process, they have chosen to develop oceans policy and fisheries management strategies (including MCS strategies) simultaneously. Consequently, although countries remain cognisant of the fact that fisheries management must link to overall oceans policy when it is ultimately established, the MCS systems required to implement fisheries management plans are being developed in the interim to address the more immediate need to conserve fish stocks and their habitat. This precautionary approach to protect and conserve the current resource status and prevent further degradation of the resource base is commendable.

The degree to which a government becomes involved in the fishing industry will have an impact on fisheries management and the resultant MCS activities. For example, a government can:

1. assume an intrusive role, such that it actually runs the industry, controls the potential income of fishers, and micro-regulates the harvesting sector; or

2. maintain a less intrusive or co-management role, whereby the fishers and the fishing industry are encouraged to accept their responsibilities and roles within the framework of general government conservation principles and legislation.

Negative results of centralized, micro-management control mechanisms have been evident in both industrialized and developing countries. Consequently, there is an emerging trend to favour the second, *participatory co-management approach.* Fishers and the fishing industry want, and in fact are demanding, a more active and authoritative role in management planning and implementation. Countries are responding by devolving authority from central agencies to smaller units of government (provinces, districts and municipalities). These initiatives have fostered the trend towards community-based management, stakeholder involvement, and the acceptance of responsibility for the care, conservation and protection of their local marine resources by the fishers and industry. In a growing number of cases the private sector is becoming involved in MCS activities, instead of relying solely on government resources (e.g. Canada with its private sector involvement in air surveillance; dockside monitoring; and the observer programme as described in box 1).

Box 1

Canada's Fisheries MCS Program

Paul Steele
Chief, Enforcement Programmes
Department of Fisheries and Oceans Canada

In Canada, the federal Department of Fisheries and Oceans (DFO) has been entrusted by the Parliament of Canada through the *Fisheries Act* and the *Coastal Fisheries Protection Act* to administer all laws relating to fisheries. The administration of federal fisheries laws has, by agreement, been delegated to some, but not all, provincial governments. DFO remains responsible for fisheries management in the tidal waters of the Pacific, Atlantic, Arctic, the inland waters of four Atlantic provinces and the salmon rivers in British Columbia. This includes management of Aboriginal, Recreational and Commercial fisheries within Canada's Exclusive Economic Zone (EEZ), in transboundary rivers, and for sedentary species on the continental shelf outside the Canadian EEZ.

There are approximately 58,400 commercial fishers in Canada (42,700 Atlantic, 8,700 Pacific and 7,000 inland), who collectively harvest more than 1,000,000 MT of fish with a landed value of about $1.9 billion. Shellfish (e.g. lobster, crab and shrimp) account for approximately 75% of the total landed value, with groundfish and pelagic fisheries making up the remainder.

One in five Canadians (about 5 million people), and almost 900,000 visitors, catch over 250 million fish in recreational fisheries, with more than half of the fish released under the catch and release regime.

Over 125 fisheries agreements are negotiated with Aboriginal groups in Canada on an annual basis. The agreements provide for aboriginal access to fisheries and an orderly management of their fishing activities.

Management Systems/Control Mechanisms

Various management schemes have been applied in different fisheries, but all are based on limited entry licensing, with vessel and gear restrictions. Other measures to limit catches include total allowable catches (e.g., groundfish), escapement targets (salmon), or recruitment strategies (e.g., lobster). Other management measures include limitations on fishing area, fishing season, gear (e.g. mesh size), incidental catch (bycatch) and minimum fish sizes. Rights-based systems -- in the form of Enterprise Allocations (EA) and Individual Quotas (IQ) -- have been introduced in some fisheries to allow fishers to more efficiently manage the capacity and effort for harvesting.

MCS Program

The Department of Fisheries and Oceans (DFO) Conservation and Protection program ensures compliance with the legislation, regulations and fishing plans. This requires an integrated MCS approach and deployment of some 600 Fishery Officers for air, sea and land patrols; independent/private sector observer coverage on fishing vessels; dockside monitoring of fish landings; and remote electronic monitoring of fishing vessel activity.

DFO operates a fleet of patrol vessels on each coast to enforce closed areas and boundary lines, and to conduct inspections at sea for compliance purposes. Contracted aircraft are used to monitor fishing fleets. Sea and aerial surveillance is also supplemented by the Department of National Defence (DND). VMS and air surveillance provide for more effective deployment of patrol vessels; with the latter also serving as a visible deterrence.

Canada deploys private sector, contracted observers, without enforcement powers, on all foreign vessels fishing in Canadian waters and on some Canadian vessels to gather scientific information and provide on-site monitoring of compliance. They are trained to detect and report infractions such as dumping/discarding, fishing in closed areas, catch mis-reporting, retention of prohibited catch and the use of illegal gear. The level of observer coverage in domestic fisheries varies depending on conservation risks and management priorities.

Contracted dockside monitors/observers verify the quantity and species/product form of fish landed for scientific, quota monitoring and compliance reasons. This data is cross-checked by random inspections by Fishery Officers at landing sites.

At-sea observer costs are shared by the Department and the fishing industry. Dockside monitoring costs are entirely paid by the fishing industry. In 1999, DFO's expenditures on fisheries enforcement amounted to CDN $70 million (including DFO's share of at-sea observer costs).

The Conservation and Protection program has been significantly re-oriented in recent years. The mix of enforcement resources has been altered to better respond to changing program requirements. For example, a number of larger patrol vessels have been replaced with smaller program boats that can be operated more efficiently by the Fishery Officers themselves. Savings from vessel reductions have been partially re-invested in new equipment and surveillance technologies. Significant investments have also been made in the creation of new enforcement data systems and the integration of existing systems, with the goal of providing Fishery Officers and managers with more accurate and timely information that will strengthen the Department's enforcement capabilities. These efforts at improving data integration and analysis will continue to be a priority for the immediate future.

The Conservation and Protection program is closely integrated with DFO's overall Fisheries Management program. Input and advice from fisheries enforcement officials is an important consideration in the development of Integrated Fisheries Management Plans (IFMPs). In future these plans will include specific conservation objectives as identified by DFO scientists in consultation with fishermen and other technical experts. The new Objectives Based Fisheries Management strategy, will require greater involvement by the fishing industry to design management measures that will minimize identified risks to conservation.

2.1 Perceptions, Issues and Ideas

There are several misperceptions regarding MCS activities, one being that all fisheries problems stem either from illegal foreign fishing, or from the fishers themselves. Admittedly, foreign fishing fleets have had, and continue to have, an impact on fisheries

conservation efforts, **but** the greater impact on fisheries often stems from the domestic fishing industry in the coastal and nearshore fishing zones. On the issue of fishers, it must be remembered that most are realists who are fishing for their survival and

> "whilst sometimes libellously assumed by the ill-informed to be crooks, are perhaps best described as being as honest as the next man, but hard, individualistic businessmen running very competitive and often highly capitalized operations. It is worth remembering that they do so in the face of a largely unforgiving sea that creates a working environment which, in terms of industrial health and safety, [has one of the worst industrial accident rates in the world]: and they operate increasingly in an economic climate of ever increasing overheads countered only by the proceeds of catches which [are] subjected to [greater] quota restriction. All of this is done in the knowledge that the success of their venture and the livelihood of their crews depends entirely on their individual skill, effort and initiative. Given these pressures, it is perhaps not surprising that such independent minds do not always take kindly to bureaucratic controls, especially if these appear to them to have little practical purpose".[1]

Fisheries MCS activities, to be successful, need to address all aspects of fishing activities, however they are broken down for management purposes, e.g., foreign and domestic, offshore and coastal, commercial and subsistence.

Another erroneous perception is to regard MCS as being exclusively concerned with enforcement, while ignoring the other two components: monitoring (data collection); and the control mechanisms (legislation, licensing, and controls on gear, season, areas, etc.). The error of many fisheries administrators and supporting agencies is their focus only on the "surveillance/enforcement" or deterrent and repressive aspects of MCS. This is often without realising that MCS is the executive arm, or one of the key implementing mechanisms of fisheries management. All three components, the **M**onitoring**,** the **C**ontrol**,** as well as the **S**urveillance and enforcement are needed to implement fisheries and resource management.

2.1.1 Civilian Versus Military Option

The expense of MCS activities is usually the primary concern of any government in designing and implementing an MCS system. Cost-effectiveness and efficiency is key to successful MCS operations. The civilian approach to the deterrent enforcement aspect of fisheries MCS has proven in many cases to be most cost-effective, responsive to fisheries priorities, and minimises the political sensitivity of international fisheries incidents by avoiding the use of the full sovereign might of the country as represented by the military.

Use of military resources usually results in secondary tasking and multi-tasking of these resources with fisheries often receiving a low priority. Military involvement except in a support role is usually not cost-effective. Military machinery costs much more to build and operate than equivalent civilian equipment. Savings accrue from the use of a civilian vessel with fewer crew, less armour and firepower and hence, lower fuel consumption and operating costs. However, establishing an inter-agency mechanism which enables the fisheries administration to call upon the navy and other agencies to play a supporting

[1] Derham, Peter (1987). *The implementation and enforcement of fisheries legislation. The regulation of fisheries: legal, economic and social aspects.* Proceedings of a European workshop, University of Tromsø, Norway, 2-4 June 1985, Ulfstein, Anderson and Churchill (ed.) 1987. pp. 71-81. Norway, University of Tromsø.

role as and when needed is recommended as a strategy to promote a stronger MCS system.

Rigid Hulled Inflatable for Fisheries

Inter-Agency Communications - Indonesia

2.1.2 Fisheries as a Lead Ministry

Effectiveness of operations can be enhanced considerably if a single ministry is designated to take the lead role in MCS activities, instead of two or three. This significantly reduces the lines of communications for the command and control of the monitoring and surveillance components of MCS activities, making them more efficient and responsive to management needs. The role of a strong inter-agency mechanism, as noted above, is however, still required for support of MCS operations in the maritime sector.

2.1.3 Overfishing and Illegal, Unreported and Unregulated Fishing

Overfishing, especially in the coastal areas, is a major concern in all countries. Illegal and destructive fishing, and unreported and unregulated fishing in coastal state waters, EEZs, and the high seas are the major challenges facing fisheries managers today. These are the key issues on which the latest FAO fisheries initiatives for the new millennium are focussed.

2.1.4 MCS Tools For Management

Key tools for MCS as the executive arm of fisheries management include:

- an appropriate participatory management plan developed with stakeholder input;
- supportive and enforceable[2] legislation and control mechanisms (licences, etc.);

[2] Unenforceable legislation, or that which is either not understood or is not acceptable to the fishers, rapidly destroys the credibility and support for a government in its efforts to conserve its fisheries resources. Such legislation usually results in active subversion by the fishers and the fishing industry. For example, a prohibition on catching a certain species of fish, or so doing with poisonous substances or in a destructive manner is very difficult to enforce unless the individual is actually caught in the act, although such a provision is understood as necessary to reflect management decisions. It is suggested that as further support for this first legislation, consideration should be given to providing for "the prohibition of possession of this certain species of fish *above a certain acceptable by-catch or tolerated level*, or

- data collection systems – dockside monitoring, observers, sea and port inspections, etc.;
- supporting communications system;
- patrol vessels that can operate in areas and remain at sea with the fishing fleets;
- aircraft for rapid coverage of large areas;
- use, where appropriate, of new technology (VMS, satellite, video, infra-red tracking, etc.);
- linked, land-based monitoring;
- professional staff;[3]
- support of the industry and fishers; and
- bilateral, sub-regional and regional cooperation with an MCS component, e.g., FFA, MHLC, OECS, SEAFO, etc.

These will be discussed in more detail later in this paper in later chapters, but the importance of professional staff is highlighted.

possession of fish which contain poisons or which have been caught by destructive fishing practices," would be easier to prove in court and also place pressure on the marketplace to refuse to purchase fish caught in such a manner due to the potential penalties.

[3] The existence of a professional MCS staff is the most important, but often least talked about, aspect of MCS system development. A credible staff with a high degree of integrity and professionalism will ensure the success of the system. The use of *preventative* (voluntary compliance) MCS techniques in a participatory management approach is much more cost-effective than the traditional "big stick" *deterrent* MCS approach of enforcement only. Through training, MCS staff will become competent as communicators, planners, community/stakeholder educators, and implementors of approved management plans.

CHAPTER 3:

MONITORING, CONTROL AND SURVEILLANCE IN FISHERIES

3.1 Definition of MCS

Fisheries are central to the development of a country's marine resources, as fish and their habitat are the key renewable resources in the territorial seas and exclusive economic zone. The goal of fisheries management, including MCS, is to maximize the economic opportunities and benefits from the State's waters within sustainable harvesting limits. Fisheries MCS needs to be defined in light of this goal.

The definition of MCS commonly used and accepted by fisheries personnel was developed at the FAO MCS Conference of Experts in 1981 in Rome and is defined as:

(i) **monitoring –** the continuous requirement for the measurement of fishing effort characteristics and resource yields;

(ii) **control –** the regulatory conditions under which the exploitation of the resource may be conducted; and

(iii) **surveillance –** the degree and types of observations required to maintain compliance with the regulatory controls imposed on fishing activities.[4]

Most simply stated, MCS is the mechanism for implementation of agreed policies, plans or strategies for oceans and fisheries management.[5] MCS is an aspect of oceans and fisheries management often overlooked, but in reality, it is key to the successful implementation of any planning strategy. The absence of monitoring, control and surveillance operations would render a fisheries management scheme incomplete and ineffective.

Enhancements to these definitions presented at subsequent workshops have been to clarify the definitions and to promote the emerging trend that MCS is more than just fisheries enforcement - it is an integral and key component for the implementation of fisheries management plans. It encompasses the development and establishment of both data collection systems and supporting legislative instruments and the implementation of the management plan through participatory techniques and strategies. The following 1993 clarification and amplification of MCS definitions in Ghana sought to note the

[4] FAO. 1981. *Report on expert consultation on MCS for fisheries management.* Rome. FAO.

[5] There is reference in this paper to oceans policy, integrated oceans planning and management, and fisheries management. This is to emphasize the fact that any management policy or plan which applies to oceans will impact on several sectors involved in ocean management. Fisheries departments, as a central component in ocean resource management, have an obligation to assume a key role in conservation and protection of ocean resources for their clients. MCS then becomes multi-sectoral, being essential for implementation of fisheries management strategies, as well as being necessary for the successful implementation of wider oceans policies, plans and strategies.

consequences of not including some of the activities in MCS. The statements made in Ghana included:

" '**Monitoring**' includes the collection, measurement and analysis of fishing activity including, but not limited to: catches, species composition, fishing effort, discards, area of operations, etc. *This information is primary data that fisheries managers use to arrive at management decisions. If this information is unavailable, inaccurate or incomplete, managers will be handicapped in developing and implementing management measures*.

'**Control**' involves the specification of the terms and conditions under which resources can be harvested. These specifications are normally contained in national fisheries legislation and other arrangements that might be nationally, sub-regionally, or regionally agreed. *The legislation provides the basis for which fisheries management arrangements, via MCS are implemented. For maximum effect, legislation should be flexible (to cater for different and changing circumstances) and easily enforceable, and*

'**Surveillance**' involves the checking and supervision of fishing activity to ensure that national legislation and terms, conditions of access, and management measures are observed. *This activity is critical to ensure that resources are not over exploited, poaching is minimized and management arrangements are implemented.*[6] "

These wider definitions amplify the importance of all aspects of MCS.

3.2 Emerging Trends in MCS

Aside from the legal initiatives to strengthen the commitment and capability of countries to implement the United Nations Convention on the Law of the Sea, MARPOL 73/78 and SOLAS, there have been changing trends in fisheries management approaches, and hence MCS strategies over the past ten years. These have occurred in three areas: *devolution of authority to lower levels of government; the encouragement of participatory management; and new technology.*

3.2.1 Devolution of Authority

Many countries are finding that with rapid population growth, urbanization and the migration to the coastal areas, there is a growing need for local administrative capability to address local concerns in a practical manner. Issues can no longer be addressed only from the central government. Further, with growing literacy and educational levels, coupled with easey access to mass media and the so-called "global village" effect, the ordinary citizen has a greater knowledge of government processes and is demanding more transparency and a greater voice in government and local administration. The response of countries has been to devolve more authority to provinces, states, districts, municipalities and communities.

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[6] Doulman, D., MCS Sub-Regional Workshop in Accra, Ghana 1993.

This devolution of authority has had a significant impact on MCS as there is a need for a shift in focus from traditional, centralized and direct control of operations on a national basis, to one of setting national policies, standards and general limits for activities to accommodate devolved authority levels, and then co-ordinating the implementation of these activities. The national government thus sets the overall framework within which the parties to whom management authority has been devolved are permitted to operate, provides the general policies and standards (equipment, operational strategies, guidelines, and training), and co-ordinates the cohesive and consistent implementation of these national policies in support of the fisheries management plan. The national unit then monitors and evaluates local government performance to enhance future co-ordination and planning. MCS planning and operations still need this national co-ordination for consistency in implementation of management plans, and for conflict resolution between parties, but MCS Units now need to accommodate the changing trend of devolution.

3.2.2 Participatory Management

For the same reasons that have led to increased devolution, there is also a trend towards more transparent, participatory, and open approaches to management strategies. This is changing all aspects of MCS from the rationale and strategies for data collection, through the development of legislative instruments acceptable to the people being regulated, and to the implementation of these laws and regulatory instruments. The benefits of adopting more transparent and participatory management from such strategies include:

- greater public understanding of the rationale behind MCS activities;
- a resultant greater sense of ownership and acceptance by those involved in the development process of their role as joint managerst and stewards of the marine resources together with government;
- the promotion of voluntary compliance and the use of peer pressure to control illegal activities of non-compliant fishers; and
- more effective use of MCS funding to focus on the non-compliant sector of the industry with the greater portion of the industry being compliant on a voluntary basis.

These trends are discussed in more detail in later chapters.

3.2.3 New Technology

Advances in MCS technologies have had a significant impact on how MCS is conducted. Reductions in the costs of these technologies have also increased options for the development of more appropriate and cost-effective MCS strategies. Examples include: inter-linked coastal radar systems in use in Senegal;[7] and the new vessel monitoring systems (VMS) in use in the South Pacific Forum Fisheries Agency, Australia, New

[7] The Senegal linked coastal radar system monitors the inshore coastal zone out to six nautical miles and permits early warning and "no force" action in the case of intrusions into this zone.

Zealand, Canada, Argentina, Malaysia, and Europe, with systems being considered for Namibia, Indonesia, and Sri Lanka. In the Maldives, a combined VMS and satellite imaging system is in use that will assist in identifying both licensed vessels carrying VMS and unlicensed vessels seen from the satellite. Over-the-horizon radar technology is evolving, but has not yet been reduced in price for general fisheries use. Finally, cheap cellular telephone and computer technology has brought the MCS world into the computer age and has greatly improved State's rapid response capability through better and more efficient communications systems.

The use of vessel monitoring systems is increasing. Currently the most popular ones are INMARSAT C (and more recently D) and ARGOS; with others – such as POLESTAR and EULTRACS - also making an appearance. (FAO has prepared detailed guidelines as part of the Code of Conduct for Responsible Fisheries Series (Volume 1, Supplement 1) for Fisheries Administrators contemplating the introduction and use of such technology.)

The combined VMS and Satellite Imagery System in the Maldives is one of the most sophisticated of MCS tracking systems in that it permits rapid identification of all licensed vessels and also presents a picture of other vessels. This facilitates a focused investigation and cost-effective deployment of expensive patrol resources. Unfortunately, at the time of writing the full system was not yet operational due to technical reasons, but as a concept it is excellent for nearshore and offshore surveillance.

Use of this technology for coastal surveillance would be difficult due to the cost to the coastal fishers. In any event, the large number of day-vessels can be monitored effectively through other means, e.g., dockside monitoring, monitoring of industry landings and production records, etc.

3.3 MCS Spatial Components

There are three main spatial components to MCS: land, sea and air (including space). These will be configured uniquely for each system depending on cost, commitment, and organisational structure (national, sub-regional, or regional). All these components can now effectively use satellite technology for: data collection; as part of licensing systems; and also for enforcement operations.

The *land* component, or base of operations, serves the inland, freshwater, and coastal aspects of fisheries monitoring, control and surveillance. It is also the co-ordinating centre for all MCS activities and regulates the deployment of resources to best address the changing situations in the fisheries. The coastal/land component is responsible for port inspections, dockside monitoring, and the monitoring of transhipments and trade in fish products to ensure compliance with fisheries legislation. This sector also becomes much more important with the emerging legislative initiatives such as port State control mechanisms for inspections in support of resource management and safety-at-sea activities. The emerging Flag State control mechanisms will also be co-ordinated from land-based offices through reports, radios, VMS or satellite tracking systems to control fleets wherever they operate in the world - inside EEZs, or on the high seas. Interlinking these systems on a

regional or sub-regional basis is feasible and highly recommended for co-ordinated and responsible management.

The *sea* component of MCS includes the use of technology for surveillance of the national, sub-regional or regional zones of control. This can include radar, sonar and vessel platforms. Traditional apprehension of an alleged violator of the laws which apply in an EEZ, or for implementation of co-operative regional and international agreements on the high seas, requires a "laying of hands" on the offender, mainly for the legal formality of arresting. This “face-to-face” activity is also for identification and securing of evidence. As this is expensive in terms of vessels, crews and supplies, many nations are now favouring "no force" surveillance techniques. These include the use of observers, national or regional vessel registers, vessel monitoring systems, and agreements that include clauses regarding the responsibility of the flag State for the actions of its citizens and vessels. Fisheries management strategies which utilise fishing divisions, quotas necessitating catch monitoring, mesh and gear restrictions and minimum/maximum fish sizes, require vessels with fisheries MCS personnel aboard to remain at sea with the fishing fleets while they fish. (Patrol vessels also serve a secondary maritime safety role while at sea.)

The *air* component of MCS is usually the first level of response to a coastal state/regional concern in its area of responsibility, or interest. The flexibility, speed and deterrence of air and satellite surveillance make these options a very popular tool for fisheries management. This component also provides rapid information collection on fishing vessel identification and fishing effort in the zone of interest, from either aircraft or satellite platforms. The cost of these systems is directly related to the sophistication of the technology utilized. Air, satellite or VMS surveillance, while providing initial information regarding the activity in the fisheries can also be the first indicator of potential illegal activity in the zone. This information can be the trigger for further MCS action. Air, satellite, video and advanced digital photographic technology, and VMS surveillance technology also have the added advantage of addressing secondary tasks for fisheries habitat and environment monitoring, and general coastal and offshore zone management monitoring, e.g., customs, immigration, and search and rescue, etc. Multi-tasking of expensive fisheries MCS resources for other fisheries-related monitoring functions can be both cost-effective and efficient in terms of integrated ocean management programmes, in particular with respect to fisheries and the marine environment.

The United States of America has used all these tools in the past and currently has a multi-agency approach to MCS as noted in Box 2.

Box 2

UNITED STATES OF AMERICA

CDR. Michael Cerne – United States Coast Guard
LTJG Matthew Barker – United States Coast Guard
LTJG Nathan Herman – United States Coast Guard

The United States EEZ is reputedly the largest in the world at 3.36 million square miles (8.684 million km²), with 100,000 commercial fishing vessels. The 1999 fisheries resulted in landings of 9,339,034,000 pounds (4.2451 million metric tonnes) valued at US$ $3.4671 billion. Pollock, menhaden and salmon in that order accounted for 40% of the landings of the top ten species; while shrimp, crab and salmon brought in the highest revenues.

The management of fisheries is shared with the federal government and the states with the latter having management authority to 3 nm. The 200 mile EEZ was declared in the late 1970s at which time the USA permitted foreign fishing vessels in their waters under very strict conditions of entry and exit reporting, licensing, observers, and access only to specified windows for fishing with further gear, catch and effort controls. Foreign fishing ceased in USAs waters in the early 1990s with the US fishing fleet encountering similar pressures of over capitalization as other countries. MCS control mechanisms for the domestic fisheries include the use of: licenses, quota, season, gear and area controls with appropriate reports and landing verifications, and observers for specific fisheries.

Vessel monitoring system technology is in use in the USA for fisheries vessel tracking on approximately 500 vessels in Hawaii, New England and Alaska, with plans for expansion for another possible 3330 vessels in the Atlantic and Gulf of Mexico..

MCS Agency Responsibilitites:

Each individual State is responsible for its 3nm zone, the National Marine Fisheries Service (NMFS) conducts shore monitoring and at times places personnel aboard multi-agency assets for MCS, e.g., air patrols and sea patrols. The United States Coast Guard (USCG) is the key agency responsible for enforcement within the EEZ and their air and sea assets are multi-tasked with fisheries being one of the secondary tasks. Coast Guard vessels spent 92, 864 hours in fisheries related operations in 1999. USCG air hours for fisheries for 1999 were 10,527 hours. This does not include the individual State efforts and dedicated efforts for MCS in their coastal waters. Further the National Oceanic and Atmospheric Administration ‘s (NOAA) Office for Law Enforcement has 5 divisions based out of Silver Springs, Maryland and supports 50 field offices throughout the United States and Territories. It is the acknowledged leader and expert in the field of marine resource enforcement in the United States.

The United States is developing an integrated national system so all fisheries that may be subjected to VMS requirements will be centralized for analysis, planning, and operations.

3.4 Role of MCS in fisheries management

A question often asked is: “Where do fisheries management and MCS merge?”

Fisheries management in its simplest terms is comprised of the following activities:

1) *Data collection and analysis* – data for management planning and operations from socio-economic studies, rural development studies, fisheries population studies, fisheries research cruises, licensing (national, provincial and district), catch and effort/logbooks, onboard observers (if established as a program), dockside monitoring/landings, VMS, satellite imaging, inspections at sea and in port, etc.

2) *Participatory Management Planning* – planning of fisheries management policies and strategies at the national level, and detailed planning for management zones or areas with input from stakeholders (provinces, districts and fishers). This input can also assist in reducing costs of MCS enforcement through encouragement of voluntary

compliance due to the perception of "ownership" of the plan through such participation. *This exercise results in the approved management plans for fisheries.*

3) *Establishing a regulatory framework* – The management plans need to be supported by appropriate legal instruments by means of which the plans are implemented. These legal instruments detail all the control mechanisms available for fisheries management including, but not limited to:

   a) *Input Controls* – such as access (number of fishers, number of vessels by fishery), licences, closed seasons, gear restrictions, vessel limitations, area restrictions (Protected Areas), VMS requirements, and vessel identification

   b) Operational and Output Controls

   - Species and Catch Limits
   - By-catch Limits
   - Reporting requirements
   - Air Surveillance
   - Sea Patrols/Inspections
   - Boarding
   - Logbooks
   - Dockside Monitoring
   - Observers
   - Port Inspections

4) *Implementation* – This includes:

   - participatory community-based management (CBM);
   - "preventative" MCS activities to encourage voluntary compliance;
   - public awareness and education campaigns;
   - assistance to small scale fishers through the middleman/ entrepreneur and rural fishers for supplemental livelihood development to reduce coastal area pressures;
   - the "deterrent" MCS, or full enforcement to ensure compliance by those minority of fishers that persist in ignoring the law.

   Similarly, **MCS** involves:

   - data collection and analyses for both operational planning and execution as well as management planning, defined as monitoring (M);

- involvement in the participatory management planning to include discussions on appropriate implementing mechanisms;
- development and approval of appropriate and enforceable legislative instruments and control mechanisms such as licences, permitted fishing gear, seasons, vessel sizes, fish sizes, species, catch limits, by-catch limits, and area controls, or other restrictions to support the management plan, referred to as the control mechanisms (C); and
- the implementation of the plan through "preventative" and "deterrent" MCS techniques, included in the idea of surveillance (S).

Unfortunately, not all fisheries personnel understand MCS, or its critical role as an implementing mechanism for fisheries management. These individuals also see arrests as the only indicator.[8] The real indicator for MCS is the level of compliance, and this is governed by many factors, e.g., the number of fishers; the number of vessels; effort and area coverage of patrols; results of patrols, increase in voluntary compliance, etc.

As noted above, MCS involves a two-pronged, parallel approach, the **preventative approach** and the **deterrent/enforcement approach**. The *preventative approach* is to encourage "voluntary compliance" through understanding and support for the management strategies and this includes:

- enhancement of community/fisher awareness and understanding of management practices and MCS through seminars, public awareness and information, education, and communication campaigns;
- participatory management development to promote ownership of the management regime and input into the regulatory/control aspect of management (laws and regulations) in preparation for acceptance by the fishers of their joint "stewardship" role for the co-management of their fisheries in partnership with Government;
- peer pressure towards voluntary compliance and support for the management regime;
- the institution of accurate and verifiable data collection regimes; and
- surveillance and verification for compliance.

The parallel approach of *deterrent/enforcement* MCS is necessary to ensure compliance by fishers who resist the regulatory regime to the detriment of both the fishery and the economic returns to their fellow fishers. Deterrent and enforcement include inspection, investigation, prevention and court proceedings to enforce the law. Voluntary

[8] There is still the mistaken perception that MCS is "unproductive" if it does not result in arrests. This does not follow the emerging idea of MCS as a key tool for the implementation of the Code of Conduct for Responsible Fisheries, nor the concept of *preventative MCS* (voluntary compliance) and *deterrent MCS* activities operating in parallel for successful and cost-effective fisheries and coastal resource management.

compliance will fail if stakeholders see non-compliant fishers successfully evading the law and thereby gaining illegal returns to the detriment of the compliant fishers.

Schematics and further explanation on fisheries management and MCS are provided in Annex B.

Namibia has used a very successful mix of input and output controls to build a very successful fisheries management regime in the short period since independence was declared in 1989 (see Box 3).

Box 3

NAMIBIAN FISHERIES AND MCS SYSTEM

Capt. Per Erik Bergh
Special Advisor to the Permanent Secretary for Fisheries - Namibia

Namibia, a country 6 times the size of the United Kingdom and with a population of 1.7 million, is on the West Coast of Africa north of South Africa and south of Angola. It has a coastline of 700 nautical miles (1500 km) and an EEZ of 275,000 km². Since independence in 1989, Namibia has developed a progressive fisheries administration and a thriving commercial capture fisheries – reputed to be the largest in the southern hemisphere, and increasingly Namibian.

The fishing industry is based on the high productivity produced from the up-welling Benguela Current system, one of the four eastern systems in the world. The fisheries contribute more than 10% to Namibia's gross domestic product (GDP) of US$500 million in 1999 and employs some 15,000 people. By law, all fish are landed in Namibia through its two ports, Walvis Bay and Lüderitz. Namibia is one of the few major fishing nations that earns more income and creates more jobs from the processing sector, than from the catching of fish, partly due to policies such as the requirement for onshore processing of hake and other species. *Namibia is recovering all expenses related to its fisheries administration and MCS operations through the collection of revenue from the fishing industry.*

The fisheries are exclusively industrial and annual catches are stable or steadily increasing after the overexploitation and depletion before independence. The total landed catch in 1999 was approximately 600,000t. The key fisheries are as follows (TAC for 2000 in brackets):

- the Demersal Fisheries – hake (200,000t), monk (16,000t), kingklip and sole;
- the Midwater Fishery – horse mackerel (410,000t) pursued by both midwater trawlers and the purse seiners;
- the Purse Seine Fishery – pilchard (15,000t) and juvenile horse mackerel with purse seine nets;
- the Deep-Water Fishery – orange roughy (2,400t) and alfonsino;
- the Large Pelagic Fishery – albacore, big-eye, yellow-fin, skipjack and swordfish;
- the Rock Lobster Fishery (400t) - small vessels using carrier vessels to bring the live lobster ashore every day;
- the Crab Fishery (2,000t) – a small fishery that uses traps to catch deep-sea crab, this fishery operates over the whole year.

Namibia uses a 3-part access system to turn its policies of Namibianisation of the fisheries into practise. First rights to exploit the fisheries are allocated, the quotas are allocated to rights holders and finally vessels are granted licences.

This allows Namibia control over the fishing companies, the vessels and the crews to assure that Namibia's policy aims are being met through a differentiated quota fees system that favours Namibian participation,

Namibian flag vessels, Namibian employment and an empowerment aspect in relation to the social inequalities.

Fisheries management controls fall into two categories;

(i) the input controls that relate to fishing effort and gear, seasons and areas controls, with the key ones being the limitation of total fishing effort and seasons; and

(ii) output controls that set quotas and regulations, size limits, and other characteristics of the fish that may be landed. The main output control is by the establishment of annual TAC and quota allocations set on the best scientific advice available, modified by socio-economic factors. TACs are today established for 7 species (hake, horse mackerel, pilchard, orange roughy, monk, red crab and rock lobster).

The trends in biomass, catch and TACs for the three major species (hake, horse mackerel and pilchard) are showing the same broadly consistent pattern of increases in biomass up to 1992; a subsequent decline; and then a general recovery more recently due, among others, as a result of a successful MCS system and good stock assessment.

The MCS system is an integrated system that has stations in the two Inspectorates in Walvis Bay and Lüderitz with each station tasked as appropriate for deploying fishery officers to air, sea or land operations, deploying fisheries observers on board fishing vessels, analysing past operations and outputs or planning future operations. There is a cross-verification of data where observer and inspector information is verified through port inspections and landings control. MCS activities related to air and sea operations are co-ordinated from the Inspectorate at Walvis Bay through a maritime and fisheries Operations Centre and an air base at Arandis.

The Ministry of Fisheries and Marine Resources operates 2 larger patrol vessels, one fixed wing aircraft in addition to 100% observer coverage of the fishing fleet (230 observers are employed in the largest observer programme south of equator). Observers and fisheries inspectors control gear and catches at sea. All catches are finally landed or transhipped in Namibia under the supervision and control of fisheries inspectors. VMS is still in a pilot stage and different systems are under evaluation.

CHAPTER 4:

LEGAL ASPECTS OF MCS

4.1 Introduction

Law is central to MCS. As is apparent from the definition of MCS (see page 13) "control" is concerned with the *legal framework* within which resources must be exploited while "surveillance" is concerned with ensuring compliance with relevant laws and policies. This chapter discusses the nature and role of international and national (domestic) law, outlines the key features of the international legal framework relevant to MCS developed during the last decade, and provides guidance on reviewing and strengthening national legislation to facilitate MCS, particularly using satellite-based vessel monitoring systems.

Laws can fulfil a number of functions but in relation to MCS, the key functions performed by laws are:

a) to define the powers, duties and obligations of States, regional fisheries bodies and fisheries administrations to manage fisheries resources;

b) to establish rules to be observed by those harvesting marine life, including prohibiting certain activities, requiring that other activities may only be undertaken with the authority of a licence, and prescribing the manner in which fishing and related activities must be undertaken;

c) to grant enforcement powers, such as powers of arrest, detention and seizure, to enforcement officials;

d) to protect the private interests of fishers, particularly in relation to confidential information relating to their activities;

e) to establish both the judicial machinery for punishing those who contravene fisheries laws and regulations, and the procedural rules, including rules of evidence, which govern these official processes.

It is important to recognise that there are different spheres of law, and as regards MCS, the distinction between international law and the law of a particular country (sometimes referred to as "domestic law") is particularly important. As explained more fully in 4.2 below, international law is concerned primarily with the relationship between States and international organisations, whereas domestic law regulates the relationships between persons (both legal persons such as companies and individuals) within a particular country. The general principle is that domestic laws only apply within the territory of the country concerned or, to the extent permitted by international law, to the areas over which the State exercises sovereign rights, such as the EEZ. There are exceptions to this general rule, most notably in relation to vessels registered in a particular country which may be regulated by that country (the "flag State") wherever they are in the world. In addition, some States do enact legislation which seeks to govern activities beyond their jurisdiction. However, such legislation

is often controversial, particularly if the measures which it seeks to introduce are not generally accepted by other countries. In some instances, a country may be forced to change its domestic legislation where this is found to be in conflict with internationally agreed rules, for example those established by the World Trade Organisation.

No MCS system is likely to be effective unless it is based on clear legal rules which set out the rights, duties and powers of the various parties in a manner which accords with the international law framework for fisheries management, and provides effective and efficient legal procedures and mechanisms for facilitating and enforcing those rules.

4.2 International law relevant to MCS

4.2.1 International law

International law is the system of rules governing the relationship between States and international organisations by virtue of their being generally accepted either by all States, or by the States concerned. One of the difficulties inherent in international law, is that it is not always certain whether or not a particular international practice or rule has become widely accepted as law (i.e. that States consider that they are bound by it and must comply with it).

Inevitably, differences of opinion as to what constitutes international law, or the precise meaning of a rule of international law, tend to emerge in the context of disputes between States. Article 38 of the Statute of the International Court of Justice specifies what rules and principles the International Court of Justice must apply when deciding disputes submitted to it and in so doing effectively specifies the sources of international law.[9]

However, for our purposes, the most important sources of international law are those contained in binding international treaties[10] such as the United Nations Convention on the Law of the Sea, and to a lesser extent, international customs which "harden" into international practices which become generally accepted as international law.

Fisheries administrators involved in the management of marine capture fisheries, particularly those involving fishing vessels, must have a working knowledge of the essential elements of international law insofar as it applies to fisheries management. Fortunately the most important international fisheries agreements and a host of related documents, explanatory guidelines and the like, are now available on the internet.[11]

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[9] Article 38 is generally regarded as a complete statement of the sources of international law. It provides as follows:
"Article 38.1. The Court, whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply:
(a) international conventions, whether general or particular, establishing rules expressly recognised by the contesting States;
(b) international custom, as evidence of a general practice accepted as law;
(c) the general principles of law recognised by civilised nations;
(d) subject to the provisions of article 59, judicial decisions and the teachings of the most highly qualified publicists of the various nations, as subsidiary means for the determination of rules of law." (Article 59 provides that the decisions of the Court do not create binding precedents.)

[10] Treaties are agreements made between States with the intention that they should be binding under international law. The term "treaty" is used generally to cover all such documents though many different terms may be used to describe a particular treaty e.g. convention, agreement, or protocol.

[11] See for example the Internet Guide to International Fisheries Law (www.oceanlaw.net).

However a fisheries administrator should bear the following points in mind when dealing with questions of international law.

4.2.2 International law governs States not people

The subjects of international law (i.e. the parties who are bound by it) are States and international organisations. This means that international law cannot be enforced directly against individuals or legal persons (such as companies) unless there is some provision in the domestic law which makes the rule in question applicable and enforceable as a matter of domestic law. In many countries (notably those which follow the common law tradition originally derived from English law) it is necessary for parliament to actually pass an Act implementing a rule of international law before it is applicable at the domestic level. In other countries (notably those following the civil law tradition) this is not always necessary, provided that the State has followed the correct procedures under its constitution in ratifying or accepting that it is bound by the relevant international treaty. However because the various rights, duties and powers created by treaties are imposed or conferred upon, they are usually not capable of direct application to individuals or legal persons established under domestic law.[12]

1) Distinguish between "hard" and "soft" law

A distinction must be made between binding and non-binding international documents. The latter are sometimes referred to as "soft law" to indicate that while they are not true law in the sense that they are not capable of enforcement by the International Court of Justice or another international legal tribunal, they nevertheless reflect the common understanding of a number of states on issues of common concern and have the potential to become "hard law". If practices recommended in non-binding international documents (i.e. "soft" law) become so widely adopted as an appropriate norm of behaviour that States eventually regard compliance with them as mandatory they become "hard" customary international law. Furthermore, the inclusion of a practise in a non-binding document may be a prelude to it being included in subsequent binding international treaties. In this regard, it is important to appreciate the increasingly significant role being played by soft law international documents such as the FAO Code of Conduct for Responsible Fisheries (discussed in 4.2.6 below) in facilitating and expediting the development of an international consensus on key issues. By providing a catalyst for developing such a consensus and by recording it in writing, documents such as the Code of Conduct also facilitate the formulation of new rules of customary international law.

2) Treaties don't bind non-parties

It is a fundamental principle of international law that a treaty only applies to the parties to it.[13] Article 5 of the Vienna Convention[14] provides that "a treaty does not create either obligations or rights for a third State without its consent". However, it is possible for a State which is not a party to a treaty to be bound by an obligation in that treaty if the State in question accepts that it is bound by the obligation, or if the rule in

[12] The situation is somewhat complicated in areas in which States have agreed to comply with laws made not by their own parliaments, but by regional organisations. For example, in the European Community, there is a doctrine of "direct effect" which allows for directives from the European Commission to be applied directly in certain limited circumstances. Nevertheless, as a general rule, it will almost always be necessary for rules contained in international legal documents to be reformulated in domestic legislation in a manner which permits them to be effectively enforced.

[13] This is reflected in the maxim *pacta tertiis nec nocent nec prosunt*, sometimes referred to as the "*pacta tertiis*" rule.

[14] The Vienna Convention on the Law of Treaties, International Legal Materials (1969), 679 which entered into force on 27 January 1980.

the treaty becomes part of international custom.[15] International fisheries agreements adopted in the 1990s, such as the FAO Compliance Agreement discussed in section 4.2.4 below, have sought to reduce the effect of this rule by encouraging the States which are parties to the agreement to co-operate in an attempt to ensure that non-participating States do not undermine the effectiveness of international conservation and management measures.[16]

4.2.3 The 1982 United Nations Convention on the Law of the Sea

The United Nations Convention on the Law of the Sea agreed at Montego Bay on 10 December 1982 ("the 1982 UN Convention"),[17] establishes a comprehensive framework for the use of the world's oceans and sets out the rights and obligations of States in this regard. It is important for all fisheries administrators to have a good understanding of the most important provisions of the 1982 UN Convention insofar as they affect the management of marine living resources. In particular, the 1982 UN Convention establishes and defines basic concepts which are fundamental to an understanding of all relevant international documents, both binding and non-binding. These include the concepts of "flag State", "coastal State", and "port State" and the definition of the various internationally recognised maritime zones including: internal waters, territorial sea, exclusive economic zone, archipelagic waters and the high seas. Different rules of international law apply to each of these zones and the extent of a State's powers to make and enforce laws depends on the capacity in which the State is acting (i.e. as a coastal, port or flag State).

The coming into force of the Convention in 1994 provided an impetus to the few remaining States that had not yet proclaimed an EEZ to do so and also encouraged the process of co-operation at global, regional and sub-regional levels, as provided for in the 1982 Convention. However, more significantly, its entry into force enabled it to fulfill its true function as an "umbrella" convention which is supported and elaborated upon by the provisions of the FAO Compliance Agreement (discussed in 4.2.4 below), the 1995 UN Fish Stocks Agreement (discussed in 4.2.5 below)[18] and the FAO Code of Conduct for Responsible Fisheries (discussed in 4.2.6 below), all of which were designed to complement and be fully consistent with the 1982 Convention.

4.2.4 FAO Compliance Agreement

The Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas ("the Compliance Agreement")[19] was developed to strengthen the provisions in the 1982 Convention relating to flag State control in order to control fishing on the high seas more effectively. The Compliance Agreement is intended to make it more difficult for fishing vessels to avoid having to comply with international fisheries conservation and

[15] For example, a treaty may provide for lawful sanctions to be imposed on an aggressor State without that State's consent (see Article 75 of the Vienna Convention and the Hague Convention concerning rules of land and warfare).
[16] FAO Compliance Agreement Article VIII.
[17] (1982) 21 ILM 1261. the 1982 Convention only came into force on 16 November 1994.
[18] This Convention elaborates upon Articles 63 and 64 of the 1982 Convention. Article 63 provides that where stocks are found with two or more EEZs or both within an EEZ and in the adjacent high seas (so-called "straddling stocks") then the States in whose waters they are found or which fish for them on the high seas, must agree on conservation measures, either directly or through regional or subregional organisations. Article 64 requires States that fish for highly migratory species to co-operate directly or through international organisations to ensure the conservation of these species and to promote optimum utilization.
[19] 33 International Legal Materials 969 (1994).

management measures by registering new vessels or changing the registration of existing vessels to States which are not members of major multilateral fisheries organisations. The Compliance Agreement will come into force on the date the Director General of the FAO receives the twenty-fifth instrument of acceptance.[20] It will form an integral part of the FAO Code of Conduct for Responsible Fisheries discussed in section 4.2.6 below.

The Compliance Agreement has two primary objectives. The first is to require all States whose fishing vessels operate on the high seas to institute a range of measures designed to ensure that those vessels do not undermine efforts to conserve and manage the living resources of the high seas. The second objective is to increase the transparency of all high seas fishing operations through the collection and dissemination of data.

The most important article in the FAO Compliance Agreement is Article 3 which sets out the responsibilities of the flag State. In essence, it requires the flag State to "take such measures as may be necessary to ensure that fishing vessels entitled to fly its flag do not engage in any activity that undermines the effectiveness of international conservation and management measures".[21]

Article 3(2) provides that:

> "In particular, no Party shall allow any fishing vessel entitled to fly its flag to be used for fishing on the high seas unless it has been authorised to be so used by the appropriate authorities of that Party. A fishing vessel so authorised shall fish in accordance with the conditions of the authorisation."

The Compliance Agreement also requires each flag State: to refrain from granting an authorisation unless it is satisfied that it is able to exercise effectively its responsibilities in respect of the vessel;[22] to refrain from authorising a vessel under suspension;[23] to require that a vessel must be marked so as to be readily identifiable in accordance with generally accepted standards (such as the FAO vessel marking scheme);[24] to obtain information on the operations of the vessel;[25] and to impose sanctions that are sufficiently severe to be effective in securing compliance with the Agreement.[26]

It should be noted that although the FAO Compliance Agreement provides for the exemption of vessels under 24 metres in length unless doing so "would undermine the object and purpose of [the] Agreement", this does not relieve the flag State of the obligation to take effective measures to ensure that any exempted vessels which undermine the effectiveness of international conservation management measures cease to engage in such activities.[27]

[20] 19 acceptances had been received by 26 October 2000.
[21] Article 3(1)(a).
[22] Article 3(3).
[23] Article 3(5).
[24] Article 3(6).
[25] Article 3(7).
[26] Article 3(8).
[27] Article 2(2) as read with Article 3(1)(b).

4.2.5 1995 UN Fish Stocks Agreement

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 ("the 1995 UN Fish Stocks Agreement") was adopted on 4 August 1995 and will enter into force 30 days after the date of deposit of the thirtieth instrument of ratification or accession.[28] The 1995 UN Fish Stocks Agreement is consistent with the 1982 Convention and is intended to give effect to the mandate in the 1982 Convention for States to co-operate in conserving and managing straddling and highly migratory fish stocks.

The 1995 UN Fish Stocks Agreement sets out general principles to be followed by States in order to conserve and manage straddling and highly migratory fish stocks. It requires a precautionary approach to be taken to fisheries management and encourages States to adopt compatible measures in relation to stocks within areas under the jurisdiction of coastal States and in the high seas. It specifies mechanisms to achieve co-operation between coastal States and distant water fishing States, particularly by means of regional or sub-regional fisheries organisations or arrangements; requires strict fisheries enforcement and the collection and exchange of fisheries information, and requires parties to settle disputes using the procedures established in the 1982 Convention. Like the FAO Compliance Agreement, the 1995 UN Fish Stocks Agreement is designed to be compatible with the 1982 Convention and to be applied in conjunction with these two agreements and the FAO Code of Conduct for Responsible Fisheries. Since it was drafted both during and after the completion of the FAO Compliance Agreement, it was able to build on this agreement and is stronger in certain important respects.

4.2.6 FAO Code of Conduct for Responsible Fisheries

The FAO Code of Conduct for Responsible Fisheries ("the Code") is a broad and comprehensive but non-binding document.[29] It prescribes principles and standards for the conservation and management of all fisheries and addresses not only capture fisheries, but also processing and trade in fish and fishery products, fishing operations, aquaculture, fisheries research and the integration of fisheries into coastal area management. The Code's objectives are set out in Article 2, and importantly from the perspective of MCS, one of the stated objectives is for the Code "to serve as an instrument of reference to help States to establish or to improve the legal and institutional framework required for the exercise of responsible fisheries and in the formulation and implementation of appropriate measures".

It is important to note the following features of the Code: [30]

(1) The Code is based on a recognition that if world fisheries are to be sustainable in the long term, structural adjustment within the fisheries sector is required and although policy decisions in this regard must be made by national governments, effective implementation of the Code requires the participation and co-operation

[28] Law of the Sea Bulletin No. 29 (1995) p25. As at 24 January 2001 it had been ratified by 27 States.
[29] Some of its provisions are binding by virtue of the fact that they are included in other international treaties or reflect customary international law.
[30] See Doulman, D J *Code of Conduct for Responsible Fisheries: Development and Implementation Considerations*, FAO, Rome, July 2000) 10 pp at page 2.

of a wide range of stakeholders including fishers, processors, NGOs and consumers.

(2) The Code is intended to be a dynamic or "living" document which will be adapted by FAO, working through its governing bodies, to meet new fisheries developments and situations. Article 5 specifically designates the FAO Committee on Fisheries (COFI) to monitor the application and implementation of the Code.

(3) The Code is intended to function as part of a package of international measures (including the FAO Compliance Agreement, the 1995 UN Fish Stocks Agreement and the various international plans of action (IPOAs) discussed in section 4.2.7 below), which are designed to work together to address the management and conservation of fisheries throughout the world.

(4) Implementation of the Code is primarily the responsibility of the States that are party to it rather than the FAO. However, the FAO has an important role to play in encouraging and facilitating the implementation of the Code and to provide technical support to national and regional initiatives in this regard.[31]

(5) The Code will require regional and sectoral implementation in order to address the particular needs of fisheries in different regions or sub-sectors.

(6) The FAO has developed several Technical Guidelines in support of the implementation of the Code of Conduct for Responsible Fisheries, including: *Fishing Operations, 1. Vessel Monitoring Systems* (Rome, FAO, 1998). These are available on the FAO Fisheries Department website.

4.2.7 Other international agreements and obligations

The FAO has played a leading role in developing international plans of action (IPOAs) to address specific fishery conservation and management issues that require urgent attention. These IPOAs have been developed within the framework of the Code of Conduct. To date three IPOAs have been formulated dealing with: the incidental catch of sea birds in long line fisheries, the conservation and management of sharks, and the management of fishing capacity. A further IPOA on illegal, unreported and unregulated (IUU) fishing, is being developed for consideration by FAO members.

It is also important for fisheries administrators to be conscious of the fact that international law relating to fisheries and marine living resources can no longer be regarded as an entirely separate and discrete area but is increasingly being affected by other international agreements and documents relating to environmental protection. For example, the Conference of the Parties of the Convention on Biological Diversity adopted the "Jakarta mandate" on marine and coastal biodiversity in November 1995. Similarly, chapter 17 of Agenda 21 which was adopted at the 1982 UNCED Conference in Rio de Janeiro sets out a detailed plan for addressing coastal and marine issues including fisheries. The Convention on International Trade in

[31] The work done by the FAO in this regard includes establishing an internet website to facilitate public access to the Code and the Compliance Agreement which is linked to national sites (www.fao.org/fi/default.asp); and establishing an inter-regional programme of assistance for developing countries focusing on several key areas including the upgrading of capabilities in MCS.

Endangered Species ("CITES") is also becoming increasingly important as more and more marines species such as turtles and hard corals become endangered by trade.[32]

4.3 The Powers of States to make and enforce fisheries laws

4.3.1 Coastal State powers in internal waters

Internal waters consist of waters landward of the baseline from which the territorial sea is measured, including waters of bays within a closing line that are not longer than 24 nautical miles, and areas enclosed by straight baselines along deeply indented and island-fringed coasts,[33] and include ports[34] and roadsteads.[35]

Under international law internal waters are regarded as part of the land over which the coastal State has sovereignty and accordingly the coastal State has full powers to make and enforce laws in this area subject only to a minor exception relating to the continuation of an existing right of innocent passage in waters enclosed by straight baselines.[36]

4.3.2 Coastal State powers in the territorial sea

A coastal State has sovereignty over its territorial sea subject to the right of innocent passage. Nevertheless, the coastal State has complete authority to prescribe legislation with respect to "the conservation of the living resources of the sea"[37] and may even adopt certain laws and regulations relating to innocent passage if these relate to "the prevention of infringement of the fisheries laws and regulations of the coastal State"[38] or "the preservation of the environment of the coastal State and the prevention, reduction and control of pollution thereof".[39]

Although the coastal State has wide powers of enforcement in its territorial sea, the existence of the right of innocent passage means that the coastal State must observe certain limitations in dealing with foreign fishing and other vessels transiting their waters that are not licensed to fish.[40] However, if any foreign ship which has not been authorised to fish, engages in "any fishing activities" in the territorial sea, it loses its right of innocent passage.[41] Furthermore, vessels engaged in transshipment (including processing vessels such as so-called "klondykers") cannot be said to be engaged in innocent passage because their passage is not "continuous and expeditious" as required by the 1982 Convention Article 18(2). Article 25(1) of the 1982 Convention allows the coastal State to "take the necessary steps in its territorial sea to prevent passage which is not innocent". This means that a State has the right to take

[32] For further information see the website of the CITES secretariat at: www.cites.org .
[33] The 1982 Convention Articles 7-16. The normal baseline is the low-water mark along the coast as marked on official recognised charts but in some instances specified in the 1982 Convention a straight line can be used as the baseline thereby creating areas of sea landward of the baseline.
[34] The 1982 Convention Article 11.
[35] Internal waters can also include so-called "historic" bays but these are not dealt with in the 1982 Convention.
[36] The 1982 Convention Article 8.
[37] The 1982 Convention Article 21(1)(d).
[38] The 1982 Convention Article 21(1)(e).
[39] The 1982 Convention Article 21(1)(f).
[40] The ships of all nations enjoy rights of innocent passage through the territorial sea and archipelagic waters under the 1982 Convention Articles 17 and 52(1).
[41] Although a coastal State may pass a law requiring that fishing vessels stow their nets while in lateral passage through the territorial sea or archipelagic waters of the coastal State, if this regulation is contravened, it does not render the passage non-innocent because the non-stowage of fishing nets is not regarded as a "fishing activity" within the meaning of Article 19(2)(i).

appropriate measures, even involving the use of force, provided that it observes relevant principles of international law such as necessity and proportionality.[42]

Even if a foreign fishing vessel in the territorial sea has not lost its right of innocent passage, the coastal State still has significant enforcement powers, which exceed those available to it in the EEZ, by virtue of the fact that the restrictions imposed on the exercise of the sovereign rights of coastal States with respect to the living marine resources in the EEZ do not apply (e.g. the restrictions in Article 73 and the provisions governing access in Article 63). This means that the coastal State would have powers to take necessary measures to ensure compliance with its laws and regulations, including boarding, inspection, arrest and judicial proceedings. These powers could be used in respect of both licensed and unlicensed foreign fishing vessels whether or not they are engaged in fishing.

4.3.3 Coastal State powers in archipelagic waters

Archipelagic waters established in accordance with Article 47 of the 1982 Convention are also under the sovereignty of the archipelagic State[43] but subject to the right of innocent passage.[44] However, Article 51(1) provides that "an archipelagic State shall respect existing agreements with other States and shall recognise traditional fishing rights and other legitimate activities of the immediately adjacent neighbouring States in certain areas falling within archipelagic waters. …"

4.3.4 Coastal State powers in the exclusive economic zone (EEZ)

The EEZ regime is set out in Part V of the 1982 Convention. Within its EEZ, a coastal State has "sovereign rights for the purpose of exploring and exploiting, conserving and managing"[45] the living resources of the EEZ. The coastal State is required to grant foreign fishing vessels access to any surplus in the total allowable catch (TAC) in its EEZ but is entitled to set the terms and conditions of access[46] and may enact laws and regulations which require foreign vessels to provide "vessel position reports".[47] Molenaar and Tsamenyi argue that this provision entitles a coastal state to require a foreign fishing vessel operating in its EEZ to install automatic location communicators (ALCs), but mention that contrary views have been expressed on this point.[48]

It is also important to note that the 1982 Convention imposes additional obligations in relation to the conservation and management of any straddling fish stocks (i.e. any fish of the same stock and stocks of associated species that are found with two or more EEZs or both within an EEZ and in the adjacent high seas) and highly migratory species. Article 63 of the 1982 Convention provides that the States in whose waters straddling stocks occur or which fish for them on the high seas, must agree on conservation measures, either directly or through regional or sub-regional

[42] The International Tribunal on the Law of the Sea (ITLOS) has reaffirmed this position and the substance of Article 22(1)(f) of the 1995 Fish Stocks Agreement (see the Saiga (Merits) case judgment at para 156).
[43] The 1982 Convention Articles 2(1) and 49(1).
[44] The 1982 Convention Article 52(1) allows a right of innocent passage through archipelagic waters in accordance with Part II, section 3.
[45] The 1982 Convention Article 56(1)(a).
[46] The 1982 Convention Article 62(4).
[47] The 1982 Convention Article 62(4)(e).
[48] Molenaar, E.J. and Tsamenyi, M. *Satellite-based Vessel Monitoring Systems: International Legal Aspects and Developments in State Practice*, FAO Legal Papers Online #7, April 2000 at page 15, esp. footnote 89.

organisations. Article 64 requires coastal states and States that fish for the highly migratory species listed in Annex I to the 1982 Convention to co-operate either directly or through international organisations to conserve these species and ensure their optimum utilisation throughout the region. (The obligations of States in relation to these species is defined in more detail in the 1995 UN Fish Stocks Agreement discussed in section 4.2.5 above.)

4.3.5 Coastal State powers in relation to fisheries on the continental shelf

A special legal regime applies to sedentary species of living organisms on the continental shelf of a coastal State. A coastal State has sovereignty over its continental shelf, and since this may extend beyond the EEZ, the coastal State's sovereign rights to explore and exploit these species would be co-extensive with the continental shelf.[49] The effect of this special regime is that the 1982 Convention does not oblige coastal States to prevent over-exploitation or to promote the objective of optimum sustainable yield nor to grant other States access to any surplus, in relation to such sedentary species. However, by virtue of the fact that the coastal State has full sovereignty in relation to these resources, its powers to legislate and to enforce legal provisions are similar to those in its territorial sea.

4.3.6 Restrictions on the powers of coastal States: innocent passage and transit passage

As discussed above, the 1982 Convention gives foreign vessels the right to transit the territorial seas, archipelagic waters and EEZs of coastal States (often referred to as "lateral passage"). It also establishes specific regimes relating to passage through straits used for international navigation[50] and archipelagic sea lanes.[51] However these regimes do not affect the right of the strait or archipelagic State to regulate fisheries.

One of the most important consequences of these regimes from the perspective of MCS is that fisheries administrators must distinguish between foreign fishing vessels which are licensed to fish within their waters, and other vessels (including fishing vessels) merely exercising their rights of passage. In relation to the latter, the coastal State is not entitled to prescribe laws and regulations that apply to the design, construction, manning or equipment (CDEM) of foreign ships unless they are "giving effect to generally accepted international rules or standards".[52]

There are differing views as to whether or not requiring a foreign vessel that is not licenced to fish to install an ALC as a pre-condition for lateral passage would constitute a CDEM standard.[53] If it does, it would not be lawful since no generally accepted standards have been established yet. The counter argument is that a requirement to install an ALC is not a CDEM standard, does not interfere with navigation and the costs are acceptable to ensure compliance with national and/or international laws.

[49] The 1982 Convention Articles 56(3) and 77.
[50] The 1982 Convention Part III, section 2.
[51] The 1982 Convention Part IV.
[52] The 1982 Convention Article 21(2). Although this provision relates to the territorial sea, this restriction must be presumed to apply to the legislative jurisdiction of strait and archipelagic States since these regimes are intended to ensure more extensive rights of navigation than exist within the territorial sea.
[53] See Molenaar & Tsamenyi supra at pp 16-17.

4.3.7 Coastal State powers in relation to the high seas

Since the high seas lie beyond the limits of national jurisdiction, States are not entitled to legislate in respect of these areas and the 1982 Convention only makes provision for very limited authority to undertake enforcement actions on the high seas. In particular, the 1982 Convention only allows coastal States to undertake hot pursuit in certain carefully defined circumstances.[54] It also restricts the rights of warships to board vessels on the high seas to circumstances in which there are reasonable grounds for suspecting that the ship concerned is engaged in piracy, the slave trade, unauthorised broadcasting or where the ship is without nationality, or is attempting to hide the fact that it is the same nationality as the warship either by flying a foreign flag or refusing to show its flag.[55]

The general principle of freedom of the high seas enshrined in article 87, includes freedom of fishing subject to it being exercised "with due regard for the interests of other States in their exercise of the freedom of the high seas" and the rights applicable to the seabed beyond national jurisdiction. Furthermore, as discussed above, States engaged in fishing for straddling or highly migratory stocks on the high seas are under specific obligations to co-operate with one another in the conservation and management of these species, both under the 1982 Convention and the 1995 UN Fish Stocks Agreement.

The rights of visit and of hot pursuit would not extend to vessels engaged in fishing on the high seas unless the flag State had entered into a treaty agreeing to the exercise of such powers, or if there were other grounds justifying the boarding (such as the vessel being without nationality or being engaged in activities such as piracy). However it is possible that a coastal State may be entitled to exercise jurisdiction over mother ships or dependent vessels on the high seas which are engaged in supporting other vessels fishing within the EEZ of the coastal State on the basis that such vessels have a "constructive presence" in the EEZ.[56]

4.3.8 Port State Control

A port State may both deny foreign fishing vessels access to its ports except in exceptional circumstances (e.g. when the ship is in distress); and prescribe laws and regulations that establish conditions for entry into its ports. A State also has full powers to make and enforce regulations within its ports and roadsteads (areas normally used for the loading, unloading and anchoring of ships) as these lie within its territory (i.e. either its internal waters or its territorial sea).[57] These regulations may include (but are not limited to) laws for the prevention, reduction and control of pollution as referred to in Article 211(2) of the 1982 Convention. In theory the port State could also impose standards relating to the construction, design, equipment and manning of vessels (CDEM standards).[58] However State practice in this area tends to reflect a reluctance to prescribe

[54] The 1982 Convention Article 111. See also the discussion on the application of Article 111 in the N/V "Saiga" no.2 case, paragraphs 139-159.
[55] If a vessel sails under the flag of two or more States it may be treated as a ship without nationality and consequently subjected to the right of visit (see Article 92(2) as read with Article 110).
[56] See Edeson, W. (supra) at p7 and the references cited in footnote 16 of that document.
[57] The 1982 Convention Articles 11 and 12.
[58] The obligation in Article 21(2) of the 1982 Convention not to impose CDEM standards applies only to vessels in lateral passage.

CDEM standards that are not generally accepted.[59] For this reason, whether or not a port State is entitled to require vessels visiting its ports to be equipped with, and to turn on ALCs, remains controversial.

The argument is sometimes advanced that since the 1982 Convention did not specifically authorise port States to take action in relation to fishing vessels in the way it did in respect of marine pollution in Article 218, the port State is only entitled to take internationally agreed upon measures to regulate fishing vessels in their ports. However, as William Edeson argues,[60] the better view would appear to be that the 1982 Convention did not alter the existing and extensive powers of port States in respect of foreign fishing vessels in their ports. Nevertheless the jurisdiction and powers of a port State may be limited by treaty[61] or by general international law. For example, a port State would not normally have the power to regulate on a matter that is essentially internal to the vessel and any rules may not discriminate on the basis of the nationality of the vessel.

Despite the fact that international law does not impose any significant restrictions on the powers of a port State to regulate foreign fishing vessels voluntarily in its ports, in practice most States have been cautious in the exercise of their powers to control foreign vessels in their ports.[62] Generally speaking port States do not exercise jurisdiction over most activities taking place aboard a foreign vessel, primarily because most port States are also flag States and wish other countries to give their vessels reciprocal access to their ports. However there may be less of an incentive to do this in relation to fishing vessels.

One of the great advantages of using port State powers is that it is much easier to inspect a vessel in port and to control its movements. This means that it is relatively easy for the port State to enforce its laws (usually without the need to use the force which may be required at sea) and to obtain and forward to the flag State any information concerning suspected unlawful activities of the vessel, wherever these occurred. As a result, a number of recent international agreements and initiatives have explored ways of encouraging or obliging port States to use their powers over foreign vessels in their ports. The IMO has already made considerable progress in encouraging port States to use their powers to inspect vessels (other than fishing vessels) in their ports for safety purposes.[63] The FAO has taken the lead (through initiatives such as the Code of Conduct for Responsible Fisheries, the FAO Compliance Agreement and various IPOAs) in encouraging the use of port State powers to support efforts by flag States and the international community to discourage vessels from contravening or undermining fisheries conservation and management measures on the high seas or in the maritime zones of other States. For example, the 1995 UN Fish Stocks Agreement (discussed in section 4.2.5 above) imposes a duty on port States to take measures, on a non-discriminatory basis and in accordance with international law, to promote the effectiveness of sub-regional, regional and global conservation and management

[59] The New Zealand Court of Appeal held that "a port state has not general power to unilaterally impose its own requirements on foreign ships relating to their construction, their safety and other equipment and their crewing if the requirements are to have an effect on the high seas. Any requirements cannot go beyond those generally accepted, especially in the maritime conventions and regulations." *Sellers v Marine Safety Inspector* Case No: CA104/98, judgement of 5 November 1998, at p. 17.
[60] See Edeson, W. *Tools to address IUU fishing: The current legal situation* (Document AUS: IUU/2000/8.2000.13P, at page 4.
[61] For example the 1982 Convention article 300 provides that State Parties must exercise the rights, jurisdictions and freedoms recognised in the 1982 Convention "in a manner which would not constitute and abuse of rights".
[62] See Edeson, W. *supra* at p4 esp. footnote 9.
[63] These have centred on ship safety and marine pollution controls within the context of the Safety of Life at Sea (SOLAS) convention and MARPOL 73/78.

measures.[64] Recent initiatives to develop an international plan of action ("IPOA") to tackle illegal, unreported and unregulated fishing ("IUU fishing") have also sought to encourage port States to exercise greater control over foreign fishing vessels.[65]

One of the most effective mechanisms for exercising port State control is for the port States to require foreign fishing vessels to obtain an authorisation to enter a port and then impose conditions in that authorisation. If a coastal State lays down pre-conditions for foreign vessels entering its ports or internal waters, the 1982 Convention empowers the coastal State to take necessary steps to prevent any breach of those conditions.[66] These powers have been used to enforce conservation measures taken under the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). For example, South African regulations require fishing vessels with certain species such as Orange Roughy and Patagonian Toothfish on board to have or apply for a permit to enter a South African port. The permit will not be granted unless the authorities are satisfied that the fish have not been taken illegally in the maritime zones of South Africa or another country. This can be established by means of a declaration of catch from the coastal State within whose waters the fish were caught, or if the vessel uses an ALC or an observer under South African control.[67]

If the use of port State control mechanisms for the purposes of enforcing fisheries conservation and management measures becomes wide-spread, this will undoubtedly significantly increase the prospect of effective enforcement action being taken against fishing vessel operators engaged in IUU fishing. The prospect of being inspected and possibly detained, in any regional port with the knowledge that any information and evidentiary material regarding unlawful behaviour will be transmitted to the flag State (and probably also to other coastal States in the region), is likely to have a powerful deterrent effect.

4.3.9 Flag State Powers

The flag State may take enforcement action against its own vessels anywhere on the high seas or within the EEZ of another State[68] but if the vessel in question is in an area under the jurisdiction of a coastal State, the flag State should consult with it. The 1982 Convention reasserted the existing rights of States to allow their nationals to engage in fishing on the high seas subject to any treaty provisions and the rights, duties and interests of coastal States.[69] The 1982 Convention also requires States to take, either alone or in co-operation with other States, measures necessary for the conservation of the living resources of the high seas[70] and to co-operate with other States in the conservation and management of these resources. Where nationals from different States exploit the same living resources or different living resources in the same area, the 1982 Convention requires the States to which these nationals belong to negotiate with one another with a view to taking measures necessary for the conservation of the living resources concerned. In particular, the 1982 Convention envisages co-operation to establish sub-regional or regional fisheries organisations.[71]

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[64] 1995 UN Fish Stocks Agreement Article 23.
[65] See T Lobach *Measures to be adopted by the port States in combatting IUU fishing*, Document AUS:/IUU/2000/15
[66] The 1982 Convention Article 25(2).
[67] See Molenaar and Tsamenyi supra at page 26, footnote 154.
[68] Since the enforcement rights of the flag State on the high seas under the 1982 Convention Article 92(1) are not incompatible with the EEZ regime established by Part V of the 1982 Convention, they apply by virtue of Article 58(2).
[69] The 1982 Convention Article 116.
[70] The 1982 Convention Article 117.
[71] The 1982 Convention Article 118.

The 1982 UN Convention provides that:

> "Every State shall fix the conditions for the grant of its nationality to ships, for the registration of ships in its territory, and for the right to fly its flag. Ships must have the nationality of the State whose flag they are entitled to fly. There must exist a genuine link between the State and the ship." [72]
>
> … "Ships shall sail under the flag of one State only and, save in exceptional cases expressly provided for in international treaties or in this Convention, shall be subject to its exclusive jurisdiction on the high seas."[73]
>
> and that:
>
> "Every State shall effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag."[74]

These clauses have been considered by the International Tribunal on the Law of the Sea (ITLOS) in the MV "Saiga" no. 2 case.[75] The majority of the tribunal was of the opinion that determining the criteria and establishing the procedures for granting and withdrawing nationality to ships are matters within the exclusive jurisdiction of the flag State and that the requirement that there be a "genuine link" between the ship and its flag State was intended to ensure that the flag State was able to effectively implement its duties and was not a criterion which other States could use to challenge the validity of the registration of the ship in another jurisdiction. In other words, because the 1982 Convention failed to specify criteria for determining whether or not a "genuine link" exists for the purposes of Article 91, fishing vessels can avoid compliance with conservation and management measures by moving to another registry. This problem has been compounded by the growth of so-called "open registries" which facilitate re-flagging. Concerns with this loop-hole led to the development of the FAO Compliance Agreement (discussed in 4.2.4 above) and to the inclusion of provisions in the 1995 UN Fish Stocks Agreement which focus attention on the duty of the flag State to exercise effective control over fishing vessels flying its flag.

The 1995 UN Fish Stocks Agreement specifically extends the responsibilities of the flag State. The following consequences of the 1995 UN Fish Stocks Agreement should be noted.

(1) The 1995 UN Fish Stocks Agreement imposes a direct obligation on the flag State to ensure both that its vessels comply with applicable conservation measures and do not undermine their effectiveness.[76] The FAO Compliance Agreement only contains the latter obligation.[77]

(2) The 1995 UN Fish Stocks Agreement provides instead that a flag State may only grant an authorisation to fish on the high seas "where it is able to exercise effectively its responsibilities in respect of such fishing vessels under the

[72] The 1982 Convention Article 91(1).
[73] The 1982 Convention Article 92(2).
[74] The 1982 Convention Article 94(1).
[75] Saint Vincent and the Grenadines v Guinea, judgment of 1 July 1999 (see www.un.org/Depts/los).
[76] Article 18(1) states that: "A State whose vessels fish on the high seas shall take such measures as may be necessary to ensure that vessels flying its flag comply with sub-regional and regional conservation and management measures and that such vessels do not engage in any activity which undermines the effectiveness of such measures."
[77] FAO Compliance Agreement Article III 1(a).

Convention [the 1982 Convention] and [the Compliance] Agreement."[78] This is stronger than the corresponding provision in the FAO Compliance Agreement which requires States to refrain from authorising a vessel to fish on the high seas unless it is satisfied that it can effectively exercise its responsibilities under the Agreement in respect of that fishing vessel.

(3) A flag State is required to make regulations dealing with a range of issues, including regulations to "ensure that vessels flying its flag do not conduct unauthorised fishing within areas under the national jurisdiction of other States".[79]

(4) The flag State is required to enforce compliance by vessels flying its flag with sub-regional and regional conservation and management measures, irrespective of where the violations occur.[80]

(5) The flag State must take measures to support the enforcement of the Fisheries Regulations of coastal States. For example, Article 20(6) provides that:

> "Where there are reasonable grounds for believing that a vessel on the high seas has been engaged in unauthorised fishing within an area under the jurisdiction of a coastal State, the flag State of that vessel, at the request of the coastal State concerned, shall immediately and fully investigate the matter. The flag State shall co-operate with the coastal State in taking appropriate enforcement action in such cases and may authorise the relevant authorities of the coastal State to board and inspect the vessel on the high seas. This paragraph is without prejudice to Article III of the Convention [the 1982 Convention]."

4.4 Strengthening National Regulatory frameworks for MCS

4.4.1 The role of domestic (national) law

As discussed in section 4.2, international agreements impose general obligations on States that must be translated into specific enforceable legal rules backed up by sanctions in national laws. In other words, an essential part of implementing international agreements is for each of the contracting States to pass legislation to give effect to the obligations contained in those treaties. In practice, MCS is primarily concerned with strengthening and enforcing compliance with these domestic law rules rather than with the provisions of international treaties, even though the two should be compatible. [81]

It follows therefore that in strengthening an MCS system it is essential to review the existing domestic legislation to ensure that it prescribes norms that are appropriate to achieve the desired fisheries management objectives, and importantly, contains provisions that facilitate effective enforcement. In practice, the effectiveness of an MCS system in ensuring compliance with the law will be very heavily dependent on whether or not domestic laws provide appropriate mechanisms to facilitate this task.

[78] Article 18(2).
[79] Article 18(3)(b)(iv).
[80] Article 19(1).
[81] This is usually so even in situations where the rule in question has been formulated by a regional fisheries body since most countries will require national legislation that stipulated that rules made by the regional fisheries body will have the force of law within areas under their jurisdiction. In order words, enforcing the rule is still a matter of national law even through the source of the rule may be a regional or international agreement.

4.4.2 Key issues

Broadly speaking, strengthening a national MCS regime will involve addressing the following key issues:

(1) ensuring that fisheries administrators and enforcement officers are empowered to use the full extent of the powers available to coastal, port and flag states under international law (this will usually require reviewing the enforcement powers of enforcement officers under domestic law and strengthening the regime for authorising fishing);

(2) increasing regional and international co-operation in order to reduce the incidence of IUU fishing, including measures to support the enforcement of fisheries, conservation and management measures on the high seas and in areas under the jurisdiction of other States;

(3) increasing the transparency of fishing efforts and thereby facilitate monitoring (particularly by requiring the use of vessel monitoring systems (VMS), including where appropriate satellite-based VMS);

(4) facilitating the use of information derived from monitoring and surveillance (particularly data gathered using new VMS technologies); to promote compliance and in particular, securing convictions in court; and

(5) strengthening existing sanctions and to extend the range of compliance mechanisms available to enforcement officers.

A list of some of the issues to be considered in reviewing national legislation to strengthen MCS is set out in Annex C.

4.4.3 Compliance with international law

In strengthening national regulatory frameworks for MCS it is important to be conscious of the applicable international legal regime (discussed in section 4.2 above). In particular, fisheries administrators and law makers must be conscious of the distinction between their jurisdiction to make laws in a particular maritime zone (often referred to as "prescriptive jurisdiction") and their jurisdiction to implement and enforce laws within these areas, as these may differ. Furthermore, States should be conscious of the fact that international law, and particularly agreements such as the FAO Compliance Agreement, the 1995 UN Fish Stocks Agreement and regional agreements establishing regional fisheries bodies, impose obligations on contracting States to pass domestic legislation to give effect to these international or regional agreements, and in some instances, to enforce it.

4.4.4 Introduction of Vessel Monitoring Systems

As discussed above, the sovereign rights of the coastal State to manage, explore and exploit the marine living resources within its maritime zones are qualified in various respects in order to safeguard the interests of the international community. For example, in relation to non-sedentary species, coastal States must: ensure through sustainable management that their resources are not over exploited; seek to promote optimum utilisation; and co-operate with other States in relation to trans-boundary

stocks.[82] Furthermore, the basic principle of freedom of fishing on the high seas has been subjected to increasingly more stringent and specific obligations regarding conservation and co-operation, though not all are in force yet.[83]

One of the implications of the establishment of an increasingly sophisticated legal framework for international and regional fisheries management, is that States will require more extensive, accurate and verifiable data concerning fisheries activities and their impacts in order to implement these regulatory systems effectively. The worsening status of many fish stocks and the marine environment, has also created a strong incentive for coastal States to adopt VMS as a component of an overall MCS strategy. Furthermore, advances in technology, particularly in relation to satellite-based vessel monitoring systems, have the potential to substantially improve the effectiveness of MCS systems by generating a wider range of useful data at a substantially lower cost that relying exclusively on more traditional MCS measures such as naval enforcement.[84]

A number of international fisheries documents encourage or require States to use satellite-based VMSs in MCS.[85] How the VMS should be implemented is generally left to the States to decide since this will depend on the circumstances. For example, in most cases satellite VMS is more appropriate for industrial fishing operations than to control artisanal fishing, and different types of satellite-based VMS may be appropriate in different circumstances.

Legislative changes are usually required to enable satellite-based VMS to operate as an integral and effective part of an MCS system. For example, legislation should provide that:

- fishing is subject to an authorisation regime (e.g. a licensing system) that requires the installation of ALCs;
- vessels must be clearly marked and capable of identification both for the purposes of identifying them via the satellite-based VMS system and in order to match data derived from the VMS system with information obtained from other sources such as visual inspection;
- fishing vessels must report regularly on their position, activities and catches;
- landings and transshipments must take place in designated ports or areas; and
- information derived from satellite-based VMS is confidential.

4.4.5 Security and confidentiality of information

One of the unavoidable consequences of generating more detailed real-time or near real-time information (particularly regarding location and catches) and exchanging

[82] See Molenaar and Tsamenyi, supra, at page 5, especially footnote 23.
[83] ibid.
[84] For a comprehensive discussion of legal aspects of satellite based vessel monitoring systems see Molenaar, E.J. and Tsamenyi, N "Satellite based vessel monitoring systems international legal aspects and developments and state practice" FAO legal papers on line number 7, April 2000.
[85] For example, 1995 UN Fish Stocks Agreement, Article 5(j), 18(3)(e) and (g)(iii) and Annex 1, Articles 5 and 6; FAO Code of Conduct 7.7.3.

such information, is to increase the risk of it falling into the wrong hands. If there is a perception that information derived from commercial operators may fall into the hands of competitors, this is likely to considerably increase resistance to the introduction of such systems. Consequently it is essential for legislation to protect data derived from VMS and to provide appropriate penalties for its misuse.

Kuemlangen[86] advocates taking the following measures to protect the confidentiality of this information:

- categorising VMS derived information as confidential;
- requiring that this information should be used primarily for fisheries management purposes;
- clearly defining the situations in which secondary use of VMS information is permitted (e.g. for search and rescue or enforcement purposes);
- restricting access to premises where VMS information is generated, stored or processed and access to the information itself; and
- making breach of confidentiality an offence punishable by severe penalties.

It is also important to be conscious that if VMSs are used to transmit a wide range of data (e.g. information on sea temperature and salinity derived from on-board sensors) this could constitute marine scientific research. If so, the consent of the coastal State would be required under Part XIII of the 1982 Convention.[87]

4.4.6 Facilitating legal enforcement

When drafting new legislation, it is important to carefully consider how that legislation will be enforced and, wherever possible, to facilitate effective enforcement without unduly infringing on the rights of persons accused of contravening the law.

1) Evidenciary issues

Although different legal systems have different standards and procedures relating to how to legally establish that an offence has been committed, each legal system will typically require that the prosecution places before the court evidence that is sufficiently reliable to establish each of the essential requirements (or "elements") of the offence with an appropriate degree of certainty. The defence will then have an opportunity to place other information before the court in order to undermine or discredit the case made by the prosecution and/or to establish the basis for a defence which would allow the defendant to escape liability. Fisheries offences are usually committed at sea where they cannot be observed by enforcement officers (other than on-board observers). This creates a number of difficulties. For example it may be difficult to identify the vessel with certainty, or to determine its precise position at the time the alleged illegal action occurred, or to determine with a sufficient degree of certainty exactly what the vessel was doing at any particular time (e.g. was it fishing

[86] Keumlangen, B *National legislative options to combat IUU fishing* AUS: IUU/2000/9 at page 7.
[87] See Molenaar & Tsamenyi supra at p13.

or not). It may also be difficult to obtain physical evidence that the offence has been committed.

Defence lawyers are often able to exploit these practical difficulties and to use technical aspects of the laws of procedure governing evidence to secure an acquittal for their clients.[88] However, appropriate legal drafting can make it easier for the prosecution to secure a conviction in a cost-effective manner while still retaining sufficient safeguards to ensure that innocent parties are not convicted. A number of mechanisms can be used to achieve this, most notably, by creating offences that are easier to prove (e.g. providing that possession of illegally caught fish is an offence in addition to the illegal catching itself); and by making it more difficult for an accused to rely on technicalities to escape conviction. Before discussing the use of some of these techniques, it is necessary to first consider some of the underlying legal concepts relating to the law of evidence.

Although there are significant differences between the approaches taken by different legal traditions, the procedural laws of most jurisdictions distinguish between the party that bears the responsibility or onus of proving that a crime has been committed (i.e. the prosecution), the party that is responsible for placing evidence before the court to prove or disprove a particular point at issue (referred to as the "burden of proof") which usually shifts from one party to another during the course of a trial, and the level of proof which is required (referred to as the "standard of proof"). For example, in common law systems, the standard of proof in a criminal matter is normally "proof beyond reasonable doubt", whereas in a civil matter, the standard of proof required is the "balance of probabilities" (i.e. the most likely conclusion).

2) Presumptions

One of the most widely used techniques in fisheries legislation is to provide that if the prosecution is able to prove certain facts (e.g. that a fishing vessel was fishing without the necessary authorisation) then certain other facts or legal consequences will be presumed (e.g. that any fish on board were caught illegally), unless the contrary is proved. It must be noted that in these circumstances the *onus* of proof remains with the prosecution, but once the prosecution has proved the initial facts giving rise to the presumption (sometimes referred to as a *prima facie* case) then the *burden of proof* shifts to the accused who must then place evidence before the court sufficient to disprove the prosecution's case or to establish a legal defence. Typically the accused need only prove a defence on the basis of a balance of probabilities, whereas the standard of proof required in respect of the prosecution's case is the higher standard of "beyond reasonable doubt".

Presumptions are most appropriately used in situations where the prosecution has reason to believe that an offence has been committed (e.g. because the vessel is observed engaged in fishing activities without the necessary authorisation) in order to establish facts which are difficult for the prosecution to prove (e.g. concerning the activities of the vessel while at sea) but can easily be disproved by an innocent accused. Examples of presumptions which shift the burden of proof include presumptions that:

[88] Fisheries officers should be particularly conscious of rules which render certain evidence inadmissible (i.e. it can't be used in court). For example the laws of many countries require an arresting officer to inform the person being arrested of his or her rights. If this is not done, later admissions or statements by the person arrested may be inadmissible.

- a vessel is a foreign fishing boat from the flying of a foreign flag, the absence of a national flag, the name of a foreign port on the stern, or the possession of foreign documentation;

- a fisher apprehended in waters where authorisation is required does not have a licence;

- fish found on board a vessel apprehended fishing illegally were caught illegally in the maritime zone where the vessel was found;

- a fishing vessel apprehended traversing the EEZ without stowing its fishing gear, had been involved in illegal fishing and that all fish on board had been caught illegally.

However presumptions can often be used in a manner which seriously impacts upon the right of an accused to a fair trial.[89] For example, in situations where the presumption of illegality is raised even if there is no *prima facie* evidence that an offence has been committed (e.g. presuming that all fish in a vessel within the EEZ are deemed to have been caught within that EEZ). This effectively places a burden on an apparently innocent party to prove that they have not acted unlawfully. Another example of an inappropriate use of a presumption concerns the creation of a wide-ranging offence for activities which are not necessarily illegal (e.g. the possession of fishing equipment within a controlled area) in order to create a situation in which the accused bears the burden of proving a defence.[90]

It should be noted that in some countries presumptions which are found to impose unreasonable burdens of proof on an accused person may be struck down as unconstitutional, or as contrary to applicable conventions on human rights. This is particularly likely to occur where the presumption "deems" or "presumes" someone to be guilty of an offence unless they are able to prove a defence. Similar provisions in various criminal laws (unrelated to fishing) have been struck down as unconstitutional by the Papua New Guinea Supreme Court[91] and by the Constitutional Court in South Africa.[92]

3) Using data from VMS in court

In common law systems, particular difficulties have been experienced in using data derived from satellite-based VMSs (e.g. to establish the position of a vessel at a particular time) because of the general rule that "hearsay" evidence is inadmissible. What constitutes "hearsay" evidence varies from country to country, but the rule reflects the general reluctance of courts to accept as fact evidence from witnesses who do not appear before the court itself, or who are testifying to matters which are not within their personal knowledge. For example, a court may refuse to accept evidence from a satellite-based VMS, that a vessel was in a particular place at a particular time,

[89] See Freestone, D. *The Burden of proof in Natural Resources Legislation. Some critical Issues for Fisheries Law*, FAO Legislative Study No. 63, Rome FAO, 1998.
[90] This is typified by section 101 of the Australian Fisheries Management Act, 162 of 1991, which establishes a broad offence of being in possession or in charge of a foreign boat equipped with nets, traps or other equipment for fishing within the Australian Fishing Zone and then establishes a number of defences, including the possession of a licence, or proving that the nets were stowed and secured and that the zone was being traversed for specified purposes.
[91] *Constitution reference no. 3 of 1978: re Intergroup Fighting Act*, 1977 [1978] PNGLR 421.
[92] See the cases of *Scagell and Others v Attorney General of the Western Cape & Others* (1996) 2 SACR 579 (CC) and *S v Coetzee & Others* 1997(3) SA 527.

unless experts appear before the court to confirm the degree of accuracy and reliability of such systems in general, that the particular system was working correctly, and that a properly qualified person interpreted the data correctly.

However, in some cases the prosecution may be able to rely on the general rule of evidence that a court may take "judicial notice" of certain facts and accept them as true even if no evidence is led on the point. Courts will generally take judicial notice of facts which are either matters of general knowledge or are well-known (notorious) in the area in which the court is situated. This obviously poses problems in relation to new technologies, but as these become more widely known and accepted, it is increasingly easy for a court to take judicial notice of them.[93]

Using expert evidence to prove the validity and accuracy of all information derived from satellite-based VMSs which is tendered as evidence in court, would be extremely time-consuming and expensive and would constitute a significant obstacle to prosecutions. In some situations legislative intervention may be required to overcome some of these issues.

For example, the South African Marine Living Resources Act, 18 of 1998, contains a number of provisions designed to facilitate the use of evidence derived from new technologies. Firstly, the Minister is empowered to designate certain classes of machines or instruments as "designated machines".[94] Readings taken from such machines are admissible as evidence if the reading is made by a properly trained person and if the machine was checked a reasonable time before and after the reading and appeared to be working correctly. Such machines will also be presumed to give accurate readings within the manufacturers' specified limits. Similarly the Minister may designate devices or machines such as ALCs as "observation devices"[95] and information or data derived from them shall be *prima facie* evidence that the information came from the vessel identified, was accurately relayed or transferred, and was given by the master, owner and charterer of the fishing vessel.

These provisions are utilised in conjunction with provisions relating to the tendering of documentary evidence which allow the Minister, or a fisheries control officer or an observer, to issue a certificate testifying to certain facts, which is admissible and may be accepted as *prima facie* evidence of the facts stated in them. Examples of such certificates include a certificate specifying the place or area in which a vessel had been at a particular date and time or during a particular period of time;[96] and a certificate from a fisheries control officer or observer certifying the accuracy of a printout or visual display unit relating to information derived from an observation device (such as an ALC) and interpreting that information.[97]

4) Administrative and civil processes and penalties

Some countries have avoided some of the difficulties associated with formal criminal trials (which involve considerable expense and meeting a high standard of proof), by

[93] For example in New Zealand in an unreported district court case of *Deirdre April Lane (Fisheries inspector) v Michael Patrick Wallace* of 11 September 1998, judicial notice was taken of the accuracy of a global positioning system (GPS) whereas in a 1994 case (*Ministry of Agriculture & Fisheries v Thomas* [1994] DCR 486) the court ruled that GPS was not a notoriously scientific instrument. See Kuemlangen (supra) at p8.
[94] Section 74.
[95] Section 76.
[96] Section 73(1).
[97] Section 76.

providing for administrative or civil penalties, rather than criminal sanctions, for the violation of certain provisions of the law. Such systems typically involve the fisheries administration notifying the alleged offender that it believes that a contravention of the law has occurred, presenting a summary of its case with an indication of the penalties (usually fines) that it intends imposing, and inviting the alleged offender to make appropriate representations and to attend a hearing. One of the advantages of this approach is that it facilitates the negotiation of settlements in circumstances in which the authorities have sufficient evidence to prove that an unlawful act has been committed, without the necessity of going through a more expensive and protracted criminal trial.

For example, in the United States, the Fisheries Conservation and Management Act provides that it is unlawful for any person to violate certain provisions of the Act and that any person who does so is liable to the United States for a civil penalty,[98] instead of the more usual formulation that a person is "guilty of an offence" which creates criminal liability. Similarly in New Zealand, administrative penalties may be imposed for minor offences where the fine does not exceed NZ$250,000 and the maximum penalty that can be imposed is one third of the maximum monetary penalty to which the person would be liable if convicted by a court.[99]

5) Compounding/fixed penalty systems

Many legal systems incorporate provisions that allow alleged offenders to pay a fixed penalty in order to avoid prosecution for an offence. These systems provide a useful means of relieving pressures on courts and of dealing with straight-forward offences quickly and efficiently. However fisheries administrators should not use this useful technique in inappropriate circumstances, for example where the offences are of a complex nature. As Thornton points out:

> "Defendants should not be blackmailed into paying fixed penalties for offences that cannot be proved against them. The system must not take advantage unjustly of the convenience for defendants of disposing of an allegation by a payment that may be less than th1e cost of successfully defending a proceeding in court."[100]

6) "Long arm" enforcement provisions

The classic example of this type of provision is the so-called "Lacey Act" in the United States which was originally passed to outlaw interstate traffic in birds and other animals illegally killed in their state of origin.[101] Under the Lacey Act, it is unlawful to import fish taken in contravention of the laws of another country and similar provisions (sometimes referred to as "Lacey clauses") have now been introduced into the fisheries legislation of other countries including, Papua New Guinea, the Solomon Islands and Nauru. As a result of co-operation between the United States and the members of the Forum Fisheries Agency (FFA) of the Pacific, the parties exchange fisheries information, including information on violations, in accordance with an agreed minute on co-operation on surveillance and enforcement. The information exchanged in this manner has enabled the USA to use the Lacey Act to prosecute vessels importing fish taken contrary to the laws of FFA member

[98] See section 1857 and 1858.
[99] New Zealand, Fisheries Act 196 sections 113ZA-113ZC.
[100] Thornton, G C, *Legislative Drafting* fourth edition Butterworths 1996 at page 381.
[101] USC title 16, chapter 53. The Lacey Act was passed in 1900 and was named after its sponsor, Iowa congressman Lacey.

states.[102] One of the advantages of these types of provisions are that they avoid the difficulties inherent in attempting to exercise extra-territorial jurisdiction by criminalising activities that occur within their territories (i.e. importation) but in a manner that supports and enforces management and conservation measures in areas beyond the limits of their jurisdiction.

4.4.7 Synopsis of the implications of emerging international fisheries regime for MCS

The 1990s saw very significant developments in the development of international law relating to fisheries, with direct implications for MCS systems. The new international regulatory framework for fisheries, centred around the 1982 UN Convention which came into force in November 1994, the FAO Code of Conduct for Responsible Fisheries, and the FAO Compliance Agreement and the 1995 UN Fish Stocks Agreement (which are not yet in force) encourages the rapid strengthening of national, and particularly regional, MCS systems as a key mechanism for improving the conservation and management of marine fisheries.

The following characteristics of this developing regime should be noted.

(1) The new regime places particular emphasis on an "ecosystem" approach which places fisheries management within a wider context of the conservation and protection of the marine environment, biological diversity, and the integrated management of coastal areas.[103]

(2) The new regime continues the trend reflected in the 1982 Convention to expand the powers of coastal states as a means of preventing over-exploitation by distant water fishing nations by emphasizing that the conservation and management regimes for straddling stocks within areas under national jurisdiction must be compatible with those in adjacent high seas areas and imposing a duty on both the coastal State and the States fishing on the high seas to co-operate to achieve compatible measures. If no agreement is reached, either party may invoke the dispute resolution provisions in Part VIII, including binding dispute resolution.[104] As Van Dyke points out,[105] the effect of these provisions is to "tilt" the system in favour of the coastal State which can set national standards on the treatment of straddling and migrating stocks and then invoke compulsory dispute resolution proceedings[106] to ensure that adjacent high seas measures are compatible with the national standards.

(3) All the international fisheries documents of the 1990s place emphasis on the importance of regional and global co-operation, particular as a means of counteracting IUU fishing. In the past the ability of unscrupulous operators to successfully avoid being regulated effectively by reflagging, or by moving in and out of areas of national jurisdiction, has seriously undermined fisheries conservation and management measures.

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[102] See Kuemlangen, supra at page 15.
[103] See for example Agenda 21, Chapter 17, and the 1995 UN Fish Stocks Agreement, article 5(d)(e)(f) and (g).
[104] The UN Fish Stocks Agreement Article 7.
[105] Van Dyke, J.M. *Modifying the 1982 Law of the Sea Convention: New Initiatives of Governance of High Seas Fisheries Resources: the Straddling Stocks Negotiations* International Journal of Marine and Coastal Law, Vol 10 No. 2(1995) pp 219-227 at p223.
[106] For a critique of this dispute resolution system see Boyle, A.E. *Problems of Compulsory Jurisdiction and the Settlement of Disputes relating to Straddling Fish Stocks* International Journal of Marine & Coastal Law Vol 14, No. 1, 1999 pp 1-25.

(4) There is increased emphasis on creating incentives for co-operation, disincentives for those remaining outside of regional fisheries management bodies, and the extension of the application of conservation and management measures to all States, even if they are not participants in a regional fisheries management arrangement or body.

(5) The principle of freedom of fisheries on the high seas incorporated in the 1982 Convention has been increasingly circumscribed by more stringent and more specific obligations regarding conservation and co-operation, as a response to serious over-exploitation of marine living resources on the high seas. This has resulted in more stringent obligations being imposed on the flag State to ensure compliance by vessels flying its flag with sub-regional and regional conservation and management measures. These include obligations to enforce measures, irrespective of where violations occur, to investigate alleged violations fully and promptly, and to ensure that a vessel involved in the commission of a serious violation does not engage in further fishing operations on the high seas until such time as all outstanding sanctions imposed by the flag State have been complied with.

The combined effect of these developments in the international fisheries regime is to enhance the importance of MCS and to provide added incentives for both coastal States to introduce VMS, particularly satellite-based VMS. However, if satellite based VMS is to be a fully effective component of an overall MCS system, national laws relevant to MCS must be thoroughly reviewed, and where appropriate, updated. Some guidelines on the issues which should be considered in such a review are set out in Annex C.

CHAPTER 5:

DESIGN CONSIDERATIONS FOR MCS

5.1 Influencing Factors

There are three groups of factors that may influence decisions regarding the type of MCS system required to meet the needs of fisheries management. These are:

1) the geographic and demographic aspects of the country, including the nature of the national fishing industry and the international profile of the fishery;

2) social and economic factors; and

3) the political will and commitment towards sustainable and responsible fisheries management.

5.1.1 Geographic and demographic aspects

1) Size of the EEZ and the Fishing Area within the Zone

The area of fishing of both the domestic and foreign fleets will have a significant influence on the design of the MCS system for each country. For example, in the Philippines the responsibility and authority for managing the artisanal fisheries has been delegated to municipalities. This involves managing more than 300,000 small fishing vessels called "bancas" fishing in the vicinity of the Phillipines' 7,107 islands. Each local municipal authority has jurisdiction over a zone out to 15 km from the shore while the remaining 2.2 million km² is subject to MCS by the central government.

However, a very different MCS system will be required for a country such as Sri Lanka which has an EEZ of 517,000 km² and 26,600 vessels in the marine fishery, including many foreign fishers.

A large zone and fishing area may require air surveillance and vessels to patrol the areas of concern. On the other hand, a narrow fishing zone might be surveyed cost-effectively using other technology, possibly land-based, such as over-the-horizon radar, coast watch systems, or vessel monitoring systems (VMS), coupled with less expensive "no force" strategies. *The physical size of the EEZ and the active fisheries area within the zone will have a significant influence on the design of the MCS system.*

2) Topography of the coastline

A coastline with several bays, river outlets and important mangrove habitat will require a more complicated MCS scheme to conserve fisheries resources than one with steep rocky cliffs and less important habitat.

3) Area of active fisheries

The specific area in which fishing is undertaken will also affect the MCS system design due to the migration of fish stocks between fishing areas and countries. This can also cause conflict between artisanal and offshore fishers, if there are incursions of vessels from the latter sector into the small boat fisher's area. This can become critical when the EEZ of a country has only a small rich fishing ground and the fishing pressures from all fishing sectors is intense. A larger active fishing area is obviously more expensive to protect than a compact smaller one, but fishing intensity in a smaller area also creates its own problems of enforcing zones. Most fisheries occur on the continental shelf or its slope into deeper water, with only a few countries exploiting the very deep fisheries (e.g. Namibia for orange roughy). In all countries, the natural tendency is to fish as close to home as possible to conserve time and fuel, hence incursions into coastal areas are common. This creates a concern with respect to the creation and implementation of zones for the MCS system.[107]

4) Fishing fleet profile

The profile of the fishing fleets, domestic, foreign, artisanal and offshore, is a consideration for the implementation of MCS strategies. The condition, size, fishing capacity, gear type and fishing patterns of the vessels will all have an impact on what the State may wish the vessels to do to comply with its management plan and MCS policies. For example, the profile of the fleets is an important factor in determining minimum safety and equipment standards, not only for the well-being of the fishers, but to reduce search and rescue costs, maximize quality of landings, and also to minimize the risk of pollution at sea.

5) Precautionary approach

If the artisanal/coastal fishery is overfished and there is growing pressure on the offshore fisheries, with little knowledge of the resource base, then consideration and effort will need to be directed both to information gathering and adoption of a precautionary approach to management, and options for re-directing fishing effort in a cost-effective and controlled manner, if this is possible. A key factor in this scenario may be the targeted species, offshore usually being high value species for profit, while the artisanal fisheries focus on any fish, often lower value for sustenance.

6) Control domestic as well as foreign fishing

If control efforts are concentrated on illegal incursions and foreign fishing in the offshore area with few controls on larger domestic offshore fishing operations and the coastal areas where intense, illegal, unreported and unregulated fishing occurs, then this is a recipe for disaster. Such a situation often occurs in countries where illegal foreign fishing has a high priority, and lack of knowledge of sustainable management techniques is mixed with devolution of authority. This usually results in few, if any controls on the domestic/national fleet during the transition period while the new authorities are being

[107] A point for consideration in MCS system development is that **area controls are often easier to enforce than species or catch restrictions.** For example, a strategy to establish a foreign, or offshore fishing zone that is restricted to an area outside a certain distance, say 12 to 15 nautical miles is much easier to enforce than a strategy where foreign or offshore fishermen are permitted in inshore/coastal, or closed areas when fishing for certain species or certain times of the year. The latter necessitates a verification of fishing catches and site monitoring, while the former only requires geographic confirmation of locations of fishing activities.

trained to manage the fisheries. The fish stocks become especially vulnerable to damage during this period.

7) Other interests in the marine area

The importance of tourism (coastal tourism and also offshore, e.g., whale watching, etc.) the enhancement of industrial capacity, the requirements for sea transportation, port and shipping activity can all have an impact on the strategy developed for fisheries management, with consequential repercussions on the MCS strategy adopted. This will necessitate discussion and liaison with appropriate ministries and agencies to ensure that government priorities are met and, as far as possible, fisheries requirements and the benefits of fisheries to society are recognized and respected. Fisheries management priorities will often seem to conflict with priorities from tourism, industry, and marine transportation initiatives. The commonality of the benefits of healthy resources to each of these sectors must be realized for both the economy and employment in each sector. There will be a need for a mechanism for discussion and resolution of differences in approaches and priorities for each of these important industries and agencies.

8) International pressures

International pressures from distant water fishing nations (DWFNs) and the short term economic benefits of foreign currency cash flow can be attractive to less developed states, but often at the expense of unsustainable exploitation of their fisheries resources. Of particular note and special pertinence today, is the economic temptation to register DWFN vessels in national registers when there is no capability to control the activities of the "new flag" vessels. Some of these "new flag" vessels operate in internationally sensitive areas of the world without appropriate attention to conservation. If this happens then the credibility and commitment of the flag State to internationally accepted fisheries conservation and principles and to the implementation of the 1982 UN Convention, will be called into question.[108] It is also likely to result in pressure on the coastal State that permitted the licensing of such vessels without the MCS capability to ensure compliance with international agreements or local legislation. Registration of these vessels should be avoided.

9) Bi-lateral and Regional Cooperation

Limited resources and the scarcity of trained staff in many countries often mean that the only effective protection against uncontrolled overfishing and lack of compliance with regulatory MCS measures, is through strong co-operation on bilateral, sub-regional and regional bases. Cooperative efforts can result in economic and international pressures to comply with internationally respected conservation principles that would not otherwise be achievable by a single State.

An example of a sub-regional fisheries organization is the Northwest Africa Fisheries Sub-Regional Fisheries Commission for which the MCS system is described in Box 4.

Box 4

SUB-REGIONAL FISHERIES COMMISSION OF NORTHWEST AFRICA

[108] The obligations of the flag State in this regard are discussed in Chapter 4, section 4.1.15 especially pages 35-36.

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SUB-REGIONAL BACKGROUND.

The Sub-Regional Fisheries Commission of Northwest Africa comprises the states of Mauritania, Senegal, Cape Verde, The Gambia, Guinea-Bissau and Guinea. Sierra Leone is an observer. The continental shelf extends to over 100 nautical miles offshore in the northwest, thus being more extensive than anywhere else on the west coast other than Namibia.

COUNTRY	**COASTLINE** in kilometres	**CONTINENTAL SHELF** in nautical miles	**SHELF AREA** [in 000 km²]
MAURITANIA	667	13 – 79	33.9
SENEGAL	718	8 – 50	23.8
THE GAMBIA	70	41 – 50	3.7
CAPE VERDE	……	1 – 10	3.0
GUINEA-BISSAU	300	40 – 105	45.0
GUINEA	350	70 – 110	50.2
SIERRA LEONE	570	15 – 80	30.0

Despite having a small shelf area, Cape Verde has the largest EEZ of the countries within the sub-region. This, coupled with the oceanic rather than coastal weather experienced in the islands, has a fundamental bearing on the type of MCS and fisheries protection service required by the islands. On the mainland, the length of coastline and the extent of the shelf have obvious implications for surveillance requirements.

TYPES OF FISHERIES AND RESOURCES.

Resources are dependent on the depth of water, temperature and salinity. Small pelagics are predominant. Demersal species vary according to seabed type and water temperature, and representatives are Croakers, grunters, threadfin, spadefish and soles, snappers, groupers and gurnards. Cephalopods exist in the whole of the region, but are most important in Mauritania. Localised stocks of shrimp are found mainly off large river mouths such as in southern Senegal, off The Gambia River, and in the Bissau archipelago and Sierra Leone. Deep-water shrimps are also targeted in Bissau and Sierra Leone. Large pelagics (tunas); [migratory/seasonal] are fished offshore by large purse seiners and closer inshore by pole and line. **All stocks with the exception of small pelagics are heavily exploited, shrimp stocks in particular being over exploited in many areas.** The advent of super trawlers (144m long, hold capacity of 7000 tonnes, 19,600 hp and 13,500 GT), mainly from Europe may have a significant impact on these stocks in Mauritania and Senegal.

There is an important artisanal fishery throughout the region for food security and employment, e.g., over 70% of fish landed in Senegal comes from this source. [*Source: Senegal Fisheries Inspectorate*]. It is estimated that there are over 750 canoes in Mauritania, 8,300 in Senegal, 900 in The Gambia, about 600 in Guinea-Bissau, 2000 in Guinea, and a registration programme completed in Sierra Leone in 1997 confirmed over 7,000. Cape Verde has around 1200 small local boats which fish the sea mounts and shallows in the island waters. [*Sources: FAO statistics and Fisheries Departments*].

Licences issued in 2000 for **industrial vessels** were: [*Source: Project AFR/013 statistical records to 2000*].

MAURITANIA	493
THE GAMBIA	62
SENEGAL	265
GUINEA-BISSAU	216 * The fishery continued to operate despite the war.
CAPE VERDE	10* does not include local boats restricted to C-V EEZ.
GUINEA	120 [approx. figure]
THE GAMBIA	62
SIERRA LEONE	92

Many vessels fish as joint ventures, e.g. OKEKY Agencies in Freetown [China National Fishing Co./OKEKY Agencies (20 trawlers)], and under access agreements between the EU and Mauritania and Senegal in particular. There are 19 French and 66 Spanish boats fishing in Senegal under various EU/Senegal arrangements. Foreign vessels [either flagged, or beneficially owned] include Italy, France, Spain, Portugal, the Netherlands, Greece and Ireland [EU], Cyprus, the Russian Federation, Ukraine, Latvia, Panama and some small flag of convenience states, as well as Korea, the two Chinas [PRC and RoC] and Japan. African registered vessels also fish outside their own waters, e.g., Senegalese vessels in The Gambia, and vice versa.

CONTROL MECHANISMS.

In addition to licences, vessels are subject to gear restrictions and inshore exclusion zones, zoning by type and species fished. Legislation is regionally sound as a result of an FAO project completed in mid-1997. New fisheries laws were enacted in both Senegal and Mauritania in 1999-2000, strengthening the legal basis for MCS. Port pre-licence inspections are carried out in The Gambia and Sierra Leone. FAO vessel marking by callsign is either legislated, or recommended throughout the region. Transhipping is monitored throughout the region, although lack of sea-borne

surveillance reduces its effectiveness. VMS is actively under consideration regionally. A pilot scheme commenced operation in Senegal in 2000.

PRIVATISATION OF MCS ACTIVITIES.

This has not been a success in the region.

MCS ASSETS.

The major focus initially was the provision and funding of fisheries aerial surveillance with a BN-2T Islander aircraft that was based in The Gambia, and flew missions in The Gambia, Guinea-Bissau, Guinea and Sierra Leone earlier in 1993. Sub-regional flying commenced in July 1996. The original aircraft were:-

CAPE VERDE	DORNIER 228-202
SENEGAL	DH6C TWIN OTTER
MAURITANIA	HARBIN Y-12 [TWO AIRCRAFT AVAILABLE]

ALL ABOVE AIRCRAFT ARE TWIN TURBOPROP CONFIGURATION.

The first two aircraft were civilian registered, and were able to operate through conventions agreed upon by all states. The Mauritanian aircraft are military registered, and are confined to national operations.

In July 1999 the Dornier was lost in Cape Verde and has been replaced by a Dornier 228-212.

PATROL BOATS.

There are many within the sub-region, in various states of operational readiness. Many are unsuitable, either because of general condition, or cost-effectiveness. Those currently available that can be chartered for use within the sub-region are:-

CAPE VERDE *VIGILANTE* KONDOR CLASS 54m SPEED 16kts Fully refitted in Germany in 1998. In class [Germanischer Lloyd] as GL100A1 Patrol Boat. Was successfully used on joint patrol in the EEZ of The Gambia in June/July 2000. Is planned to be used in Sierra Leone/Guinea in 2001.
SIERRA LEONE *ALIMMAMY RASSIN* MOD SHANGHAI CLASS SPEED 24kts. Delivered from PRC in late 1995. Operated during war by the Nigerian Navy. Recently returned to Sierra Leone, and is being operated with UK assistance.
SENEGAL A patrol boat is currently available, but not the Danish built 54.75m *FOUTA*. This vessel is currently non-operation due to an engineering problem.
MAURITANIA NAME UNKNOWN. New build from Germany; 2000. 55m SPEED 18.5kts. Has at least 18 months of Germany logistic and technical support.

Of the rest, many are unsuitable, or non-economical to refit.

SUB-REGIONAL FISHERIES COMMISSION [SRFC].

The Commission was formally constituted in 1985 comprising Mauritania, Senegal, Cape Verde, The Gambia and Guinea-Bissau. Guinea joined in 1986. Of the other three Manoh River States, Liberia did not proceed because of war, and Sierra Leone will only formally apply in the spring of 2001. The Commission has been responsible for a number of protocols on hot pursuit and legislative harmonisation, and the use of sub-regional aircraft. The Commission was instrumental in establishing joint air and sea surveillance activity between states, however lack of funding is hampering its current effectiveness. FAO has a function, through its Dakar office, to strengthen the SRFC to make it a more authoritative and representative body on behalf of its member states.

LUX-DEVELOPMENT: PROJECTS AFR/010 AND 013 [1995-TO DATE].

The Grand Duchy has, through the medium of Lux-Development, has been instrumental in working with the seven states mentioned in fisheries management and surveillance since the end of 1993 when the evaluation mission recognised the value of aerial surveillance as a control mechanism against illegal fishing in the sub-region.

ACHIEVEMENTS.

Project aims were relatively modest. An MCS office had already been established in late 1993, and in early 1994, the first Gambian pre-licence inspections were carried out in Banjul. Patrols using the Islander were already established in the four southern countries of the project.

Achievements – First Project
Project enlargement to include Senegal, Mauritania and Cape Verde resulted in:

- December 1995: Agreement in principle to set up a dedicated HF SSB radio/telex land/sea/air net in the four southern countries.
- April 1996: The agreement in principle to use sub-regional aircraft. [Implemented in July 1996].
- July 1996: Commencement of communications net. Extended to cover northern states and Cape Verde.
- 1995-96: On going training of cadre of air surveillance observers.
- Late 1996: Supply of camera systems in sub-regional surveillance aircraft.
- 1996-1997: Production of MCS Sub-Regional Fisheries Operations Manuals in French and English.
- 1997-98: Up grading of offices in Banjul to provide better facilities.
- 1997-98: First combined patrols between aircraft and patrol boats. Locations: Guinea-Bissau, Guinea,

The Gambia, Senegal and Sierra Leone.

- Commencement of counterpart training for principal posts within the project started as early as 1996, and culminated in the appointment of a Gambian national as Chief Technical Adviser.

Achievements - Second Project.

This project is funded by the government of Luxembourg, and co-sponsored by the FAO. The project remains centred in Banjul. Funding from the member states is a difficult obligation at this time.

- 1999: Establishment of SOCU as part of SRFC.
- 1999: Appointment of sub-regional nationals to all posts in SOCU. These include the Director [Gambian], the Marine Control Officer [Senegalese], the Statistician [Mauritanian] and a bi-lingual secretary [Gambian]. One international consultant remains as the project link between the donor, SRFC and the member states – the Maritime Control Advisor.
- 1999: Final upgrade of office complex to incorporate a conference room, an MCS operations and control centre and an autonomous communications facility.
- 1999-2000: Running of a number of multi-state air/sea surveillance missions, using sub-regional assets. This included a successful patrol in the EEZ of the Gambia using the Cape Verde patrol boat.
- 2000: Refining the sub-regional Database System, including the training of sub-regional information officers, and the provision of computer equipment associated with this to all states.
- 1999-2000: Establishment of new communications stations in Banjul [SOCU], Dakar, Nouadhibou and Praia. Upgrading and rectification [Bissau and Sierra Leone] ongoing in 2001.
- Feb-June 2000: Chief of Maritime Mission [CMM 2000] training course for two senior fisheries officers from all member states in all aspects of MCS and surveillance. This used a modular system of training, and was based on the MCS Operations Manual, which was revised into Edition II in both French and English for this purpose in late 1999. The course culminated with two weeks of seagoing practical training in the Cape Verde Islands, based in Mindelo, and using the *Vigilante.*
- The above course provides the basis of a cadre of fully trained sub-regional fisheries officers who will be available as heads of missions in future multi zone operations.
- 2001: Projected: The establishment of a Sub-Regional Fishing Vessel Register. This will be based on the successful FFA Register, and will make use of the already established Database.

Future challenges include: the strengthening of the SRFC to make it a truly effective organisation; the solving of the problem of interaction and conflict between artisanal and industrial fishers; and the serious and on-going situation involving a hard core of illegal trawlers fishing without licences, or in some cases semi-legitimately with licences. These vessels are often protected in their operations by vested interests, and fish with no regard whatsoever to fisheries regulations or good practices. It might also be worth considering special courts with legal experts and justices trained in the administration of fisheries law. A future aim is also to rationalise the use of sub-regional patrol boats to allow operations in several states, using the cadre of trained officers from CMM 2000 as a base team.

A second, very successful regional fisheries organisation is the South Pacific Forum Fisheries Agency ("FFA") based in the Solomon Islands. A description of the evolution of the FFA's MCS system is set out in Box 5 on page 89.

10) Involvement of fishers, communities, organizations, cooperatives, unions and fishing companies

It should be self-evident that the cooperation of the fishing industry and fishers is essential to cost-effective fisheries management. If the industry, fishers and their communities and organizations actively participate in fisheries management and MCS planning and implementation exercises, the potential for successful implementation of these plans is much greater. Alternatively, lack of attention to these aspects has often resulted in non-compliance, alienation of the fisheries department officials, and active subversion of the intended plan.

MCS operations directed towards education and seeking input from fishers are facilitated if there are strong fishers' organizations or community organizations in place to discuss these issues. The independence of fishers is well-known, consequently there is often a reluctance for fishers to join together for these types of discussions. Assistance to fishers in getting them to recognize and accept the advantages of having a collective voice is

one of the challenges of fisheries educational initiatives in seeking input and support for MCS activities.

11) Demographics of the domestic fishery

Other issues may impact on the type of MCS strategy to be adopted to ensure the continued health of fisheries, especially the domestic fishery. For example, in the Seychelles and Malaysia the average age of fishers is high because other employment opportunities appear more appealing and lucrative to the younger people. This creates several unique challenges for the State. It also presents an opportunity to educate the new fishers in the benefits of fisheries conservation. Alternatively, if young people are not encouraged to enter the fishery, the MCS system design will need to focus on the possibility of an increase in foreign offshore fisheries, or rely on increased use of foreign fishers to crew local vessels.

5.1.2 Socio-Economic factors

1) Contribution of fisheries to the GNP

It is obvious that the contribution of the fishery to the national economy will determine its profile and the importance placed on fisheries management activities. Generally the resources allocated by a State to conserve and manage fisheries is determined by the total value of the fisheries, including all short and long term, direct and indirect benefits to the State. This is because most States are not prepared to expend more on the MCS system than the total economic value of the resources. However, it is interesting to note that in Malaysia the profile of fisheries is relatively high, even though its contribution to the GNP is low. This is due to the government's emphasis on environment, food, security and employment as well as recognition of the contribution of fisheries to other industries such as tourism.

2) Foreign currency earnings

As noted earlier, a factor of considerable importance to several developing states is the earning of foreign currency by permitting international access to the fishery. It is very unfortunate that certain distant water fishing fleets have exploited this desire for foreign currency without consideration for conservation or reasonable returns to the coastal States. International efforts should ensure that the fishing opportunities granted for domestic and foreign fleets result in appropriate levels of compensation, and that these funds benefit the State.

3) Employment opportunities

Employment opportunities that can result from enhancing the fishing potential of the State are also a factor in the consideration of the MCS strategy for the State. In a situation where there are seen to be advantages of long-term displacement of international fishing fleets, this may require training of coastal or island State nationals who will eventually assume these fishing rights, or MCS training to monitor and conserve the resources. Training of nationals could therefore be a component of the access agreement with third party fishing fleets.

Linked with the above strategy of training of nationals could be the opportunity to ensure the implementation of appropriate safety-at-sea equipment and practices in accordance with the coming into force of the Protocol to the Torremolinos Convention 1977. This Protocol will bring fishing vessels under port State control with respect to safety certificates. Such training can also link with the Code of Conduct for Responsible Fishing resulting in a new attitude towards conservation and safety.

4) Benefits to other ocean users

Recognizing that MCS should conserve fisheries resources *and their habitats*, there may be benefits to other ocean users and fishers, if appropriate liaison between these users and the fisheries departments can be addressed as the MCS System is being developed. For example, careful assessment and control of tourism development, assurance of non-destructive fishing practices, development of marine parks, use of mooring buoys to reduce the damage to coral reefs from *ad hoc* anchoring, etc. can all benefit fishers, tourism agencies, and marine supply industries.

Small island States are now realizing the negative impacts of marine pollution resulting from uncontrolled industrial development and the excessive use of pesticides. It has being noted that all land-based activities on small islands eventually influence the marine environment, and they have the potential to kill the very marine resources and habitat, including the coral reefs that bring the tourists to the State. MCS activities for fisheries can also assist in addressing safety-at-sea through vessel tracking systems for national and international seafarers, as well as for monitoring marine pollution and other environmental concerns.

On a positive note, Belize, in Central America, and Malaysia in Southeast Asia have been attempting to regulate tourism, and encourage the development of marine parks and the fisheries, and have established appropriate surveillance initiatives to ensure the implementation of management plans since the early 1990s. Other similar initiatives are springing up all over the world: the coral reef rehabilitation and management program (COREMAP) in Indonesia; and the coastal resources management project (CRMP) in Philippines, to name only a few.

5) Low cost protein

A further economic factor to be considered in the design of an MCS system is the requirement of the State for low cost protein for its citizens. The MCS design can include a requirement for a percentage of the catch to be discharged in the coastal state for distribution, value-added processing, or for further export. This could result in the direct provision of protein for the people, enhance industry development in the fish processing sector, increase employment, and have positive impacts on export earnings for the procurement of this protein.

6) Opportunities for regional co-operation

As discussed in chapter 4 above, all the key international agreements, the 1982 UN Convention and all the key international agreements concluded during the last decade envourage States to co-operate in fisheries management by establishing sub-regional or regional fisheries organisations. The advantages of regional co-operation and some of the potential problems are discussed in section 5.2.1 below. However, the benefits of

successful regional co-operation can be significant as demonstrated by the experiences of the FFA which are described in Box 6. Participation in a regional fisheries organisation will clearly have a major impact on the design of an MCS System.

5.1.3 Political will and commitment

The key behind any ocean policy, planning and management system, including that for fisheries, is the degree of political will and commitment to implement such a system. The actual or potential economic profile of the fishery in the national economy will undoubtedly determine the level of political support that the MCS initiatives will receive from the government. A potentially lucrative domestic fishery, and the MCS activities required to protect it, will probably receive significant government attention. Nevertheless, it will be necessary to balance the long-term benefits with the short- and medium-term benefits to maintain the political support that is key to the successful development and implementation of MCS systems. Some of these could include the establishment of a database for resource management and timely information to political masters; a system to maximize potential revenues from implementation of licence fees; and greater control of the resources from licensing and surveillance with a focus on increasing the incomes of the fishers.

These influential factors and their relative importance to the political objectives of a country make fisheries management, and the resultant MCS strategy, unique to each country.

5.1.4 Scientific advice and the precautionary approach

It is generally accepted that although there is a definite need for "pure scientific research" for fisheries management, there is a greater need for "applied research" for sustainable and responsible fisheries management. Many countries claim that they have insufficient scientific information available for management but, instead of using the available scientific advice, they continue to pursue research interests that may or may not have any positive influence on sustainable management strategies. Fisheries managers should ensure that their scientific research programmes are structured in such a way that they provide appropriate information on which to base management decisions.

The finest minds in global fisheries management have offered the best advice possible with respect to fisheries research and scientific advice and these nuggets are contained in Article 12 of the Code of Conduct for Responsible Fisheries. In summary the key clauses note:

(i) the recognition of the need for sound scientific advice for responsible fisheries management;

(ii) the need to establish institutional frameworks for applied research;

(iii) that research results should be made available to the managers and stakeholders in a timely manner, respecting business confidentiality where appropriate;

(iv) that "in the absence of adequate scientific information, appropriate research should be initiated as soon as possible"[109];

[109] FAO, *Code of Conduct for Responsible Fisheries,* Article 12, para 12.3, Rome, Italy.

(v) that reliable and accurate data (catches, by-catches, discards and waste) should be collected and shared as appropriate;

(vi) the need to monitor and assess the state of stocks under national jurisdiction including ecosystem impacts;

(vii) the need to strengthen national research capabilities;

(viii) the need for studies on new and selective fishing gear;

(ix) the suggestion for "use of research results as the basis for the setting of management objectives, reference points and performance criteria"[110]; and

(x) the need for regional cooperation in research for management.

It is also important to note that Article 6 of the Code of Conduct states that: "conservation and management decisions for fisheries should be based on the *best scientific advice available*…..".[111]

The Code of Conduct also advocates the precautionary approach by stating that *"The absence of adequate scientific information should not be used as a reason for postponing or failing to take measures to conserve target species, associated or dependent species and non-target species and their environment"*.[112] The precautionary approach is a key principle of international environmental law which has been incorporated into virtually all major international and regional treaties relating to the environment concluded since the 1992 Rio Declaration. The concept reflects the recognition that environmental matters, including fisheries management, tend to be complex and multifaceted and it is often difficult to obtain conclusive scientific proof of the causes of any phenomenon which is observed. It also reflects the increasing recognition that the degradation of the environment (including fish stocks) has now become so serious that it is frequently necessary to take urgent measures to address problems (e.g. to conserve marine resources) even if full scientific information is not yet available. The principle therefore seeks to qualify the general principle that conservation in management decisions should be based on scientific advice, by making it clear that the absence of adequate scientific information should not be used to justify a failure to take urgent conservation measures. In other words, fisheries administrators should act now to conserve fish stocks while continuing with research, the results of which must be used to refine and adjust conservation measures to ensure that they continue to be based on the best scientific information available.

5.1.5 Participatory management and MCS

There are simply not enough resources to adequately monitor all the fishing activities of the rapidly expanding world population to ensure compliance with fishing regulations. The traditional ideas of fisheries MCS being only a police function and enforcement being the only real activity in MCS are no longer applicable. Although MCS activities do include enforcement activities, the focus in many countries is moving towards

[110] Ibid, Article 12, para 12.13.
[111] Ibid, Article 6, para 6.4,
[112] Ibid, Article 6, para 6.5,

involving stakeholders in the development of acceptable, responsible and sustainable management planning **and implementation.**

In the past many countries fisheries administrations tended not to involve MCS personnel in fisheries planning due to the perception that MCS is only concerned with enforcement and has no relevance to planning. This frequently resulted in management plans that were not capable of being fully implemented due to MCS considerations. In these circumstances one of the first tasks in implementing the MCS system was to determine which aspects of the management plan could actually be implemented. Another approach, at this time, especially for the offshore fisheries, was to involve the fishing industry and then go into a "government" corner and produce the final plan. Again in these cases, few if any MCS personnel were involved to advise on whether or not there was sufficient capacity to implement the final plans.

In the late 1970s and early 1980s, the emphasis shifted to community-based management in the coastal sector, and many non-governmental organizations (NGOs) were hired to educate the fishers to take over the management of their fisheries. This was the pendulum swinging to the opposite end of the spectrum with a resulting increase in confrontation between fisheries organizations, NGOs and local authorities. Again, very seldom were MCS personnel involved in these educational campaigns, or the management planning exercises, and often little attention was given to how the rules would be monitored and enforced.

Stakeholder involvement is an essential element in all integrated marine resource management, whether concerned with offshore, near-shore or coastal resources. Co-management regimes between governments and resource users based on the joint stewardship and management of marine resources can only be established by involving all stakeholders. Stakeholders must be involved not only in planning the management regime, but also in developing strategies to strengthen the MCS system. This might involve, for example, establishing a verifiable data collection system, contributing to regulatory reform processes, and playing a role in surveillance and enforcement activities.

By involving stakeholders in the development of MCS plans and the regulatory system and keeping them informed, the prospects of the plans being successfully implemented will be greatly increased. Where those subject to the regulatory regime have been involved in the development of the conservation measures, they will not only know and understand the rules and the reasons for them, but will also be more inclined to comply with them voluntarily. By taking a "preventative" approach which reduces the likelihood of non-compliance, in this way, it should be possible to focus enforcement activities on a smaller number of offenders. In other words, by adopting a participatory approach to the development and implementation of MCS systems, the effectiveness of the systems should be substantially increased at no additional cost, and in some cases, this may even result in the reduction in the cost of MCS activities.

5.1.6 Synopsis of design consideration

Reviews of successful national and regional MCS systems have produced the following findings.

1) There are no universally applicable models and each MCS system is adapted to the cultural, geographic, political and legal framework of the country or region.

2) The political will on the part of coastal states or strong national government support of a regional body is an absolute requirement for a successful MCS scheme.

3) The operational character of the system will depend on management decisions.

4) Legal and policy considerations must always be taken into account when establishing an MCS system.

5) The decision-making power should always be in the hands of the civilians, even for surveillance matters.

6) National and regional MCS activities must complement each other.[113]

7) Stakeholder involvement is key to successful implementation of the management and MCS plans.

After assessing the geographic, demographic, economic and political context for the MCS system, one should reflect on how the MCS system will be implemented as this will influence the design of an appropriate MCS system. This will require considering questions regarding the most cost-effective and efficient system for the agency, the legal framework that will be required and will be acceptable to the fishers, the co-ordination of agencies and ministries, training, infrastructure, organizational support mechanisms, and funding sources. The following section highlights these points, with examples of options that have proved effective in the past.

[113] *Bonucci, Nicola (1992) GCP/INT/NOR Field Report 92/22 (En)*

5.2 Organizational Considerations

5.2.1 National, sub-regional and regional structures

The FAO is currently supporting initiatives to strengthen fisheries management and MCS in several countries in East Asia. In some countries (including Philippines, Malaysia, and Indonesia), MCS operational manuals have already been developed.

Regional and sub-regional co-operation is also on the increase. The 1982 UN Convention requires States to co-operate with one another: (a) in the conservation and management of the living resources of the high seas;[114] (b) in the establishment of sub-regional or regional fisheries organisations where the nationals of more than one country are engaged in exploiting the same living resources or different living resources in the same area;[115] and (c) in the management of straddling and highly migratory fish stocks.[116] The UN Fish Stocks Agreement, the 1995 FAO Compliance Agreement and the Code of Conduct for Responsible Fisheries, discussed in sections 4.2.5 – 4.2.6 above, all encourage or create strong incentives for countries to co-operate through the establishment of sub-regional or regional fisheries organisations to manage and conserve straddling and migratory fish stocks, and regulate high seas fisheries, respectively.

There are many reasons for coastal States to co-operate with other coastal States in their region to establish a regional MCS system, particularly where the States have a rich marine resource base which they have difficulty in protecting against the international fishing industry. Some of the potential benefits of regional co-operation among developing countries include: the exchange of appropriate fisheries data for MCS and fisheries management purposes, harmonised legislation, extradition agreements, cost savings and increased negotiating power from regional cooperation, implementation of flag and port State control agreements, and combined measures to address illegal, unreported and unregulated (IUU) fishing activities. In practice, the cost of implementing MCS measures is often a decisive factor in encouraging countries to join sub-regional and regional MCS initiatives.

The decision as to whether or not to establish regional or sub-regional, in addition to focusing on a national MCS system, depends on several factors. Regional or sub-regional co-operation will generally be more attractive where:

(i) there is an existing organisation which will serve the purpose;

(ii) the States in the area have a common interest in fisheries which would benefit from such co-operation; and

(iii) there is a common language and/or cultural ties.

An initiative to establish sub-regional or regional co-operation in MCS has greater prospects of success in situations where: fish stocks are shared, there are no significant language barriers, maritime boundary delimitation issues between countries in the region or sub-region have been resolved, and the political ideologies and policies of the government are compatible. Where these circumstances exist, the prospect of being able

[114] 1982 UN Convention Article 117.
[115] 1982 UN Convention Article 118.
[116] 1982 UN Convention Articles 63 and 64.

to implement a more effective MCS system at a lower cost, creates strong incentive for co-operation. The cost savings of co-operation in the implementation of MCS operations have been demonstrated in the successful regional fisheries programmes in places in the South Pacific and the Caribbean basin.

However, regional and sub-regional co-operation can be problematic, particularly where the circumstances which tend to facilitate co-operation (referred to in the preceding paragraph) are not present. Regional co-operation also creates the need to deal with additional considerations. These include: the security of what may is considered to be sensitive data; how differences between the participating States will be resolved in order to present a common face to the outside world; and how to take account of the difference in the economic situations of potential member countries, in devising cost-sharing arrangements to support an international organisation. Each country must balance the advantages and disadvantages to itself before deciding whether or not to make a commitment to regional, sub-regional, or bilateral cooperation regarding international fisheries and MCS activities.

Despite the difficulties, there are many examples of fisheries organisations that have successfully dealt with these issues and have gone on to deliver substantial benefits to the member States of such organisations. These include:

- the South Pacific Forum Fisheries Agency (FFA);[117]
- the Organization of Eastern Caribbean States (OECS) Fisheries Unit;
- the Caribbean International Community (CARICOM) Fisheries Resource Assessment and Management Programme (CFRAMP);
- the South East Atlantic Fisheries Organization (SEAFO);
- the West Africa Sub-Regional Fisheries Commission; and
- the Indian Ocean Tuna Commission (IOTC).

The experiences of long-established regional fisheries organisations can provide valuable guidance in relation to issues such as: regional information sharing; joint control and management of common areas of interest; achieving cost savings from the shared use of assets; harmonisation of laws and common goals in fisheries agreements with DWFNs; and regional training. In addition to the fisheries organisations referred to above, useful sources of information and guidance include: the Northwest Atlantic Fisheries Organization (NAFO), the European Union (in relation to the development and implementation of the EU's Common Fisheries Policy), the Indo-Pacific Fisheries Commission (IPFC), the Asia-Pacific Fisheries Commission (APFC); and the Indian Ocean Fisheries Commission (IOFC).

5.2.2 Roles and responsibilities

A decision on international co-operation will not absolve the State from its responsibility to establish appropriate internal structures to address fisheries MCS issues.

[117] The evolution of the FFA's regional MCS system is described in Box 6.

As an MCS system is developed, various government agencies not directly concerned with fisheries (e.g. environment authorities, national defence, coast guard, customs and immigration) are likely to want to have an input into matters such as determining priorities, allocating resources and the sharing of information. Experience has shown that establishing an effective inter-agency co-ordinating mechanism for all national maritime agencies can be an efficient manner of avoiding duplications of effort and jurisdictional conflicts between agencies and to share mutually required information for operations.

It has been noted that MCS surveillance resources are expensive and that multi-tasking could be cost-effective and efficient. In the past, split operational "command and control" has been unsuccessful in both military and civilian operations due to differing mandates and priorities, e.g., fisheries patrols turn into drug enforcement or customs patrols. The need for one lead agency, or a recognized and formal inter-agency mechanism has been suggested. If this is not acceptable to governments, an alternative could be an alternating chair for the co-ordinating committee, or the inter-agency mechanism adopted. It is always preferable for fisheries managers to have to report to only one superior to maximize efficiency in operational MCS activities. This lead role and authority for coastal and oceans fisheries and environment management, whichever strategy is selected, should be formalized in legislation to clarify litigation procedures, as well as for operational purposes.

5.2.3 Core infrastructure requirements

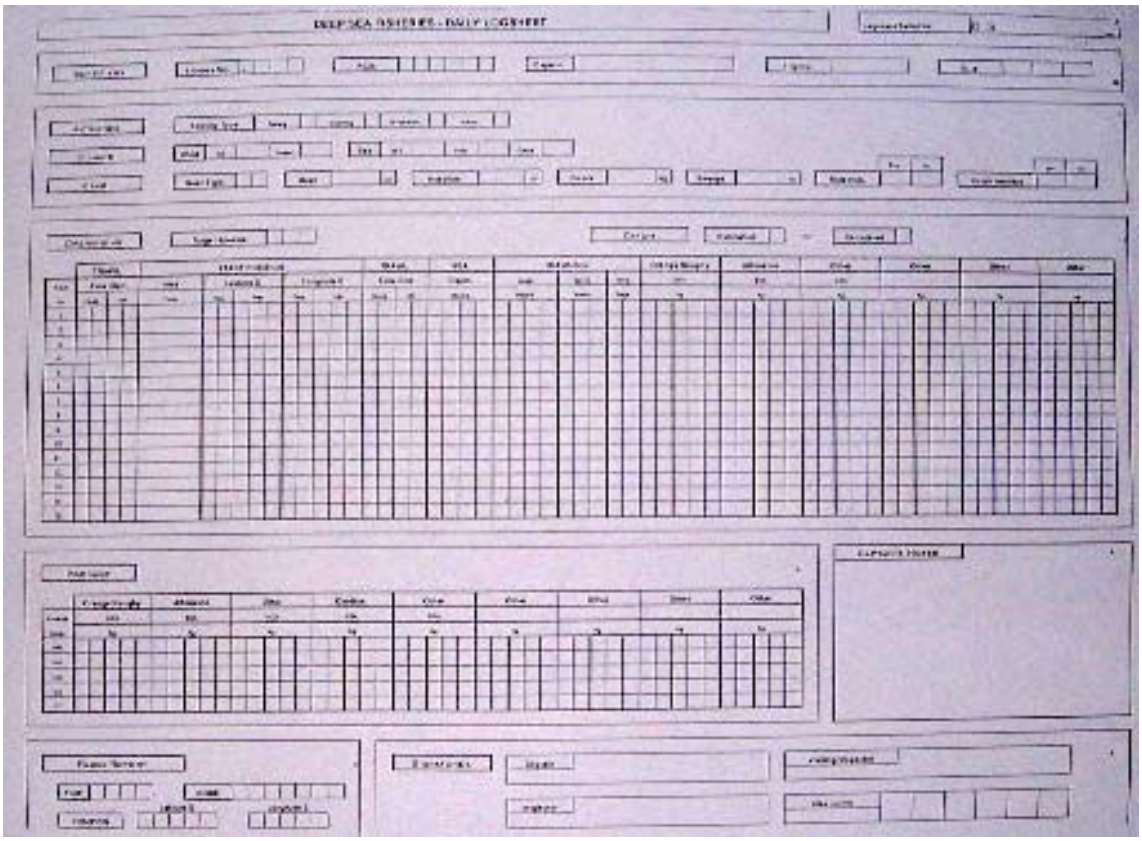
It is impossible to make concrete suggestions that would quantify the MCS requirements for each situation, as they will be different for each system. It is possible, however, to make suggestions on core requirements and to leave the quantification to each Fisheries Administrator.

1) Monitoring

The *monitoring* component of MCS should receive, integrate and verify information from: the licensing unit, sea-going units (sightings and inspections), observers, VMS and satellite imagery, radar, port inspection, regular dockside monitoring of landings, logbooks, production logbooks, and air sightings for vessel identification, activity and location. The system can also include data on fishing patterns, fishers and community profiles with respect to socio-economic factors, dependency and earnings from fishing and any other fisheries information required. This data can be used for the verification of licensing conditions and to assess catch and effort for resource assessment and fisheries management planning in the future.

The accumulation of data will require a significant storage and analysis capability. Although this can be done manually, the system will be more responsive and effective if it is computerized. When planning the data management system, it is important to bear in mind that the system must be capable of allowing immediate access to information required for operational purposes and MCS planning. On the other hand, it must be capable of storing certain data for long periods of time, particularly data to be used for long-term stock assessment and monitoring, and management planning. These two aspects of data management must be considered during the data system development exercise.

Deep Sea Daily Logsheet - Namibia



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2) Control

The *control* component of MCS will require appropriate and enforceable legislation to implement the approved, participatory fisheries management plans. In essence and to be effective, these controls must address five key areas:

a) the powers and responsibilities of all fisheries personnel from the Minister to the lowest level, including contract personnel if such are part of the MCS scheme[119];

b) international conservation agreements such as the 1982 UN Convention, UN Fish Stocks Agreement, FAO Compliance Agreement, the voluntary Code of Conduct for Responsible Fisheries and the new IPOA for the control of IUU Fishing agreed in 2001;

c) the national, legal fishing activities;

d) minimum terms and conditions for fishing[120], including safety; and

[118] VMS information sharing in Argentina resulted in the Navy and Coast Guard placing a permanent representative at the Fisheries Headquarters to enhance liaison for operations.

[119] Some countries are utilizing contract personnel and the private sector for observer programs, dockside monitoring, and air surveillance.

e) penalties for non-compliance.

The key issues to be considered in reviewing and strengthening national legislation for MCS purposes are set out in Annex "C".

Consideration should also be given to providing for the devolution of authority, and procedures for involving stakeholders in decision-making and to increase the transparency of the management system, in legislation.[121] In order for the control component of the MCS system to function effectively, the fisheries administration should have access to a team of suitably qualified and experienced lawyers, to draft appropriate legislation in support of management plans, to provide ongoing advice on legal issues which may arise with regard to the implementation of management measures, and to prosecute offences under fisheries legislation. The expertise of the team of lawyers should cover both relevant international law (in particular the treaties discussed in Chapter 4) as well as national laws related to fisheries management.

The effectiveness of the control system will be substantially increased if all personnel involved in enforcing the legislation are appropriately trained. It is recommended that this training include advice from members of the judiciary or lawyers with extensive court experience, regarding the presentation of evidence. Hopefully this will also result in a greater awareness of fisheries and management issues flowing back to this sector of government.

3) Surveillance

The *surveillance* component of MCS will require fisheries personnel who not only collect data for the monitoring aspect of MCS during their surveillance duties, but can also communicate with, and educate stakeholders involved in participatory conservation activities. They must also have the appropriate equipment and facilities, operating funds and training both to encourage voluntary compliance and to enforce laws where necessary. Surveillance is usually the largest and most expensive component to fund. It must be remembered that for international MCS activities, there is a requirement under the 1982 UN Convention that all surveillance ships or aircraft must be "clearly marked and identifiable as being on government service" and authorised to that effect.[122] This requirement is often addressed through large, highly visible, government markings on all surveillance vessels and aircraft. This is supplemented on sea-going vessels by a fisheries flag that also denotes that the vessel or aircraft is on fisheries duties. The design and use of the flag is usually clearly stated in fisheries legislation. All fisheries vessels, regardless of size, should fly this flag while on fisheries duties. The legislation of the fisheries flag also facilitates identification of assets when the Government charters vessels for surveillance activities.

The *equipment* requirements are more detailed in the next chapter and it should be noted that it may well be more cost-effective if they are shared with other enforcement

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[120] Minimum conditions which a State may wish to implement could include vessel identification; catch and reporting requirements; conditions for transhipment; standard catch and effort log sheets; terms for assistance to and living conditions for observers and authorized fisheries personnel on the vessel; local agents for international fishing partners; authorized and mandatory fisheries and safety or MCS equipment; and flag state responsibility for their vessels.

[121] The Philippines has placed the formation, roles and responsibilities of the Fisheries And Aquatic Resources Management Committees (FARMCs) in their new Fisheries Law of 1998 that formalises the input of stakeholders at all levels of government from the national level to the barangays (villages).

[122] The 1982 UN Convention Art 111(5) dealing with hot pursuit and Art 224 dealing with the exercise of powers of enforcement in relation to the protection and preservation of the marine environment.

agencies involved in fisheries and oceans-related MCS operations, but not at additional cost to the fisheries duties[123].

The basic infrastructure required should consist of at least the following:

a) A **national headquarters** for the co-ordination of fisheries operations with a network of linked field offices.

b) A **central operations room** where the current status of the fishing operations can be shown.

c) The **communications system** to all fisheries centres and mobile platforms in the field for both safety and control of operations.

d) **Computer data system** for licensing and vessel registration, data collection and analysis.

e) **Surveillance equipment.** Depending on local conditions and local government budgetary constraints this equipment might include aircraft, vessels, air surveillance, sea surveillance (coastal, offshore and boarding equipment), VMS[124] and satellite imaging technology, radars, GIS equipment and land transportation.

It is important to consider the equipment necessary to implement the MCS operational plan at an early stage. It is recommended that a central policy on equipment is developed which takes account of standards, training and overall co-ordination capability, and a need for a computerized data system and network to the coastal and inland areas and field offices for data collection and surveillance, communications facilities, transportation, land, sea, and possibly, air platforms. In addition, where appropriate, provision shall be made for the use of satellite technology and other safety equipment for surveillance operations. Appropriately trained directors, supervisors, and field personnel are an absolutely essential requirement for an effective MCS system. The central headquarters then works with the "devolved" fisheries authorities and field offices to train staff, assist in co-ordination, and monitoring of operations.

5.2.4 Staffing

The requirements for MCS include personnel to address each of the components of monitoring, control and surveillance. The numbers of these personnel will vary with the MCS scheme in place, but the basic requirements would remain fairly constant. These personnel need varied levels of expertise; for example, the data collectors need literacy and good interpersonal skills with knowledge of the fishery and its policies and procedures. These individuals are often at the technician level. Observers for offshore vessels also fall into this category of staff. It must be noted here that the observer scheme is only appropriate if capable, honest and dedicated personnel are available, preferably with offshore sea experience. In many countries, close supervision is also necessary to minimise the onboard pressures placed on these individuals. If these factors cannot be met, there is a need for careful consideration prior to implementing such a programme.

[123] It is not appropriate for fisheries administrations to pay the additional costs involved in using large and costly military equipment for fisheries patrols.

[124] *FAO Technical Guidelines for Responsible Fisheries, Fishing Operations, 1. Vessel Monitoring Systems, Vol. 1 Supplement 1, FAO, Rome, 1998.*

The ability to analyse the data collected for fisheries management decisions and operational deployment requires a higher level of knowledge and competence, both academic and practical. Computer skills are mandatory for these individuals.

The control component requires individuals with a comprehensive working knowledge of fisheries and the law. These individuals would either be lawyers or at least work with lawyers assigned from the Ministry of Justice or equivalent, in order to design enforceable laws, and also to advise on internal decisions regarding MCS operations.

Finally, there is the need for MCS and surveillance personnel. This includes personnel to operate small and large patrol vessels. Aircraft personnel will be required, as will the every day fisheries officials at the junior and more senior levels for coastal, river and lake patrols, management of the offices and liaison with the fishers. The sea-going surveillance personnel can usually be recruited from fishing communities. The air surveillance personnel can usually be seconded from the military, or possibly local airlines to minimize training requirements. Support personnel will also be required from local administrative staffing pools. Maintenance personnel for equipment will need to have experience, or be trained, on the equipment provided.

The training for fisheries technicians and officers is key to ensuring competent staff for the implementation of fisheries plans. For example, observers require very focused and specialised training to ensure that they understand their role and can complete accurate reports. When contemplating the selection of fisheries officers it is important to keep in mind that the MCS Fisheries Officer is no longer just a development or enforcement officer. The officer must assume the "role of a multi-tasked officer"[125] as a development officer, a communicator and educator for voluntary compliance and transparency in MCS, and as an enforcement officer. Further details on suggested training requirements are attached in Annexes D and E.

5.2.5 Financial aspects

There can be a tendency when considering a new system to look for the most advanced technology that can do the work required. This is usually also the most expensive equipment on the market. However it is more prudent to look for *appropriate and affordable technology for each fishery situation*.

1) Resource rent

The issue of resource rents has been before fisheries managers for decades, and there are two schools of thought. One school of thought is that fishers should not have to pay for fishing as these are a common property resource and fishing is really the employment of last resort. This is the same school that holds to the "open access" management approach as a constitutional right, even when the resources are at a critical, and possibly non-recoverable state. Fortunately the approach has now been discredited in most, but not all, countries. Today there is general recognition that rights of access should not include the right to deprive future generations of protein and the rights to enjoy the marine resources and their habitat.

[125] Kapetsky, J.; Honneland, G.; Kelleher, K., *FishcodeProject: Report of the Evaluation Mission, Page 6*, FAO, Rome, October 2000

The second approach, especially for management strategies that advocate limited entry fishing, queries, "Should not the fishers, boat owners, port owners and fish processors pay for the privilege of access to these resources to offset government and taxpayers costs for sustainable management and controls/MCS?"[126]

Fish are a fugitive resource and although often seen as a common property resource, they are not treated like any other economic production activities. In all economic production activities, the producer must pay for a licence and also for the raw materials. In the past in fisheries, a minimal fee was charged for the privilege of getting a license, but nothing was paid to the owner or steward of the marine resources for the raw materials – the fish. Today, decreasing stocks in most fisheries and the increasing costs of suitable management has meant that the governments of many countries, as the owner/custodian of the fisheries resource charge for the use of the resource in the same way as they would require rent for the use of State land.

Resource rents systems should be based on the following principles:

1. they must be reasonable and relatively stable – i.e. they should not fluctuate dramatically from year to year.

2. the rent capture should result in a reasonable return to the resource owner (usually the State);

3. the rent levied should be fair to both fishers and public taxpayer (if it is too high then fishers will exit the industry; and if it is too low, there is a loss to the resource owner which will have to be made up by the tax payers); and

4. they should be simple so resource users can easily calculate the fee and include it into their financial planning.

In the past, countries have based the royalty for fishing on the catches of the vessel. This is more common in the case of international fishing partners than domestic vessels. An unfortunate consequence of this practice is the incentive to misreport catches to avoid fees. The more successful fee strategy is one based on a fee per vessel or allocated quotas, and **not** on catches. The need to verify catches to calculate licence fees and the incentive to misreport and falsify records is removed by these strategies.

It has been suggested that resource rents should be set in accordance with costs and profits. This is **not** recommended as these are very difficult to determine on an enterprise basis and fluctuate considerably from year to year. This strategy would also encourage misrepresentation of the costs of operations to reduce the resource rents owed.

The resource rent is usually included in the licensing fee. In determining this fee governments must also consider other fees also levied for use of port facilities, transshipment fees, import and export fees, etc. Licence fees could therefore be based on[127]:

[126] Bergh, P.E., Paraphrase from *Resource Rents* Lecture at the FAO Regional MCS Training Course in Songkhla, Thailand, June 2000.
[127] Mees, C.C. and Parkes, G., *Fisheries Monitoring, Control and Surveillance – a Multi-Purpose Questionnaire,* Regional Workshop on Fisheries MCS, Muscat, Sultanate of Oman, 24-28 October 1999, FAO/Norway Co-operative Programme – GCP/INT/648/NOR.

- the cost of administering the licensing system;
- the cost of fishery management including resource assessment;
- a proportion of the value of the catch **allocated** in the EEZ, or coastal area;
- the economic benefits of fishing inside the EEZ or coastal area as opposed to being restricted to other areas;
- the period of time for which access is granted; and
- the gross tonnage of the vessel licensed.

Resource rents can therefore address: the size, and hence catch capability of the vessel; the time approved for the fishing privilege; the value of the fish approved for catching; and an additional amount to reduce, or minimize the cost to the public of managing the marine resources.

2) Cost-effective data collection and verification

The requirements for *data collection* and verification usually include information on the fishers, their socio-economic status, their fishing vessels and gear, individual and community dependence and returns from the fishery, and hence, the period, quantity, and value of their landings. Further information on the area of capture and the size, weight and age of the fish are also beneficial for fish stock assessment modelling and stock predictions. It could follow then that the most cost-effective strategy would be to have data collectors in each, or many of the large fishing communities.

The initial data collection task is a complete census of fishers. One cost-effective strategy is to use inter-agency resources for multi-tasking when the regular census of the population is taken. The key role of the data collector, following the establishment of the data base is the verification and ongoing monitoring of the fish caught including capturing additional information on the area of capture, size, age and sex of the catch. Some States use personnel on a part-time basis for both data collection and enforcement, but fishers may believe that the only reason personnel are collecting data is to catch them breaking the law e.g. not paying taxes. This can lead to falsification of the data provided. Extension officers and community development officers from other ministries working in the field can also provide a wealth of basic social information if linkages are forged and it is accessible to the fisheries database. Data collection reliability is often enhanced when the individual collecting the data is known and respected in the community. The data being collected is information that can be interpreted as being sensitive and personal to the fishers and companies. It is key for acceptability by the fishers and fishing industry that the confidentiality of individual and company data must be assured throughout the data collection and analysis exercise.

<u>Coastal</u>

One example of a low cost method to gain information, if the fisheries are close to the coast, has been used successfully in New Zealand and some of the countries in the South Pacific and is now being tested in Indonesia. This involves the deployment of part-time coast/reef watchers, usually from the communities, at a minimal cost to the State of the

price of binoculars and a radio. Information on fishing activities, especially incursions from outside the area is easily determined and the fishers and community are thus encouraged and educated through participation in the conservation, protection and management of their coastal marine resources. The key to ensuring quality data from the domestic fishers is to maintain credibility and close contact with them in their communities, and seek their ideas and support for new management and regulatory measures.

Offshore

There are several options for the offshore portion of fisheries MCS. These depend on the value of the fisheries to both domestic and international fishers. The strategy of "limited entry" fishing to protect the overfishing current in the world today carries with it an exclusive right of access to harvest the marine resources in the designated area. This "limited access" privilege granted to all licence holders is intended to maintain and conserve the fish stocks, and hence fishers' livelihoods. It is generally thought that this privilege should be offset by a resource rent or access fee that relates to the resultant returns to the licence holders. It is difficult to justify requiring other sectors to supplement fisheries management and conservation expenses while those that are benefitting from having the limited access rights do not contribute appropriately to the costs of management.

Under the 1982 UN Convention on the Law of the Sea, the coastal State must grant foreign fishing vessels access to its EEZ if it cannot harvest all the total allowable catch. However, as discussed in section 4.3, the coastal State may establish the terms on which access is granted to its territorial sea and EEZ. This could include setting a potential "resource rent" for the privilege and opportunity of fishing in a particular zone. In many developing countries the resource rent imposed on foreign fishing vessels is too low, and is often less than 1% of landed value of catches. Setting of an appropriate level of revenues can often offset a significant portion of the costs of enforcement[128].

Port options

There are several options for monitoring offshore fisheries activities. For example, it would be safer and more cost-effective for governments to conduct inspections and transhipment of fish in port rather than at sea. However this is generally resisted by the industry due to the additional costs involved, and the loss of the opportunity to bypass regulations when at sea without any monitoring. Where possible, maximum use of port surveillance and inspection are recommended, as these can be very cost-effective, thorough and safer than at-sea inspections. These port inspections also permit an opportunity for port States to implement international port State control mechanisms. It must still be recognized however, that at-sea surveillance will still be a necessary component of most fisheries regimes to monitor against area infractions, species and gear infractions, as well as dumping, discarding and culling for high value species.

[128] A study of the fisheries in the Philippines in 1994 as a preparatory document to the ADB Project Development Mission for the Fisheries Resources Management Project, indicated revenues from licensing at 0.03 of 1% of landed values of fish caught. An increase to 1% of landed value would have recovered the entire cost of the newly proposed MCS system for the entire country.

3) Fisheries management strategy

The choice of the management strategy will greatly impact on the cost of the MCS system. This will be noted in more detail in the next section, however, it can be readily seen that *effort* controls are much easier and cost-efficient to implement than multi-species or multi-area quota and species controls. The effort limitations by area would be established from catch rates in the past applied to each fishery. Fishing in an area after closure is thus an offence. Effort could be verified through information provided on sightings from the sea, land or air, and also from VMS. It is noted however, that this suggestion, although ideal for surveillance, may be a bit impractical in terms of optimum utilization of the resources, e.g. combined fisheries in one area where the total for one species has been taken, but not that for the second fishery. It could possibly be an option however, for a single species fishery.

Using the principle of least cost to the State, however, if the fishing industry wishes to control the fishery by quota management instead of effort control, the industry, as part of the resource rent, should shoulder the additional costs of MCS.

On the issue of *quota controls*, these have been found to be effective only if there is very timely acquisition and processing of accurate catch data, including discarded and dumped fish that has been removed from the resource base. The acquisition of these data is also helpful for stock assessment, but it requires at-sea observations and inspections for quality control and verification of the validity of the data being collected. This latter requirement is an expensive undertaking, but it is a supporting rationale for fishers to assume the costs of observer coverage, VMS, and dockside monitoring, if quota control is the strategy they support for fisheries management.

4) Legislation

Fisheries legislation forms a major component of the *control* aspect of fisheries MCS. The fisheries management plan is transferred from theoretical ideas to legal requirements that form the basis for the MCS operations. It is at this juncture that fisheries managers, MCS officials and lawyers can assess the enforceability and cost of their management schemes. Common concerns expressed by MCS personnel all over the world concern:

- the time to enact the law;
- the appropriateness of the law when finally enacted (e.g. the original draft may be changed as a result of political compromises made during the parliamentary or other process required to pass the law);
- legal complexities;
- enforceability and costs; and
- credibility loss due to laws that cannot be enforced.

Cost-effectiveness can be increased if there is co-ordination and cooperation between the fisheries managers, MCS component and legal drafters.

5) Licences

Licences are a key tool in most managerial regimes, particularly where it is necessary to limit access to a fishery. Licences are also an important mechanism for imposing conditions on access. For example, coastal States can use licences to impose conditions on foreign fishing vessels which place stricter obligations on them than would have applied under international law (e.g. to install ALCs) and which facilitate enforcement in national courts. The licence holder obtains a conditional right to fish (i.e. the right depends on compliance with the conditions of the licence) and non-licence holders are excluded. As noted above, the government should consider imposing an appropriate fee for granting this right and for excluding others from the resource to the benefit of the licence holder.

6) "No force" strategies

The use of cost-effective "no force" tools is becoming popular. These include:

- making the granting of fishing authorisations dependant on the vessel being in "good standing" in a national or regional registries;
- observer programmes;
- VMS, satellite imagery, remote video and digital photography and infrared tracking technologies; and
- port State controls for safety at sea and compliance monitoring.

These strategies can all be cost-effective, and if applied on a cost-recovery basis, they can be of minimal cost to the State after the initial investments in the procurement of base equipment and in training staff for inspections and observer duties.

7) Private sector MCS

An option gaining in popularity in some countries is to move the MCS costs away from the government bureaucracies to the private sector. Although the unit operating costs of MCS activities may increase initially above those for the government, it has been found that the private sector, with a clear mandate, can sometimes run the MCS operations in a more business-like, cost-effective manner than is possible in the government bureaucracy. Experience has shown this to be the case for air surveillance in some countries, (e.g. Canada and Malaysia).

The concept of community-based fisheries management and the deputizing of private sector personnel to work with local authorities could also be a cost-effective option worth considering for monitoring purposes, e.g., observers, dockside monitoring, reef/coast watch programmes. This permits Government to look at operating standards, outputs and cost-effectiveness while the private sector addresses the competency of employees, operations and all personnel related issues. Privatization of many non-enforcement aspects of MCS can be carried out successfully, but a very good liaison between all involved parties must exist, perhaps more than can be expected in some bureaucracies.

5.3 MANAGEMENT MEASURES

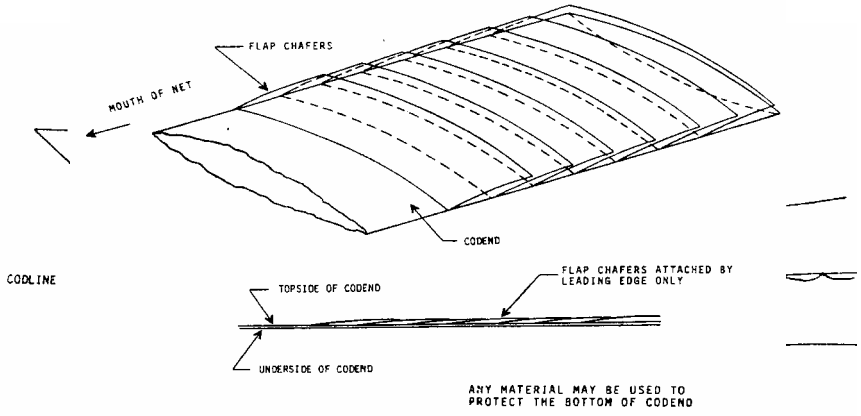
Management measures are the specific elements of fisheries control that are embodied in regulations, and which become a focus for surveillance activities. Cost-effectiveness needs to be considered for each management measure. Fisheries should provide appropriate legal tools (e.g. licensing requirements and enforcement powers) to enable the fisheries management plan, operational strategy and the management measures chosen for MCS to be implemented effectively. The management measures noted here include:

- mesh size;
- use of chafers and strengthening ropes;
- area closures;
- windows or zonation of fishing areas;
- catch and quota controls;
- trip limits:
- effort control;
- individual transferable quotas (ITQs);
- minimum and maximum fish sizes;
- vessel movement controls;
- vessel sightings reports;
- vessel inspections, port and at-sea;
- observers;
- licenses;
- participatory management;
- new technology including: radar technology; vessel monitoring systems; satellite imagery; digital photographic technology; and
- "no force" measures.

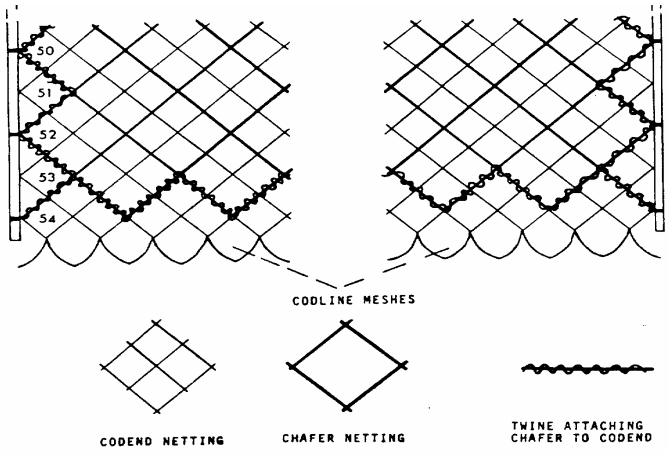
It should be noted that the ***mesh size*** requirement can only be enforced by two methods; inspection prior to going to sea, with the provision that no other gear can be carried on board for that trip; or, inspection at sea which can only provide a snap shot of the fishing operations while the officer is onboard the vessel. *Many countries have legislated mesh size requirements, but they are never enforced, thus making this control mechanism ineffective.* In the case of towed nets, if the fisher is permitted to use strengthening ropes

to keep nets together when full of fish, and top and bottom chafers to protect the nets, and then trawls through weeds on the way to the fishing grounds, can small fish really escape from the net? Square mesh nets maintain their open shapes as opposed to diamond mesh nets that close under pressure of being towed through the water. One can question the advantages of using mesh size as a conservation tool in the case of towed gear, if it is not properly enforced. The case for gill nets and entangling nets is different and the mesh size can be a significant conservation factor. Further details on measuring nets follows in Chapter 6, Section 6.4.

A second management measure is the use of ***chafers and strengthening ropes***. Chafers are attachments to the bottom and top of towed fishing gear to prolong the life of the expensive nets by reducing wear and tear from rubbing on the seabed. These can be made of netting, for topside chafers, or twine, net and leather strips, for bottom chafers. These attachments are common and necessary fixtures to the gear, but a supplementary result is that they block the mesh and therefore retain all fish caught in the net. Chafers, especially for bottom trawls that are meant to drag on the seabed, should only be attached at the forward end of the bottom of the net, and along the sides, but not to encompass the entire "cod end". Topside chafers come in many different shapes and sizes, the main criteria normally established for this attachment being that it is attached only to the cod end of the net and in such a manner that it does not overlap the mesh to restrict the normal openings of the mesh in the cod end. Examples of two chafers are seen in the following figures.



Strengthening ropes are attachments to hold the net together and prevent it from ripping open when it is hauled on deck with a full load of fish. These are ropes that should be attached along the main axis of the net and where attached across the net must be attached in such a manner as to ensure they do not reduce the size of the meshes in the net. The following example illustrated this point.

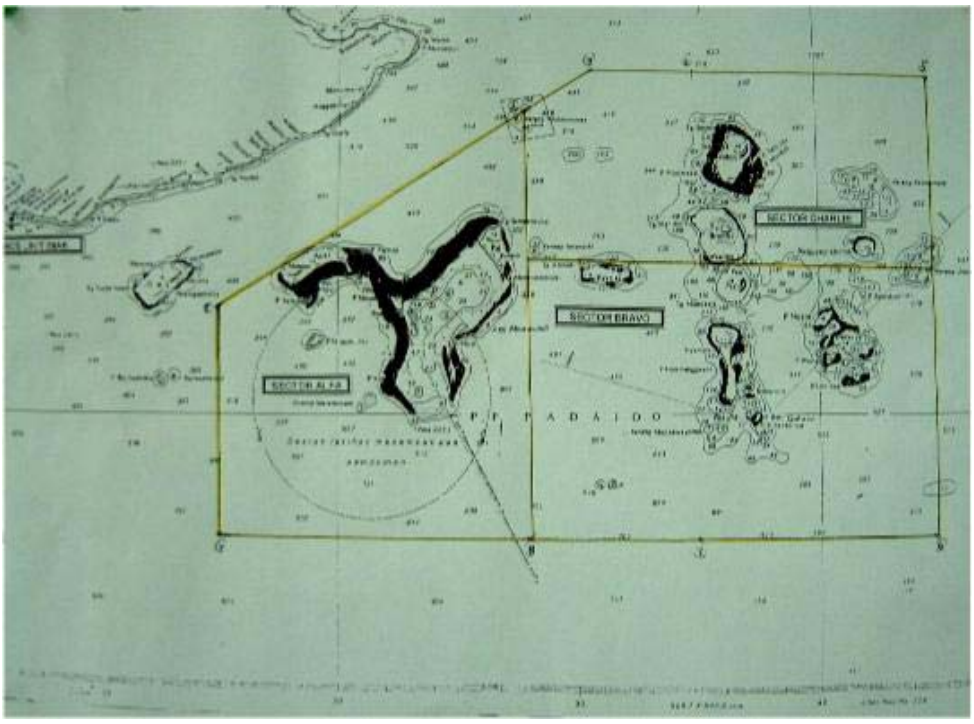


Strengthening ropes and chafers can only be checked during inspections in port and at sea. These can be re-laced to the net at sea and therefore become a management measure that is difficult to control.

Area closures are a management tool recommended to protect spawning areas during known breeding seasons. This tool is also used to separate types of fishing gear whereby one type of gear is permitted, such as set gear, and another is prohibited, such as mobile towed gears. One lesson from the experience of area closures is that the areas should be defined by latitude and longitude co-ordinates rather than on depth of water which is effectively unenforceable. This tool does not require at-sea boardings and inspections unless there is a prohibition of different types of stationary gear, such as traps and nets. The surveillance of area closures can be accomplished by properly equipped aircraft that have photographic, and integrated navigational equipment, and night flying and surveillance capability.

Some countries use ***windows or zones*** as a tool to control fishing in their zone. In this case, areas for authorized fishing are established by latitude and longitude, by distance from the coast, or depth, and all other areas are closed to all fishing. Geographical zones or areas are always recommended above other methods because it is easier for fisheries to comply with them and because they are easier to enforce both in court (the evidence required is fairly straight forward) and by using administrative penalty mechanisms. These windows, or zones, can be set for different gears, size of vessels or based on fishers status, e.g., sustenance fixed gear fishers, and patrolled by aircraft, radar or patrol boat. Windows, or zone/area closures can be used effectively to reduce gear conflicts

especially between offshore commercial and artisanal fishers. On some occasions, countries have set area and time closures to permit different gear types to use the same area, but at different times. Another advantage of *windows, areas or zones* as a surveillance tool is that sea patrols can then be concentrated on these areas for at-sea inspection of regulations, which are normally not enforceable by any other means. The disadvantage of this strategy is the impact this management strategy may have on the fishers and their reduced ability to chase the fish over their migration paths.



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each case, there is a requirement to be able to verify, on a timely basis, the actual catches of fish by each vessel, species and possibly by area. This becomes a very complex administrative and operational programme that is expensive in terms of finances and human resources. It is commonly accepted that control of the removal of resources from the sea is the most desirable conservation measure. However, the method of control, whether by counting each fish or through fishing effort can significantly impact on the cost-effectiveness of fisheries management and MCS operations. It is accepted that where estimates of stock abundance are accurate, then catch controls would maximize the benefits to the fishers by permitting them the maximum removals, but this is an exercise which, to date, has been found to be very costly.

A popular management scheme is the use of ***individual transferable quotas*** (ITQs) as a management tool. This system is employed for those fisheries where there is limited access to the resource, the numbers and identification of each fisher and gear are known, recorded and have a history. The system then provides for an allocation of fish to each fishing enterprise, or fishers to permit maximizing of economic benefits in the fishery and removing the "grand rush – winner take all" approach to fishing. ITQs are often set by species and stock area for a period of time. The fisher also has the right to transfer, or sell, all, or a portion of, the allocation or portion thereof to another fisher on a temporary basis.

The complexity of the system and the requirement for an advanced communications and data network to effectively manage this strategy makes it difficult for developing countries. It is for these reasons that the ITQ strategy is not recommended for developing countries as an initial management strategy. The use of satellite imagery or VMS, to enhance the ability of management to monitor the fishing activity, receive and process timely catch reports can make this a viable option for the future.

Trip limits are sometimes used as a measure of fishing control. These limits could include total catches permitted per trip or, more commonly, effort limits. The former requires someone to meet the vessel upon arrival and to be present during the weigh-out of the catch. If a fisheries official is employed to monitor landings for the data system, this strategy could be implemented as part of normal operations. If not, then it would necessitate extra personnel and effort. The disadvantage of trip, or catch limitations is the temptation to discard all the lesser value, or small fish, prior to landing. The effort control requires reports of departure and return and a capability to verify these periods through sightings at sea. The growing use of VMS for licensed fishing vessels is making this management option more favourable.

Another management tool is the establishment of ***minimum or maximum fish sizes***. The regulations normally specify that the capture or landing of a fish of a certain size is not permitted. The intent behind the minimal size of fish is to prevent the harvesting of non-commercial, juvenile fish of little market value. The prohibition against large fish is usually intended to preserve the brood stock. Unfortunately, neither of these regulations can be enforced without continual monitoring at sea due to culling and lack of reporting. The surveillance costs to enforce these regulations are difficult to justify unless there is a physical presence on the vessel at all times, e.g., observer programme, or a high level of spot checks at sea.

Most states implementing a MCS system employ some sort of ***vessel movement controls***. These are usually in the form of report requirements from any offshore vessel that is fishing longer than two or three days at sea. The vessel movement reports range from zone entry and exit reports, to port entry and exit reports and area changes. All movement reports require the vessel identification, commonly the vessel name and call sign, the master's name, fish onboard by species and intended activity. The first reported zone entry for licensed foreign vessels commences the monitoring exercise, which will continue until the vessels have departed the zone and all reports and documentation have been received.

The ***zone exit report,*** which is commonly required by the central fisheries control well before departure from the zone, reiterates the vessel identification information, and the time and position of expected departure from the zone. This report is the final opportunity for the Fisheries Administrator to inspect the vessel by intercepting it at sea, or ordering it to port.[129] The zone exit report thus triggers the action for decisions regarding the control of the vessel prior to its departure from the zone. Multiple exits and entries to the zone for fishing purposes (medical evacuation, transhipping, crew changes, etc.) are activities with which Fisheries Administrators will have to contend. These activities create a gap in the fishing operations information. The coastal State may

[129] Legislation in the Maldives provides that all foreign vessels must come to port for inspection prior to departure from the EEZ, but unfortunately, this is not always enforced.

also wish to include in its legislation and fishing agreements, provisions to capture the information required for conservation purposes.

Vessel sightings reports are collected to update the fishing vessel monitoring information database. The report normally includes vessel identification information, such as the name, vessel marking/call sign, home port (if it can be determined), the position sighted, and information as to the activity of the vessel. The vessel sighting report should also record any photographs that were taken, and the numbers on the film. This could all be necessary information for the courts if it were later found that the vessel was not fishing in compliance with its licence, or fishing without a licence.

Vessel inspections are a key management tool for monitoring and surveillance. Port inspections are considerably easier to conduct than those at-sea due to the safety factor of not having to deal with the motion of the sea either on boarding and disembarking, or during the inspection itself, nor the dangerous operations of the fishing gear. How detailed the vessel inspection is, either at-sea or in port, depends on the Fisheries Administrator. Fishing operations can only be seen at sea, e.g., fishing, discards, waste handling, processing etc., and these may be of benefit to management in their information collection and negotiations regarding catch methods and efficiencies.

The accuracy of vessel inspections, both in port and at sea, is a crucial component of the surveillance aspect of MCS. It is the initial inspection that verifies the fish onboard the vessel. Intermediate inspections during the authorized fishing period provide verification of compliance with fisheries legislation and obtain data used in the determination of catch rates and catching efficiency of the fishing unit, processing efficiency, and handling of waste product. Inspections in port or at sea also can also provide information on the safety-at-sea capability of the vessel.

The use of fisheries ***observers*** is a management strategy that may not be appropriate for all countries. A large measure of the success of observers depends on their professional competence, their personal integrity and, in short, their honesty. An observer programme, to be effective, needs close supervision and appropriate checks and balances to validate the accuracy of the data collected. A system of incentives to maintain integrity of staff is sometimes helpful.

Fisheries observers, where this management tool can be utilized, can be one of the more cost-effective MCS schemes available to the State. Some observer schemes have been *less than successful* for a variety of reasons, particularly where there have been insufficient safeguards to protect the observer from pressure from the master of the vessel.

For example, observer programmes are unlikely to be successful where the observers are employed in a dual role of observer/crew member and are paid directly by the vessel master, thus compromising their role and loyalty to their fisheries duties and creating a conflict of interest.

Success in observer programmes seems to have resulted when:

a) observer services have been funded by the fishing enterprises through the government, or some other co-ordinating body, such as the private sector;

b) the observers have been employed solely as observers, that is, monitors for the government (also in gathering much scientific and technical data) and advisors to the vessel masters regarding authorized fisheries activities;

c) observers have not been granted enforcement powers;

d) appropriate training and evaluation have been conducted for observers;

e) observers have been paid appropriately to negate the incentive of bribes; and

f) observers have been trained and promoted in a phased manner and see the programme as a future career as an observer and then possibly as a fisheries officer.

Observers can effectively watch for compliance with regulations and report possible violations to enforcement authorities, who subsequently take enforcement action.[130]

One of the key management tools available to Fisheries Administrators is the ***fishing licence***. This document is one of the most powerful documents in fisheries MCS, for it establishes the legal rights, privileges and obligations of fishers. In order for a licensing regime to be introduced, legislation must be enacted which: firstly, prohibits the activity in question (e.g. fishing within a particular zone) without a valid fishing authorisation and in accordance with any terms and conditions imposed in that authorisation; secondly, provides penalties for contravening the conditions of any such authorisation, and thirdly gives enforcement officers the necessary powers to enable them to control compliance with fishing authorisations (usually referred to as "licences").

Fishing licences are analagous to contracts in the sense that the fisher voluntarily accepts to be bound by the terms and conditions in the licence in return for being granted a conditional right of access to the resource. This right of access also carries with it other benefits, including the exclusion by the State of non-licence holders. This right is conditional because it may be lost if the fisher does not comply with the terms of the licence. However, a fishing licence is not a contract in the ordinary sense of the word. For example, non-compliance with the terms and conditions of the licence are usually punishable as criminal offences which is not the case with a contract.

A fishing licence is a particularly powerful mechanism in relation to foreign fishing vessels since it can be used to impose additional requirements that these vessels would not otherwise be required to comply with under international law. The licence conditions may not contravene international law (e.g. by unreasonably restricting the right of innocent passage), but may set strict terms for granting access to a coastal State's marine resources. This is permitted by international law and is justifiable since these requirements are not simply imposed on all foreign vessels, but are rather pre-conditions which foreign vessels must accept if they want to obtain the benefit of gaining privileged access to the resource of the coastal State.

The licence can be used to provide all the base data regarding fisheries activities in the area to which it applies. It can require appropriate reports on fishing gear, activities in

[130] A very effective multi-graded observer programme for the offshore fisheries has been developed in Namibia by Ms. Sandy Davies and Capt. Per Erik Bergh. Reference materials for their programme are available through direct contact (pebergh@mfmr.gov.na) or through FAO. *At-Sea Observer and Landing Site Sampling Programmes,* Walvis Bay, Namibia

terms of time, location and catches, and can also require cooperation in fisheries management objectives. Furthermore, it is the main mechanism for extracting a resource rent for the privilege of fishing in the State's waters.

Participatory management has been discussed earlier in this paper as an emerging management trend and will be further amplified in Chapter 7.

The use of ***new technology*** is always an attractive option. There are new satellite capabilities, vessel monitoring systems, new aircraft, radars, infrared equipment and photographic technology, and vessels, which can be attractive to MCS officials. It is recommended that Fisheries Administrators look carefully at the use of the technology in local operating conditions and make the assessment and decision based on these results, with appropriate attention to the cost of procurement and, more important, to the operations and maintenance costs and local capability to carry these out in the country[131].

Due to the relatively high cost of MCS operations, there has been a growing trend to seek ***"no force"*** MCS strategies. The intent here is to pick those MCS tools which can be used to exercise sufficient monitoring and surveillance controls over the fisheries resources to meet government needs at the lowest cost possible. The most popular "no force" strategies seem to be the use of a national, or regional register of "vessels of good standing". Only vessels on this list would be eligible for licenses to fish in the fisheries waters of concern. Information in the register includes the identification of the vessel and master and a record of performance and compliance in the fishing sector. In a regional situation, information is shared between participating countries in the region and decisions can then be made regarding a vessel and master in the entire area. The FFA's experience is that vessel masters and fishing companies respect this approach, to the point that even the threat of removal of *good standing* has been enough to ensure compliance.

As noted earlier, vessel registration is an area that merits considerable attention in the future for both fisheries control/MCS purposes and also vessel safety requirements that impact on safety-at-sea, search and rescue, and protection of the fisheries habitat. The potential exists for this to be a credible international management tool for both flag State and port State control. For example, developing countries would benefit from being able to access information on third party vessels applying for registration in their countries.

Other tools in this category of "no force" mechanisms include:

- port State control mechanisms and inspections;
- flag State responsibility for the actions of its vessels;
- observer programmes;
- the requirement for a representative from the international fleets that are authorized to fish in their waters to be resident in the State, with full authority to direct vessels as required by the coastal State;

[131] It is the supplier who should shoulder the financial responsibility of assessing the appropriateness of the equipment to the situation before attempting to sell this equipment. It remains the responsibility of the Fisheries Administrator to assess the performance to meet his/her management needs. The operations and maintenance training for the equipment should be included in the cost of the equipment, if it is accepted.

- VMS and satellite technology, combined with geographic information systems (GIS) to rapidly analyse the data; and
- remote video and digital photographic technologies including infrared tracking;

5.4 CONSULTATION AND LIAISON

The success of MCS operations in almost all cases has been as a result of liaison between parties with a vested interest in the fishing industry. Clear delineation and acceptance of roles, responsibilities and obligations has made the process easier for all concerned. The harvesting of any natural resource by third parties intending to make a profit has always been a challenge, and nowhere is this more evident than in fisheries. Successful MCS operations have demonstrated the necessary requirement for all participants and players to understand and accept MCS management plans.

5.4.1 Fishing industry inputs

One of the purposes of fisheries management, and subsequent MCS activities in support of it, is to provide continuing benefits to the fishers of current and future generations. It is clear then, that central to any discussions regarding the fishing industry would be the fishers themselves. Unfortunately, there is often little input from this sector. It should be no surprise that, after many years of negligible input into fisheries management, fishers are suspicious of government officials. There is a need for respect and partnership of government officials and the fishers themselves in the development and implementation of fisheries management plans in the future.

This link with the fishers can often be assisted through liaison with fisher groups, unions, or cooperatives, where these are in existence. Where these are not in place, the community organizations, extension and development officers can serve as the appropriate link with the fishers and their families. When the fishers become confident that the intention of the government is to act in their best interests, the government will have a very influential and powerful ally in developing and implementing its management and its MCS plans.

The input of bigger fishing enterprises which are connected to the international market for fishing vessels, joint agreements and trade are also very important in this exercise. However, practical experience has shown that placing too great an importance on one sector of the fishery, while neglecting the impact other sectors have on the industry (usually at the expense of the artisanal, domestic fishers) may have undesirable results. The larger fishing enterprises should be encouraged to provide their input, and in fact will probably do so of their own accord due to their investment in the industry. The challenge will be determining the balance between interests of large fishing industry interests and the more scattered local artisanal fishers. The input and participation of local, sustenance and coastal fishers will be discussed further in Chapter 7, but suffice it to note that participatory management both in the offshore commercial and coastal fisheries is vital to the future success of MCS and management.

5.4.2 Inter-agency liaison

The large number of government agencies interested in the marine sector, and particularly fisheries creates the potential for administrative complexity. These include

the Ministry of Justice and judiciary; municipal and federal police agencies; port authorities; national defence; customs; immigration; health; tourism; environment; transport; foreign affairs; and the fisheries department itself. The respective roles of these agencies in an MCS system are discussed briefly below.

The *Ministry of Justice and the judiciary* need firstly to understand the fisheries management objectives, policies and the importance of the resources and the ecosystem to the State and the fishers. Secondly, they need to have a good understanding of the intent behind the fisheries management plans and the standard MCS procedures in order to reflect these in the fisheries legislation and to enforce the legislation.

The cooperation of the *federal and municipal police agencies* is an essential ingredient to successful MCS systems. These agencies are often the operational arm of the surveillance and enforcement component due to a lack of appropriately trained and mandated fisheries personnel to undertake these responsibilities. Whether or not this is so, the cooperation of all enforcement agencies through shared databases, shared training, and shared resources has proven to be very cost-effective in many countries.

The *Port Authorities* can be of considerable assistance in fisheries MCS, both for monitoring and surveillance activities. A multidisciplinary port authority can facilitate coastal State port inspections, briefings, and monitoring of the transhipment of fish with a minimum of bureaucracy and maximum of control, at low cost. Sharing of resources and information for monitoring and enforcement purposes could also be considered here as being potentially cost-effective.

The *Ministry of National Defence* often takes an interest in fisheries operations and vessel movements under its sovereignty and State security mandates. There have been cases where military resources have been seconded to fisheries, under the control of fisheries administration, and these have proven effective for MCS activities. As noted earlier, the use of the military in a support role has been found to be more cost-effective than as the primary surveillance and enforcement tool with fisheries as a secondary task. The sharing of the fisheries database with the military might however encourage cooperation and also assist them in their priorities, including sovereignty matters. In Argentina, fisheries found that providing access to their fisheries VMS resulted in greater support and assistance from both the Navy and Coast Guard vessels and their respective flight support. Information on fisheries activities from air patrols was readily shared with Fisheries.

Customs and Immigration are being considered together due to their similar interests in the control of goods and persons into, and out of, the State. Again, cooperation for surveillance purposes and to share resources can be cost-effective, but only when priorities coincide. In cases of joint patrols, Fisheries often receive a lower enforcement profile due to higher priorities such as drug interception. One advantage of cooperation with these agencies is the sharing of surveillance information and the back-up support for fisheries surveillance activities. Both of these agencies will have an interest in fishing vessels during their port visits. Co-ordination with fisheries administration for port inspections has been effective and could facilitate these operations. Customs, Immigration to a lesser degree, and Coast Guard are often called upon to assist in monitoring and controlling port inspections, port transhipment and export of fish products as a secondary task when Fisheries personnel are not available, for example, in the Maldives.

The *Ministry of Health* usually has an interest in fishing vessels and the fishery for two principal reasons. The first is the state of health of foreign vessels and crew when they enter port, and the second is the quality of the product that is being imported or exported. The Fisheries Administrator can often gain assistance from these officials regarding fish product inspection concerns.

In several countries, the *tourism* agency plays a key and complementary role with the fisheries administration, especially in the coastal areas. The parallel demands on marine resources of tourism and the fishing industry often give rise to conflicts with regard to areas and use of the resources. However both agencies need to ensure the sustainability of the resources and therefore need to work together to resolve area and user conflicts for the mutual benefit of both the tourists and the fishers.[132] Valuable guidance on how to avoid these conflicts through integrating fisheries management into a system of integrated coastal area management and on how to resolve any conflicts that do arise, is given in the FAO Guidelines on "integrated coastal area management and agriculture, forestry and fisheries".

The Department responsible for e*nvironment* is always closely linked to fisheries interests for no fishery can be healthy unless there is a healthy marine environment, as evidenced by the results of destructive fishing practices. MCS activities often take on dual responsibilities for fisheries and environmental monitoring and such joint activities, shared monitoring resources, and shared information should be encouraged.

The *Ministry of Transport (or other agency responsible for harbours)* is likely to take an increasingly active role in relation to safety-at-sea and vessel registration issues. Fishers and fisheries administration can benefit significantly by close cooperation with transport authorities to reduce fatalities at sea through implementation of safety-at-sea regulations. Cooperation on vessel registration and standard marking activities is also an area for potential co-operation.

Foreign Affairs has a significant interest in fisheries, especially where it involves international fishing partners and negotiations. It is usually Foreign Affairs which takes a lead role in these negotiations. The challenge for fisheries administrators, as noted earlier, is to ensure that the fundamental principles of fisheries management and MCS control are not compromised in negotiations. Key to the negotiations is the principle of lowest cost and effective MCS to conserve the stocks. Any negotiated change that increases the costs of MCS should only be agreed to if there is a corresponding increase in benefits, preferably financial, from the international party to offset the increased costs for implementing MCS.

An example is the case where the international fishing partner wants all the licences for the foreign fleet to be picked up in port by one vessel with the fleet commander abroad. The coastal State thereby loses the opportunity to verify the fish onboard each vessel for later calculation of the total fish caught in the zone. There are three options that can be considered to offset this loss:

[132] In the Maldives, tourism took over the key foreign interest earnings from fisheries, but fisheries remains the major employer and export earner. Conflicts over areas of access are being resolved by designation of protected areas, and more recently attempts are being made for closer inter-agency cooperation mechanisms.

- the fleet commander's vessel would carry observers, paid by the international fleet, to the other vessels, where they would estimate fish onboard prior to the vessels commencing fishing in the zone;

- a fisheries officer would be transported by the fleet vessel to every vessel, and then returned to port; or

- an agreement for a grant of the equivalent funding to permit the patrol vessel to deliver the licences to each vessel.

In all cases, foreign vessels should not fish until the total quantity and species of fish onboard has been verified by a fisheries official, or government representative. These alternatives preserve the important principle of verification of fish onboard the vessel prior to the commencement of fishing operations in the country's zone. Similarly, any attempt to minimize the control mechanisms to verify catches from the country's waters by ignoring or waiving the final port inspection should be met with an alternative to enable MCS officers access to the vessel prior to departure from the zone. The importance of each of the MCS activities needs to be understood by the Foreign Affairs negotiator.

The *Fisheries Units* themselves, especially in the more remote areas of the country, need to be kept up to date with the fisheries MCS strategy. This point becomes critical to maintain operational standards and common information collection, especially where government devolution exercises are ongoing, e.g., in India, Philippines, and Indonesia. Close liaison and cooperation with the devolved authorities, provinces, states, districts or municipalities is essential for MCS activities to develop appropriate implementation strategies in a common and standard manner.

The heart of successful MCS operations in the field is the communications system. A telecommunications network is essential for MCS operations in the current fishing environment. Lack of information creates insecurity, concern and difficulties in supporting government policies and explaining these to the fishers in order to maintain their creditility with the fishers. All the field units must be fully aware of the policies and the rationale behind decisions. On the other hand, it is also important that fisheries officials in headquarters also realize the benefits of the information that can be provided by their field units for all aspects of fisheries management and MCS operations. Internal team building is also critical to fisheries agencies.

One of the more successful countries to establish inter-agency liaison between fisheries and the supporting military agencies is Argentina, despite its difficulties with other fisheries matters. This is described in Box 5.

Box 5

ARGENTINA

The Argentinean fisheries management regime is based on quota limitations by species. Only two species are split in areas with separate quotas, hake – north and south of 42°S, and mackeral – north and south of 39°S. The Sub-Secretariat of Fisheries monitors 28 quotas, two of these being split into two areas and a further three non-quota catches including grenadier, squid and shrimp.

FLEET COMPONENT	SIZE OF VESSELS	NUMBER OF VESSELS	TOTAL FLEET SIZE
Artisanal	10-17m	186 vessels	
Coastal	17-25m	124 vessels	310 vessels
Ice Trawlers	25-63m	133 vessels	133 vessels
Processing Fleet:			
Freezers		103	
Factory		17	
Jiggers		104	
Longliners		23	
Surimi		5	
Scallopers		4	
Shrimp		32	288 vessels
TOTAL			**731 vessels**

In 1997 the established TAC was 300,000mt, but the fishing industry landed in excess of 1.3 million mt. Of this over 550,000 mt were hake, which when combined with the by-catch of hake in the shrimp fishery and the Uruguan fishery, meant that the total hake catch approached 800,000 mt. The catches exceeded the TAC every year by 130% to 158% of the TAC for 1997. New entrants were still permitted into the fishery and there appeared to be no political will to close the fishery when the TAC was reached. "Limited entry" for fisheries in Argentina has not been successful to reduce fishing effort below maximum sustainable yield (MSY) levels. A new Fisheries Law (Law No. 24,922) was enacted but lacked the political support for effective implementation.

Fisheries officials in Argentina noted that the monitoring exercise was faulty due to: lack of staff, lack of training and equipment, inadequate accountability for management funding, lack of transparency and consistency in management and MCS practices (licensing, operations, penalties, etc.), lack of credibility in the eyes of the fishing industry, *but most importantly*, the lack of both political will and knowledge of the importance of sustainable and responsible fisheries management.

It is unfortunate that Argentina is one of the many countries that have suffered from errors in negotiating strategies with larger economic blocs that do not have the same respect for conservation and are using developing countries to accommodate their overcapitalization in the fishing industry. It was this agreement that permitted foreign vessels in Argentina's waters and was instrumental in the collapse of the hake fishery.

The Government finally closed the hake fishery until an appropriate management scheme could be put in place, an action very unpopular with fishers. The VMS system is being reviewed for cost-effectiveness. Other plans for the future include assistance for MCS in:

- legislation;
- institutional strengthening and transparency;
- training for port inspectors, inspectors and observers;
- further enhancement of the Observers programme and feedback to industry;
- MONPESAT VMS if it can become cost recoverable;
- enhanced data collection and liaison with the provinces; and
- Navy/coast guard air and sea support.

Other MCS-related issues being considered include:

a) ITQ management and decisions for implementation with appropriate legal support, data infrastructure, equipment and personnel to appropriately address ITQs on a real time basis; and

b) liaison and possibly a Memorandum of Agreement with the coastal provinces to ensure cooperative efforts for licensing, information and MCS activities in support of the ITQs system.

5.5 MCS PLANS

MCS plays a key role in monitoring and data collection, in developing the legislative base for successful implementation, and as the enforcement arm of the policy. This makes it apparent that MCS must be an integral part of planning from the very commencement of fisheries management consultation. Once it is determined which control mechanisms (effort, catch, quota, area, fish gear and mesh sizes, or a combination of these) will be utilized for fisheries management, then the MCS officials can assist in planning an enforceable fisheries management plan for both the domestic and international fleets with appropriate control mechanisms. This involvement of MCS from the commencement of the negotiations and planning is doubly important for foreign fishing negotiations to ensure enforceable agreements.

MCS planning stems from the approved management plan for the area in question. It results in a detailed action plan to implement the management plan. Ms. Sandy Davies and Capt. Per Erik Bergh developed a very thorough set of guidelines for developing an MCS action plan that was presented at the FAO Regional MCS Training Course in Songkhla, Thailand in June 2000, and is drawn upon here.

How to write an Action Plan[133]

- Only one person should write an action plan after brainstorming, participatory involvement and information gathering.
- The writer determines the priorities related to objectives and goals. All sentences in the action plan should be active, that is, start with a verb, be clear, and direct.
- Assign only one person to each task with a follow-up monitor. Divide all main goals into sub-functions that clearly describe actions leading to the goal.
- Frequently update action plans – it is not static and at least monthly updates are recommended.
- Each action should have a time line for activities and a deadline for completion for accountability and to reduce panic.
- All tasks should be prioritised for information of all staff and the leader for implementation of the plan.
- Above all be realistic and do not promise what cannot be achieved.

This leads to the next part of the exercise which is designing the MCS system that is most appropriate for the management plan. Once again, the FAO Regional MCS

[133] Bergh, P.E., Davies, S., FAO Regional MCS Training Course – Action Plan, Songkhla, Thailand, June 2000.

Training Course addressed this exercise through a series of tables to take the planner step-by-step through the exercise.[134] This included the following:

- identification of all resource users and interest groups;
- assessment of MCS measures to implement the management plan (gear/area/season restrictions; licenses; limited access/catch/by catch; control checks and frequency; market restrictions, etc.)
- review of legal requirements and their status (e.g. has the relevant law been brought into effect or is it still a draft?);
- assessment of current assets – human and hardware, and professional capability, e.g. training requirements;
- MCS operation to address management needs, e.g. air surveillance, VMS, satellite imagery, data collection, port controls, sea inspections, surveys, etc.;
- list objectives for the chosen MCS operation, and the human and hardware resources required;
- note available resources and options to address shortfalls, e.g. supplement existing hardware by buying, chartering or sharing hardware and increase human resources by training staff, by employing staff on a part-time or full-time basis or by contracting the private sector to undertake specific tasks; and
- calculate the investment requirements – procurement and operating costs by year.

Answers to the above queries will then provide all the information required for the budget exercise for the MCS plan. These results can then be used to determine the shortfalls in government budgets if the plan is to be achieved, and also provide input into the resource rent exercise for users to pay their share of resource management.

The full plan will be the summary of the budget and operational requirements for legislation, to meet MCS operational intentions, hardware and human resource needs and training, and the information or data management system requirements with costs and projections to cover costs over the period set for the exercise.

Box 6

The MCS initiatives of the South Pacific Forum Fisheries Agency
(Mr. Andrew Richards, the FFA MCS Manager)

Introduction

The Pacific Islands region (30 million km² of ocean and 23 countries and territories) is host to the most productive tuna fishing grounds in the world, supplying over 50 per cent of the world's canning tuna. The total land area of 0.5 million km² (87% in Papua New Guinea) supports a population of slightly less than 6 million, of which 67% are also in Papua New Guinea. The smallest States in terms of land area are Nauru and Tuvalu, which have a total of 21 km² and 26 km² of land respectively. However, on a global scale, the exclusive economic zones (EEZs) of the small island States of the region are large,

[134] Ibid. MCS Operations

covering 19.8 million km² (excluding Australia and New Zealand). Kiribati's zone covers almost 3.6 million km² and that of the Federated States of Micronesia, 2.9 million km².

Approximately 50-60 per cent of the total tuna catch is taken within the exclusive economic zones (EEZ) of the South Pacific Forum Fisheries Agency (FFA) member countries. Since 1994, the FFA member countries have been discussing with their distant water fishing nation (DWFN) partners how to jointly manage the 40-50 per cent of tuna being caught in the high seas and in the waters of non-FFA members. In September 2000 these discussions resulted in the adoption of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the western and central Pacific, that will place increased MCS responsibilities on FFA member countries.

Tuna resources of the region

The annual catches in the region of the four principal tuna species - skipjack, bigeye, yellowfin and albacore – consistently total between 1.2 - 1.3 million metric tonnes. The value of the unprocessed tuna catch in 1999 has been estimated in excess of USD1.7 billion. With global demand for tuna growing each year, and limited scope for increased catches elsewhere, the region is destined to become an even more dominant source of the world's tuna in the future.

The region's tuna fisheries

The region's tuna fisheries are complex in nature. There is a range of target species (tuna), in some cases captured at different stages of their life by three fishing gears (purse seining, longlining and pole-and-lining) operated by a variety of fishing nations. A variety of other non-target species (by-catch), some of considerable economic value, are also landed.

The situation is further complicated by the tunas' migratory nature, in that each stock may migrate through numerous national jurisdictions and areas of high seas. The tuna resources of the region, if managed effectively, are capable of generating sustainable revenues over time. Effective management of these resources will only be achieved if the fishing operators whose vessels harvest the tuna comply with the management plans being put in place by FFA member countries in their EEZs. The two main challenges facing the FFA member countries in relation to the operations of DWFN fishing vessels are illegal fishing, and mis-reporting and/or under reporting of catches of tuna in their EEZs.

Innovative tools for administration and monitoring of fishing vessels

Effective control over all fishing activity in the region is essential if domestic industry development is to stand any chance of long-term success. For this to occur, the island States in the region require improved fleet monitoring and regulatory procedures. Past efforts to establish administrative arrangements for foreign fishing vessels operating in the region have proven difficult. This has largely been a function of the size of the region, combined with the fact that the small island States in the western and central Pacific have only limited personnel and financial resources to apply to this effort.

In recognition of these constraints, the Pacific Island countries have adopted some innovative procedures to assist their fishing vessel administration and monitoring efforts. The procedures that have been developed combine legal and technical elements that are applied at either the national level, or regionally in co-operation with other island States, and in some cases, supra-regional agencies. A diagram depicting the relationship between national, regional and supra-regional vessel monitoring and surveillance arrangements is presented at Figure 1.

Minimum Terms and Condition of Fisheries Access

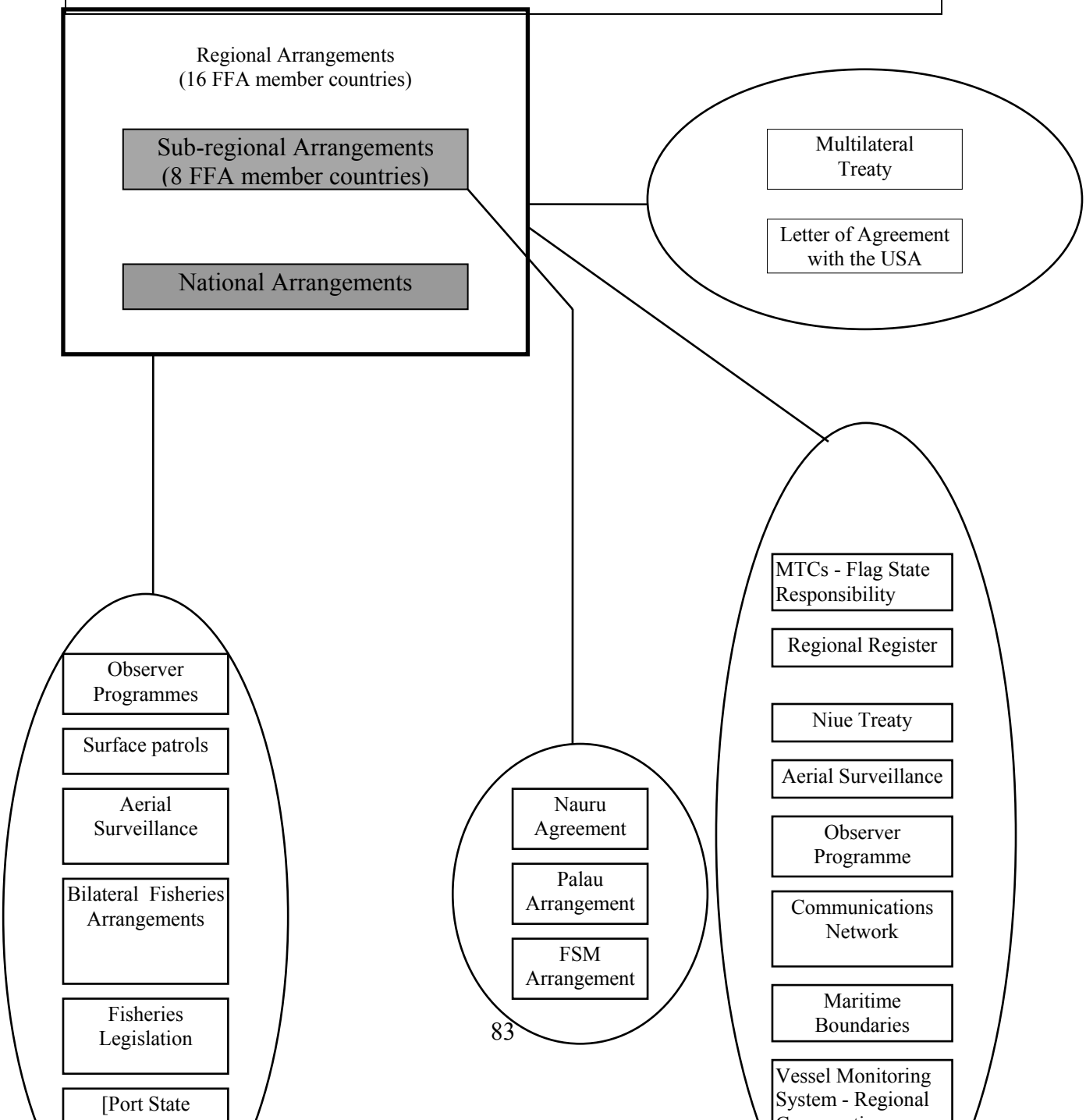
The Minimum Terms and Conditions of Fisheries Access (MTCs) were originally adopted by the South Pacific Forum in 1982. Recognising the dynamic nature of tuna fisheries in the South Pacific region. FFA member countries reviewed the MTCs in 1990. The revised, harmonised MTCs were adopted by the South Pacific Forum in the same year, and now apply to all arrangements for fisheries access to the EEZs of FFA member countries. As a result of the implementation of the FFA member countries' Vessel Monitoring System (FFA VMS), the MTCs were revised again in 1997 and now include the following:

Uniform Vessel Identification: All vessels operating in the region are required to be marked according to the 1989 FAO Standard Specifications for the Marking and Identification of Fishing Vessels. This is to ensure that each vessel licensed is uniquely marked and can be easily identified during aerial and surface patrols. It also serves to make licence-swapping more difficult.

Catch and Position Reporting: Foreign fishing vessels (FFVs) are required to provide to the licensing country or its representative, information relating to the vessel position and catch on board at least every Wednesday while in the Zone, and prior to entry to and departure from the Zone. As with all other MTCs, countries are free to impose more stringent requirements if they desire.

Transhipment: Full reporting on trans-shipment activity, including 24 hours notice of the intention to do so, is required. Only vessels listed in the Regional Register can take part in transhipment operations. Since 15 June 1993, the licensing country determines the time and place (at designated areas or designated ports) where transhipment may occur, and may elect to place an observer aboard the vessel to monitor operations. Vessels that continue to tranship at sea jeopardise the possibility of obtaining future licences from FFA member countries for in-Zone fishing.

Figure 1 Relationship between national, regional and supra-regional vessel monitoring and surveillance arrangements



Catch and Effort Logsheets: Standard logsheets have been adopted for all fishing operations in the region. These are required to be completed daily and returned to the licensing country within 45 days of trip completion. A preliminary report is required within 14 days of trip completion. Information on activities within the Zone, as well as adjacent high seas areas, is required when a trip includes fishing in both areas.

Observers: The licensing country has the right to place observers on board FFVs for scientific, compliance, monitoring and other functions. The observer is entitled to officer-level accommodation and the vessel operator is responsible for observer travel, salary and insurance. Observers placed on board foreign vessels can continue their observation duties during a trip which extends beyond national jurisdiction into high seas areas.

Appointment of an Agent: The flag State government and/or fishermen's association and/or vessel operator is required to nominate, appoint and maintain an agent. The agent shall be resident in the licensing country, and must have authority to receive and respond to any legal process.

Foreign Fishing Vessels in Transit: Foreign fishing vessels navigating through the fisheries zone or EEZ are required to have all fishing equipment on board stowed or secured in such a manner that it is not readily available to use for fishing,

Flag State or Fishermen's Associations Responsibility: Flag States, or in the absence of access arrangements with flag States, the appropriate Fishermen's Associations, are required to take measures to ensure compliance by their fishing vessels with coastal State laws. Difficulties encountered with vessels operating under flags of convenience is an issue that requires considerable attention in the region. Although the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (the Compliance Agreement), developed by FAO, provides a useful start for dealing with flag of convenience fishing vessels, FFA member countries will need to develop additional arrangements to supplement that Agreement.

Vessel Monitoring System: The vessel monitoring system shall be implemented by the operation of a VMS Register of Foreign Fishing Vessels. The operator of a foreign fishing vessel shall apply for registration of an Automatic Location Communicator (ALC) each year and pay a prescribed fee; install and operate a registered ALC on board the vessel; and maintain the ALC in good working order. The operator shall not interfere with, tamper with, alter, damage or disable the ALC; move or remove the ALC from the agreed installed position without the prior permission of the licensing country; or impede the operation of the ALC. There are also several measures relating to the operation of the ALC while it is on a fishing vessel.

The Regional Register of Foreign Fishing Vessels

The Regional Register of Foreign Fishing Vessels is a compliance mechanism. It constitutes a database of details for foreign fishing vessels that are able to apply for licences to fish in the South Pacific region. The database holds information on vessel owners, operators, masters and the physical characteristics of the vessels, and provides a history of any changes in that information over time.

The intention behind the Regional Register is to shift some of the responsibility for ensuring compliance to the flag State or fishing association. The fundamental requirement of the Register, which is administered by the Director of FFA, is that before any vessel may be licensed to fish in the region, it must be in "Good Standing"on the Regional Register. Good Standing is a status that is automatically conferred on a vessel upon registration. The status may be suspended in certain circumstances, such as where a vessel has committed a serious fisheries offence. Once Good Standing is suspended, the vessel is effectively prevented from fishing in the region, as no FFA member country will issue a fishing licence to vessels that are not in Good Standing on the Register.

The Niue Treaty

In an effort to enhance their control over foreign fishing vessels operating in the region, FFA member countries signed a Treaty on Cooperation in Fisheries Surveillance and Law Enforcement (Niue Treaty)

during the South Pacific Forum in Honiara in July 1992. The Treaty entered into force in May 1993, after the deposit of the fourth instrument of ratification. To date, all FFA member countries and Tokelau have signed the Treaty, while all but three of these have ratified it.

The Treaty is a head agreement intended to provide flexible arrangements for cooperation in fisheries surveillance. It is proposed that bilateral or subsidiary agreements will contain clauses facilitating closer cooperation in more concrete ways, such as the physical sharing of surveillance and enforcement equipment, the empowerment of each other's officers to perform enforcement duties, enhancement of extradition procedures and evidentiary provisions.

The Niue Treaty has been under-utilised by the Parties to the Niue Treaty. The only subsidiary agreement under the Niue Treaty is that signed by Tuvalu and Tonga, though several FFA member countries have recently indicated their intention to enter into subsidiary agreements with neighbouring countries. The Niue Treaty offers an ideal mechanism for increasing the current level of surveillance cooperation in the WCP.

The Palau Arrangement

After the PNA considered a brief prepared by Papua New Guinea concerning the rapid expansion of the purse seine fleet operating in the western Pacific in 1990, the parties recognised the urgent need to agree on a mechanism to regulate purse seine fishing effort within their EEZs. The final text for the Arrangement for the Management of Western Pacific Purse Seine Fisheries (the Palau Arrangement) was signed by the parties in October 1992. While stock conservation is a consideration in the Arrangement, it primarily seeks to improve the economic returns to coastal States through access fees and local fishery development.
The main components of the Arrangement, which stem from Articles 56(1)(a), 61 and 62 of the 1982 UN Convention and the First and Second Implementing Arrangements of PNA, and which recognise the special interest of the PNA in high seas adjacent to their EEZs are:

- the inclusion of all tuna, tuna-like species and by-catch;
- a clear definition of domestic, locally-based foreign and foreign fishing vessels;
- special working groups (catering for scientific, legal, economic or socio-economic areas relating to tuna resource exploitation) to serve in an advisory capacity to a management body consisting of all parties which will meet at least once a year;
- the establishment and implementation of surveillance, enforcement, observation and inspection procedures consistent with regionally agreed initiatives, now facilitated through the Niue Treaty;
- agreed license allocation criteria; and
- a clear role for the FFA Secretariat.

In an effort to regulate fishing effort and thus support prices for raw material, vessel numbers by fleet nationality will be capped under the Arrangement according to agreed criteria. These include the history of compliance and co-operation with South Pacific island nations and the fact that flag of convenience vessels will no longer be licensed. The Palau Arrangement will not necessarily prevent new fleets entering the fishery. In fact, interest from potential new operators in the fishery will be encouraged by South Pacific countries on the basis that the new entrants would have the potential to displace existing operators if the new entrants demonstrated an improved commitment to terms and conditions for access to the region and were willing to pay increased fees.

Not only do buoyant tuna prices create a more favourable environment for DWFNs to be able to meet license fee expectations of South Pacific island countries, but depressed tuna prices constrain attempts by Pacific island countries to develop their own tuna harvesting capacity, a development already actively pursued in the region. Thus, it is in the interests of South Pacific countries to promote mechanisms that will help support prices for raw tuna at reasonable levels. By regulating the number of purse seine vessels that will be licensed to operate within zones, the Palau Arrangement promotes this objective.

In the future, additional tools including improved domestic fisheries legislation which will address issues such as port State enforcement, and vessel tracking, observer programmes and communications will be further developed and implemented by the FFA member countries themselves, or where possible, in co-operation with others with a mutual interest in the long term rational utilisation of the resource.

Agreed Minute on Surveillance and Enforcement

In May 1994, the Director of FFA, on behalf of FFA member countries, and the United States signed a minute of agreement relating to cooperation in fisheries monitoring and surveillance in the Western and South Pacific ("WCP"). The Minute provides for cooperation between FFA member countries and the U.S. in all matters relating to fisheries compliance in the western and South Pacific. It includes the exchange of intelligence on fishing vessel activities in the region, the exchange of personnel to assist with the investigation of fisheries infringements, the exchange of information in the case of suspected violations and fisheries enforcement training. Following consultation with the appropriate FFA member country, the Minute also provides for the U.S. to take action, consistent with U.S. law, against vessels that violate the conservation and management measures of FFA member countries.

The Minute governs the FFA Secretariat's relationship with the U.S. National Marine Fisheries Service (NMFS) and the U.S. Coast Guard. NMFS provides seconded personnel to occupy the position of Fisheries Enforcement Adviser in FFA's MCS Division and on a more ad-hoc basis, provides personnel to assist with MCS training at the FFA Secretariat. The U.S. Coast Guard has participated as an observer at several MCS meetings at the FFA Secretariat and as from 1998, has participated fully in the annual Regional Aerial Surveillance Meeting. Both U.S. organisations are actively involved in surveillance cooperation with FFA member countries either bilaterally or multilaterally through the FFA Secretariat.

Lacey Act

Increased awareness and successful application of the Lacey Act is perhaps one of the most significant recent developments as far as regional cooperation in fishing vessel monitoring in the South Pacific is concerned. This provides a useful means by which, in collaboration with U.S. authorities, FFA member countries can seek the prosecution of foreign fishing vessel operators who infringe the fisheries laws of their country, and who subsequently enter a U.S. port and attempt to discharge their fish. Although the FFA member country concerned receives no financial settlement as a result of a successful prosecution under the Lacey Act in U.S. courts, the effect of deterring foreign fishing vessels from future illegal activity while within the zones of member countries, and promoting improved compliance, is of significant value. In any case, additional action, utilising the Regional Register, can be initiated as supplementary support for any action that may be taken by the U.S. against foreign fishing vessels for contravening FFA member country laws.

Port State Enforcement

In the absence of effective flag State control, as is the case for a number of fleets operating in the South Pacific, port State control offers an effective mechanism to ensure compliance with regional or sub-regional agreed conservation and management measures. Port State control should cover elements such as reciprocal rights to inspect documents, logbooks and licenses, the catch on board, to enforce the rules and regulations of other parties to an arrangement, which ideally should be regional or sub-regional in scope, and provide for enforcement action against fishing vessels that infringe coastal State laws when the flag State fails to do so within a limited time period. FFA member countries have supported a clear elaboration of port State enforcement in the outcome of the United Nations Conference of Straddling Fish Stocks and Highly Migratory Fish Stocks. In the future, all FFA member countries, both individually and as a group, are likely to develop comprehensive legislation relating to port State enforcement.

Harmonisation of National Laws

National legislation provides the basic framework for all fisheries activities in the region. Thus the incorporation of arrangements, such as the MTCs, into domestic law is important in ensuring the

effectiveness of the regionally agreed arrangements. Once the MTCs are part of national law, they can be enforced through the courts and cannot be called into question during access negotiations.
FFA member countries have met with varying degrees of success in implementing the MTCs through national legislation. In most countries, considerable time is needed to effect changes to legislation. The Parliamentary process can be extremely slow, and it is impractical for a country to pass a new Fisheries Act every few years.

To overcome this, many countries have used enabling provisions to allow regulations to be promulgated by the Minister or other authorities. Alternatively, power may be conferred on designated bodies to conclude access agreements in conformity with certain prescribed parameters. A less satisfactory mechanism is to confer upon the Minister or Cabinet, power to attach conditions to a licence. The disadvantage of this approach is that it still leaves scope for the DWFN to enter into negotiations on the conditions to be attached to the licence.

Observer programmes

The observer programme implemented under the multilateral Treaty on Fisheries between FFA member countries and the U.S. is the only regional observer programme currently operational in the western and central Pacific. This programme is designed to monitor the compliance of U.S. vessels licensed under the Treaty. In addition to compliance duties, observers deployed under this programme also collect biological and scientific information. The FFA Secretariat, as administrator of the programme, encourages observers to report sightings and activities of other foreign fishing vessels observed during trips aboard U.S. vessels.

The regional programme conducted under the auspices of the Treaty on Fisheries complements national observer programmes operating in a number of member countries of FFA, including Australia, New Zealand and Federated States of Micronesia. Several other FFA member countries such as Federated States of Micronesia, Solomon Islands, Palau, Kiribati, Papua New Guinea, Fiji, Nauru and Marshall Islands have also established observer programmes for foreign vessels operating within their zones.

In addition, the SPC operates a scientific monitoring programme that extends throughout the region. Coordination of the various programmes that operate in the WCP region are the responsibility of the regional agencies, the SPC and the FFA. Coordination of the various programmes that will be operating in the South Pacific region in the future will most likely be the responsibility of the regional agencies, SPC and FFA.

Port Monitoring

The implementation of the ban on trans-shipment at sea in mid-1993 has been of substantial economic benefit to FFA member countries. Most of the trans-shipment activities in ports have, so far, taken place in Federated States of Micronesia and Solomon Islands. These countries, and to a lesser extent, Kiribati and Nauru, have benefited from the registration, port and trans-shipment fees levied on the purse seiners and carrier vessels and from the expenditures made by the vessel operators on provisions, fuel, agency services and travel while they are in port.

Overall, the transhipment activities in ports have generated substantial economic benefits and can be expected to spur the development of local service industries to cater more effectively for the needs of the foreign vessels. The monitoring of catches has also been dramatically improved with the onboard monitoring of trans-shipment operations now possible. Port visits by vessels also make it considerably easier to deploy observers on fishing vessels for scientific research and compliance monitoring. With the development of additional national observer programmes and the commencement of enhanced observer and port monitoring programmes at the two regional fisheries agencies, the SPC and FFA, port monitoring will play an increasingly important role in gathering information and compiling vessel activity profiles for fishing operations throughout the western and central Pacific region in future.

Aerial and Surface Surveillance

Currently, Australia provides approximately 450 hours of aerial surveillance and New Zealand provides approximately 300 hours of aerial surveillance annually to the South Pacific. In 2000, France provided approximately 30 hours of aerial surveillance per year to Fiji, Vanuatu and Tonga. In addition, some countries, for example Tonga, operate national aerial surveillance programmes using either their own defence force, or chartered, aircraft.

Coordination for the majority of the aerial surveillance effort in the region increasingly involves the FFA Secretariat. In recognition of the value of this role, an informal meeting of personnel involved in regional aerial surveillance issues has been convened annually since 1992. The 10th Regional Aerial Surveillance Meeting took place at Honiara, Solomon Islands on 12 March 2001 involving Australia, France/New Caledonia, New Zealand and the FFA Secretariat. The US National Marine Fisheries Service participated as an observer.

Utilising industry sources and periodic reports from observers, FFA is well placed to identify areas of primary interest for aerial surveillance. This has been used to good effect in the last few years resulting in several significant settlements for infringements reported during aerial surveillance flights.

The majority of the surface patrol vessels operational in FFA member countries have been provided as part of an Australian Defence Cooperation initiative, the Pacific Patrol Boat Programme, which was announced at the 1983 South Pacific Forum Meeting. Under this Programme, vessels, spare parts, training and technical assistance have been provided to enhance the capability of island nations to detect and apprehend vessels operating illegally within their respective EEZs. Since 1983, 22 vessels have been built and provided to 12 FFA island member countries under this Programme.

FFA's MCS Division, principally through the position of Surveillance Operations Officer, liaises with Maritime Surveillance Advisers based with patrol boats in FFA member countries and with FFA's Surveillance Contacts in each member country. FFA's Manager Monitoring, Control and Surveillance and the Surveillance Operations Officer actively participate in the annual conferences of Maritime Surveillance Advisers.

The FFA member countries' vessel monitoring system (FFA VMS) - position and catch reporting

In 1988, a regional meeting of fisheries surveillance officers from FFA member countries discussed the possibility of using satellite technology to enhance other compliance measures used by FFA member countries in their respective EEZs. From those early discussions that were reported to the FFC, the concept was developed by the FFA Secretariat in collaboration with fisheries officials from FFA member countries, into a FFA VMS Business Plan.

The FFA VMS Business Plan identified two main business problems, namely illegal fishing and mis-reporting and/or under reporting of catches of tuna in FFA member countries' Exclusive Economic Zones (EEZs), that total approximately 30 million square kilometres of ocean. Once developed and discussed with FFA member countries, the business plan was then used as the basis for engaging a contractor to build the FFA VMS. On 17 March 1999, the FFA Director signed off with the FFA VMS contractor, signifying that the contractor has delivered the FFA VMS as required.

To complement the technical development of the FFA VMS, two legal workshops involving legal and Monitoring, Control and Surveillance officers from FFA member countries have been held to discuss the legal under-pinning of the system. The FFA Secretariat has assisted several member countries in the development of national FFA VMS legislation.

The FFA VMS provides the FFA member countries with a cost-effective tool to enhance other measures in place in their EEZs to ensure fishing vessel operators comply with national fisheries regulations. The system has been built to exacting standards and has been rigorously tested to provide the functionality required by FFA member countries.

Though the FFA Secretariat provides technical, administrative and management support for the FFA VMS, the FFA member countries have agreed that they will be individually responsible for informing their bilateral fishing partners about the timetable for implementing the FFA VMS in their respective EEZs. Vessels applying for licences to fish in the EEZ of a particular FFA member country may be advised by the national licensing authority that a pre-condition of obtaining a licence is that the vessel must first be registered on the FFA VMS Register. The decision to require a fishing vessel to register on the FFA VMS Register is therefore the responsibility of FFA member countries, not the FFA Secretariat. There are currently over 570 vessels of all types being tracked by the FFA VMS.

Definition of Maritime Jurisdictional Limits

The entry into force of the United Nations Convention on the Law of the Sea of 10 December 1982, on 16th November 1994 has placed additional pressure on FFA member countries to accurately define their various maritime limits. Under UNCLOS coastal States are required to provide the United Nations with either charts or a list of coordinates defining outer limits. Due to limited resources, in terms of funds and survey and cartographic expertise, and the fact that the production of charts is a long-term expensive option, most South Pacific States will opt, in the first instance, to produce a list of coordinates.

In recognition of the importance of accurate maritime jurisdictional limits information to fishermen and surveillance personnel, the FFA supports a regional programme which has the objective of defining those limits for all member countries. Throughout 2000, the Agency's Maritime Boundary Delimitation project continued to assist member countries in the technical aspects of the determination of the maritime zones and limits, including preparations for negotiating the delimitation of maritime boundaries, the provision of appropriate geographic databases and maps, and training related to these various activities. During 2000, the Maritime Boundary Coordinator conducted fieldwork in Marshall Islands and Vanuatu.

In 2001, the Maritime Boundary Delimitation project will be transferred from the FFA Secretariat to the South Pacific Applied Geoscience Commission (SOPAC) based at Suva, Fiji. Although it will have a new location, the project will continue to provide assistance to FFA member countries.

Conclusion

The FFA member countries are well placed to be able to generate significant economic benefits from the rational utilisation of their tuna resource. In order to realise this potential, the member countries of the FFA have worked harmoniously over a period of 20 years to gradually establish effective administrative controls for exploitation of the resource. This has been facilitated by working towards the implementation of effective means for monitoring, control and surveillance throughout the western and central Pacific, at both regional and national levels.

Although there remains much to be done if FFA member countries are to secure full control over use of the valuable tuna resource of the region, building on existing cooperative arrangements through the adoption of new surveillance and monitoring tools, such as the FFA VMS, have provided a sound platform from which the FFA member countries can become more directly involved in the management of the fishery. Where in the past exploitation has been dominated by foreign fishing fleets, in the future, domestically-based fleets will dominate the fishery thus ensuring that a greater proportion of economic benefits accrue to the resources owners themselves.

CHAPTER 6:

MCS OPERATIONAL PROCEDURES

It is intended in this section to look at some actual processes and core points for coverage in MCS operations, that have been used with some success in various parts of the world. The section will touch on licensing, data collection and components for the system, boarding procedures, catch verification, navigational positioning, inspection procedures in port and at sea, transhipment verification, planning patrols, evidence gathering and handling, and prosecution procedures.

6.1 Licensing

The importance of licensing and its potential use as a mechanism for recovering a resource rent was noted earlier in the paper. The use of the licence in the field has however, not been addressed. Other than vessel marking and identification, the licence is the first thing the MCS officer requests when he/she boards the vessel. Licences are normally issued in respect of the vessel, the individual fisher and the fishing gear to control all three aspects of the fishing enterprise. The licence is the field document that verifies the vessel identification, the fisher, and tells the officer the fishing rights and privileges of that vessel, its area of operations, its authorized fishing gear and often, the species permitted to catch and sometimes, how much (quotas and ITQs).

As the primary initial document inspected in the field, the licensing data for the MCS Officer needs to be up to date at all times, further, it must apply to all fishers and vessels. Many countries do not require licences for sustenance or artisanal fishers. Failure to license, or register[135] these individuals creates a major gap in the data system for stock assessment and also for management. It is recommended that artisanal and sustenance fishers be registered. It is further suggested that the registration and licensing system be networked to a national system for both management and stock assessments. It is a process that, with appropriate controls and integrity of the responsible officers, can be devolved to regional, provincial or field offices.

A second problem often encountered in licensing of fishing vessels is the involvement of a second agency, e.g. transport, harbours, Coast Guard, etc., and without a very close and tight inter-agency mechanism this usually creates confusion for the fishers and results in errors. Another concern, is the idea of licensing only mobile fishing gear and not licensing all fishing vessels carrying this gear. A final concern is the lack of controls and licensing of vessels and fishing gear that fish outside national EEZs. Not only does this create serious gaps in the data for management of the resources and knowledge of the viability of the fishing fleet but a State which fails to exercise control over the activities of national vessels fishing in areas which are not under the jurisdiction of the flag State

[135] For the purposes of this document it is suggested that licensing of sustenance fishers be without a fee of any sort, at least initially until the benefits of such a system become apparent, **and that this process for sustenance fishers be called registration to differentiate between the licensing and the payment requirement.**

may be in breach of its obligations under international law. As discussed in Chapter 4, the 1982 UN Convention, the UN Fish Stocks Agreement, the FAO Compliance Agreement, and the Code of Conduct for Responsible Fisheries all require flag States to exercise varying degrees of control over the fishing activities of their vessels.

An item very closely linked to licensing is the vessel marking and identification of the vessel. The rapid visual identification of a fishing vessel is a requirement for all surveillance activities; satellite, air, or sea. The first institution to propose international standard specifications for a vessel identification and marking system was the FAO in the mid-1980s.[136] This system based its markings on the International Telecommunications Union (ITU) Radio Call Signs (IRCS) that are unique for each vessel. The size and spacing of each mark is dependent upon the size of the length of the vessel. The location of the markings requires highly visible locations on the sides of the vessel, and the top of the wheelhouse for air identification. Advantages are for both control mechanisms and also for rapid identification for safety-at-sea.

This system did not meet the needs of all coastal fisheries. Consequently Malaysia, a federal country with well-developed MCS systems, has adopted a system to rapidly indicate the Malaysian state in which the vessel is registered by colour coding on the wheelhouse land, the operational limits of the vessel by a highly visible zone mark or either side of the wheelhouse, and the vessel's number (which also identifies the state). In addition, a metal disk with a state marking is hammered into the bow post of the vessel and a tin plate with the Fisheries crest and special identification number for the vessel is affixed to the bow post with non-removable nails. Details of these two systems are presented in Annex G and a summary of the Malaysian system is included in Box 7.

Box 7

THE MALAYSIAN MCS SYSTEM

Malaysia is a federation of 13 states comprising two distinct regions; Peninsular Malaysia, and Sarawak and Sabah. Malaysia has a total land area of 329,758 sq km (127,320 sq miles) and an EEZ of some 475,600 sq km, or more than 1.5 times the land mass. The total population of Malaysia is approximately 21.5 million (1996 official estimate).

Malaysia' fisheries contribute approximately 1.54% of the GDP, but are considered an important source of protein for the country with a production of some 1.2 million tonnes at a value of Malaysian Ringit 3,840 million (US$100 million), with 90% coming from the marine fisheries. Only 18% of the total fleet operates with commercial fishing gear inside 30 nm, but it represents 60-70% of the total national fish production. More than 95% of the 34,000 registered fishing vessels operate inside 30 nm, and 80% of these are traditional vessels with gill nets, hook and line, and traps. The commercial vessels use trawls and purse seines. Only 600 vessels fish outside 30 nm.

In the early 1990's Malaysia took dramatic steps to gain control of its fishing areas: the overfishing; illegal fishing; the lack of timely fisheries data for sustainable planning and the enhancement of its fisheries management regime. There are no international agreements for fisheries inside Malaysian waters, but joint ventures are approved. The growing shortage of fishermen has resulted in a high dependence on foreign fishers to crew Malaysian vessels above 40 GRT.

The Malaysian MCS System is definitely the most progressive and successful in the Southeast Asia. They have:

a licensing and registration system that has met ISO 9000 standards with **all** fishers being licensed (including artisanal fishers);

a four zone (A-D) coastal and near shore fisheries management system linked to their vessel marking system;

a very clear vessel marking system for rapid identification of vessels using marks for zones, colour coding and a numbering system for provincial identification, and special trawler markings;

a marine park system for the protection of nursery areas;

[136] Endorsed by the FAO Committee on Fisheries in 1989, and recently updated in 1999.

approximately 100 patrol vessels of various sizes;
a formal inter-agency mechanism called the Maritime Enforcement Coordination Committee (MECC); and
a pilot VMS system to control their domestic fleet and address incursions and illegal fishing by foreign vessels.

Foreign vessels that contravene fisheries laws are dealt with quickly and in a strong deterrent manner. Offences are usually punished by confiscation of vessels and gear and by fining the master *and crew members*.

A summary of the challenges facing fisheries managers includes:
illegal (zone incursions) and overfishing in the coastal areas;
the need to update their legislative tools;
control of charter vessels;
reliance on foreign fishing crews to ensure the development of Malaysian fisheries;
enhancement of direct control and regular practice of inter-agency operations and cooperation;
destructive fishing practices, bombing and use of poisons
development and use of new MCS technology, e.g., VMS;
investigation and enhancement of regional cooperation initiatives for training, information sharing, control mechanisms, etc.;
enhancement of training and career planning for MCS Staff;
involvement of the stakeholders in the management exercise;

Malaysia is working on all these issues and promoting regional co-operations in fisheries management with regular meetings with Thailand, Indonesia and the Philippines.

6.2 Data Collection

In the case of **data collection** (the monitoring side of MCS), fisheries officials should become involved in establishing the fishers' licensing information, and the vessel registration systems, and as well as the catch or effort monitoring system. The fishers and vessel monitoring databases, whether manual or computerized, will create an initial census of fishers in the country, domestic and foreign, if the latter are permitted. The fisher information usually includes the name of the fisher, home address, age, experience in years and type of fisheries, whether fully or partially dependent upon the fishing industry, position in the fishing industry as a vessel owner, operator or crew member, and sometimes, a general average income from fishing. Further monitoring information by fishing trip, if included, is intended to collect and cross check fish catches, broken down by species and weights, area of fishing activities, time of fishing, and finally, the returns from the fishing activities which can be used to calculate the efficiency of the fishing unit.

Vessel registration is intended to capture data which can be cross-linked to the licensing system, such as the description and size of the vessel, home port, call sign, where fish are landed, catch capacity in terms of hold and fishing gear type and capability, experience and efficiency as a fishing unit, the age of the vessel, and equipment including communications, navigation and fishing gear, and processing capabilities, if any. The potential for regional and other international cooperation on developing and implementing standards for vessel registration have already been noted, e.g. common terms and conditions for FFA Foreign licensing.

This census of fishers and vessels active in the domestic fishing fleet needs periodic updating, a task that can be facilitated through annual licensing procedures and appropriate report procedures during the fishing season.

Most of this information is used to ensure that the fishers and the fishing units act in conformity with the agreed fishing plan, but it is also used by the fisheries biologists to assist in stock assessment exercises. Fisheries economists and sociologists can use the

information to determine the importance of the fishery to the national and community economy. The sociological and demographic profile of the fishers and their communities can also assist with the enhancement of their social and economic position and to provide support facilities where needed. Infrastructure, communications and data networks, is needed to support these data collection.

6.3 Fisheries Patrols

Integrating the use of information from different surveillance methods (e.g. land patrols, patrol vessels, aircraft and satellites) results in a more cost-effective operation. For example the information from satellite imagery and VMS, especially for larger vessels, will allow one to target air and sea patrols to areas or vessels of concern as opposed to random patrolling. All patrols should commence with pre-planning, a briefing of key participants to ensure that there are no surprises, the actual patrol, and a de-briefing on completion, with appropriate documentation for record purposes, or follow-up action, and lessons learned as required.

Land patrols up rivers and along lakes and the coast can be effective if focused on fishing activity, areas of illegal activity or zones where the fisheries resources are particularly vulnerable to over-exploitation by licensed and non-licensed fishers. Coastal areas, where domestic fishers operate and can be seen from land, can be watched for incursions by larger vessels not authorized to be in the area. This information can be relayed to coastal sea resources for action as appropriate. Use of coastal radar if available, for these coastal patrols will enable better planning, risk assessment and again, targeting of resources.

Air patrols to target focused areas or vessels identified by other means, e.g., VMS or satellite imagery, are most effective if this prior information is shared with the air surveillance unit, or at least the fishing areas denoted by season and species are known in advance. Random patrols are less cost-effective than directed patrols. The endurance time of the aircraft will determine how many priorities can be addressed in a single patrol. The aircraft crew should be briefed on the patrol area, provided with a summary of the vessels and their markings and the expected activity in the zone, as well as the priority activities for surveillance. If possible the patrol aircraft should link directly to the VMS system cross-referenced with its own radar in order to increase the flexibility and effectiveness of the patrol. Aircraft burn more fuel at low altitudes, consequently a high transit to the patrol area is recommended for both fuel efficiency and to increase radar coverage, plus this strategy increases patrol time on station. Priority areas could include: closed areas; zones to prevent incursions of offshore vessels, and areas of heavy fishing concentrations where non-licensed vessels may hide during fishing operations. If stocks migrate close to the edge, or beyond the fisheries waters of the State, foreign offshore vessels may be tempted to follow the fish into the EEZ if they believe the risk of detection and apprehension is small. The new VMS, satellite imagery, and radar technologies, and air surveillance can provide the front line information for more effective deployment of other more expensive resources, such as offshore patrol vessels.

Coastal patrols at sea are most effective if smaller patrol vessels can be pre-deployed to areas of fishing concentrations and operate from a base in this area to provide a timely

response to fisheries conservation needs. In this manner, the patrol vessels can shadow the coastal fishing fleet. The presence of a fisheries patrol vessel can also contribute to fisher safety, but this can be abused[137]. In some areas the use of coast watchers and reef watchers from the community has increased community involvement in the management and MCS process, and has strengthened joint stewardship, or co-management of the resources between the government and the communities.

Offshore patrol vessels are usually the most expensive of patrol assets, but are necessary for actual apprehension operations. It is most cost-effective if these assets can be targeted to trouble spots. More cost-effective is the possibility of using diplomatic channels to bring the vessel to port, but this may not always be possible without greater international pressure than that which a single State can exercise.

It is obvious that each patrol vessel should have the necessary accoutrements to carry out assigned duties, e.g., clear identification that it is on government service, clear MCS officer identification,[138] copies of regulations, inspection gear, including a handheld GPS if possible, communication and safety equipment. A summary of points to consider prior to the patrol up to the decision to board the vessel follow in the box appearing below.

1. PRE-PATROL BRIEFING

- Current Status of Activities
- Objective of the Patrol
- Area of the Patrol
- Tolerance level, if any
- Expected Duration of the Patrol
- Rules for USE OF FORCE/Rules of Engagement (Protection only)
- Expected Boarding Type – routine/opposed or hostile, etc.
- Stress Safety & Back-up
- Communications – Call Signs of Participants, Frequencies for monitoring and safety (HF 2182 Mhz and VHF Channel 16)
- Special Instructions for particular situations or patrols
- Questions from the Patrol Vessel crew

2. PRE-PATROL CHECKS

- Navigation equipment – radar, GPS, echo sounder, charts, DF
- Ship's logbook open and duly noted for the commencement of the patrol
- Radios for ship-to-shore, boarding boat and boarding team[139]
- Boarding boat, life jackets, binoculars, rifle, hand guns, flares, boarding flags
- Boarding team
- Boarding equipment (net gauge, Fishery Officer ID, fish ID cards, boarding queries translation cards, papers – boarding reports/arrest reports, notebooks with numbered pages, carbon paper, pens, pencils, gloves, weather gear, etc.)[140]

[137] There have been cases where fishers took turns to raise safety concerns to get a tow from the patrol vessel, thus putting the latter out of the patrol zone for a period while all the remaining fishers fished in a spawning area.

[138] It has been found that in many countries, Fisheries Officers are not issued appropriate identification cards and rely solely on their fisheries hats or uniforms to identify themselves as MCS Officers with powers in accordance with their Fisheries Acts. **It is strongly recommended that all fisheries MCS Officers be issued a picture identification card for their duties and this be so described in the appropriate legislative instruments.**

[139] Radios are essential for operational communications of events and note taking onboard the patrol vessel of reports, as well as for safety reasons.

- Raise international fisheries pennant to show that you are on a fisheries patrol

3. SIGHTING THE TARGET

- Confirm sighting
- Check position
- Identify the vessel
- Call the fishery officer to discuss the type of expected boarding
- Call the boarding team for the boarding briefing
- Move into a boarding position as soon as the boarding team is prepared to board
- (ensure that the boarding team is prepared prior to moving close to the target vessel so that the boarding is very closely following the announcement of a boarding – this to prevent time for the fishing vessel to destroy evidence of an infraction)
- Call the vessel and notify her that you intend to board
- Raise the "SQ3" signal flags (heave to, I will board you), and/or the "Lima" flag (stop your vessel)

6.4 Boardings

The decision as to whether it is safe to board due to weather is that of the master of the patrol vessel. The fisheries officer is the leader of the boarding team and as such it is the officer's decision whether the boarding party will actually board a particular vessel. On fisheries patrols there should be no doubt that the vessel is for support of the fisheries activity, and hence the senior fisheries officer is in operational command of the patrol, e.g., where it goes on patrol etc., while the Captain is responsible for the safe operations of the vessel and crew.

The fisheries officer should ensure that notes of observations of all activities on the vessel to be boarded and responses to communications are made from the moment the vessel is sighted. These observations may prove very useful if there is an alleged violation and can assist the prosecutor in successfully prosecuting the case. Dates, times and events should be recorded faithfully by designated fisheries staff and boarding personnel both in the boarding team and onboard the patrol vessel.

Many countries practice the direct boarding technique of bringing the patrol vessel alongside the fishing vessel and boarding from this platform. This is not normally recommended as it places the patrol vessel and the entire crew at risk for this process instead of only the boarding party. As noted earlier in the report, a small boarding boat, to carry the boarding team is recommended as this leaves the larger patrol vessel in a position to cover and provide safety to its boarding party.

Linguistic differences tend to pose an initial concern for both fisheries officials and foreign vessel masters. There are two common solutions to this problem; one is to require the use of reports, logbooks and such that are issued by the coastal State, in the language of that State. The responsibility then rests with the international partner to translate the information. In addition, some countries and regional organizations obtain copies of the relevant reports,

[140] Notebooks for boarding team with numbered pages and the patrol vessel logbook are two of the most important documents that will provide data of the events for possible future court action. Note-taking is an art that should be initiated early in any MCS training and continued throughout each boarding. *Remember to: (i) use the notebooks only for official business; and (ii) cross out any errors with one line and continue writing, do not remove any pages from the notebook as it gives the court the impression of possible manipulation of evidence.*

logs and documents from the international partner and translate them for the State's officers. A further tool is a small handbook of questions in the various languages with a common numbering system so that the appropriate numbered question can be asked and shown to the fishing vessel master in his/her language. This procedure has been used effectively by many international fisheries organizations. It is also advantageous if there is a member of the boarding team who can understand the language of the master of the vessel being boarded.

A check list for pre-boarding, the boarding kit, and for the approach for boarding is set out below.

1. PRE-BOARDING BRIEFING

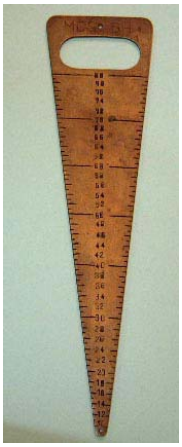
- Identification of vessel
- Weather and sea state
- Type of boarding – routine/resistance expected
- Boarding team and order for boarding
- Boarding team tasks – radio communications, security of crew, note taking on both the patrol vessel and boarding boat, search of vessel, etc.
- Communications – call signs and frequencies
- Security cover from the patrol vessel
- Boarding positions of patrol vessel and boarding boat for security
- Equipment checks
- Special instructions as are appropriate

Key is SAFETY, SAFETY, SAFETY

2. THE BOARDING KIT

There are several items that are required for a boarding, including, but not limited to:

- Acts and Regulations
- Fishery Officer Identification Card;
- Fish identification cards;
- Boarding Report Forms/Arrest Forms, Seizure tags and forms;
- Translation cards;
- Radios – (must be checked);
- Notebooks with numbered pages;
- Net gauges and standard weight;
- Gloves;
- Flashlight;
- Camera (with film);
- Tape Measure;



Net Gauge

- Safety equipment (lifejackets, flares, etc.)

3. FLAGS AND APPROACH

The "Sierra, Quebec, Three" flags are raised as the international flag signal "Heave to, I intend to board you". *Alternatively one can raise the "Lima" flag that indicates "stop your vessel" immediately.*

THE CRITICAL FACTOR IN BOARDING THE VESSEL IS SAFETY OF THE BOARDING CREW:

The boarding procedure should include the following steps:

- note-taking (this should have commenced on the patrol vessel immediately upon departing harbour, and have been continued in detail when it was decided to check a target vessel);
- checking both sides of the fishing/target vessel for any unusual activities;
- order the vessel captain to steer a course that provides a lee side for boarding[141];
- ordering the fishing vessel captain to gather his crew in a designated open space before boarding;
- positioning the patrol vessel for launching the boarding craft;
- launching the boarding craft and approaching from the leeward side of the fishing/target vessel;
- for routine boarding, placing the patrol vessel on the opposite quarter of the fishing vessel from the boarding craft to watch that side of the vessel for any untoward activities;
- placing the boarding craft on the opposite quarter for security, and to facilitate disembarkation; and
- the patrol vessel maintain security watch and checking communications regularly with the boarding party if nothing is heard from the latter.

6.5 Inspection Procedures

This section considers the actual *at-sea inspection* of the vessel. There are cases when the boarding team consists of the fisheries officer and an assistant, but these are rare. Generally a minimum of four persons should be in the boarding team. In cases when the reception may not be friendly, a full and equipped boarding crew (minimum of six persons) is advised. This would include: the fisheries officer, a navigating officer and an engineer with two or three crew. A possible check list follows for routine boarding procedures and steps for a boarding where there may be resistance.

1. ROUTINE BOARDING[142]

- Radio check prior to departing the patrol vessel and again on gaining access to the fishing vessel.

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[141] The master of the fishing vessel may communicate that he will complete hauling the net or other fishing operations prior to boarding. If boarding would result in potential loss of fish or gear, the fisheries officer should respect this request. The fishing vessel may stop, but experience has demonstrated that it is actually easier for the boarding boat and team to get on the vessel if the Captain keeps some way on the ship in the range of a few knots. It is possible to board comfortably at fishing speeds, but speeds above 10 knots become more difficult, even for an experienced team.

[142] An inspection focuses on data gathering for two purposes. The first is for surveillance of the fishing operations to determine compliance with the terms of the licence, legislation and approved fishing plan. The second is to gather data for the monitoring aspect of MCS and also for future fisheries management. The verification of the logbooks should be sufficient to reconstruct the fishing activities of the vessel since entry into the waters under jurisdiction of the State.

- Senior fishery officer greets the crew and Captain, identifies him/herself, asks the Captain for identification, and explains the inspection process.
- One of the boarding team meets and talks with the Observer as soon as possible on boarding, if an Observer is on board.
- *The note taker records time and all events and reports these to the Patrol Vessel where they are entered in an appropriate logbook or daily record of events.*
- Check vessel position from Captain and check vessel navigation equipment.
- Check vessel documents (licensing, vessel documents, fish log, navigation log, engineering log, processing logs, etc. as appropriate to verify fishing operations).
- Check for transshipments and details of the operations.
- Check the fishing gear and fish catch on deck.
- Measure the net and check the mesh size if a net is on deck.[143]
- Check the fish storage areas and processing plant, if applicable, to get packing weights and conversion rates.
- Take pictures where possible of all events – net measuring, storage, fish verification, etc.
- Return to the bridge and complete the inspection report.
- Draw a line under the last fishing logbook entry, sign and date the log.
- Explain the report to the vessel captain and seek his signature on the form.
- Provide a copy of the inspection report to the Captain, including any comments from the Boarding Team and the Captain.
- If no major concerns, thank the Captain, and disembark from the vessel in the opposite method as boarding, e.g., boarding craft to leeward and depart.
- Always debrief the patrol and boarding team after the inspection, complete the documents and reports, and prepare for the next inspection.

Legal Net

[143] The method for measuring a net should be standard, at least by country, and acceptable to the courts where fisheries cases go to court. Assistance of the judiciary to establish these standards would be advisable. Common standards include:

a. measure with a standard, graduated wedge or an implement with a standard width and a standard, set weight for equal pressure on all meshes,
b. measure the net when wet, as it would be while fishing,
c. measure the mesh stretched between opposite corners,
d. measure several adjacent meshes (a minimum number should be set) and averaging the results,
e. measurement should be in the middle of the net away from any strengthening ropes.

2. BOARDING WITH VIOLATION

- Note taking is extremely important during these events for court preparation and processes.
- Tag and secure the evidence where it can be guarded or secured against tampering.
- Complete the inspection.
- Complete the inspection report and note the infraction to the Captain.
- Report the event and time to the patrol vessel.
- Request the Captain to return to port for further investigation – if he refuses, order him to do so (the necessary authority to do so must be set out in the Fisheries Legislation).
- If the Captain still refuses, bring additional crew to the vessel, conduct arrest procedures, remove the Captain from the vessel, and bring the vessel to port.

  (Remember that upon removal of the Captain, the Patrol Vessel has immediately assumed full responsibility for the safety of the fishing vessel, equipment and crew safety).
- Maintain security of the vessel and crew during the trip to port.
- Notify the Base of the incident and planned action.
- Ensure the appropriate persons are prepared to meet the vessel on landing to take charge of the Captain and crew and secure the vessel, e.g., Legal, Police, Foreign Representation, etc.
- Secure the evidence on shore (including pictures), complete the documents to charge the accused and to bring them to trial and those for the court case.
- Debrief the Base Commander and Legal Officer and arrange for witnesses for the court hearing.

3. BOARDING WITH POTENTIAL RESISTANCE

This is NOT intended to be an aggressive action – it is planned with the sole purpose of protecting your crew and still enabling them to carry out their duties.

- During the Pre-Boarding Briefing - stress safety.
- Carefully detail the boarding approach.
- Detail boarding teams duties and check all equipment carefully, especially radios for each of the boarding teams.
- Do not board until the vessel is stopped and the crew are in a visible position on deck.
- Division of boarding team into three teams of at least two persons each:

  1. Team 1- bridge control and security
  2. Team 2 - crew security with team 3
  3. Team 3 - vessel search and inspection, after assisting with crew security

  (**Note:** Additional to other boardings are the issuance of firearms – this is not done without training).
- Boarding Order: Team 2 to secure the boarding point; Team 1 to the Bridge; and Team 3 to assist Team 2 in the crew personal security search;
- Team 2 crew security; Team 1 secures and reports control of the bridge; Team 3, when completed crew search, conducts a vessel search – REMEMBER SAFETY, SAFETY, SAFETY!!!

- If all secure, the options are to complete the inspection as planned and take action as per the routine boarding, or to take the vessel to port, or to arrest the Captain as appropriate according to the situation.

NOTE 1: It may be that the Boarding Party finds no resistance on boarding and that the Captain just did not understand what was happening, this is in itself no reason to arrest the Captain, but a written warning in the fishing vessel logbook might be appropriate. The onus is on the Senior Fishery Officer to revert to a modified routine boarding or continue in a hostile boarding mode as required, but it is still essential that the boarding teams continue their security duties.

NOTE 2: *Remember again* - Arrest at sea signifies a transfer of the vessel and crew safety responsibilities to fisheries personnel and the liability aspects of this should be a consideration before taking this action.

NOTE 3: Note-taking and debriefing sessions are particularly important at all times, **but they are essential** for all alleged violations and hostile boardings.

NOTE 4: Boarding with firearms requires special training in safety and security precautions – remember these firearms are for the safety and security of your own boarding team and **not** for active aggressive action towards non-hostile fishers.

In several countries it is noted that even for the larger, near-shore vessels (defined as those licensed to fish outside 3-5 nm) fisheries officials do not require vessels to carry logbooks, nor do they complete inspection forms. It is recommended that logbooks be issued to all vessels, especially those engaging in commercial activities, and further that inspection forms be completed for each inspection. This has a number of advantages. Firstly, the fishing captain can then show another officer when the vessel was last boarded and the results, thus possibly shortening the inspection time and potential interference to fishing operations. Secondly, all actions by the officer can be recorded and directions can be noted in the logbook, i.e., no verbal warnings are given and each officer can follow-up on the direction of a previous boarding officer. Thirdly, this permits a record to be kept of the compliance history of the vessel and master and can then facilitate operational patrols by concentrating on those vessels or fleets with a poor record of compliance.

6.6 Verification of Catches

One of the challenges of inspections when the management strategy is based on catches and quotas is the *verification of catches*. There are many different aspects to this process, the first being the type and processing, or product form of the fish in its final storage. It may be seen as a simple matter of counting boxes, but in a large fish hold with a capacity of 500-700 metric tons of product from several species, the task can be onerous. In most cases, verification of catches becomes a mathematical problem.

The independent and accurate estimation of total catch by species on a set-by-set basis is the fisheries officer's/observer's most basic and important function. Often information from these estimates of catch composition provides the only reliable estimate of removals from the stocks. Traditional recording methods, such as logbooks, often fall short of recording all the data such as culling, dumping or discards.

Catch estimates must be both independent of those derived by the captain of the vessel and as representative as possible of what is occurring in the specific fishery. Domestic vessels, the catch of which is offloaded in a domestic port, are much easier to verify than a large

offshore international trawler. Measuring techniques appropriate to each country can be assessed using various sampling methods on domestic vessels and verifying them against weigh-outs on landing. The following provides a few general methods in use today that may be considered.

Estimation of total catch of trawlers

While a direct weighing is the best verification of the amounts caught, it proves impossible for most fisheries due to the large catches involved. A number of estimating procedures have been developed to verify the total catch. The two basic methods commonly used on trawlers are:

- observation of the catch in the codend; and
- volumetric calculation of fish pre-processing holding bin capacity.

There are two additional methods to both provide the estimates of the total weight and to verify the previous estimates of total catch:

- volumetric calculation of fish hold; and
- use of production figures.

These methods are further explained below.

1. Observation of the catch in the codend: An estimate of the total catch may be obtained by knowing the capacity of the codend and approximating the percentage of it filled with fish, by taking a volumetric measure of the catch in the codend, or by breaking the codend into smaller volumes to estimate these sections. The rough and ready estimate comes from a visual calculation. Vessel masters usually place the lateral strengthening ropes on their trawls at stress points along the cod end. These relate to a very rough approximation of one and one half to two tons of fish per strap when the cod end is full, depending on the species and size of fish. This gives the fisheries officer a visual estimate before asking the vessel master for his figure. This visual method is the roughest and most inaccurate for estimating catches. The sampling of smaller sections of the codend usually yields the best results.

A basket, of known volume and weight, should be used to take samples of the fish in the codend. The vertical strengthening straps divide the codend into a number of sections. Each section should be broken down to an estimate of the number of sampling baskets (of known volume/weight) of fish contained therein. Due to the tendency for fish to pack more densely in the after section of the codend, each section of a codend should be treated separately. For smaller catches, the number of sampling baskets for the total volume of the catch in the codend can be estimated. Thus, the estimated number of baskets should be multiplied by the average weight of fish per basket, allowing for the variations in catch densities.

2. Volumetric calculation of pre-processing holding bin capacity: Catch is usually stored in holding bins, or bunkers prior to processing. This presents an opportunity to verify the initial estimate obtained by viewing the codend.

The volume of the bunker has to be determined and multiplied by the density of fish to calculate the capacity (the density of fish can be easily calculated using a small container/sampling basket). Once the bunker capacity is known, the amount of fish in the bunker can be determined by estimating the percentage of the bunker filled with catch.

3. Capacity of fish storage hold and use of production figures: The capacity of the storage area can be used to verify the initial estimates. The total fish hold capacity can be obtained by interviewing the captain, or from ship's drawings and previous inspections.

Estimating techniques vary considerably, depending on whether the fish storage is wet or dry. If it is dry and the fisheries officer can get into the hold, it is a matter of sampling the fish, probably frozen, in the boxes for product form and averaging weights of the product in the boxes. This should be done several times for each species and the box weighed separately for later subtraction of its weight. If possible, the number of boxes should be counted and the weights calculated using the average for each species. If it is not possible to physically count all the boxes, the vessel drawings should provide enough information for the officer to estimate the number of boxes in the hold using a simple mathematical formula to compensate for the vessel contours.

This estimate can be cross-checked against the number of boxes the storage manifest states there should be in the hold. The actual content by species will be very difficult to obtain without a physical check; consequently the storage manifest, or log, may be the only documentation available to address this point. It should be remembered that the purpose of a random sample and catch estimate is to assure the officer that the documents are accurate. An estimate will undoubtedly result in a difference from the records and the actual numbers of boxes in the hold, but it should be within an acceptable percentage of that in the records. Conversion rates (discussed later) will be required for estimation of processed fish.

If the species has been wrongly noted in the log, it will be difficult to determine, but if the officer checks a random sample of the labels on the boxes, and where possible the product therein, it may be possible to ascertain if there is any misreporting. If misreporting of catch is found, it is grounds for the vessel to be brought to port for further investigation.

Assuming, however, that hold measurements and access to the hold are possible, the production log and storage logs become further checks as to the estimate in the hold. On factory-type fishing vessels, the units of production (i.e. boxes) from a specific set can be tabulated, multiplied by the unit net weight and converted to round weight to check the accuracy of the initial estimates. The production log should note the fish processed to the current date and the storage log should note the fish boxed and stored in each hold. It becomes a matter of calculating the daily totals for the period, cross-checking these against each other and the estimates in the hold to verify if the records seem to be reasonably correct. It should be noted that the processed weight/production figures, using this method, are being used to verify the initial estimates of the retained portion of the catch. It does not include the weight of non-targeted fish and offal discarded.

Catch estimation for other fisheries and product types

Other fisheries, using different gears, may necessitate a totally different approach to catch estimation. Below is a brief description of procedures used to estimate the catch in longline and purse seine fisheries.

1. Wet or salt fish: The estimates for wet or dried fish such as salted fish, are very difficult to obtain due to variances in the types of salted fish; light salted and heavy salted. The duration of the catch in the salt, density, and also hold capacities again come into play in these estimates. Some countries have attempted different methods for these estimates using volumetric methods, salt densities and hold conversion factors. Canadian fisheries officials have developed a computer programme for estimating salt fish in the hold of a vessel.

2. Longline fishery: The nature of this operation does not allow one to see the entire catch at once. Fish are coming on board individually and the number of fish may be easily counted and multiplied by the average weight of fish (determined through sampling) to obtain the estimation of the total catch of the species. Occasionally, the fish are stored in a holding pen on deck before processing. This gives an opportunity for volumetric calculation.

Some longline fisheries (e.g., tuna, shark) present an opportunity to weigh all fish caught, provided appropriate scales are on board. In the absence of those, other vital measurements such as fish lengths can be obtained and translated into corresponding weights using tables.

The estimate of the weight of large fish that are frozen whole, such as tuna, is very difficult to obtain due to the variance in the size of the fish and the storage. A sampling of the fish can produce an estimate for extrapolation, but these estimates are very rough. The best figure one can expect is from the landing weights and through a cross check of the fishing and storage logs.

3. Purse seining: In the case of wet fish storage, such as refrigerated circulating sea water (CSW) systems for herring as an example, several methods have been used. Herring, and possibly other fish, have a tendency to move to the bottom of the tank in a CSW system. One method is to drain the tank down to the top level of herring and dip the herring to see how much is left. This can be time consuming and the water has to be replaced to assist in offloading, as the herring are pumped ashore to prevent damage to the fish.

A second method is to weigh the herring as it is removed from the vessel after draining, but this is not always possible if the inspection is at sea, or in a port other than that designated for offloading.

A third method designed in cooperation with herring seiner captains themselves is most common. This method requires a pre-season calibration of the fish hold with the vessel in a stable, upright position. Marks are then placed on the bulkheads of the hold to indicate the level of water and fish in the space. These marks are then equated, through pre-set volumetric calculations using a common fish density, to a calibration card that provides an estimate of the amount of fish in the hold. This method requires the fisheries officer to check the fore-and-aft trim of the vessel as well as the list. The vessel master then attempts

to bring the vessel as close as possible to an upright position, possibly by swinging a boom or pumping and flooding tanks. The officer then takes a weighted tape attached to a large screen apparatus and lowers this into the holds until the screen rests under the water on top of the herring. The readings on the tape and the hold calibration table are then used to provide an estimate. This is done at least four times in each hold and then averaged. This dipping process is simpler than other methods and has received support from the industry as it is timely and easily carried out without considerable input from the master or crew.

Estimation of catch composition

While estimating total catch is not an easy task, an accurate determination of catch composition may present an even bigger challenge. The following four basic methods have been developed to derive a breakdown of catch by species:

1. Actual weighing of the catch by species: This method can be utilized for small catches or with small amounts of by-catch species present in the total catch.

2. Extrapolation from the surface area occupied: This approach involves the estimation of the percentage of the known area (usually surface of fish as it rests in the bunker) occupied by each species in the catch. These percentages are applied to the total estimated catch to obtain the weight of individual species. This method should be used with caution, since some species may not appear on the surface, due to different densities.

3. Extrapolation from the random sample: A random sample is gathered from the catch and the estimate of the percentage weight of each species is made. This percentage breakdown is then extrapolated for the entire catch. This method has proven to be very effective for catches composed of fish of uniform size.

4. Monitoring the catch exiting the holding bin: This approach involves tallying an estimated weight of by-catch species exiting the holding bin. The figures are subtracted from the total estimated catch to arrive at the estimated catch for the major species.

Estimation by production category

Once an estimation of the total catch and its composition by species is made, the final estimation, by production category, is performed. It involves the determination of a round weight of species **retained** for further processing and round weight of species **discarded**. Discards, due to their rather limited amounts, may be accurately weighed. They have to be subtracted from the total species weight to determine the retained weight.

A final variable in the calculation for fisheries records is the conversion of the product form back to the round weight of the catch, for this is the figure to be used for determination of the total catch which has been retained. The conversion factor from whole fish to product form depends on the efficiency of the processing equipment. Sharp and well-maintained equipment, or experienced manual plant workers, can make a considerable difference in the conversion factor of the final product form.

The maintenance of the processing machinery can increase production by a significant percentage, and thus the conversion factor from processed to round weight will reflect a considerable difference in the estimate of fish onboard the vessel. If the factor for fillets is estimated to be 1.4, then 20 tonnes of product would convert to 28 tonnes of round fish. If however, the real efficiency of the plant is 1.6 for fillets, this same 20 tonnes of product becomes 32 tonnes of round weight, a significant difference. It is necessary to carry out such calculations to determine the catch efficiency of the vessel and to calculate the catch and effort and the portion of the quota caught by the vessel.

There are several variables in the rough estimation methods that must be noted. These include: the space occupied by the fittings in the hold, the space between boxes, the contour of the vessel bottom and estimates of capacity for storage of boxes, especially if they vary in size and weight. There is also the variance in the weights of the boxes themselves. The difficulty in determining the type of fish once processed, such as fillets, is another potential problem. These points are noted to emphasize that without offloading, it will be very difficult to make a completely accurate estimate. It is for this reason that the fisheries officer must use judgement when making the estimates, anticipate these variables, and consider the final figures carefully before making a decision regarding bringing the vessel to port under an allegation of misreporting. The latter creates a considerable loss of fishing time and cost to the large vessel fisher, and without justification, can impact severely on the credibility of the Department to carry out its duties effectively. The bottom line is *tolerance*. This may vary according to the circumstances at the time, the amount of fish onboard, the value of the fishery, the location of the vessel, the past performance of the vessel and master, etc.

6.7 Verification of Position

The *verification of the position* of the vessel is a key requirement for any fisheries sighting, inspection, or prosecution. Surveillance aircraft are usually equipped with highly accurate positioning systems, many linked to automatic photographic equipment that shows the position of the aircraft or target at the time the photograph was taken. This has been accepted in courts in some countries as evidence of the position of the vessel, provided evidence is led to prove the circumstances under which the photographs were taken, developed, and stored so that the court is satisfied that they have not been tampered with.

In the case of inspections at-sea, it is common procedure to take a position on the patrol vessel just before conducting the boarding. The fisheries officer should ask the vessel's master for the position of the vessel upon boarding, and if there is a variance, the officer should watch the master take another fix. If the officer is not satisfied, and does not hold appropriate navigation papers, it is recommended that an appropriately certified deck officer from the patrol vessel take a fix on the boarded vessel. Enforcement officers should be on the alert for subterfuges by the crews of vessels engaged in illegal fishing, in order to avoid detection or to create doubt as to the vessel's actual position at the relevant time in order to avoid being convicted in court. Some masters have removed a fuse from key navigation equipment, and have then claimed that the equipment is faulty. In these circumstances the enforcement officer should touch the equipment because if it is warm a court may be prepared to infer that it has been used recently. Another method is to deliberately re-calibrate equipment to give a false reading. Consequently it is recommended

that an appropriately certified patrol vessel deck officer take the fix on the boarded vessel if there is a discrepancy in readings from the position indicated just before boarding. This deck officer can then appear in court to give evidence of the position of the vessel if necessary. Today the inexpensive access to Global Positioning System equipment (prices being approximately US$250-US$1000) make the verification of the position of the fishing vessel easier and more difficult for the fisher to refute.

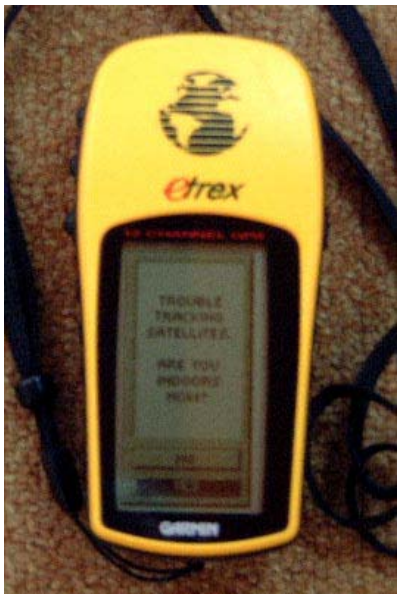
The requirements for VMSs on the larger fishing vessels will also provide very accurate positioning information for fisheries officers. VMS and satellite technology have been discussed earlier and are key emerging tools for the fisheries officers, thus reducing the need for random air or sea patrols. Noting that all vessels may not have such technology, it is incumbent on the fisheries officer to have a working knowledge of common marine navigational systems and techniques for fixing the position of the vessel. The officer must be able to detail the procedures used in gaining the position and verification of the position of the vessel and an accurate determination of the time of the fix. This will form the base for the verification of all the activities of the vessel while in the zone, and especially in the case of an alleged infraction of fisheries law.

Most larger vessels carry a variety of compasses, both magnetic and gyros; radars; satellite navigation machines; omega positioning gear; a sextant; direction finding equipment; echo sounders; fish finders and sonars; as well as navigation publications for the area. These pieces of navigation equipment and the observation of their use and status on boarding the vessel can be very useful in court proceedings. For example, one could note the course being steered upon first sighting the fishing vessel and check if it is the same as that given to the helmsman, the latter often being pinned to a board near the wheel. The radar on a very short range, one mile or less, could indicate searching for a transponder from a fishing buoy, whereas the safety range is 10 or 12 miles. The satellite navigator often provides printouts of positions over a period of time and can show where the vessel has been. Direction finding gear settings should be compared to the frequencies for the vessel's fishing buoys and cross-checked with the course being steered. Echo sounders and fish finders could indicate the presence of fish being chased and prominent markings could assist in the determination of the course of the vessel over a period. The charts and logs indicate positions, times when freezers are operated, engines run and at what speeds and temperatures, etc. These observations can all assist in building and supporting a prosecution if an alleged violation has occurred. Notations as to whether the gear was warm on arrival, signifying recent use, engines functioning properly on the return to port and navigation equipment suddenly working accurately could all be points to refute claims of malfunctioning gear and the master not knowing where the vessel was in the ocean.

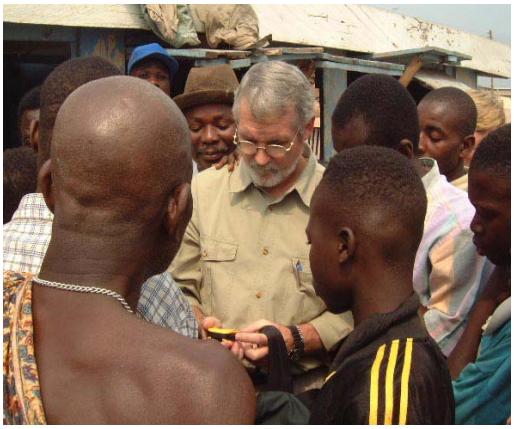
6.8 MCS Equipment

This section briefly discusses some of the newer MCS tools available on the market today. VMS is a relatively new and popular MCS tool that has come to the fore since the early 1990s. Digital technology has enabled most electronic equipment to be miniaturized thereby making it much more flexible to use, providing higher levels of security and reducing costs. This has made computers, cameras, telecommunications and even satellite technology more accessible to fisheries administrations throughout the world. Other

innovative advances that are now becoming more affordable include satellite imaging technology; the automatic integration of information into visual presentations through geographic information systems (GIS); and over-the-horizon radars. Other remote sensors and remotely controlled surveillance vehicles, although available, are usually beyond the budgetary limits of most fisheries administrations at present. This section concentrates on the popular VMS and satellite technology, while more traditional MCS equipment is covered in more detail in Annex B**.**



Hand Held Global Positioning System (GPS)



GPS Familiarisation for Coast Watch

in Mumford - Ghana

There is no one answer as to the equipment requirements for MCS as each system must be adjusted to the needs of the country and its fisheries priorities. Consequently the answers vary according to the intent and degree of commitment of the country involved, its geography, its fisheries and their value, the extent of external threats, etc. One can however provide estimates of various equipment and operating costs on a per unit basis for planning and budgetary purposes, noting that costs are subject to change due to demand and changing technology. Countries will need to determine the system best suited for them, and hence the number of units and combination of tools to develop an appropriate cost-effective MCS System for their country and fisheries. Inter-agency linkages and information sharing to benefit other agencies will always assist in justification of the costs of system development. It is suggested that a country assess its current infrastructure and marine resource situation prior to making commitments for new equipment, as MCS equipment is often expensive, both in procurement and in maintenance and operations.

The following list assumes that State's MCS staff members are familiar with the advantages and use of the various types of equipment noted below. If this is not the case, or if staff members are only partially familiar with the equipment, it is recommended that a feasibility study be undertaken prior to procurement of the equipment in order to assess

need, cost-effectiveness and viability for both the system and resource conservation in the country.

Annex B provides estimates for MCS equipment including:

- Air Surveillance options;
- Radar for coastal areas;
- Patrol vessels – coastal, and offshore (7-9, 17, 22, 27 m vessels)
- Safety equipment including:

  Radio Communications,

  Global Positioning Systems,

  Binoculars and Night Vision Equipment;

  Cameras – still and video;

  Flashlights,

  Vessel Safety Flares; and

  Solar electrical systems and generators for isolated locations;
- Office equipment;
- New technology:

  Vessel Monitoring Systems;

  Satellite Imagery; and

  GIS

A few words on VMS, satellite imagery and GIS are warranted prior to discussing the minimum MCS equipment requirements.

Vessel monitoring systems for fisheries appeared in the early 1990's. A VMS in its basic form is essentially a global positioning system (GPS) linked to a satellite communications transponder, with a small processor to poll the vessel automatically and pick up information on the vessel position, course and speed. In 1998, FAO looked at the three major systems available: ARGOS; INMARSAT and EUTELTRACS, and then formed a working group of specialists to summarize their experiences into guidelines for VMS for fisheries administrations. The 1998 FAO Technical Guidelines on Vessel Monitoring Systems[144] is by far the best guide for any Fisheries Administrator contemplating the introduction of this technology. *It must first be noted that VMS is a satellite tracking system that will only provide information on those vessels carrying the equipment, hence non-licensed vessels and all other vessels without this equipment will not be shown on the VMS.* However VMS is one of the better tools available to the MCS Manager to assist in monitoring vessels equipped with it.

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[144] FAO, *FAO Technical Guidelines for Responsible Fisheries, Vol 1 Supplement 1, Fishing Operations – 1. Vessel Monitoring Systems,* Rome, 1998.

Concerns in developing VMSs include:

1. the confidentiality of information provided;

2. preventing access to the information by third parties (i.e. how to maintain the security of commercially sensitive information); and

3. evidentiary admissibility (i.e. whether the information obtained from VMSs can be used in court).

Legislative measures to address these concerns are discussed in Chapter 4.

Features that are a concern to officials are similar to those mentioned above:

1. the security of the system:
2. whether or not the VMS is a tamper-proof system, or at least can record attempts to tamper with it;
3. the reliability of the system under all conditions;
4. the timeliness of data;
5. the back-up systems in case of onboard system failure; and
6. the existence of new features, which will be of benefit to fishing businesses.

The aforementioned FAO VMS Guidelines responds to all these concerns and notes that the system can be protected against tampering, or will be able to indicate that tampering has occurred; is reliable over 99% of the time; and back-up manual systems can accommodate system failures. The system, if appropriately setup during initial development, can automatically respond with alarms to alert the monitor to entry into closed areas or zones; can be polled by vessel, or fleet, e.g., FFA VMS system, and can respond immediately to position, course and speed requests. The automatic interval between common reports can be decreased down to a few minutes, but this will result in a corresponding increase in telecommunications charges. The VMS legislation should include the authority for Fisheries Agencies to establish parameters and acceptability of system components for their MCS system, e.g., Automatic Location Communicators on vessels so they are compatible with the designed system, etc.

Many new VMS features found in the more advanced systems have benefits for the fishing industry. These include: catch and effort reporting (electronic logbooks); weather reporting; and two-way communications for fleet management, marketing and trade; internet access; and two-way communucations for safety-at-sea. The use of sensors on equipment at sea to automatically monitor activities is another innovation being tested at this time. A key initiative, endorsed by FAO, is to try to find common message formats so that systems on vessels can be used in all regions of the world without the need for re-programming. A challenge for FAO and legal officers is how to get VMS data accepted by the courts as being generally reliable (i.e. unless proven otherwise) so that it can be used as primary evidence in court as opposed to supporting evidence as is now the case in most countries.

Satellite imagery available includes "optical/infrared" and "Synthetic Aperture Radar (SAR)"[145] technology. The latter appears more useful for fisheries, but until recently it was beyond most fisheries budgets. Satellite imagery provides a scanned image of an area in a time period and it does not provide vessel identification, **but** if used in conjunction with VMS it can rapidly point out those larger vessels that are not licensed fishing vessels, assuming that the latter are required by legislation to carry VMS. This then permits a focussing of MCS resources to identify these latter vessels and their activities. A further advantage of the SAR technology is its all-weather capability, thus increasing its popularity as the prices for the images decreases for the public market. It is expected that where MCS operations are expensive and a focused response is desirable this technology combined with VMS will become one of the key tools for monitoring the larger offshore vessels.

Geographic Information Systems (GIS) have the ability to rapidly transfer data from many sources to a visual image with flexibility to respond quickly to several different queries. It is an ideal analysis tool to address the myriad of MCS queries as to the status of activities and projections for fisheries management. The capability of GIS is limited only by the availability of information and funds to develop the system, and it will become the analytical tool for the future for both longer-term management and for immediate operational matters. However each system must be developed to meet the express needs of each country's fisheries administration.

6.9 Operational Infrastructure for MCS

The basic MCS infrastructure required for operations is discussed below:

National headquarters

A central headquarters near the departmental decision-makers for the co-ordination of fisheries operations is usually preferred. Ideally, this headquarters, would house the offices for the administration of fisheries, and the operations headquarters situated adjacent to the operations room.

A **central operations room** where the current status of the fishing operations can be shown through maps, plots and computerized equipment is recommended, e.g., VMS, satellite imagery, etc.. This centre would need offices and personnel, with communications to appropriate field offices and other enforcement agencies, and direct communications to the Minister responsible for fisheries. This becomes the situation briefing and de-briefing room when a sensitive fisheries matter arises. The Fisheries Administrator should thus have the capability, through the equipment and information accessed from this centre, to show the situation to decision makers and thus obtain authority for timely responsive actions. These centres can be staffed by as few as two or three persons trained in communications, computer access and display techniques.

The **communications system** would ideally have telephone and appropriate radio communications to all fisheries centres and mobile platforms in the field for both safety and control of operations. Some MCS systems also incorporate satellite communications into

[145] Ibid., p9.

their networks through two-way VMS, or simply communications satellites. The modern digital HF radio and data systems on the market today could possibly assist in minimizing costs without losing effectiveness and are an effective back-up system.

Computer data systems for licensing and vessel registration, data collection and analysis are now very affordable. There are several licensing and vessel registration systems in use today and it will be a decision of the Fisheries Administrator as to the system which will best meet the State's needs.

It is anticipated that the procurement of other major MCS equipment will be co-ordinated from the central headquarters to realize cost savings in bulk purchasing as well as the advantages for standardization for operational planning and maintenance.

A **land based option** for monitoring coastal, and in some cases offshore areas, is *radar*. Radar technologies include the more expensive over-the-horizon radars that permit surveillance from a land base to areas in the ocean far offshore, with the advantage of being able to direct expensive large patrol vessels to prime target areas. Inexpensive coastal radars can be utilized to protect coastal zones from incursions and are being utilized in Senegal and are being set up in key coral reef areas as a pilot project in Indonesia[146]. The advantage of these coastal radars is the potential for involvement of the local fishers in the conservation of their coastal zones through cooperation with fisheries monitoring systems.

Coastal Radar - Indonesia

The **air surveillance** requirements for MCS may appear expensive, but are still seen as one of the cheaper methods to receive rapid surveillance information with respect to fishing and fish habitat information. As a minimum, it is highly desirable to have a twin engine turbo-prop aircraft for over-sea flights for safety, endurance and to minimize maintenance costs. These aircraft should have common marine frequencies in their communications system to contact the patrol vessels directly from the air. The navigation system of the aircraft will

[146] The World Bank, ADB and AusAID Coral Reef Rehabilitation and Management Program, a US$263 million, three phased 15 year program is pilot testing coastal radar in Take Bone Rate in South Sulawesi and also in Padaido in Irian Jaya in the year 2001.

need to be accurate, for it will form the base for prosecution of area infractions. It would be desirable to have an endurance capability of 4-6 hours at economical speed. The speed for transit should be reasonably fast to maximize the time in the assigned patrol area, but the aircraft should be able to go slowly enough at low levels to identify and photograph fishing vessels. Photographic equipment for the recording of vessel activities is necessary.

More expensive air surveillance platforms are available. Additional equipment could include navigational equipment that can be used in combination with the photographic evidence for court purposes. Night photography lights and instruments for Instrument Flight Rating (IFR) flights are very desirable for surveillance purposes. Onboard computers linked to accurate navigation systems, communications systems, radar, infrared tracking, day and night photographic systems, and the capability to accommodate VMSs are now available, and can result in a technologically advanced air surveillance platform. This would however, be an expensive operational tool that might be inappropriate for the budgets of developing countries. The expense would be easier to accommodate through multi-agency or regional cooperation and shared use of the air surveillance equipment.

The choice and equipping of the aircraft will be dependent upon the cost of the aircraft and the selected equipment and the ongoing costs of operation and maintenance. The latter two factors are often lost in the considerations for air surveillance, but they are the most significant cost for the MCS air activities. Aircraft operations and lease costs can vary from a few hundred to thousands of dollars per air hour depending on the configuration of the aircraft and equipment. If at all possible, it is highly desirable to ensure that there is local access to appropriate training and equipment to provide long-term maintenance of the aircraft.

The added advantages of GIS has already been noted, and if it can be afforded is a recommended tool for MCS and fisheries management.

The **sea-going requirements** will vary considerably between countries, depending on the MCS strategy. The *offshore* fishery will require the largest, and hence the most expensive, sea-going platforms in the infrastructure for fisheries MCS. These vessels can range from deep-hulled trawler type vessels, to offshore oil supply vessels with helicopter landing facilities. The key in the choice is, again, the capital cost for the vessel and equipment and, equally important, the operating and maintenance costs. Large vessels, by their very nature, require considerable fuel and provisions to operate for extended periods at sea. It has been recommended that wherever possible the management strategy should attempt to keep the need for these expensive sea-going platforms to a minimum, but it must be realized that they are necessary for most traditional fisheries management schemes.

The primary concern when considering the acquisition or use of patrol vessels should be cost-effectiveness and affordability for the primary task of fisheries surveillance. One golden rule for cost-effectiveness is that the patrol vessels should have at least the same sea keeping capability as the fleet that they are monitoring. There may be a temptation to procure fast, expensive vessels; however, it must be remembered that the purpose of these vessels is to transport the authorized fisheries officials to the fishing vessel for inspection. Although a quick transit to the patrol zone may be desirable, this capability must be

balanced against the high fuel and maintenance costs for such machinery. There may be a requirement to be able to overtake a departing vessel where there are no other diplomatic arrangements in place to halt this alleged violator, but this capability should not overshadow the need for staying at sea and cost-effectiveness on a daily basis. No matter how well-trained the operator, fast patrol vessels tend to be operated near top speed making them expensive in fuel and maintenance, with long down times due to equipment wear and repairs. Economic considerations may also make vessel charters a viable option instead of purchasing these assets. In this manner maintenance, salaries, insurance and other costs become the concern of the contracting firm and not the government.

Most offshore vessels for fisheries would best be equipped with twin diesels of a dependable model, with trained engineers, up-to-date navigation equipment, radar, photography equipment and radio communications. The latter communications equipment should be at least as good as the equipment installed in inshore patrol vessels, preferably with back-up systems such as satellite communications, possibly computer linkages to the base and ideally, linkages to the air surveillance platforms. These vessels are intended as boarding platforms and their regular duties should not require them to be heavily armed assault vessels. As noted earlier, their primary role is as boarding platforms for the fisheries officer.

Coastal and nearshore patrol vessels do not need to stay at sea for prolonged periods and hence are usually faster craft for a rapid response capability. Smaller patrol vessels with one or two days sea keeping capability, or rapid response shore-based craft, might serve the purpose in this case. These vessels would be best equipped with a good communications system, and possibly a radar system. It is strongly recommended that for safety at sea, all patrol vessels have two engines, even if the second is a smaller engine. These patrol boats should have both marine radio frequencies and an additional commonly agreed one to communicate with the government or leased air surveillance platforms where these are to operate in the area.

Equipment for boarding and an appropriate boarding craft are recommended. Most countries have found the fibreglass, V-hulled, rubber-sided, speed boat to be most effective for boarding (rigid hulled inflatable). The boarding boat should have two outboard engines, or one inboard/outboard and a small outboard engine, for safety. The boarding boat requires communication equipment to remain in contact with the patrol vessel at all times.

Thailand is advancing rapidly in its MCS System development and fisheries management. Thailand has several patrol vessels and is taking advantage of FAO's assistance in training and legal assistance. The profile of their MCS and management system is included below.

Box 7

THAILAND

The population of Thailand was estimated at 61.4 million in 1996. The agriculture and fisheries sector contributes approximately 12% to the GDP (US$454 billion/1995) with fisheries being 2% of the total. The Department of Fisheries (DOF) appears to receive only 0.4% of the agriculture budget and the MCS Conservation Programme receives 5% of the fisheries budget. The total number of fishers was estimated at 320,000, comprised of 70,000 full-time commercial fishers; 180,000 small-scale fishers; and 70,000 engaged in fisheries related activities. The small-scale

fishers accounted for 73% of the fishing gear. A recent census revealed 54,715 fishing boats in the country in 1995, while the Department of Fisheries had registered only 17,657 vessel fishing gear for that same year due to open access and registration of only mobile gears contributed to the inaccuracies. According to the figures of registered vessels in 1995, only 154 vessels (less than 1% of the total 17,657 fisheries registered vessels) were over 25m.

Trawlers and gill netters comprised 75.5% of the total gears registered in 1994, with a further 3.7% identified as push netters. Total production was 2.9 million tonnes with 380,000 t from the aquaculture sector. An increasing percentage of the capture fishery is trash (estimated as high as 70%+) thus increasing pressures on the fishers to catch more fish to maintain their economic status and increasing illegal fishing, especially when the perception of deterrence is low.

It is estimated that more than 4000 Thailand fishing vessels fish outside Thailand's waters. The current Eighth National Economic and Development Plan has established targets of 1.58 million tonnes for fish production from Thai waters, and a further 1.8 million tonnes from outside Thai waters through joint ventures, etc.

Fisheries in Thailand are over-exploited. Control of the fisheries is hampered by;

the open access policy;
outdated fisheries legislation, but this is being addressed;
control of the domestic fleets respecting licensing and gear conflicts internal and external to Thai waters;
overfishing of Thai fisheries stocks;
lack of judicial and political support and commitment for this sector;
an inefficient and complex licensing system;

MCS operations in Thailand are well planned, and while under-funded for their 80 vessel patrol fleet, they are professional in their execution and all the staff appear very committed to their work ethics. Annual MCS goals and priorities are set for each conservation station and general patrol plans for the utilization of its equipment and human resources. These priorities currently cover, in order: marine sanctuaries (preservation areas); reserves or special use areas such as mangroves and sea grasses; and other public fishing areas. The patrol units address public and community awareness; illegal fishing activities; gear conflicts; training of staff; and general conservation patrol and protection duties.

Thailand has taken very positive steps to enhance the training and hence capability of its field staff in MCS activities both on a national basis and also by hosting a regional (six country) MCS Training Course in July 2000. Further, Thailand have recently opened discussions with Malaysia to address fishing and MCS concerns of both countries.

It is an aim of the Government to ensure compliance of its vessels in their activities outside Thai waters.

Field offices

This category includes area and regional offices within the country. Similar principles apply for larger international regional organizations.

Field Base – Take Bone Rate, Indonesia

Office space is required for the field staff and their supporting administration. The office should be equipped with communications equipment to maintain contact with the headquarters and also to maintain communication with staff while on patrol. A radio communication network is usually sufficient for these activities. The office also requires the capability to collect and transmit data to other offices for compilation and analysis, and to receive results for local action. Ideally, this capability can be achieved through a computer system with communication to these other offices. Transportation is required for staff for patrol purposes, either along the coast at sea, or by land, and also along the rivers and lakes where there are active fishing operations. This transportation can range from small boarding type craft, to motorcycles, to other types of vehicles. It is highly recommended that staff patrol in pairs for safety and personal security.

It is assumed that each Fisheries Administrator will ensure that each field office has in its reference library certain documents for assistance in their duties. These include:

- current fisheries legislation, acts, regulations, notices and the official publication in which they were published (e.g. the Government Gazette),
- departmental guidelines for MCS activities including those for prosecutions,
- copies of any applicable treaties including those between countries in the region,
- a set of charts with updated baselines, territorial seas, EEZ and any specifically noted areas for fisheries management,
- past fisheries cases, details and penalties for reference during the preparation of a case,
- safety procedures and guidelines for MCS.[147]

Each officer should have in his/her possession, at all times, an official identity card with his/her photograph on it that clearly identifies the individual as a government-authorized fisheries officer. This requirement should also be in the fisheries legislation. Each officer requires communications equipment to maintain contact with his/her base of operations. Each officer must have the appropriate accoutrements to record findings during the patrol; e.g., a patrol book with clear identification of the owner and sequentially numbered pages.

[147] *Coventry, R.J., paraphrased from the South Pacific Forum Fisheries Agency Fisheries Prosecution Manual.*

This notebook could be used in court proceedings for identification of events, and as an *aide memoire* for the officer. It is essential that it is properly maintained.

A final item for careful consideration is the provision of firearms to staff. There are several considerations with respect to this matter but in general **firearms, if they can be avoided are not recommended for fisheries MCS.** However, it is recognized that there are situations when it would be considered very dangerous for fisheries officials to conduct their business without adequate personal protection. It is also important to assess compliance trends in the fishing industry and the history of difficulties with fishers, both domestic and foreign, regarding the protection of fisheries staff. Where fisheries have become uncontrolled and unmanageable, it has been found that fishers resort to other, less desirable and violent activities, thus making the protection of fisheries MCS staff a priority requirement. Where possible, other means of protection, such as guard dogs or batons, are urged. The issuance, carriage and use of firearms should be considered as a tool for staff protection only; it is not recommended that firearms be considered or used as an aggressive surveillance tactic.

If it is decided that firearms will be issued to staff, new considerations apply. The first of these is the appropriateness of the designated individuals for the carriage of the weapons. Not all persons are mentally suitable to carry and use firearms. The Canadian experience in fisheries recognized this fact and now a battery of psychological tests, as part of the selection process, are used to screen applicants for their suitability to carry firearms. Those found not suitable are released from further recruitment testing. The danger in putting weapons in the wrong hands, in terms of potential accidents, can be significant and result in a legal liability for the agency. The second major consideration is the initial training, and also the real need for ongoing refresher training (at least annually). This is critical for the confidence of the staff in the proper use of the weapon, and for their own and their partner's personal safety.

The decision on arming vessels for fisheries enforcement purposes is one that should not be taken lightly. It is a conscious decision to arm the vessel for protection, *and creates the potential for aggressive action*. This decision may be necessary where fishing vessels commonly do not comply with the orders to halt for fisheries inspections. This scenario may result if no other enforcement strategies or agreements to ensure compliance have been established with the flag State of the vessel and diplomatic relations to address the situation are not available or have failed, or other means are not available for domestic vessels. In this case it may be the government's policy to permit aggressive, civil police action to apprehend the alleged offender. In these situations it is essential that the boarding vessel is appropriately identified as being on government service and that it has properly identified itself to the vessel which it intends to board.

Particular care must be taken when using force. Typically State officials such as fisheries officers are only authorised to use the minimum force necessary to ensure compliance with any lawful instructions that they may give. The decision as to what degree of force is deemed appropriate is always a subjective one and will be judged objectively by the courts. If a court finds that excessive force was used, the party against whom it was used may have a right to claim damages. It is suggested, therefore, that officers be required to observe strict

rules regarding the escalation of the use of force. For example, if the vessel does not respond to the standard instruction to stop and permit boarding (see the discussion on boarding procedures in section 6.4) it should be warned (by radio and loud hailer) and only if no response is received should warning shots be fired, before finally force is used to physically stop the vessel; i.e. stop or potentially, sink it. Countries should ensure that appropriate higher authorities are involved in the decisions to escalate the use of force.

The use of force for protection when fired upon is always automatically given to the master of the vessel to protect his/her ship and crew. The use of firearms by a fisher against a fisheries official or vessel should be responded in kind, with the maximum use of force directed at the source of firing.

6.9 Transshipment

Transshipment of fish at sea is one of the most dangerous and difficult fisheries activities to monitor. It cannot be done effectively without at least two persons, one on the delivering vessel and one on the receiving vessel. As the activity of two ships heaving in the sea side-by-side is a dangerous operation, the masters of both vessels will want to carry out the operation as quickly as possible. The fisheries official, on the other hand, will want to ensure that there is an accurate account of the fish onboard the receiving vessel before the transfer, and to have an accurate recording of the fish transferred. This will necessitate an inspection of the vessel receiving the fish before the commencement of operations and very accurate monitoring of the fish transshipped. The difficulty in verifying the species and weight of the fish moving from one vessel to another is a challenge as this may require the officer's presence in the hold of the vessel, thus making observation from the deck of the movement of the fish impossible.

If a country refuses to permit the transhipment of fish inside its fisheries waters, then the vessels will, in all likelihood, tranship the cargo outside the zone and then apply to re-enter to continue fishing. This will result in the loss of continuity of important data on the fish removals from the zone. This can sometimes be calculated from other records, but it cannot be verified and on some occasions, it is lost from the system. It is recommended that Fisheries Administrators, in designing their MCS strategy, use negotiations to encourage the vessels to tranship their fish in their ports. This might be done through an incentive of reduced port administration costs or procedures. The country would then have both the vessels in a stable, controlled environment where the accuracy of the transfer can be closely monitored.

Another international concern that can partly be addressed through the encouragement for fisheries transhipment in port is the issue of obtaining information on fisheries support vessels involved in the transhipment. The tool of the fisheries licence, supported by appropriate legislation which also regulates support vessels (e.g. by including support vessels in the definition of fishing vessels), can also assist in implementing international standards and control of these vessels for safety-at-sea purposes.

6.10 Fisheries Prosecutions

One of the most onerous but important tasks for fisheries administrators and officers is preparing for, and successfully prosecuting, those who contravene fisheries laws. Prosecutions are an essential part of MCS and, particularly if the administration has a high success rate, serve to deter others from breaking the law. On the other hand, if fisheries officers obtain clear evidence that the law has been broken and the matter is not taken to court, this can have an extremely bad effect on the morale of enforcement officers and may encourage further non-compliance.

Fisheries administrators are sometimes reluctant to prosecute all but the most blatant contraventions of the law because it can be a time-consuming exercise (particularly for senior officers) and because of the risk of an embarrassing acquittal. Although no administration is likely to have a 100% success rate, it is important to appreciate that most of the expense and effort expended on fisheries MCS will be wasted if the fisheries administration is incapable of successfully prosecuting cases in court.

Many fisheries prosecutions have resulted in the alleged offender being acquitted in the courts due to lack of proper preparation and training by the fisheries prosecutions team. For this reason it is essential for countries to give attention to training officers and prosecutors in how to gather evidence and to prepare and argue a case. Proper training can dramatically increase the success rate in fisheries prosecutions. Indeed, this is one of the most cost-effective ways of improving the effectiveness of MCS systems, particularly since every successful prosecution which is well publicised is likely to deter a number of others from attempting to break the law.

One of the ways of improving the success rate of fisheries prosecutions is to compile standard training manuals and to run training courses and exercises. For example, both the South Pacific Forum Fisheries Agency and the ASEAN countries have compiled standard manuals on prosecution procedures for their regions.[148]

It is important that the fisheries prosecutions team and the judiciary are well-informed about fishing, the fishing environment, the management scheme and its importance to the national economy, and the MCS activities required for the conservation of these resources. Prosecutions are often conducted by prosecutors employed by the Ministry of Justice (or an equivalent organ of government) who may have little or no knowledge of fisheries. If this is the case, it is important to educate and train selected individuals *before* they are required to be involved in an actual case. One of the best ways of achieving this is to stage exercises and mock-trials which may be supplemented and supported by workshops and manuals.

The advocate or prosecutor, judicial officers (e.g. magistrates and judges), fisheries officers, interpreters, patrol vessel crews and officials from other departments can all benefit from visiting a fishing vessel and taking part in a mock exercise in which a vessel is boarded, inspected, detained, ordered to port and charged. The moot court can also

[148] For example the FFA Fisheries Prosecutions Manual (Coventry, R.JJ. 1991) provides as very useful guide for fisheries officers in common law jurisdictions who may have to prosecute a case. Contact details for the FFA are given on their website: www.ffa.int .

prepare all parties for the types of questions and explanations that the prosecutor will need to be able to present to the judge to ensure an understanding of the alleged infraction. The exercise can also be used to test the effectiveness of institutions and established procedures in dealing with a detained vessel, cargo and crew.

Fisheries administrators should ensure that their field patrol staff are trained to be very observant and to record their observations from the time the vessel is sighted until a decision is made to order the vessel to port or to permit it to carry on with its activities. Where appropriate, these records may be made in the logbook of the patrol vessel, but more detailed personal observations can also be recorded by officers in their notebooks. One of the most important reasons for recording observations when, or soon after, these sightings occur is that a court will tend to give greater weight to evidence of this nature. This is because courts generally recognise the fallibility of human memory and prefer to rely on "contemporaneous notes" (i.e. written accounts of events that were recorded at the time they occurred or soon afterwards). Furthermore, notes taken at the time can be of invaluable assistance to an officer who is called on to be a witness in a trial, particularly if the trial is held a long time after the events themselves.
Photographs and video-tapes can also be extremely valuable as evidence because they record details which may have escaped the attention of the observer at the time but which may prove vital at a later stage, particularly to disprove any incorrect statements made by the defence. Wherever possible the cameras should be set to record the date and time on the picture or video-tape. The photographer must keep the film in a secure place after it is removed from the camera and must record exactly what is done with it (e.g. how the photographs were processed and by whom) so that he or she is in a position to confirm in court that it was not tampered with. (In some countries this evidence may be given by way of a sworn affidavit or certificate submitted to the court.)

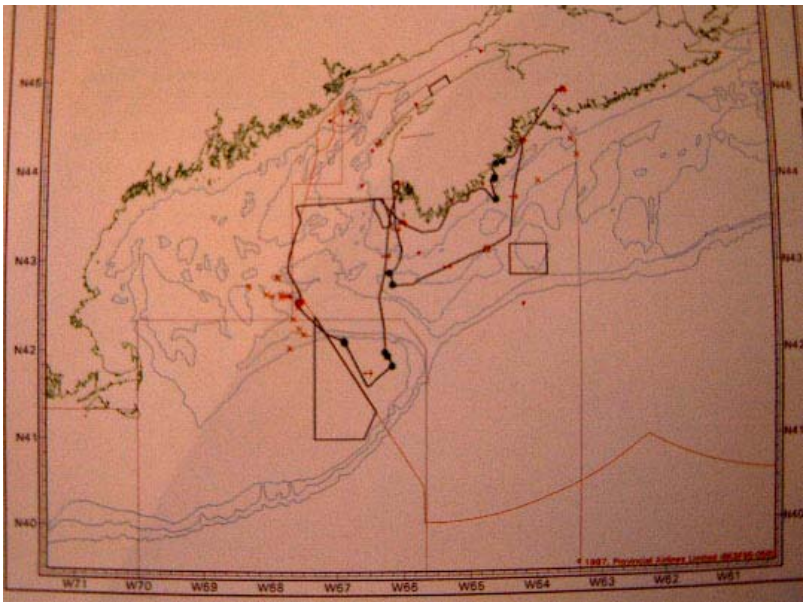

Chart Work and Air Patrol Results - Canada

Observations with respect to the activity on the deck of the fishing vessel when the patrol vessel comes into view are important. Hasty activity on the deck, dumping of gear or

fish, fresh fish offal in the sea, sea birds feeding, ropes or gear over the side are all indicators of fishing. Photographs and videos with time and position notations are particularly useful to record this evidence. If the vessel is acting appropriately or after the trial, the photographs can be used for training purposes. *The more observant the fisheries officer and the more accurate the notes, the easier it will be to reconstruct the events to decide whether to lay charges, which charges should be preferred, and how to prosecute the case.*

When making and recording observations the fisheries officer should always keep in mind the fact that the judicial officer will want to be able to understand events unfolding in chronological order through the explanation of the officer in court. With this in mind, the officer may wish to continually remind him/herself, "What is the judge going to ask?" or "How do I describe this?" For example, fisheries officers participating in an enforcement situation (or an exercise) that involves surprising and boarding a vessel suspected of illegal fishing should consider the following questions and record any relevant observations.

Observations to be noted and recorded by an officer on the bridge of the patrol vessel

When approaching any fishing vessel that may be involved in illegal fishing, an officer on the bridge of the patrol vessel should be assigned to note all activities during the approach and while the boarding team is on the vessel. Where appropriate the officer should note observations made in response to the following questions in the ship's log.

- What is the time, weather, the state of the sea, the temperature and the direction of the wind and waves?
- What courses are each of the fishing vessels steering on the appearance of the patrol vessel, what is their speed and are there any changes when they recognise the patrol vessel?
- As the patrol vessel approaches, are there any signs that the fishing vessel is engaged in fishing activities? Examples of such signs may include: reduction factory working, winches in operation, radar operating, radio communications or echo sounders in operation (picked up by the sonar of the patrol vessel).
- Is there any evidence that the vessel has been fishing? Examples of this type of evidence would include: calmer sea around the fishing vessel as a result of fish oil in the water; dead fish or fish offal on the sea; fishing gear, buoys or small boats in the water or on the vessel; lines over the side; bloody water or offal in the scuppers of the vessels; flocks of sea birds feeding on fish scraps; or fish activity on the surface of the sea in the immediate vicinity indicating the use of fish baiting.
- What are the deck crew doing on first sighting and is there a change in the nature or level of activity? For example, are they stowing gear, or dumping fish?

- What is the reaction of the fishing vessel when the patrol vessel communicates with it and orders it to prepare to be boarded?

- What are the activities seen on deck during the period when the boarding team approaches the vessel? (If hostile, the bridge officer must warn the boarding team).

- What happens on deck during the boarding team's inspection? For example, can the bridge officer identify any gear being switched off during the boarding?

Observations to be noted and recorded by members of the boarding team

The minimum boarding team should be comprised of four, preferably six, persons including the fisheries officer, a member from the engineering department and a ship's officer. There should also be a boarding boat operator who drops the team and stands off the fishing vessel, prepared to pick up the team.

On approach to the vessel the team should observe the activity on the vessel and note the presence of increased activity. In particular, the team should consider the following questions and record their observations.

- Are there any signs that fish have been caught (e.g. fresh fish, blood or offal)?

- Are there any indications that the vessel was engaged in fishing? (e.g. gear in a position for fishing, gear poorly-stowed, winches hooked to fishing gear, diving gear or small boats on deck and wet from recent use.)

On boarding, the crew should still be observing the deck and activities of the crew. If the boarding appears to be unopposed, the fisheries officer and boarding team (except for one person who should remain at the head of the ladder), should proceed to meet the captain and identify themselves. Requests should be made for the fishing licence, ship's log, all fishing, processing and freezer logs, and the engineering log. Two members of the team should accompany the vessel crew when retrieving these logs, if this is possible. The activities ongoing on the bridge of the vessel should be noted at the time of boarding to determine if there seems to be a flurry of activity around the navigation chart or vessel logs. The settings on all navigational gear should be taken at this time. The inspection should then be carried out in accordance with standard procedures identified during the briefing. For example inspecting the fishing gear to determine whether or not it is hot from recent use, and looking for fresh fish in the freezers, wet fishing gear and blood in the production areas. Photographs are a rapid method of indicating the state of the vessel and gear on arrival on the vessel.

The master must be asked to indicate the position of the vessel and to respond to questions regarding the activities of the vessel. If the inspection of the vessel and documents indicates that the master may be fishing in a closed area without authorization, the master is then ordered to take the vessel to port for further investigation. There are several opinions as to when the master should be informed that there appears to be a

violation and of the appropriate legal rights available under the law. If the fisheries officer intends to ask the master whether he/she knew they were fishing in a closed area, or in an area in which they were not authorised to fish, this is effectively asking the master to make a self-incriminating statement. Consequently, the fisheries officer should inform the master of his or her legal rights (e.g. the right to remain silent if this is recognised under national law) before the question is asked since a failure to do so may mean that the master's reply cannot be used as evidence in court. On the other hand, if the officer is determining the position of the vessel and asks the master to indicate the vessel's position, there may be no need to inform the master of his or her rights until a decision to charge the master is taken at a later time. This is an important point in law and fisheries enforcement officers must obtain legal advice on how to deal with this matter.

The reaction of the master and the fishing crew when ordered to take the vessel to port is very important to the safety of the boarding party. The co-operation of the master in this process should be duly noted, as well as the performance of the vessel and its navigation and engineering gear. The MCS Central Operations Centre and appropriate port authorities should be notified of the vessel's passage to port and its expected time of arrival (ETA), so that arrangements for accommodation of the crew and security of the vessel and catch can be prepared. Preliminary documentation for court appearances can be drawn up on land and officials representing the vessel informed of the vessel's port visit.

During the passage to port the fisheries officer may wish to consider the preparation for the case. The points listed below should be considered.

1. Is there a need for an independent expert witness(es) to check the state of the navigation gear, the freezers or the engine machinery?

2. What evidence has been gathered and how strong is it? Has it been cross-checked and verified through different sources?

3. What certificates are needed to use the evidence appropriately in the case? Have all statements been taken and were warnings read to each witness when it was decided to proceed in this manner?

4. Which witnesses will be necessary to the case? Should they be interviewed on landing or at a later stage and who should be present? Will interpreters be needed?

5. Which charge(s) should be laid and against whom? (This must be discussed with the prosecutor in some detail.)

6. Has all the evidence including all exhibits been secured? Is there need for any more documentation? Are any other photographs necessary?

7. What is the value of the vessel, its equipment and the catch on board? Is a valuation expert needed? (This will usually be necessary for setting a bond.)

8. What arrangements should be made for the preservation or disposal of the catch?

9. Can this be settled through an administrative procedure or does it need to go to court? What might happen if the fine is too high (e.g. the owners may abandon the vessel), and what follow-up procedures would then be necessary?

10. What are the procedures for setting bail for the accused and what is a reasonable amount?

11. Where can the crew and master be accommodated?

12. Have all the notes for the case been completed for use by the prosecutor?

Armed with the answers to the above questions, the fisheries officer is ready to meet and brief the prosecutor and the Fisheries Administrator on landing in port. This briefing should be chronological and thorough and at the conclusion, the fisheries officer should have a list of recommendations of action to be taken, if it is decided to proceed with the case. The master should then be formally charged, witness statements taken and certified, if not already done, and the crew and master accommodated. An appearance date should be set with the courts for as early as possible and the vessel, gear and fish should be secured in a manner so as not to result in spoilage of the catch. Evidence from the air patrol and statements from the air crew should be obtained and certified. The prosecutor should then review the evidence, exhibits and statements and then prepare the case for the appearance hearing.

CHAPTER 7:

COASTAL MONITORING, CONTROL AND SURVEILLANCE

7.1 Introduction to Coastal MCS

An estimated one quarter of the world's population of approximately 5.9 billion live in coastal areas. There is a worldwide trend for humans to migrate towards the coast and the current population of 220 million people living in coastal cities is projected to almost double in the next twenty to thirty years.[149] Furthermore, in some States, particularly island States, a very high percentage of the population lives near the coast. For example, an estimated 60% of Indonesia's population of 200 million lives in coastal areas.[150]

[149] Scialabba, Nadia (N.) 1998. *Integrated coastal area management and agriculture, forestry and fisheries. FAO guidelines.* Environment and natural resource service, FAO, Rome. 256p. p1. This publication is referred to hereafter as the "FAO ICAM guidelines".

[150] Ministry of State for Environment statistics, 1996.

In coastal areas one typically finds of both highly valuable and productive ecosystems and an extraordinarily high level of human economic activity. In many countries this has led to the over-exploitation of coastal resources and severe degradation of the environment. In response to this the integrated coastal management ("ICM")[151] approach has been developed as a means of managing human interactions with coastal ecosystems in an integrated and holistic manner which seeks to balance the competing demands of different users of coastal resources and to optimise the benefits obtained from the use of these resources without degrading coastal environments.

Agenda 21 adopted the ICM approach.[152] In 1992 FAO published FAO Fisheries Technical Paper No. 327, *Integrated Management of Coastal Zones,* in order to support the implementation of Chapter 17 of Agenda 21, by identifying actions that governments could take to manage coastal resources more effectively. This was supplemented in 1998 by the publication of the *Integrated coastal area management and agriculture, forestry and fisheries. FAO Guidelines* ("the FAO ICAM guidelines") which provides excellent theoretical and practical guidance for planners in the agriculture, forestry and fisheries sub-sectors who are concerned with planning and natural resource management in marine coastal areas. The ICM approach has been rapidly adopted in many countries and a 1997 review of ICM efforts throughout the world concluded that approximately 90 coastal States had been involved in at least 180 programmes, projects or feasibility studies in relation to ICM.[153]

The importance of integrating fisheries management into coastal area management (i.e. the ICM approach) is emphasised in article 10 of the Code of Conduct which is entitled "Integration of fisheries into coastal area management". Paraphrased it suggests that States:

i) take fisheries into consideration in a more holistic approach to coastal resource management especially noting the impacts of pollution, habitat degradation and spatial conflicts that are increasing due to demands from the multi-users of this zone;

ii) include fisheries and their habitat into coastal resource management (CRM);

iii) take into account the fragility of the coastal ecosystems;

iv) involve the fishers and fisher communities into the decision-making processes;

v) take into account rights of coastal communities in setting rights of access;

vi) set fisheries practices that avoid conflict amongst fishers; and

[151] The terms integrated coastal area management "ICAM", integrated coastal zone management ("ICZM") and integrated coastal management ("ICM") are often used interchangeably. The distinctions are not important for the purposes of this paper but strictly speaking, the term "coastal zones" refers to geographical areas specifically designated as zones for management purposes as opposed to the more general term "coastal area" which means an area of land and sea recognised as a geographical entity even through the boundaries have not been demarcated.

[152] Agenda 21, chapter 17, programme area A, "Integrated management and sustainable development of coastal and marine areas, including exclusive economic zones".

[153] Sorensen, J. 1997. *National and international efforts at integrated coastal management: definitions, achievements and lessons*. Coastal management, 25.

vii) establish conflict resolution mechanisms.

Articles 10.2, 10.3 and 10.4 address policy, regional cooperation and the implementation of coastal management processes[154].

Article 10 of the Code of Conduct has been supplemented by volume 3 of the FAO Technical Guidelines for Responsible Fisheries which is entitled "Integration of fisheries into coastal area management". These guidelines emphasise the importance of adopting a holistic approach to coastal fisheries management for a variety of reasons. One of the most important reasons is that ICM provides a mechanism for controlling activities that have a negative impact on fisheries but over which the Fisheries Administration have no control. For example, coastal fisheries may be severely impacted by factors such as pollution from land-based sources, habitat degradation (e.g. clearing of mangroves and other forests, thereby causing sedimentation), and spatial conflicts where other coastal developments gradually displace coastal fisheries and agriculture which may have insecure legal rights to use certain coastal areas. It also emphasises the importance of providing for the participation of representatives of the fisheries sector and fisheries community in decision-making processes and other activities related to coastal area management planning and development.[155]

One of the difficulties facing managers of coastal areas and those involved in drafting coastal management legislation, is how to define the extent of the coastal zone. The flexibility of the coastal zone concept is noted in the following extract from FAO Technical Paper 327, *Integrated management of coastal zones.*

> [The coastal zone] "Is the interface between the land and the sea and may extend inland and seaward to a variable extent, depending upon the objectives and needs to the particular programme. By virtually any set of criteria, the coastal zone is a linear band of land and water that straddles the coast – a "corridor" in planning parlance – which has a one-dimensional aspect. The second dimension (width from onshore to offshore) tends to be overshadowed by the linearity: thus people talk about being <u>at</u> the coast or <u>on</u> the coast, but never <u>in</u> the coast.
>
> The boundaries of the coastal zone depend on political, administrative, legal, ecological and pragmatic consideration because there is a broad array of possible coastal issues and because the zone can be affected by remote activities. A narrow coastal zone could be appropriate if its purpose were to manage only the shoreline and inter-tidal waters. If watershed issues are of concern, then an inland extension is necessary. Likewise, if the issues extend … seaward then a more extensive seaward area might be appropriate."[156]

The more common area recognized as that for coastal fisheries is from the coast to 12 nm (i.e. the territorial sea), Usually other zones are established both within and beyond the territorial sea for other management reasons, e.g., protection of sustenance fisheries and fixed fishing gear; delineation of restricted areas for mobile gear; and reduction of gear conflicts, to name a few.

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[154] Paraphrased from FAO *Code of Conduct for Responsible Fisheries, Vol. 3 – Integration of fisheries into coastal area management,* Rome 1995.
[155] See Code of Conduct, Article 10.1.2.
[156] Clark, J.R., *FAO Fisheries Technical Paper – Integrated management of coastal zones, No. 327,* Rome 1992., p 11 of 167 p.

7.2 Stakeholder participation in ICM

In many parts of the world, local community management of fisheries was replaced during the colonial era with management by the central government. This approach, which persists today, has often resulted in a high percentage of failure due to the lack of involvement of the participants and stakeholders. This led to the recognition that:

> "[A] more dynamic partnership is needed, using the capacities and interests of the local fishers and community, complemented by the ability of the state to provide enabling legislation, enforcement and other assistance, specifically co-management. Co-management aims to achieve joint responsibility and authority for resource management through cooperation between the government and local resource users. (Pomeroy, 1995, pp. 149-150)"[157]

For example, in the latter part of the 1970's and early 1980's "the Philippines embarked on several initiatives towards community-based coastal management in response to the failures of more centralized approaches"[158]. The evolving concept of collaborative, or joint stakeholder and government management of coastal activities is one of the powerful and important aspects of ICM today

7.3 The challenges facing fisheries administrators in coastal areas

Integrating fisheries management into coastal area management poses a number of challenges to fisheries administrators which do not arise in relation to the management of offshore fisheries. Collectively they have resulted in the trend for involvement of coastal stakeholders in integrated, collaborative coastal management planning exercises. These factors are discussed below.

1. *Narrow view of management*

ICM has broadened the perspective of Fisheries Administrators in many countries[159] Unfortunately, in some countries the attempts of Fisheries Administration to address threats to the health of the fisheries and their habitat is still hampered by their very narrow view of the problems. In many cases, Fisheries Administrations need training in expanding perspectives to be able to take a more holistic view for an appropriately matched and integrated, multi-sector approach to coastal resource management, including fisheries. The wider scope approach to integrated coastal resource management, with fisheries and habitat as one of the base cornerstones, is one of the evolving trends and strategies in this sector.

2. *Socio-economic status of coastal fishers*

A challenge, not present in the offshore, commercial fisheries scenario, is the ongoing degradation of the social and economic situation present in the coastal fisheries. In most

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[157] Christie, P., White, A., *Trends in Development of Coastal Area Management in Tropical Countries: From Central to Community Orientation, 1997, p 162.*

[158] Christie, P., White, A., *Trends in development of coastal are management in tropical countries: from Central to Community Orientation,* Coastal Management, 25: 155-187, Ann Arbor, University of Michigan, USA, and Cebu, Philippines, 1997.

[159] Countries with growing experience in integrated coastal resource management, such as the Philippines are now benefiting from practising zoning for multi-use of coastal resources, participatory resource assessment and management planning and implementation, e.g., USAID Coastal Resource Management Project 1996-2001.

coastal areas, the coastal fishery includes the poorest of the poor, the rural, artisanal fishers who are fishing as an "employment of last resort". Typically they have no other means of livelihood and are totally dependent upon the sea for their very survival. These people are numerous, often illiterate, lacking in formal education, and at the lowest end of the socio-economic ladder. They are the most in need of assistance from the State. These families migrate to the sea and often settle unofficially in coastal areas thus further increasing the pressures on stressed coastal resources.

3. Open Access

It is the combination of the increasing numbers of these poor, sustenance fishers due to the "open access" policies in many small island states that is contributing to the increased over-fishing and over-capacity in the coastal areas. It is essential to limit access to fisheries resources before attempting to reduce fishing effort by developing alternate livelihood opportunities to encourage fishers to leave the sector. These "exit strategies" cannot be successful unless this is done.

As the FAO Technical Guideline *Integration of fisheries into coastal area management* points out:

> "30. A major cause of problems in coastal area management is the free and open access to coastal renewable resources. This has long been recognised as a problem in the fisheries sector, but also effects many other coastal resources, particularly water, space and primary productivity.
>
> 31. It is important that where there is free and open access to coastal fisheries resources that this regime be replaced as soon as possible by one based on exclusive use rights. There are a number of reasons which take into account not only the inefficiencies generated within the sector by open and free access, but also because of the interaction with other sectors in the coastal area. If the fisheries sector remains open access then it may be difficult to persuade other agencies and resource users to restrict their activities in favour of fisheries since incremental benefits will be dissipated in the same way as resource rents. Conversely, as fisheries move towards an exclusive-rights regime, it is essential that they can operate in an overall rights-based system of coastal resources development."[160]

4. Numbers of fishers, fishing gear and landing points

The number of fishers, the amount of fishing gear and the large number of landing points is another of the challenges in the coastal fishery. It is one of the reasons why local governments often ignore the registration or licensing of sustenance fishers, gear and landings. This requires considerable effort, and without checks and balances and ongoing maintenance funding, the system can easily be distorted.

5. Coral reefs and mangrove nurseries

Another challenge not present in the offshore commercial fishery is the coral reef and mangrove factor. These are the nurseries of tropical fisheries; the base for the lucrative

[160] FAO *Code of Conduct for Responsible Fisheries, Vol. 3 – Integration of fisheries into coastal area management,* Rome 1995.

and growing live reef fish restaurant trade (US$150/kg for high priced species) and global aquarium fish trade. The increase in the use of destructive methods of blast and poison fishing to pursue these two markets is extremely damaging to the sustainability of the fisheries and their habitat. Destructive fishing practices also have a negative impact on the tourism trade. Coral reefs in good to excellent condition are expected to yield approximately 10-20 mt/km²/yr (Caesar 1996, p. 16) and the world coral reefs have been estimated at a value of approximately US$345 billion per year. However, losses are estimated at up to US$100,000/km² for each of the 3000 km² of pristine reefs destroyed annually[161].

6. External interests with higher funding levels

Immediately behind these sustenance fishers and destructive fishing comes the transportation industry, trade, tourism, and other coastal development initiatives that wish to locate near the sea. These other interests all have investment capital that far exceeds that available to the sustenance fishers and hence increase the pressures on the area, with fisheries being awarded a lower priority. As noted in the FAO Technical Guideline *Integration of fisheries into coastal area management,* the Fisheries Agency, as representatives of the fishers, needs to ensure a strong and appropriate fisheries input into multi-sector discussions on coastal area development.

7. National political will, policies, guidance and devolution of authority

As discussed earlier in the paper, MCS activities need a central umbrella of policies and guidance under which local governments, according to the level of devolution permitted by law, can operate. In particular:

a) if the political will is not present, there will not be successful implementation of coastal fisheries management and MCS systems; and

b) provision must be made for the devolution of management responsibilities to coastal communities and other stakeholders.

8. Research and information

The greatly enhanced ambit of integrated coastal area management and the highly participatory approach inherent in ICM, also generates a need for considerably more research to inform management decisions. By way of example, establishing an ICM system that incorporates coastal fisheries management as an integral part, may involve conducting some or all of the following studies:

a) political will assessment;

b) participatory management studies to determine the degree to which authority has been devolved, and the current involvement of the coastal community and

[161] World Bank COREMAP draft report, for the International Coral Reef Symposium in Indonesia in November 2000, written in Jakarta, 26th June 2000, *Value of Coral Reefs.*

stakeholders[162] in management, alternatively, the need to encourage such input;

c) socio-economic studies of coastal dwellers and fishers to provide information regarding their dependency on the coastal resources, as well as the alternative livelihood opportunities;

d) alternative livelihood opportunities assessments to determine the potential to promote "exit strategies" from the fisheries to reduce pressures on coastal resources;

e) reviews of the current legislative framework for resource management to demonstrate the need for revision, or to identify the point where the community can have appropriate input to foster joint stewardship and collaboration in the coastal management and MCS processes;

f) coastal resources assessments to determine priorities and timing for corrective action;

g) reviews of forestry and reforestation activities and catchment management to determine the need for rehabilitation of the forest and watershed base to control runoff and erosion and the need for MCS activities in the land-based sector;[163]

h) assessments of coastal agriculture, the use of pesticides and run-off to determine the impact on the coastal area and the requirement for legislative instruments and action to address these negative impacts on the coastal area;

i) participatory assessment of the resource impacts to help identify any short-comings in the controls on heavy industry and pollution;

j) tourism studies to identify both complementary and antagonistic interactions with fisheries management;

k) studies of coastal/sustenance fisheries activities versus commercial fisheries to show the potential interaction between the two fleets and to determine the liaison and conflict resolution mechanisms needed for successful implementation of management plans, and appropriate MCS action;

l) resource management studies to determine the degree of compliance versus illegal fishing activities, to provide information to determine the appropriate and acceptable MCS strategies; and

[162] These issues apply equally to management issues on lakes and rivers where multi-sector development and potential conflicts can arise.

[163] This point is not the subject of this paper, but it is an influencing factor in CRM that can have impacts on coastal MCS.

m) assessments of destructive fishing activities assessments which can be used to provide information for MCS needs for either education (a preventative approach to MCS), or for a more forceful and deterrent approach to MCS.

Box 8

Coastal Resource Management in the Philippines Project (USAID:

The key elements of this project were:

- the education of the community in management processes through public awareness campaigns, seminars and specific technical training;
- the application of participatory management practices for rapid resource assessment and resource mapping to familiarize the community and local managers with the resource base through the mapping exercise;
- the scientific verification of the resource mapping where possible; and
- the participatory development and implementation of a coastal management plan, including accommodation of multi-sectoral interest group requirements; and
- monitoring, evaluation and refinement as appropriate.

This project involved the following steps:

1. signing Memoranda of Agreement with participating communities to ensure their commitment to the initiatives;
2. encouraging local government authorities to make annual budget allocations for CRM as a show of commitment to achieving sustainability;
3. establishing local resource management organizations (e.g. around reefs, mangroves; fisheries, etc.);
4. undertaking resource assessments with the participation of stakeholder communities (i.e. gathering of information, community entry and preparation, participant observation, interviews and household surveys, identification and classification of resources, habitats and other environmental factors, mapping to include local knowledge and historical trends, database and profile development, enhancement of the role of women in participatory coastal resource assessment);
5. evaluating the coastal resource management opportunities, constraints, issues, and making management recommendations for the **management plan,** and monitoring and evaluation) with the coastal resource management (CRM) plans finally adopted by communities[164];
6. developing and implementing fisheries and coastal management legislative instruments to support the implementation of CRM plans;
7. establishing and training coastal law enforcement teams and bringing them into operation;
8. declaring, monitoring and protecting marine fisheries sanctuaries and protected areas;
9. placing mangrove areas under community conservation management;
10. enforcing municipal waters boundaries; and
11. establishing environmental-friendly enterprises to provide alternative livelihoods[165].

The project demonstrated the importance of stakeholder participation. This should occur at three levels: *consultation* for input into management planning; *involvement* in the planning; and the recommended level and emerging trend - *empowerment* and full participation of the community at all levels of management.

[164] Walters, J.S., Maragos, J., Siar, S., White, A.T., *Participatory Coastal Resource Assessment – A Handbook for Community Workers and Coastal Resource Managers,* Siliman University, Dumaguette, Philippines, 1998.
[165] Courtney, C. A., White, A.T., *Integrated Coastal Management in the Philippines: Testing New Paradigms,* Coastal Management, 28:39-53, Manila/Cebu, Philippines, 2000

7.4 The role of fisheries MCS in ICM

ICM involves the integrated management of all activities involving the use of coastal resources within an area that spans both coastal waters and the adjacent lands. Therefore it follows that one of the main challenges to traditional fisheries MCS systems is how to integrate these into systems which involve the monitoring, control and surveillance of other coastal resources. In order to do so, it is essential that mechanisms are established to ensure that: fisheries administrations (including personnel responsible for MCS) are involved in the preparation of ICM programmes; that relevant information is shared among all agencies involved in ICM, that the implementation of the ICM programme incorporates the preventative MCS elements discussed in section 7.5 below; and to co-ordinate their enforcement activities with enforcement agencies operating in coastal areas.

On the other hand, ICM managers have often given inadequate attention to fully integrating MCS principles into community involvement activities at an early stage. MCS has in general been left out, or added at a later stage for enforcement purposes only and has not been included in the regular planning activities from the beginning. It is recommended that MCS principles be included at the very beginning of community-based, coastal resource management, or integrated/collaborative coastal management activities. This will:

- solicit input from the community and stakeholders;
- result in a better understanding of the requirements for MCS activities and community-accepted legislative requirements to support the management plan;
- encourage the participation of the community in the actual implementation of the plan, e.g., educational seminars at schools, local community clubs, local fishers meetings, etc., and participation through coast watchers, reef watchers, observer programmes, etc. and
- encourage voluntary compliance through education and understanding.

The overall results should be the requirement for a more focused surveillance and enforcement programme for the coastal area with community support for MCS activities. In fact coastal MCS can be seen as one of the key mechanisms for achieving integrated implementation of participatory management plans. Integrating an MCS perspective into the educational, public awareness and communications aspects of an ICM programme will encourage most people to comply with the laws and ICM plans voluntarily. The policing aspects of the MCS system can then be focussed on a smaller group of persistent offenders.

The South African experience in combating abalone poaching (described in Box 9) is an example of both the benefits that can flow from co-operation among

enforcement agencies and local communities and of the inherent limitations in focussing primarily on the policing element of coastal MCS. As is clear from the conclusions, involving the community from the start in developing proactive and preventative strategies, and addressing the root causes of the problem, are essential to achieve long-term success.

Box 9

South Africa: Combating Abalone Poaching

Background

In 1994 poaching of abalone rocketed along the Southwest coast of South Africa. This was partially related to the transition of the country to a full democracy which led to local communities claiming rights to harvest abalone and rock lobster on the basis that under the apartheid regime they had been unjustly excluded from access to fisheries. This led to conflicts with established divers and violent confrontations broke out between the illegal fishers, licensed commercial divers and the police. Initially this was a local issue but the very high value of the abalone on the international market soon resulted in the involvement of local street gangs and sophisticated international syndicates that provide the necessary channels to export abalone to the Far East. This rapid escalation of the problem meant that it was no longer the sole concern of Marine and Coastal Management ("MCM") who did not have the capacity to deal with major local and international criminal networks. In response to outcries from coastal communities, environmental organisations and community policing forums who were angered by the rapid destruction of the resource and the increased lawlessness in the areas, a co-operative policing venture known as "Operation Neptune" was launched. The operation was implemented jointly by the South African Police Service (SAPS) and MCM but with the assistance of other stakeholders. The operation was commenced in February 1999 and lasted for an initial period of six months, but a second operation (Neptune II) was subsequently launched when the termination of the first operation resulted in a massive increase in illegal fishing.

The main objective of Operation Neptune was to curtail illegal fishing of abalone along a defined area of the South-west Cape near Cape Town. There were two main objectives: (a) to prevent further decimation of the abalone stocks by increasing law enforcement visibility along the coast to deter illegal fishing; and (b) to clamp down on illegal fishing by improving intelligence gathering, arresting those involved and seizing illegal catches. The operation was also designed to reduce crime in general in the area.

A special task force was assembled that included both police and fisheries personnel, with additional assistance from the army, navy and locally based organisations (such as local authority enforcement officers and a community-based organisation, Sea Watch). Personnel from other areas in South Africa were brought in to assist with the operation and officers were rotated regularly to prevent those illegal fishers from getting to know them and attempting to bribe or corrupt them. Members of the special task force were visible on a 24 hour basis and continually changed their shift times to be unpredictable.

Positive impacts of Operation Neptune

Different sectors of the community had different views as to the effectiveness of Operation Neptune. However, it seems clear that it had the following positive consequences.

1) It resulted in *increased coordination and co-operation between enforcement agencies* (primarily MCM and SAPS) and also between them and community structures such as Sea Watch and the Nature Conservation Department of the local authority. This also meant that better intelligence could be assembled by combining local knowledge with information from specialist police units who provided information about organised crime networks.

2) *A drop in general crime* in the area of operation. The establishment of road blocks and the regular patrols by Neptune personnel resulted in a number of arrests for crimes such as robbery, assault and vehicle theft and assisted in the confiscation of drugs and weapons. The visibility of police also reduced gang-related activity in the area and provided much needed additional policing resources.

3) Local communities reported an *increased feeling of security*. In addition, trust improved between fishers and the SAPS as the fishers saw that the police were serious about reducing illegal fishing.

4) The operation created a *strong deterrent to illegal fishing* which was reflected in the black-market price for abalone which increased from R80.00/kg to R120.00/kg during this period. One of the middle men for illegal abalone admitted that they had had to increase the price in order to persuade illegal fishers to continue diving. Operation Neptune also resulted in a dramatic decrease in the amount of abalone confiscated, but this rapidly increased after the first phase of the operation was terminated.

Potential negative effects

A number of negative effects were identified by the authorities and local community members.

1) The *short time frame* of Operation Neptune was identified as the greatest problem (this was subsequently addressed by reinstating the operation as Operation Neptune II).

2) The reduction in the supply of abalone to the black market as a result of Operation Neptune *increased the black market price of abalone* and thereby increased the incentive for illegal fishing. Poaching activity moved to new areas along the coast where there was a less intensive police presence.

3) Poachers responded by adopting *more sophisticated ways of operating* including building more organised networks, establishing stronger relationships among buyers and improving communication channels among all the participants.

4) There was a perception that the operation had been *unsuccessful in arresting licensed commercial divers* who were suspected of exceeding their quota allocations.

5) Many authorities believed that the effectiveness of the operation was undermined by *insufficient fines and jail sentences* imposed by the courts.

6) Concern was expressed that some of the Neptune taskforce were *insufficiently trained* to identify marine species and to handle confiscated abalone or rock lobster.

7) The *rotation of personnel* had the disadvantage that it took the enforcement officers longer to become familiar with local conditions (e.g. how and when the illegal fishing took place, who the local informers were, etc.) and that every time officers were rotated out of an area, they took with them important information.

8) Fishers, local authorities and local organisations felt that it would have been *better to give local people assistance to develop coordinated, long-term strategies* to address the problem rather than relying on short-term solutions based on bringing in personnel from the outside.

9) The operation was criticized for *inadequate funding*, which was seen as particularly short sighted since during 1999 the value of all confiscated abalone amounted to approximately R6 million whereas the total expenditure on Operation Neptune (excluding overtime and certain equipment costs) was probably in the region of R1.5 million.

Conclusions

Operation Neptune was undoubtedly more successful than the previous *ad hoc* law enforcement strategies that often led to aggressive confrontations between coastal communities and the authorities. It was given substantial support from commercial divers and by communities most effected by gangs and other criminals involved in illegally harvesting the abalone. However, it is clear that such an operation is only likely to have a lasting impact on deterring illegal fishing if: (a) it is implemented with a long-term vision, (b) it works closely with local community structures, fishers and fishing groups, (c) it is closely linked with a serious programme to improve equitable access rights to inshore resources for local communities, and (d) interactive and co-operative strategies for working with coastal communities are developed.

(Source: Hauck, M. and Hector, R. 2000. An analysis of Operation Neptune: Government's response to marine poaching (occasional paper series). Cape Town: Institute of Criminology, University of Cape Town. Further information may be obtained from the website of the Institute of Criminology at the University of Cape Town: www.uct.ac.za/depts/sjrp/neptune. SPM

7.5 Establishing an MCS system for Coastal Waters

This section discusses four basic steps in establishing MCS systems for coastal waters, namely:

1) assessing the relevant influencing factors;

2) establishing appropriate inter-agency mechanisms;

3) incorporating preventative MCS approaches in CRM planning; and

4) evaluating the various options for coastal MCS and combining these in an appropriate manner.

This section does not deal with MCS planning for the coastal areas as this follows the same process described in chapter 5: section 5.5 although with a particular emphasis on fully involving coastal communities and stakeholders in the planning exercise.

Step One: Assessment of the influencing factors (national policies, guidelines and devolution of authority)

Integrated, collaborative or co-management of coastal resources cannot stand alone. MCS in support of coastal management also needs to have a basis in law. The assessments of the influencing factors in coastal resource management will provide the national parameters under which the coastal management process can proceed. This initial review of national policies and guidelines will provide the "umbrella" under which the MCS system will operate.

For example, the review should assess whether or not:

- there is a policy of "open access" in the current Constitution and legal system thus automatically placing limitations and pressures on MCS activities, for without limited entry, the promotion of "exit" schemes will fail;

- devolution of authority will enable sustenance fishers to be registered or licensed to assist in obtaining data for sustainable and responsible fisheries management;

- the re-application for fishing licences, gear, and fishers can be done locally;

- there is a national data information system for linkage with the local system being established for CRM, providing feedback for local management purposes;

- there are national guidelines for the marking and identification of fishing vessels to which the CRM system must link;

- there are national standards for staffing, for training and MCS operations which the local CRM MCS system can access, or with which it must comply;

- there is a national policy regarding participatory management and to what level;

- policies exist regarding fishing zones, inter-agency mechanisms, and their potential impact on the MCS design.

Step Two: Inter-Agency Mechanisms

The next challenge for coastal area management is to address the mix and overlapping of mandates of the agencies involved in the coastal area. This will be required whether or not there is a national system or policy. The positive interaction of local agencies will be critical in the success of the coastal MCS programme.

As pointed out in the 1998 FAO Integrated Coastal Area Management Guidelines,[166] it is in the interests of fisheries sector institutions to take the initiative in coastal area management processes. This has a number of advantages, including the following:

a) it will usually allow them to exert more influence on future developments, particularly where the ICM policy or supporting legislation establishes the principle that priority should be given to coast-dependent developments, thereby providing a rationale for prioritising uses such as fisheries, which by their very nature are dependent on inherent attributes of the coastal area;

b) it allows fishery sector institutions to build alliances with other institutions or interest groups around issues of common interest which may be politically important in protecting fisheries' interests; and

c) it enables the fisheries administration to have an influence over key factors affecting the success of fisheries management in general and MCS strategies in particular, including input into strategies to alleviate the socio-economic hardships suffered by many sustenance fishers.

Inevitably the process of introducing ICM brings with it the need to resolve potential conflicts that may arise from the overlapping mandates of different organs of government. The desire of several agencies to have jurisdiction over the coastal area for their mandated activities: industry, transportation, tourism, customs, security and fisheries are often in conflict. The overlapping of mandates

[166] See box D.3 "Fisheries institutions and the other sectors" on page 163.

and interests usually becomes first evident in two areas: area jurisdiction, and registration or licensing of fishers, boats and gear. Consequently it is usually necessary to establish inter-agency mechanisms to discuss and resolve conflicts of interest at the local level (and often at higher levels as well).

In Sri Lanka, Special Area Management (SAMs) Committees on which local stakeholders are represented, have proved to be very successful for lagoon and coastal management. Such a Committee can form the basis for cooperative efforts for licensing and registration of coastal fishers, conflict resolution, input from the stakeholders for development activities, including fisheries, and education on management processes.

Step Three: Preventative MCS in CRM Planning

There are several MCS activities under the community-based, or co-management CRM planning exercise that are recommended and will encourage the preventative MCS approach towards voluntary compliance. First, is the introduction of MCS in the context of the participatory community resource assessment exercises. During these exercises the need for protection of the resources as they are mapped, the problem areas needing protection and the threats should be identified. This introduces MCS as an activity integrated with management.

Second will be the inclusion of MCS requirements in the development of the community-based data system for management of the coastal area, such as a means of identifying fishers, vessels and landings. Not only are these requirements for management, but also for the MCS activities for operational planning and controls. MCS impacts can be highlighted during the planning process through the public awareness, education seminars, and workshops to show their role in the management exercise.

Third, the strengths, weaknesses, opportunities and threats (SWOT) sessions should include issues for the development of an appropriate and acceptable MCS system for the coastal area. The MCS information requirements, equipment, and staffing needs would be considered, along with the idea of acceptable limits for quotas, zones and methods to address sustenance fishers.

Fourth is the identification of training requirements for MCS in the coastal area, either for community-based monitoring programmes such as reef watch, or coast watch, or for integrated, inter-agency, cooperative law enforcement activities. Criteria for both personnel to provide this training, and also selection of trainees will evolve from this exercise. These preventative steps integrate MCS into the participatory management process, foster input and support of these measures, and encourage voluntary compliance.

Step Four: Coastal MCS Options

There are several ideas and options for MCS strategies in the coastal areas for discussion between the government and the fishers, and other interested parties.

1. *Licensing and registration*: The licensing of fishers, boats and gear should follow national policies, if they exist. A particularly important issue to address is the licensing of sustenance fishers. As noted earlier, if they are not licensed or registered this creates a major gap in information on the numbers of fishers using the resources, the effort, and the landings. This lack of licensing is usually justified on the basis of:

    - the open access policies of government;
    - the large numbers of sustenance fishers and the difficulties in registering or licensing them;
    - the idea that these fishers have an inherent right to continue fishing under the concept of the "employment of last resort";
    - the illiteracy of the sustenance fishers; and
    - the inability of sustenance fishers to pay for licences.

    It is suggested that for management and MCS purposes it is essential to first determine, and if necessary and at a later stage limit, the numbers of fishers, boats and gear. This should be implemented in phases but it must be done otherwise it will not be possible to address the fishing overcapacity in most coastal areas. Where there is devolved fisheries management authority, licensing (with fees as appropriate to the social capacity of the fishers) can be implemented at the local level. Alternatively, registration of fishers without fees can be implemented to identify the fishers for both fisheries management purposes and for future social assistance programmes for this sector of the fishery.

    If fishers can see an immediate, or future benefit to registration, e.g., identification for possible economic assistance, with no assistance to be provided to those who do not register, then most will probably register. It is proposed that this system could be established through the local communities. Communities would be more inclined to ensure that the registrations were correct if the area in question were to be set aside for their exclusive use and management.

    It is suggested that a photograph of the fisher, with his or her address and age and a simple vessel licence containing a photograph and details of its size and propulsion equipment, could be utilized for this purpose. The benefits of such a system, in addition to fisheries management, are often twofold:

(i) identification for the individual who may have no other identification for other purposes, hospital, social assistance, etc.; and

(ii) identification of the individual for other government purposes - certification of professional status as a fisher, etc.

2. *Data Collection*

It is also easier to develop and verify a data collection system that includes information on fishing effort and landings if this responsibility is devolved to the local community officials, aggregated, and then transmitted to the higher authorities. This system should always be developed within national guidelines to ensure integration and compatibility with the national system. This will facilitate training, input of information and analysis. A network of part-time data collectors at the landing sites has been found to be effective in many countries, especially where special coastal landing stations are built and appropriate incentives are provided for fishers to land their catches at these points, e.g., ice, boat repairs, buyer stations, etc. Data systems for coastal resource management need not be complicated, but they must be accurate.

3. *Community Involvement in MCS*

The growing trends towards devolution of government authority and community participation in management are also recommended for coastal MCS. Some options have been noted in Section 7.5 Step Three and include:

- introducing education and public awareness component(s) (preventative) of MCS to promote voluntary compliance;
- considering the MCS options to conserve coastal resources and including these in the coastal resource management plan;
- ensuring that communities are consulted during the process of drafting local legislation, such as by-laws and ordinances, to implement the management plan; and
- instituting coast watch or reef watch programmes that follow the same general principles as an observer programme, to **observe, record and report, but to take no direct enforcement action**.

These programmes are not full enforcement programmes and it is not recommended that individuals in these programmes be provided with any enforcement authority. Personnel would be utilized in an observation, “no force” role to provide information to the community and authorized law

enforcement personnel to take appropriate follow-up enforcement action. *It is strongly recommended from past experience that protection of individuals assigned to these programmes from harassment or aggressive behaviour, be included in legislation.*

4. *Equipment*

The selection of MCS equipment for coastal MCS is as varied as there are numbers of plans and suppliers. Basic equipment for coast watchers would include: *binoculars; radios, identification vests, life vests (if at-sea duties are included), hand-held GPS, transportation*, *and report forms* supported by a base station for communications and back-up support.

A definite "must" for equipment for the coastal areas is an appropriate radio and telecommunications system for contact with MCS assets and resources in the field. No field personnel should be permitted to go into the field without appropriate back-up support available and constant links with the base office for safety and security reasons. Radio systems of the High Frequency (HF) and Very High Frequency (VHF) are readily available and inexpensive. Linked to the communications requirements for safety, is the hand-held global positioning system (GPS) to enable the field personnel to know their position at all times for both operational and safety purposes.

Use of "no force" techniques such as *small coastal radars* can also provide early warning information and permit risk assessment of intrusions into any coastal zones set by the management plans. A small coastal radar system in Senegal combined community involvement and government officials with inter-linking coastal radars to protect the six nm coastal zone. Officials noting an intruder would seek assistance from a fisher to use a fishing boat to come alongside the intruder, take a picture, record its position with a hand held GPS, record identifying markings on the vessel, and return to the beach. The information would then be passed to the local law enforcement personnel who would then take appropriate action to apprehend the vessel within a 24 hour period. Coastal radars are being tested in Indonesia in 2001 in two marine parks to provide early warning against intruders and permit MCS enforcement staff to intercept these vessels. These are also being used to monitor the "access gates" to the marine parks.[167]

An innovative experience in MCS technology came from a new public awareness initiative in the Race Rocks Marine Protected Area in Canada where an interactive web page has been established that allows the internet visitor to activate *a real time, remote camera* on site to see the sites of the park. The Department of Fisheries and Oceans received calls from visitors

[167] The World Bank COREMAP is testing this technology in Take Bone Rate, South Sulawesi and Padaido Islands, Irian Jaya, 2001. Take Bone Rate has four "gates" by which vessels are permitted access into the park.

to the web page to report illegal activities in the area, thus another "no force" monitoring tool had evolved from a public awareness initiative[168].

As noted above, the coastal area MCS system can make good use of video and night vision video for "no force" techniques and record evidence for court proceedings. Further "no force" technology includes links with national VMS or satellite imagery systems, if available, for risk assessment and early warning of potential threats to coastal resources, from larger commercial vessels. The myriad of options should be tempered by the costs, benefits and an assessment of real needs of the area, and **not** be driven by a desire for the latest technology.

Coastal MCS requirements also include small patrol vessels, either speedboats, or rigid-hulled inflatables. For the coastal areas, vessels of 7-9m are often required for the inshore waters and vessels of 18-25 m are more appropriate for the near-shore to commercial offshore seas.

The use of computer technology and GIS systems noted earlier in the paper are also applicable for coastal management and operations.

Finally, a required tool for coastal MCS is appropriately selected and trained staff. **No MCS system can be successful without professional staff with integrity, enthusiasm and the ability and eagerness to learn.** Training should cover all subjects including: verbal communications; radio communications; integrated multi-sector management planning; conducting seminars; navigation; statistics; inspection techniques; monitoring of landings; preparation of legal staff and witnesses for court proceedings; and a myriad of administrative duties. Training courses must be developed to address each coastal management situation in a participatory manner.

7.6 Emerging Trends in Coastal MCS

A summary of the emerging trends in coastal MCS that we have noted so far include the following:

1. the trend of governments to devolve authority for coastal management to provincial and local government units so that these issues can be dealt with in a more cost-effective manner;

2. the trend away from centralized management to community-based management, and now moving to integrated collaborative and co-management of coastal resources by government and stakeholders;

[168] MPA news, International News and Analysis on Marine Protected Areas, Vol. 2, No. 5 November 2000, *Use of Video for Monitoring*, www.racerocks.com, Canada.

3. the increased awareness among stakeholders and coastal communities of sustainable management practices;

4. the advancements in rapid resource assessment techniques that are more understandable to the communities and stakeholders to explain resource assessment and management options in a layperson's terms;

5. the trend for stakeholders to demand a more active role and involvement in coastal resource management, and hence MCS;

6. the move towards limited access/entry management to control access and to allow for the development of "exit strategies" to reduce pressures on over-exploited coastal resources;

7. the trend for a re-emphasis on traditional management practices that involved land tenure and legally-recognised rights over defined coastal areas;

8. the trends in MCS to encourage voluntary compliance as a "preventative" approach to MCS instead of the former "big stick" or punitive approach that focused on the "deterrent", and full traditional enforcement of the law;

9. the advancements in technology and reduced costs thus permitting more effective MCS strategies in the coastal areas;

10. the increased willingness of community members to become involved in management of "their" coastal resources; and

11. the need in coastal management for a more integrated, cooperative, multi-zoned, and holistic approach to marine resource management due to the multi-interest users.

These have all now combined to create an approach to coastal resource management and MCS activities that is transparent, participatory, low-cost and environmentally and socially responsible. As Christie and White point out:

> "Analysis of the various forms that coastal management has taken allows the identification of three important trends:
>
> 1. increasingly interdisciplinary research and integration of management;
>
> 2. increased interest and reliance on traditional knowledge and management systems; and
>
> 3. increased reliance on local participation."[169]

[169] Christie, P., White, A.T., *ibid. p165.*

7.7 Safety-At-Sea for Coastal Fishers

Many countries are experiencing a rapid growth in their offshore fisheries for varying reasons. These reasons include:

i) limited access to areas of coast due to internal fighting between factions thus creating an incentive for fishers to go further offshore for fishing and also for personal safety reasons;

ii) rapid expansion of domestic fleet technology to displace foreign fishing, or to access under-exploited marine resources.

"Fishermen are now taking more risks by ranging beyond their 'normal' fishing grounds and going further offshore, sometimes for several days, in basically the same small fishing boats and canoes which they've been using for day trips in the nearshore zone."[170] Annual mortality rates reaching 1% are impressing on fishers the need for greater attention to safety, but the high cost of "northern" sea safety programmes do not address the economics of the tropics. Northern solutions are based on heavy seas, high labour costs and low capital costs that result in heavily constructed vessels and safety gear. In the tropics, the opposite is true, the seas are not as heavy and fishermen do not venture out in rough waters. Furthermore, the same safety equipment becomes a very high capital cost and in many cases is prohibitively expensive, while labour is much less expensive. Consequently, solutions relying on greater use of labour and less costly equipment are more attractive in the tropics. When fishers are informed of action that they can take to improve their safety at sea at a reasonably low cost – they will usually take these actions.

The fundamental strategy for safety at sea relies on:

- prevention;
- survival and self-rescue; and
- search and rescue.

Methods, equipment and techniques exist that can assist artisanal and small boat fishers in each of these approaches. Costs for these programmes are not as prohibitive as "northern" approaches, can be supported by tropical fishers, and can work to reduce incidents of fatality.

Institutional supporting structures that can assist in the implementation of such approaches include:[171] mutual insurance groups, fisher's sea safety committees and communication link with MCS systems.

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[170] Johnson, Jan, *Improved Safety at Sea for Artisanal Fishermen,* FAO, Rome, 1999.
[171] Ibid. p. 4.

In **mutual insurance groups,** it is in the interests of the whole group to ensure compliance with sea safety standards and procedures. A loss will impact on the premiums for the entire group. Peer pressure thus ensures compliance with insurance requirements for safety equipment and good safety-at-sea practices.

Fishers' Sea Safety Committees based on fishers' self-help groups can fulfil a number of important functions. For example a Sea Safety Committee can:

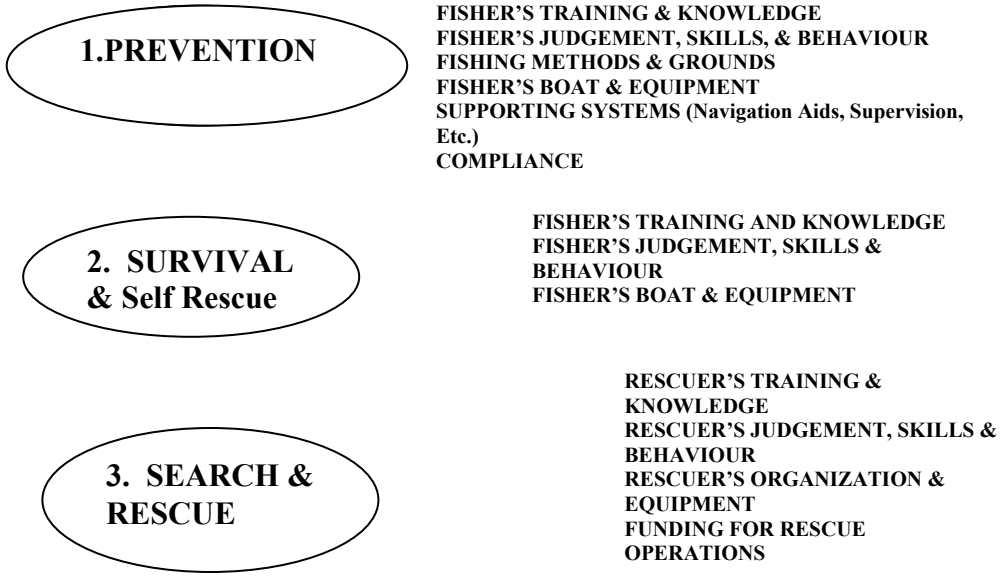
- act as a strong lobby group to press for compensation for loss of equipment caused by industrial vessels;
- use members' dues for search and rescue costs;
- support sea safety training and procurement of safety equipment for small vessels, such as basic communications equipment, etc.; and
- link with MCS Systems to augment Search and Rescue (SAR) operations.

Enabling fishers to establish communication **links with the MCS System** can play an important part in ensuring greater safety at sea for fishers by enabling fisheries staff to receive calls for assistance and to effect a rescue.

It has been suggested in some papers that the navy would be the better agency to participate in such activities. However, it is recommended that with professionalism increasing as MCS systems and as MCS units are formed, that these units are already proving themselves capable in search and rescue activities. Further, MCS assets are often at sea during the same periods and in similar locations as fishers. By default, the fisheries MCS units will be called upon for search and rescue duties as fishers become better equipped with safety and communications equipment.

Box 11

THREE APPROACHES FOR SEA SAFETY [172]



It is also suggested that as local fishing boats and fleets expand to address offshore resource harvesting, government agencies responsible for safety may wish to ensure that fishers are required to have more up to date training and safer equipment onboard as a legal requirement for registration and operations in the EEZ and coastal waters.

Finally, it is realized that regional and intra-regional sharing of fishing vessel safety information and training experiences can better prepare fishers for their challenging and dangerous profession. It has been suggested that the following be considered[173]:

1. forming national safety- at-sea services for commercial **and** artisanal fishers to include relevant government agencies, NGOs, and representatives of fishers and vessel owners;

2. developing of a national monitoring capability to analyse incidents and recommend practices to address concerns;

3. developing instructors courses to raise awareness for safe practices at sea for fishers, boat builders, owners and rescuers;

[172] Ibid. p.3.
[173] Ibid. p.7.

4. developing effective marketing for safety equipment and through fishers groups promoting the acquisition of this equipment;

5. ensuring the integrity of vessel inspection schemes;

6. assigning full-time professionals to a national safety-at-sea programme;

7. developing search and rescue capabilities in regions and locally where possible; and

8. establishing a continuing national programme for Safety-at-Sea education.

Where possible, IMO and other interested organizations can also assist by:

- developing and presenting guidelines for safety-at-sea for fishers;
- developing and establishing minimum safety equipment for various sized fishing vessels where none currently apply;
- developing and facilitating training of fishers at all levels of safety-at-sea equipment and practices; and
- providing a pool of information, both written and through electronic means for safety instructors in developing countries for access by fishers, boat owners and suppliers of fishing apparatus as part of a global awareness and promotion on safety-at-sea.

7.8 Vessel Identification in Coastal Waters

One of the better vessel marking and identification systems for coastal waters has been developed by Malaysia[174]. This system has now achieved an International Standards Organisation (ISO) 9000 rating. The system was designed to address several factors, including:

- the need to identify fishers, gear and boats in a secure manner that is difficult to duplicate;
- the need for rapid identification of the vessel home state;
- the need for rapid identification of the permitted area for which the vessel is licensed to operate; and
- the need for rapid identification of non-environmentally friendly fishing gear.

[174] Salehan, *Draft Paper on Malaysian Licensing and Vessel Marking System, May 2000*, Kuala Lumpur, Malaysia.

This was achieved by:

- using passport-type paper and passport bound licences for fishers and vessels;
- fixing metal letters denoting the state and number for the vessel on the bow post of the vessel with non-removable nails;
- fixing a metal plate from the Department of Fisheries signed by the Director General with a plate number on the bow post to also identify the vessel as being appropriately licensed in Malaysia;
- painting the wheelhouse a standard colour in accordance with the assigned state colours;
- numbering the vessel with the first two letters designating the state, and the number of the vessel;
- using a black circle up to 22 inches in diameter with a large white letter to designate the authorized area for fishing of the vessel in accordance with the fishing gear and zone; and finally,
- using a diagonal white line across the wheelhouse for all vessels that are licensed to use trawl nets, the latter having been designated as “not environmentally friendly”.

The details of this system with diagrams and pictures are attached as ANNEX G.

ANNEXES

ANNEX A

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ANNEX B

Table 1: KEY MCS COMPONENTS

KEY MCS COMPONENT	OPERATION	INSPECTIONS, ACTIVITY /DAY	EFFECTIVENESS OF MCS TO CHECK				TIME OBSERVED	EFFECTIVENESS OF DETECTION OF ILLEGAL ACTIVITY	COVERAGE	POWERS OF ARREST
			position	fishing gear	catch limits /bycatch	days at sea				
BY VESSEL	Sighting and inspection	2-3 per day/officer[175]	High	High	Med.	Med.	Low	High	Visual 300 nm² /hour radar 600 nm²	Yes
BY AIR	Sighting and photography[176]	200-300 per flight	High	Low	None	Low[177]	Low	High	3500-4800 nm²/hr	No[178]
SHORE BASED CONTROLS	Coast patrols, market checks, port inspections	3-5 per day	None	High	High	High	Med.	Med.[179]	0-20 nm²/hr	Yes
OBSERVERS AT SEA	Continual observation[180]	One vessel per day	Med./ High	High	High	High	High	High on assigned vessel	High for assigned vessel	No
DOCKSIDE MONITORS	Landing checks	3-5 per day[181]	None	Low	High	Med.	Med.	Med.	None	No
VMS	Periodic monitoring of licensed vessel positions and activities[182]	All vessels logged on at pre-set intervals	High	None	None	High	High	High for area violations	Complete for fitted vessels	No – as per air surv.
SATELLITE IMAGERY	Periodic monitoring of all contacts in a set area	All contacts at time of scan	High	None	None	Low	Med.[183]	High for unlicensed if linked to vms	Complete for scan	No – as per air surv.
RADAR	Monitoring of contacts in a set area	All contacts in range	High	None	None	Low	High in range	High for area violations	High for range	No
REAL TIME VIDEO	Full time monitoring capability of a set area	If taped, all contacts in range	Med.	Low	None	Low	High in range	High if in range	High for range	No
COAST/REEF WATCH	Sightings at sea	Contacts in 3nm of patrol line	Med.	Low	Low	Low	Med.	High if in range	18 nm²/hr	No

[175] This depends on the fishery, by catch and method of capture, e.g., purse seine inspections can be more rapid than trawlers.
[176] Effectiveness increased if night time infrared tracking and night photography is available.
[177] Dependent upon the frequency of air patrols to the same area and distance from shore – if offshore and sighted every two days, assume still at sea.
[178] Secondary information or possibly from helicopters.
[179] Depends on thoroughness and time involved in port inspection.
[180] Effectiveness dependent upon technical capability of observers, for GPS, catch estimates, processing conversion factors, storage estimations, and time observer works.
[181] Dependent upon the method of offloading, individual boxes and scales or by pumping and weigh outs in holding tanks.
[182] The capability for electronic catch reporting could enhance the capability of this component.
[183] Depends on frequency of scans.

Table 2: ADVANTAGES AND DISADVANTAGES OF MCS COMPONENTS

Key MCS Component	ADVANTAGES	DISADVANTAGES
By Vessel	Provides at-sea verification of fishing gear, discards, dumping, catches and regular logbook completion. Control of offshore and foreign fishing and areas violations. Can arrest at sea.	Expensive even where focussed and directed to problem areas.
By Air	Best for large area coverage and directing sea assets to problem areas. Very good for area violations. Excellent if night patrol capable, e.g., night photography, infrared tracking, etc.	Expensive, cannot check catches, gear, etc.
Shore-based controls	Stable and low cost with potential for complete inspection. Can arrest for violation.	Cannot monitor dumping, culling, discards or gear violations. Cannot monitor fishing or processing operations for catch estimates and processing conversion rates. Can only monitor port transshipment.
Observers at sea	Can monitor all at-sea operations and verify catches, discards, dumping, gear, processing and reporting.	Medium cost, but can be transferred to the industry. Only for larger vessels. Integrity checks need cross verification.
Dockside monitors	Excellent for landing checks. Medium cost, but stable platform and safe verification of landed value and species.	No at sea verification of full catches and dumping, etc.
VMS	Near real time full monitoring of fitted/licensed vessels. Can focus more expensive assets to target areas and reduce costs. Low cost with only communications costs and depreciation after initial capital acquisition of base (ship fitted equipment should be at cost to fishing vessel unless for small boat fleet)	No coverage of unfitted vessels, hence no coverage of unlicensed vessels, or small boat fleet not required to be fitted. Needs integration with other sensor for full coverage of activity in the area.
Satellite Imagery	Full coverage of area scanned.	Still relatively expensive for regular scans. No identification of targets unless linked with other sensor (VMS). Little information on course and speed of contact.
Radar	Full coverage of closer contacts. Good area coverage for set area. Prior risk assessment and pre-positioning of MCS intercepting assets. Relatively low cost for wide area coverage. Good for incursion monitoring.	No identification of vessels. Limited range. No arrest capability, only supporting information.
Real time video	Full coverage and identification within set area. "No Force" approach with maximum safety to monitor. Relatively low cost for small areas.	No hands on ability for arrest, information only. Small are of coverage. Open to elements and outside influence/destruction.
Coast/reef watch	Relatively low cost. Community participation and involvement. Witness for events and follow-up action. Good prior notification for patrol planning and focused MCS activities to problem areas. Intelligence gathering. Potential CBCRM educators for community liaison and preventative approach for MCS. Low cost.	**Need legal protection against harassment, adverse and negative reaction of public and fishers.** Needs selling to community that "watchers" are on side of the community conservation.

MCS EQUIPMENT COSTS

Air Surveillance: This is an expensive undertaking and dependent upon geographical area of coverage, but it can be cost-effective for large areas. Many countries rely on their Air Force for these services and pay a retainer for this service, which can be as low as US$400/hour to US$3000/air hour depending on the aircraft, patrol time and equipment.

The countries of the South Pacific Forum rely on the Air Forces of Australia and New Zealand for these services in their area.

The countries of West Africa share air surveillance costs of an aircraft out of the Gambia.

Aircraft costs vary with size, propulsion and equipment from a Defender type aircraft equipped for air surveillance at US$4 million, to a fully equipped night surveillance capable aircraft such as the Beechcraft King Air turbo prop at US$6.2 million as used in Canada and the US DEA.

Countries often rely on institutional aircraft – air force or other services, or contract out the service to the private sector to reduce long term costs of crew, maintenance, etc. A few countries have their own fisheries surveillance aircraft, but these are expensive to procure, maintain and operate. The lease option is recommended. It can vary considerably from a small Cessna at US$350-$400/air hour to the Canadian leased service at a cost of approximately US$1400/air hour for a Beechcraft King Air turbo prop aircraft with three navigating systems, HF and VHF radio, integrated computer technology to link the air navigation systems with the day/night photography system, the Litton V5 Side Looking, Single Aperture Radar (SLAR) radar and forward-looking infrared tracking.

Radar: In coastal areas where air surveillance is difficult and expensive some countries have opted for small low cost-radar systems, e.g., Senegal's linked coastal radar system; the Indonesia trial system for two marine parks in Take Bone Rate, South Sulawesi and Padaido, Irian Jaya. These are small short range radar systems 24-48 miles at a cost of approximately US$ 9,000 – $10,000/unit including solar panels and tower for the antenna. These are low technology units that can be used by operators after approximately one day of training.

Patrol Vessels: These come in various sizes in Asia including the very large naval vessels (for which operational costs are unavailable) for offshore and high seas patrols. Nearshore and coastal patrols utilize the better known vessels of the sizes ranging from 26 m and 17 m steel hull vessels, 22 m fiberglass and 7-9 m fiberglass. Also, from an Indonesian MCS model we will present costs for small local fisher-type vessels for reef watch/coast watch duties.

Table 3 VESSEL COSTS PER UNIT

VESSEL TYPE	PROCUREMENT/UNIT	COST/DAY		COST/MONTH	
		L/HR AND HR/DAY	COST	DAYS/MO	COST
27 m Steel Hull (twin 500 hp engines)	US$ 3 million	10 hr x 300 ltr @ US$ 0.20/ltr	US$ 609/day	12	US$7308
17 m Steel (aluminum) (twin 500 hp engines)	US $ 1.1 million (US$1.25 million)	10 hr x 600 ltr @ US $0.20/ltr	US$ 1218/day	12	US$ 1416
22 m Fiberglass (twin 680 hp engines)	US$ 560,000	12 hr x 240L x $0.20	US$ 576/day	12	US$6912

7-9 m Fiberglass (twin 150 hp gasoline engines)	US$ 68,000	5 hr x 36 l @ $ 0.25	US$45/day	20	US$900
Local boats 40 hp diesel	US$ 4,350	8 hr x 40 l average @ $0.20	US$ 64/day	20	US$1280

Notes:

1. One must add docking costs for each of the larger vessels at approximately US$80-100,000/year and 5% maintenance costs after year two.
2. Maintenance costs of 2-5%/year should be added to the small speed boats and the local boats.
3. Maintenance costs are based on operational usage costs.

Safety Equipment: This is a package that can also vary, but using the Indonesian model for COREMAP this could include:

SSB/HF radios @ US$2900/unit
VHF Base radios @ US$ 1430/unit
VHF Hand held radios @ US$700/unit
GPS hand held @ US$ 500/unit
Binoculars @ US$ 220/unit
Binoculars – night vision @ US$ 1700/unit
Loud Hailers @ US$ 100
Signal flares and ID Jackets @ US$ 500/unit
Heavy Duty Flashlights/Flood lights for the boats @ US$400/unit
Digital cameras @ US$ 800/unit
Video Cameras @ US$ 1,400/unit
Solar panels for radio at remote locations @ US$ 1,000/unit
Diesel generators for remote locations @ US$2,000/unit

Office Equipment: The average is US$ 3,000/unit space for computers etc. plus $5,000 for the photocopier.

Enforcement Staff and Observers/Dockside Monitors: costs depend on local wages, but it is suggested that to ensure integrity of staff that these should be at a reasonable level. The observers and dockside monitors are usually not granted enforcement powers. Training costs to develop the professionalism for MCS are additional and very dependent upon the tasks expected of the staff, e.g. IT staff training/person would be more expensive than dockside monitoring courses.

New Technology: VMS is being utilized in greater frequency as a tool for MCS in many countries. Some countries that have VMSs include: Argentina; Australia; Canada; European Union (EU); Iceland; Japan; Malaysia; Maldives; New Zealand; Norway; Peru; South Africa; United States and several regional organizations (Commission for the Conservation of Antarctic Marine Living Resources; South Pacific Forum Fisheries Agency; International Commission for the Conservation of Atlantic Tunas; Northwest Atlantic Fisheries Organization; North-East Atlantic Fisheries Commission; and the Central Bering Sea). Some of these are being used in conjunction with other tools such as radar, forward looking infrared systems and satellite imagery.

VMSs are becoming more sophisticated, but costs range in the area of US$200,000- 300,000 for the base station and US$3-5000/unit onboard the vessel. VMS is only a tool and must be used in conjunction with one of the other systems noted above to provide coverage of all vessels in an area. The combination of two systems will assist in rapid identification of non-VMS vessels. These non-VMS contacts should automatically be targets for further investigation.

Satellite imagery and use of integrated GIS costs for MCS are not available at this time as they are subject to the satellite systems used, frequency of access and communications costs for integration with national systems. It is suggested that as each system is developed the parameters for the operational demands be carefully identified so that the most appropriate mix of technologies can be selected.

There are several legalities which are emerging with the use of new technology and it is recommended that the FAO Code of Conduct for Responsible Fisheries guidelines, and other FAO legal publications be consulted prior to procurement to ensure that one can maximize the benefits from such equipment.[184]

[184] Erik Jaap Molenar & Martin Tsamenyi, *Satellite-based vessel monitoring systems international legal aspects and development in state practice,* FAO Legal Papers, FAO, Rome, April 2000, 44 pp; Philippe Cacaud, *Legal issues relating to vessel monitoring systems,* FAO Legal Papers, FAO, Rome, 1999, 40pp.

ANNEX C

STRENGTHENING NATIONAL LEGISLATION RELEVANT TO MCS

One of the most important activities in strengthening an MCS system is to review national (domestic) legislation to ensure that it provides the necessary legal mechanisms and appropriate powers to facilitate the cost-effective implementation of MCS. In reviewing legislation, it is important to review the regulatory system as a whole. For example, some of the relevant provisions may not be included in an Act of parliament but may be included in regulations or even in the terms and conditions of licences.

The following list of questions is intended to give an indication of some of the issues that it is useful to consider when reviewing national regulatory systems in order to strengthen a system of MCS. It is not an exhaustive checklist. Furthermore, it is important to appreciate that deciding what measures are appropriate to adopt in national legislation will depend on a variety of factors including: the legal tradition of the country concerned, the particular circumstances of the fisheries management in that country, the international or regional agreements to which that State is a party, and whether or not these agreements have entered into force.

The following abbreviations are used in the table:

CA : FAO Compliance Agreement;
UNFSA : UN Fish Stocks Agreement;
Code : FAO Code of Conduct for Responsible Fisheries

It is important to note that the references cited are intended to direct fisheries administrators to articles in recent international documents which address these issues. The Code is voluntary and neither the FAO Compliance Agreement nor the UN Fish Stocks Agreement are in force. Furthermore, even when they enter into force, they will not be applicable in many situations because the former relates to fishing on the high seas and the latter to the regulation of straddling and highly migratory fish stocks. However, their provisions give useful guidance as to how national regulatory systems can be strengthened to facilitate and develop MCS.

ISSUES WHICH NEED TO BE CONSIDERED	REFERENCES AND NOTES
1. Scope of legislation	
1.1. Is the scope of the relevant legislation (which may be contained in more than one Act) sufficiently wide to regulate the activities listed below? (a) fishing related activities such as transshipment and bunkering, both within the maritime zones of the coastal State and on the high seas;	

ISSUES WHICH NEED TO BE CONSIDERED	REFERENCES AND NOTES
(b) the activities of mother ships and fishing support vessels; (c) the fishing activities of national fishing vessels even when beyond the area of jurisdiction of the State; (d) the fishing activities of national fishing vessels of less than 24 metres in length; (e) the activities of masters, officers and crew of national fishing vessels; (f) the taking of action to enforce compliance by national and foreign vessels with conservation and management measures applicable to the high seas and to areas subject to regional management regimes; (g) measures to minimise pollution and waste.	CA Article 1(a). See also the distinction between "fishing operations" and "fishing activities" in the Code. CA Article III(1)(b). UNFSA Article 5(f).
2. Collection of information	
2.1. Are both national fishing vessels (wherever they operate) and foreign fishing vessels operating within the area of jurisdiction of the State, under a clear and legally enforceable duty to provide information relating to the vessel and its fishing activities?	CA Article III(7). This should include information regarding operations, catches, landings and mother ships and support vessels.
2.2. Must fishing vessels and fishing gear be marked for identification in accordance with a uniform and internationally recognised marking system such as the FAO "Standard Specifications for the Marking and Identification of Fishing Vessels"?	See UNFSA Article 18 which specifies duties of the flag State. CA Article III(2).
2.3. Records of fishing vessels 2.3.1. Is the fisheries administration under a duty to maintain a record of fishing vessels entitled to fly the national flag and authorised to be used for fishing on the high seas?	See CA Article IV and Article VI. Article VI lists the information to be entered in the records in respect of each fishing vessel, as well as other information which should be recorded and transmitted to the FAO to the extent practicable.
2.3.2. Are fishers under an obligation to provide vessel-related data for standardising fleet composition and vessel fishing power and for converting between different measures of effort?	UNFSA Annex 1. This would include: vessel identification, flag and port of registry; vessel type; vessel specifications (e.g. material of construction, date built, registered length, gross registered tonnage, power of main engines, hold capacity and catch storage methods); fishing gear description; and position fixing aides.
2.3.3. Is there a requirement to promptly inform the fisheries administration of any changes to the information recorded?	Parties to the CA are required to promptly inform FAO of certain changes to records of fishing vessels (Article VI.5). This would include information on: the scrapping, decommissioning or loss of a fishing

ISSUES WHICH NEED TO BE CONSIDERED	REFERENCES AND NOTES
	vessel, changes in ownership etc
2.4. Reporting 2.4.1. Must national vessels/foreign vessels in areas under the jurisdiction of the State maintain records and report promptly on: vessel position, entry and exit from defined maritime zones, catches of target and non-target species, fishing effort and other relevant fisheries data in accordance with sub-regional, regional and global standards for collection of such data? 2.4.2. Do the reporting requirements allow appropriate data to be collected and compiled in a manner that enables statistically meaningful analysis for the purpose of fishery conservation and resource management? 2.4.3. Do data reporting requirements include: catching and fishing effort statistics; information on non-target and associated and dependent species, time series of catch and effort statistics by fisheries and fleets; total catch in number and/or nominal weight by species; discard statistics; effort statistics; fishing location, date and time fished and other appropriate statistics; composition of the catch according to length, weight and sex?	UNFSA Article 18(3)(e). UNFSA Annex 1.
2.5. Verification 2.5.1. Is the national fisheries administration under an obligation to verify fisheries data, either independently or in conjunction with sub-regional or regional fisheries management organisations? 2.5.2. Is failing to maintain an accurate record or failing to report or misreporting an offence that attracts adequate penalties to deter the offence? 2.5.3. Is it a legal requirement for national and foreign fishing vessels to install automatic location communicators (ALCs) or vessel tracking units (VTUs)? 2.5.4. Are fishing vessels prohibited from being supported by other vessels within the maritime zones of the coastal State (other than for safety purposes) unless the latter vessels are equipped with ALCs? 2.5.5. Is it a requirement that ALCs are kept in good working order at all times and are turned on at all times in designated fishing areas? 2.5.6. Is it an offence to destroy, damage, render inoperative or otherwise interfere with the operation of an ALC?	Note: Some coastal States require foreign fishing vessels to turn on their ALCs well before entering the EEZ but it is doubtful whether this can be enforced as a matter of international law at this stage.
3. Information, exchange and dissemination	
3.1. Data protection 3.1.1. Are there legally enforceable provisions protecting the confidentiality of commercially confidential data,	

ISSUES WHICH NEED TO BE CONSIDERED	REFERENCES AND NOTES
including requirements to restrict access to it? 3.1.2. Are there sanctions for the unauthorised disclosure of confidential information?	
3.2. Information exchange 3.2.1. Is the fisheries authority empowered to exchange information and data relevant to specific fishing vessels and to management and conservation measures (both in respect of areas under national jurisdiction, within the region and on the high seas), to other states, regional fisheries management bodies or arrangements and international organisations? 3.2.2. Does the legislation empower the fisheries administration to publish and disseminate fisheries data and information in an aggregated form? 3.2.3. Is the national fisheries administration under an obligation to exchange relevant information, including evidentiary material, with other States, regional fisheries bodies and international organisations (e.g. the FAO) in accordance with applicable international agreements?	CA Articles V and V1.
4. Management plans	
4.1. Are the fisheries authorities under a legal obligation to prepare appropriate fisheries management and conservation plans based on best scientific evidence and including consideration of the interactions between the use of the particular fisheries and the wider environment?	
4.2. Are the authorities responsible for preparing coastal management plans legally obliged to take account of fisheries management objectives and to integrate these into the coastal management plans?	
4.3. Does the legislation prohibit the granting of authorisations for fishing or related activities which would undermine the effectiveness of national, regional or international fisheries, management or conservation plans?	
5. Licensing of fishing	
5.1. Flag State responsibilities 5.1.1. Are national vessels prohibited from (a) fishing or undertaking fishing-related activities on the high seas without authorisation from the flag State, and (b) contravening the terms of the authorisation?	CA Article III(2) and UNFSA Article 18(3)(b)(ii).
5.1.2. Are national vessels fishing on the high seas obliged to carry their authorisation on board and to produce it for inspection by duly authorised persons?	UNFSA Article 18(3)(b)(iii).
5.1.3. Can an authorisation to fish on the high seas be suspended on the basis of extra-jurisdictional infringements of international conservation and	CA Article III(5).

ISSUES WHICH NEED TO BE CONSIDERED	REFERENCES AND NOTES
management measures? 5.1.4. Are national vessels prohibited from fishing in areas under the jurisdiction of other States without authorisation by the coastal State concerned?	
5.2. Coastal State responsibilities 5.2.1. Is it prohibited to issue fishing authorisations if the vessel is not registered in a national or regional or fishing vessel record? 5.2.2. Is it prohibited to grant access to foreign fishing vessels unless an access agreement has been concluded with the flag State which requires it to ensure that its vessels comply with the terms of the access agreement and with the laws of the coastal State? 5.2.3. Are the conditions imposed on licensed fishing vessels appropriate to promote proper fishing conduct and compliance with conservation and management measures? 5.2.4. Have minimum terms and conditions (MTCs) for foreign fishing vessel access been developed and are these harmonised with the requirements of other States in the region? 5.2.5. Can fishing authorisations be suspended, amended or revoked to protect the environment or a fish stock?	
6. Enforcement powers	
6.1. *Authorised officers* – 6.1.1. Does the legislation make it clear who is authorised to enforce fisheries legislation (e.g. fisheries officers, police, navy, environmental conservation officials, etc)? 6.1.2. Does the law provide for the appointment of individuals from coast-dependent communities to monitor compliance with fisheries laws (usually without enforcement powers)? 6.1.3. Are inspectors and observers required to carry appropriate identification? 6.1.4. Must inspection vessels be clearly marked to indicate that they are in government service? 6.1.5. Does the legislation clearly specify the pre-conditions for the use of enforcement powers in various maritime zones? 6.1.6. Are fisheries and naval officers empowered to engage in hot pursuit?	See UNFSA Articles 21 and 22. e.g. In some circumstances “clear grounds” are required, in others “reasonable grounds” etc. See UNCLOS Section 111.
6.2. Inspection 6.2.1. Does the law facilitate inspections (e.g. by requiring	

ISSUES WHICH NEED TO BE CONSIDERED	REFERENCES AND NOTES
landings to take place only at specified landing stations and transshipments in designated areas)? 6.2.2. Does legislation permit the establishment of a system of observers on fishing vessels and grant such observers appropriate powers and protection? 6.2.3. Does the legislation make it clear under what circumstances routine inspections (i.e. where there is not necessarily any apprehension of non-compliance) may be conducted within ports and at offshore installations, within internal waters, the territorial sea and the EEZ? 6.2.4. Are observers aboard foreign fishing vessels subject to the jurisdiction of the fisheries administration of the coastal State while that vessel is within the maritime zones of the coastal State? 6.2.5. Are inspectors granted appropriate powers to inspect not only vessels, but also documents, log books, catches, equipment etc.?	
6.3. Boarding 6.3.1. Are the preconditions which must be met before a vessel can be boarded in each maritime zone, clearly specified? 6.3.2. Have basic procedures for boarding and inspection been established? 6.3.3. Are the masters of national vessels under an obligation to accept and facilitate prompt and safe boarding by inspectors of other States in appropriate circumstances, and to facilitate their safe disembarkation?	
6.4. Powers of entry, search, seizure and arrest 6.4.1. Do authorised officers enjoy adequate powers of search, seizure and arrest to facilitate effective enforcement, including powers in respect of premises where fish and fish products are processed? 6.4.2. Is provision made for releasing foreign fishing vessels and crews arrested in the EEZ on the posting of a reasonable bond or other security? 6.4.3. Do authorised officers have the power to inspect the vessel, its licence, gear, equipment, records, fish products and any relevant documents necessary to verify compliance with conservation and management measures? 6.4.4. Is the master and the crew of the vessel under a duty to co-operate with and assist in the inspection of a vessel? 6.4.5. Is it an offence to obstruct, intimidate or interfere with authorised officers (including fisheries officers, officers enforcing environmental laws, observers on board vessels and individuals from coastal communities participating in coastal MCS programmes) in the	See UNCLOS Article 73(2).

ISSUES WHICH NEED TO BE CONSIDERED	REFERENCES AND NOTES
performance of their duties? 6.4.6. Is it an offence to fail to comply with a lawful instruction of a fisheries officer?	
7. Offences	
7.1. Are landings and transshipments prohibited where it has been established that the catch has been taken in a manner which undermines the effectiveness of sub-regional, regional or global conservation and management measures on the high seas?	UNFSA Article 23(3).
7.2. Is it an offence to land, sell, receive or possess illegally caught fish?	
7.3. Can the master, owner and charterer of a fishing vessel which acts unlawfully be convicted of the offence?	
8. Evidentiary provisions	
8.1. Are offences formulated in a manner that facilitates enforcement? (E.g. prohibiting the possession of illegally caught catch as well as illegal catching and demarcating areas from which all fishing vessels are excluded.) 8.2. Are ancillary activities that facilitate IUU fishing prohibited (e.g. the possession or transportation of illegal fishing gear)?	
8.3. Will information and data from ALCs and satellite VMS systems be admissible in court?	(Answering this question will depend on the procedural rules of the legal system in question but problems are often encountered because the court may not be prepared to accept the accuracy of new technologies without expert evidence.
8.4. Does the law include appropriate presumptions of fact and law which will be regarded as true unless the contrary is proven, to facilitate securing convictions?	Examples of such presumptions include: (a) that the ALC is accurate and functioning correctly; (b) that information obtained by the use of an ALC comes from the vessel identified by it, is accurately relayed or transferred, and is given by the master, owner, operator or charterer of the fishing vessel; and (c) that a vessel found fishing without appropriate authorisation is undermining the relevant conservation and management measures in that area.
8.5. Do the evidentiary provisions in the law facilitate proving the essential facts of the charge without requiring the presence in court of a variety of experts to testify on technical points?	For example, the law may provide that instead of bringing VMS operators to

ISSUES WHICH NEED TO BE CONSIDERED	REFERENCES AND NOTES
	court on every occasion, evidence may be given by way of certificate to the effect that the person was competent to read any printout or visual display, the date and time the VMS information was obtained or ascertained, the name and call sign of the vehicle on which the ALC is or was located, and declaration that there was no apparent malfunctioning in the ALC or other equipment and that the appropriate reading was done at the same time that the offence was being committed.
8.6. Is it an offence to destroy evidence and to throw fish, gear, log books, etc. overboard when being pursued or when about to be boarded?	
9. Penalties	
9.1. Does the law provide for appropriate administrative penalties in addition to criminal penalties?	
9.2. Does the law allow for the "compounding" of offences (i.e. the payment of specified fines in order to avoid prosecution)?	
9.3. Are the sanctions sufficiently severe to be effective in securing compliance and to discourage violations wherever they occur?	CA Article III(8).
9.4. Will convicted offenders be deprived of the benefits accruing from their illegal activities?	UNFSA Article 19(2). CA Article III(8).
9.5. Can fishing vessels involved in the commission of an offence, as well as their gear, catches, etc. be forfeited to the State or the fine imposed for the offence be increased by an amount equivalent to their value?	
9.6. Can sanctions be imposed on the master and other officers of national fishing vessels which contravene the law, including refusing, withdrawing or suspending their authorisations to service masters or officers on such vessels?	
9.7. Can licences be refused, suspended, varied or cancelled in response to a serious violation or persistent violations?	CA Article III(8).
10. Other matters	
10.1. Does the law provide mechanisms to discourage contraventions of fisheries management and conservation measures applicable to areas beyond the jurisdiction of the State concerned?	For example the so-called Lacey Act in the United States which makes it unlawful to import fish that have been taken contrary to the laws of the other States.
10.2. Does the law require fishing vessels in transit through the maritime zones of the coastal State to stow their gear in a prescribed manner?	
10.3. Must licensed fishing vessels stow their gear when in areas in which they are not licensed to fish, or are not licensed to use	

ISSUES WHICH NEED TO BE CONSIDERED	REFERENCES AND NOTES
that gear?	
10.4. Must foreign vessels appoint a local agent on whom documents may be served for the purposes of legal proceedings?	

ANNEX D

CORE COMPONENTS OF FISHERIES OFFICER TRAINING

Training requirements for Fisheries Officers will vary in every country due to many factors, not the least being the level of the fisheries knowledge and the corresponding standards of education in the State. There have been two major fisheries training needs assessments in the past few years, one in the South Pacific for FFA and a second in the Caribbean for the CARICOM Fisheries Resource Assessment and Management Program. Although the details varied with respect to the training required, it was noted that training should be an ongoing exercise and there should be a commitment to enhance the capabilities of fisheries staff as they increase their responsibilities. Training should correspond to the responsibility level of the position and be matched by the general educational level of the recipient. In the Caribbean, for example, the broad categories of fisheries field staff include fisheries assistants, fisheries officers, senior fisheries officers and chief fisheries officers/fisheries directors/fisheries administrators. Each of the general levels has several different titles. It was noted that the shortage of individuals with formal secondary education places pressure on those with said education to accept a much higher level of responsibility and, consequently, their own formal training and educational level needs to be at a high generalist/managerial level to give them the capability to address the wider range of issues, compared to countries where the human resource pool is sufficient to fund and attract specialists. This is more evident as the seniority of the individual increases.

Fisheries Assistants tend to be technical level officers who are in the infancy of their careers and consequently require introductory and hands-on technical training. It is expected that this level of officer would possess a minimum of high school or "A" level formal education to be able to respond appropriately to the training recommended. Officers below this level would be encouraged to upgrade their formal education. The fields of study for these officers should include, in random order, the following:

level 1 orientation
fish handling
extension field work
administration
basic biology
gas and diesel maintenance
small fish business practices
fishing methods
navigation and safety
communications
resource management principles
fishing gear design and construction
vessel repairs and maintenance
introduction to computers

Fisheries officers, on the other hand, are expected to possess a formal degree in a fisheries or marine related field of study. Their level of training for their duties emphasizes a higher theoretical level of resource management.

Their training should focus on the following:

level 2 orientation
aquaculture
socio and economic principles
fisheries development
marketing
sea use planning introduction
policy and planning skills
advanced computer skills
resource assessment applications
data collection techniques
fish technology
fisheries law
processing
extension field training
introduction to oceanography

Senior fisheries officers, and supervisors in the fisheries department, are expected to possess a minimum of a first degree. It was seen as advantageous if such officers have a post-graduate degree in a related field. This level officer, as a supervisor and senior individual in the department, would be called upon to manage personnel and represent the department at meetings regarding ocean use management in general. The individual needs greater knowledge of the integrated ocean management principles and techniques to properly represent the department. The training suggested for this level of officer includes the following subjects:

level 3 orientation
environmental impact assessment
value added product skills
data interpretation and analyses
aquaculture
survey methodologies
human resource development
advanced fish marketing strategies
stock assessment
survey descriptions
finance and administration
project management
personnel management
general management skills
integrated sea use planning

Fisheries administrators are again expected to have a minimum of a first degree in a related field and considerable field experience. These individuals are the department's representatives to the government and require senior level management skills as well as knowledge and ability in the planning and policy side of fisheries and habitat management. Subject areas identified for this level officer include:

senior management orientation
policy development and management
Convention on the Law of the Sea
international affairs
communications skills
personnel management
finance and administration
program development and management
fisheries development and management
donor agency programs
socio and economic analyses
legal interpretation
senior management skills
MCS strategy and policy development and implementation.[185]

This information is presented as one example of a regional initiative with respect to an assessment of fisheries training required to meet gradually increasing levels of responsibility in

[185] *O'Reilly, A. and Clarke, K. (1993).*

the fisheries departments. It might be noted that there appears in the above example a dearth of information on fisheries MCS, except at the final level. This may be true, but it could be expected that the general orientation and the fisheries management training would cover this area of responsibility. It might, however, be clearer if the MCS training commences at the first stage and progressively increases in profile and tasking at each level. Certainly it would be expected that officers would all require considerable training in this area of work with emphasis on the enforcement aspects of MCS, if fisheries are to carry out the surveillance aspects of fisheries management, or guide the other ministry officials seconded to them for this purpose. Fisheries administrators and their field staff would require the knowledge to guide these individuals appropriately in fisheries management techniques and priorities. It does appear common to all training packages for fisheries that the following general subjects are required for fisheries officials to carry out their duties:

resource management
data collection and analysis
public relations
personnel supervision
integrated management
habitat management
enforcement/surveillance
administration
policy development and implementation
coastal zone planning
and management

It has been found through experience that training for fisheries can best be achieved through the use of modular training techniques. This can assist in minimizing the time the officer needs to be away from duty and permits assimilation of the theoretical knowledge into practical experience between training sessions.

The emphasis and detail for each subject will be determined by the Fisheries Administrators to meet the individual needs of their countries. Training, especially on a regional or sub-regional basis, is an area of high interest to all donor agencies.

As this paper is focused on MCS, an expansion of that module might assist Fisheries Administrators in planning the training programmes for their staff. It must be noted that the fisheries officer will not be fully qualified to carry out MCS duties following this module, due to the fact that it is the linkage and knowledge of the other training modules which cements the capabilities into a competent whole.

Without setting priorities for the training, some of the task modules which might be concentrated upon during the training would include:

- understanding of the Department's mandate and jurisdiction:
    * answer the questions as to why there is a fisheries department and what it is
    * answer the question as to how far does its authority extend

- the purpose and scope of MCS/the objective of the country's MCS policies:
    * the purpose of MCS
    * difference between MCS and enforcement
    * difference between actual and preventive enforcement
    * departmental MCS policy

* difference between renewable resource management and other management strategies

- principles of law:
    * the purpose of the law
    * the role of society in establishing law
    * the impact of law on society
    * how laws are made in the country
    * the meaning of the law (interpretation of the law)
    * what is meant by case law, common law, civil law, summary conviction and indictable offence (not all these terms will be applicable in every legal system)
    * powers of search, arrest, entry and settling disputes as established in fisheries law

- the court system:
    * how the judicial system works
    * levels of the courts and authorities
    * court terminology

- introduction to the fisheries laws - acts and regulations:
    * how to interpret the Fisheries Act(s) and regulations
    * the lay-out of the Act(s) and regulations
    * the use of the Act(s) and regulations
    * authorities and powers of fisheries officials

- the support resources available to address the task:
    * who controls the support services
    * how these resources are accessed
    * emergency support

- the co-operation and linkages with other ministries that are necessary for successful MCS implementation:
    * which ministries may become involved in fisheries MCS activities?
    * what are their procedures which impact on fisheries MCS activities?
    * who are the contact persons in these ministries?
    * what is the official mechanism to interact with these officials?
    * what is the mechanism in off-hours or emergency situations?

- determining MCS priorities:
    * identify MCS problems
    * identify problem area and the impact of continued activities
    * develop a plan and allocate resources

- planning MCS activities, data collection and surveillance patrols:
    * routine patrol planning for land, sea and air patrols
    * dedicated patrol planning for land, sea and air patrols
    * measure fish, fish catches and fishing gear
    * collect scientific information through sampling techniques
    * collect socio-economic information through questionnaires
    * stop vessels at sea

* stop motor vehicles
* develop local contacts and sources of information/community relations
* conduct checks of licences, vessels, gear, vehicles, facilities and persons

- determine the violation:
  * evaluate the situation
  * conduct searches
  * evaluate complaints

- apprehend violators:
  * establish identification of self and alleged violator
  * advise alleged violator of offence
  * obtain information from the alleged violator and witnesses
    - warnings
    - note-taking
    - exhibits, care and security
    - interview techniques
    - use of recording equipment
    - questions to ask
    - evidence, definition and use thereof
    - definition of threat, promise
    - elements of a charge
    - separation of alleged violators
  * issue appearance notices, warnings or secure certificates

- arrest alleged violators:
  * ensure custody
  * searches
  * rights of the alleged violator
  * release from custody
  * appearance notices
  * policy on use of force
    - issuance of firearms
    - policy on use of firearms
    - practical firearms training
    - armed boarding training
  * application of use of force
    - procedures for escalation of use of force

- gathering evidence:
  * maintain the scene of the alleged violation
  * make and secure seizures
  * obtain exhibits
  * continuity of evidence
  * statements
  * liaise with senior staff and counsel

- charge alleged violators:

* violation reports
* prepare information
* summons
* laying of information and summons
* serving summons
* proof of service of summons
* subpoenas
* executing warrant of arrest
* orders of forfeiture

- court procedures:
  * court duties
  * giving evidence

- completion of final documentation:
  * return of prosecutions
  * court case follow-up action

- completion of final procedures:
  * return seized items or proceeds
  * disposal of forfeited items

-review and evaluation of MCS program:
  * assess MCS activities
  * recommend amendments to procedures or control mechanisms
  * recommend enhancements to MCS procedures, equipment, staffing, training, etc.[186]

[186] *The CFRAMP Training Needs Assessment, FFA Training Needs Assessment, training programs in Canada, FFA, Belize and USA have been used extensively to produce this summary of training modules.*

ANNEX E

CORE COMPONENTS OF OBSERVER TRAINING

This Annex is very dependent upon the objective of an observer program. If it is assumed that observers will be employed by the State, or a third party acting on behalf of the State, and they will be used for data collection and advice to the vessel master only, **with no enforcement powers**, then the following could comprise elements for their training.

The material for this section has drawn heavily on the FFA and Canadian experience. These have been relatively good experiences, but it has been found that without the Government commitment to take the observer programme seriously, it can be a very abused fisheries management tool.

Problems which can be encountered include hiring practices, poor work practices, lack of commitment, lack of funding received at the programme level and lack of basic educational skills. The personal integrity of the observers is an important factor, as fabricated data sets, if used, can distort the fishery management advice and hence impact very negatively on the fish stock assessments. These points are brought out to note the requirement for full government commitment and support for this programme, if it is to succeed. This is not a programme that is appropriate for all countries, and where this is the case, it should not be used.

The complexity of the observer programme can be assessed and decided by the Fisheries Administrator in accordance with the needs of the State and the level of competence of the staff available. As with fisheries management, each observer programme should be custom designed for the State. The following, therefore, is a listing of elements and some detail on the lecture content for observer training which can be drawn from as required by the Fisheries Administrator in the design of the programme.

COMPONENTS OF AN OBSERVER TRAINING COURSE

1. Role of Observer

The role of the observer will be stressed in that he may only observe, record and report. The methods by which each of the aforementioned is accomplished will be addressed. It will be emphasized that part of the reporting requirements is to advise the master of irregularities.

The appropriate regulations concerning observer safety and rights will be addressed for both foreign and domestic vessels. The intent of these regulations will be explained.

In an introductory lecture on the duties of an observer, the two principal aspects of the job should be emphasized.

1) Monitoring compliance of fishery laws,

2) Conduct biological sampling.

The fact that each of these basic principles is complementary to the other will be explained. The basic tools: observing, recording and reporting will be emphasized.

2. Introduction to Fisheries to be Observed

A brief lecture on the fisheries to be covered by fisheries observers will be given noting the fish species and common gear used to catch these fishes. This will be broken down into national and international fishing authorized in the zone.

3. Introduction to Fisheries Laws

These sessions are pertinent if the observer is hired to monitor compliance of the vessel and crew with the national fisheries legislation. The sessions would be structured to cover, in detail, the various acts and regulations for fisheries with particular emphasis on areas of concern for fisheries management. Some of the subjects would include:

Licensing
Authorized fishing areas
Authorized fishing gear
Fisheries management plans for each species
Records of fishing
Prohibitioned catches
Unauthorized fishing activities

These sessions will also address the problem areas in the fisheries with respect to compliance with fisheries laws. These could include misreporting in the logbooks through misrepresentation of the conversion of fish from product weight, or fish reduction, back to whole, round weights; area violations; double book-keeping of catches, one for the inspector and the real one for the master; discarding and dumping.

4. Catch Estimation

This session is to note the various catch estimation procedures available to the fisheries official/observer to verify the actual catch of the vessel. It will also note the dificulties of estimating when mixed species are involved.

1) a. A brief introduction as to the importance of estimating catches as accurately as possible, explaining that the estimate of total catch is the most reliable estimate and that species in the least quantities should be subtracted from the total catch with the remainder assigned to the species in the greatest abundance.

b. Emphasize the importance of accurate estimates in relation to monitoring the vessel's catch recording/reporting practices.

2) Total Catch Estimation techniques are discussed:

a. Codend estimation once on deck, highlighting the use of strengthening straps.

b. Utilizing the bunker which holds a known quantity which can be determined by interview.

c. Use of baskets to determine a density figure applied with a measurement of the bunker.

d. Crew member estimates
i) caution on estimating of catch in processed weight,
ii) caution on the possibility of misleading information,
iii) comparison of icer's figures to logbook's figures in relation to determining whether dressed or round weights recorded.

3) Species Composition Estimates:

a. Utilization of percentage estimate while catch is being dumped.

b. An actual estimate of weight in codend when species are of small quantities during dumping of codend.

c. An estimate based on how many baskets that species would fill, while being dumped, compared to what a basket of that species would weigh.

d. Observation of the catch being processed - know what percentage of catch has been processed and compare it to the percent estimate of species observed to have been processed and extrapolate back to total catch.

e. Observation of catch culled in factory.

4) Verification Techniques:

a. Bunker capacity - density

b. Crew member estimates

c. Icer's figures/processed fish

5) Discard/Reduction Estimates:

a. Weighing of all fish

b. Weight of fish/time period/processing time

5. Conversion Factors

1) The definition of a conversion factor as associated with the fishing industry will be explained. The source of conversion factors to be used will be discussed.

2) Symbols such as pies will be applied using the percent (100%) concept in order that individuals may understand how a conversion factor is derived.

3) Given a known quantity that can be converted back to a whole (100%) by utilizing a conversion factor, what percentage would be non-utilized material.

4) The concept of the already compensated for material which was not utilized, being produced as a by product thereby not requiring conversion will be put forward. The pie concept will be used.

5) Finally this will all be drawn together by substituting the pie for a fish undergoing processing.

6. Gear Type

This training is focused on the identification of various fishing gear, their component parts and how to measure the parts to ensure compliance with fisheries laws, if there are such, pertaining to mesh size.

1) A brief discussion on the importance of being able to identify gear types and component parts to ensure compliance with the authority in the fishing licence.

2) Examples of component parts of trawls will be shown by utilizing diagrams and a model with a brief explanation of the purpose of each component given. Modifications will also be discussed at this time.

3) Diagrams of various gear types will be shown highlighting the differences between gear types. Distinctions will be discussed.

4) Utilizing a diagram and a model, indicate what measurements are necessary to ensure the fishing gear is measured in a fashion acceptable to the courts of the land.

7. Introduction to Navigation

Part of every observer's training is to know where the vessel is fishing. This mini-session on navigation will assist the observer in this regard.

1) Latitude and longitude will be explained as to the orientation on a chart. The component parts will be shown: degrees, minutes and seconds, explaining the significance.

2) Basic plotting of a position will be shown with each individual having to plot several positions.

3) Distance travelled between points in relation to speed and time will be discussed.

8. Biological Sampling Methods

This would be a lecture on biological sampling methods highlighting proper sample collection.

a) Random samples
b) Stratified samples
c) Combined samples
d) Processed samples
e) Discard samples
f) Reduction samples

9. Species Identification

Every observer needs to know the identity of the species which are being fished in the country's waters. There needs to be at least one session to ensure the observers are competent at species identification.

10. Sampling Techniques and Requirements

Where it is decided that observers will also be utilized to take biological samples for the resource assessment activities of the stock assessment personnel, the individual will need to be trained in various sampling techniques and standards in accordance with acceptable scientific procedures. Some of these are noted here for reference.

1) The actual types of samples taken in relation to their importance in the overall sampling scheme of the State will be noted.

a) directed species
b) bycatch species
c) reduction
d) discard
e) otoliths
f) specific requirements

2) Numbers of individuals comprising a sample will be addressed.

3) Sample selection will be reiterated.

4) Length frequencies will be discussed with demonstrations.

5) An actual length frequency will be done by each candidate.

6) Sexing of fish will be demonstrated. Each candidate will obtain hands-on experience.

7) Otolith collection will be demonstrated on various species. Hands-on experience will be obtained.

8) Morphological requirements will be discussed and demonstrated. Hands-on experience will be obtained.

9) It will be emphasized that full morphologies are required while taking otoliths and it will be stressed that during morphologies all information with the exception of collecting the otoliths is required.

11. Logbooks

The fishing records of the activities in the country's fisheries waters are the only real written record of events. Observers must be familiar with all aspects of fishing records to ensure they are being completed correctly. This includes ensuring all the data is being recorded regularly and accurately. Such data might be:

1. Date, licence number, activity, position, time, depth, gear, mesh size, retained and discard estimates by species.

2. Format for fishing sets by gear and the correct times.

3. Licence number, vessel name, side number, date and the proper entry of species by product form.

4. The proper determination of meal produced from offal, considering product produced, will be explained. The lecture will consider individual species and product forms produced. The following approach will be used:

   a) Identify what products have yielded waste that will go to meal. Emphasize that products which are frozen round do not yield offal.

   b) Has any of the waste material been utilized to produce a by-product? Identification of some of these products.

   c) Convert all product forms to round that have produced waste that will go to meal.

   d) From the total round weight determined in step (c) subtract the product weights of all products that have been converted to round. Also subtract the weight of any material identified in step (b) as having been produced as a by-product.

e) This is now the total round weight of waste material that will go to meal. This figure divided by the fishmeal conversion factor provided by the vessel will give the amount of meal (product weight) that will be produced.

5. Determination of round fish produced as meal will also be discussed.

   a) It will be noted that estimates of round fish will often be utilized by the vessel to arrive at this figure.

   b) The utilization of appropriate conversion factor for meal production will be explained. The product weight can then be converted back to round weight.

   c) The fact that excess meal production must be reported as round fish to meal will be discussed.

6. Problem Areas - Areas where misreporting can occur will be discussed. Specifically the recording of estimates for kept and bycatch species, area of capture and start position will be covered.

12. Documentation of Irregularities

The three places in which information pertaining to infractions are documented, and the purpose of each, will be discussed:

1) Notebook - purposes:
   a) to aid in the monitoring process;
   b) to aid in report writing;
   c) to aid in accurate testimony;

   Ongoing entries should be made at the first possible instant.

2) Observer Diary - purpose is to provide a detailed chronological documentation of trip events, used to assess situation and decide whether or not to proceed with charges. Entries are made at regular intervals (i.e. each evening).

3) Observer Trip Report - purpose is to provide a concise reference to the irregularities. Entries are made throughout the trip and at trip end.

4) Documentation Rules for the notebook will be addressed and explained. The contents of the documentation of an irregularity will also be discussed (answering the questions who, what, where, why, and how, along with extraneous information such as weather). Personal information or opinions should not be recorded).

13. Observer Trip Report

The most important document from the observer is the trip report and as such it should be as complete as possible. The following are some of the areas which Fisheries Administrators may wish to include in the requirements for their observers in their final trip reports.

Vessel Information
Daily Trip Summary
Vessel's Fishing Log
Sampling Inventory
Fishing Pattern
Fishing Operations
Discards
Trip Summary
Observer Activity
Comparison of Observer Estimates &

Vessel Sighting
Unique Areas
Logbooks
Hold capacity

Please note that this is only one example of possible observer training scenarios and all modules are not essential, nor ideal to address the fisheries management situation in each case. Each Fisheries Administrator can pick and choose various modules appropriate to the country's fisheries and adapt them as required.

ANNEX F

CORE COMPONENTS OF A FISHERIES OFFICER'S OPERATIONS MANUAL

The fact that the MCS system for each country is going to be unique has been stressed throughout this paper, but it is true that there are core components and subject matter that should be included in every fisheries officer's operations manual(s). The actual content of each section will show the variability as to how each State wishes to address the subject matter. There is no one example that will be fully correct for each State consequently, it is recommended that each Fisheries Administrator use this annex as a guide only as to the subject matter for a manual.

A fisheries manual can be comprised of one or several documents which, as a whole, form the directives for fisheries officers. As the fisheries management and MCS procedures will evolve over time to address the changing situations encountered, the manual system should be easily amended. Records of the amendments should be included in each document, as this procedure then permits the reader to know the latest authorities under which they are operating.

A 1991 initiative in the ASEAN countries resulted in a series of five manuals for general guidance in patrolling fisheries waters. These manuals were titled:

MCS I: Conduct of MCS Officer in Patrolling Fisheries Waters
MCS II: Procedure to Plan An Operation
MCS III: MCS Radio Communications
MCS IV: Log Books
MCS V: Guidelines on Prosecution

The Member States of the Forum Fisheries Agency have developed, over time, minimum terms and conditions for fishing in their collective fisheries zones. Training in MCS activities is regionally executed and, consequently, common standards for operations are evolving. The most recent document for MCS has been the aforementioned Fisheries Prosecutions Manual with two other papers expected in the near future, one on vessel monitoring systems and their use and a second on common terms for use of force in fisheries MCS activities.

There are several examples of common fisheries operational procedures such as the regional system for the Northwest Atlantic Fisheries Organization (NAFO) Conservation and Enforcement Measures.

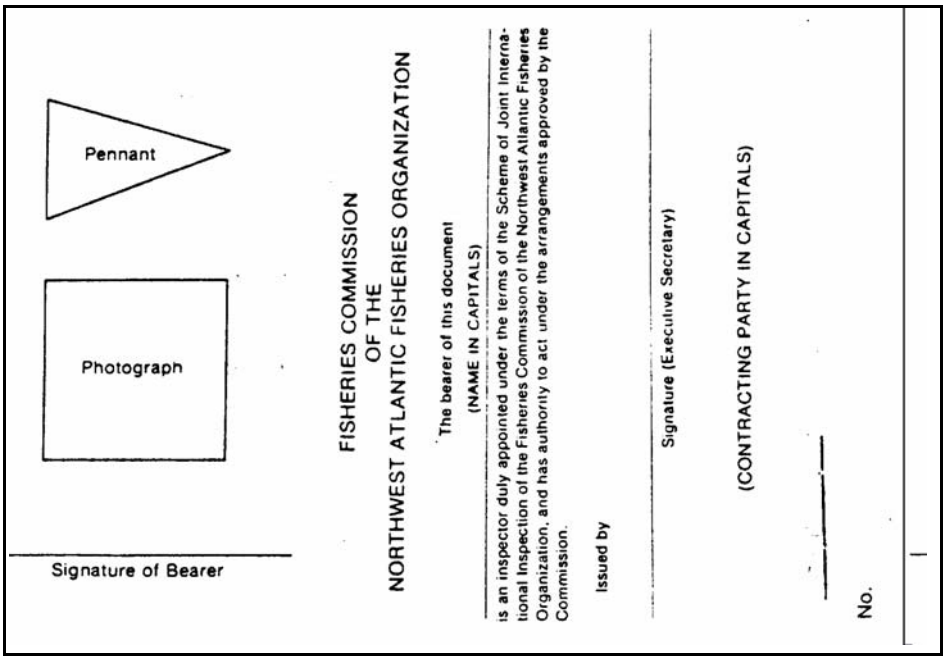
Common to most of these manuals, both on a national and regional basis, is an introductory section which sets out the organization, its mandate and policies with respect to fisheries management. This introduction now often includes direction as to the interaction expected between fisheries and other coastal and ocean interests of the government(s). In the Philippines, for example, there is an inter-agency committee on enforcement which addresses fisheries and other coastal zone

management concerns. This committee provides overall direction to ministries involved in MCS activities.

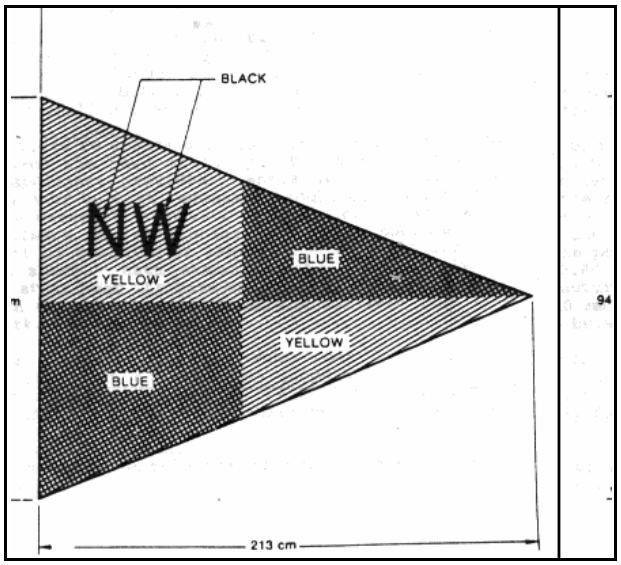
The optimal National MCS organization, according to a consultant for the Commonwealth Secretariat in 1992, included an office of Executive Direction (President/Prime Minister and Cabinet), a Policy and Coordination Committee (Lead Minister for MCS and concerned Public and Private Officials), Chief of MCS (Officer in Charge of day-to-day operations), Surveillance Centre (Officers for coordination of specific operations) and Information Data Collection and Compilation. The latter includes the information from ship-based personnel and equipment, intelligence networks, aircraft, other countries, reporting systems and personnel on MCS activities from other agencies.

Following the introductory section might be a reasonable place to include the authorities and powers vested in fisheries officers. This then sets the stage for officers as to their duties and responsibilities. The identification for fishery officers is often referred to in this section with appropriate descriptions in appendices. Examples of identification cards follow:

FFA Identification Card



NAFO VESSEL FLAG



A common section included in all manuals is the current fisheries management plans for each fishery. Accompanying each of these plans should be the operational strategy to implement the plan. It is this latter document which is of considerable importance for the fisheries officer, as it sets not only the priorities for action, but also the detailed procedures to be taken for monitoring, the control directives and the surveillance/enforcement action. Some of these procedures are common and hence can be grouped, but any special considerations for each fishery are best noted along side the management plan and implementing policy. These plans would provide information on the management system for the fishery; effort, area, overall quotas, individual quotas, trip limits and others noted earlier. The fishing gear permitted and its attachments or prohibitions on methods for setting would also be noted here. The MCS plan would detail how the different aspects of the plan are to be monitored and surveyed, if special techniques are required. Special monitoring requirements for data would be noted in this section as well, including any special obligations for the fishers. This procedure would be necessary for each fishery, and if there were different requirements for sectors of each fishery, due to agreements with the industry or international negotiations, fisheries officers would need to be familiar with these conditions as well.

There are other core sections for each manual which would not change appreciably over time. These include the gear specifications, measuring methods, approved attachments, markings for vessel and gear identification, reports required from the fishers, internationally recognized instructions for stopping the vessel for inspections, boarding procedures, arrest procedures, the international aspects of the 1982 UN Convention, pertinent regulations, communications procedures and codes, to name a few. The boarding and inspection procedures, the approach to the fisher for monitoring are procedures with which every fisheries officer should be very familiar.

Approved reaction to hostile and aggressive responses and to inspection and monitoring activities should be clearly described in the fisheries officer's manual. This relates closely to the powers and authorities and will impact significantly on the success of prosecution activities when these are necessary. This section, commencing with the identification of the officer(s), through the entire inspection or monitoring procedure to the final reports and follow-up action, should be detailed in the manual and reference to it included in every briefing of officers.

Other information for officers could include fish identification guides, gear identification guides and monitoring/measurement requirements for fisheries stock assessment activities.

Therefore, without pre-empting the prerogative of the Fisheries Administrator with respect to format and appendices, a possible operations MCS manual could resemble the following:

FISHERIES OFFICER OPERATIONAL MANUAL

Amendment List and Dates

Introduction

- Background and history of the fisheries in the country.
- Organization
- Mandate
- Linkages with other Ministries
- Linkages with other Governments for support

Authorities and Powers

- Identification of Fisheries Officers and their equipment, vessels, vehicles and aircraft.
- Acts
- Regulations
- Fisheries Agreements - national joint ventures, special fishing for research, etc.
  - international
- 1982 UN Convention - pertinent clauses and definitions of zones

Fisheries Management Plans

These would include all the parameters for each plan including the controls to be used, effort, quotas, areas, gear, seasons and their combinations.

Plan 1 - Pelagic
- Fish Identification Guides
- National Plan
- International Plan
- MCS Implementation Plan
  - data collection
  - special regulations and policies
  - enforcement strategy

Plan 2 - Demersal
Fish Identification Guides
National Plan
International Plan
MCS Implementation Plan
data collection
special regulations and policies
enforcement strategy

Plan 3 - Crustaceans, etc.
Fish Identification Guides
National Plan
International Plan
MCS Implementation Plan
data collection
special regulations and policies
enforcement strategy

Fisheries Habitat Management Plans

Objectives
Areas for special concern
Monitoring and control procedures

Vessel Types and Markings

Fishing Gear Guidelines

MCS Operational Procedures
Data Collection
Boarding and Inspection
non-hostile
hostile/use of force guidelines
Investigation
Seizure
Confiscation
Disposal and security of goods seized
perishables
non-perishables

Prosecution
evidence gathering and security of same
detention and ordering to port for further investigation
arrest procedures
pre-trial actions
trial procedures
post trial activities

- Patrol planning
  - air
  - land
  - sea
- Pre-patrol briefing and check list
  - safety equipment
  - report forms
  - inspection and data collection equipment
  - gear check
  - translation guide for inspections (if necessary)
- Patrol report guides
- Post patrol de-briefing check procedures
- Communications guides
  - radio frequencies for support stations
  - radio procedures
  - names and telephones of key persons for support by Ministry

Reports and Documents

These include samples of the various reports with detailed instructions as to the proper completion of each document, where these instructions are necessary.

- Common terms and conditions for licenses
- Fisher's licence
- Vessel licence
- Vessel movement reports
- Vessel inspection reports
- Seizure reports/receipts/evidence tags

- Fishing log interpretations for fishing, processing, freezing, transhipment and storage
- Witness statements
- Certificates, where these are appropriate
- Data collection reports - biological, social and economic
- Patrol reports

- Port State Controls and Contacts

ANNEX G

FISHING VESSEL IDENTIFICATION AND MARKING

(FAO and Malaysian systems)

FAO SYSTEM

The rapid identification of a vessel type and its identification greatly facilitates MCS activities. The efforts of FAO towards standardizing the vessel markings to correspond with international radio call signs is an added advantage for identification and initiating communications with the sighted vessel.

The contents of this annex are paraphrased from FAO Fisheries Technical Paper, Definition and Classification of Fishery Vessel Types, 267 and The Standard Specifications for the Marking and Identification of Fishing Vessels. The guidelines were designed more for foreign fishing vessels, but can equally be applied to national fishing vessels.

The Specifications contained herein were endorsed by the Eighteenth Session of the FAO Committee on Fisheries, Rome, April 1989, for adoption by States on a voluntary basis as a standard system to identify fishing vessels.

1. RATIONALE

1.1 As an aid to fisheries management and safety at sea, fishing vessels should be appropriately marked for their identification on the basis of the International Telecommunication Union Radio Call Signs (IRCS) system.
The basis for the Standard Specifications, the IRCS system, meets the following requirements:

i) the use of an established international system from which the identity and nationality of vessels can be readily determined, irrespective of size and tonnage, and for which a register is maintained;
ii) it is without prejudice to international conventions, national or bilateral practices;
iii) implementation and maintenance will be at minimum cost to governments and vessel owners; and
iv) it facilitates search and rescue operations.

1.2 Definitions

For the purpose of these Specifications:

i) the word "vessel" refers to any vessel intending to fish or engaged in fishing or ancillary activities, operating, or likely to operate, in all fishing waters and also includes

a boat, skiff or craft (excluding aircraft) carried on board another vessel and required for fishing operations;

ii) a deck is any surface lying in the horizontal plane, including the top of the wheelhouse;

iii) a radio station is one that is assigned an International Telecommunication Union Radio Call Sign.

2. BASIC SYSTEM

2.1. The Standard Specifications are based on:

i) the International Telecommunication Union's system for the allocation of call signs to countries for ship stations; and

ii) generally accepted design standards for lettering and numbering.

2.1.2 Vessels shall be marked with their International Telecommunication Union Radio Call Signs (IRCS).

2.1.3 Vessels to which an IRCS has not been assigned shall be marked with the characters allocated by the International Telecommunication Union (ITU) to the flag State followed by the license or registration number assigned by the flag State. In such cases, a hyphen shall be placed between the nationality identification characters and the license or registration number identifying the vessel.

2.1.4 In order to avoid confusion with the letters **I** and **O**, it is recommended that the numbers **1** and **0**, which are specifically excluded from the ITU call signs, be avoided by national authorities when allocating licence or registration numbers.

2.1.5 Apart from the vessel's name or identification mark and the port of registry as required by international practice or national legislation, the marking system as specified shall, in order to avoid confusion, be the only other vessel identification mark consisting of letters and numbers to be painted on the hull or superstructure.

2.2 Application

2.2.1 The markings shall be prominently displayed at all times:

i) on the vessel's side or superstructure, port and starboard; fixtures inclined at an angle to the vessel's side or superstructure would be considered as suitable provided that the angle of inclination would not prevent sighting of the sign from another vessel or from the air:

ii) on a deck, except as provided for in paragraph 2.2.4 below. Should an awning or other temporary cover be placed so as to obscure the mark on a deck, the awning or cover shall also be marked. These marks should be placed athwartships with the top of the numbers or letters towards the bow.

2.2.2 Marks should be placed as high as possible above the waterline on both sides. Such parts of the hull as the bow and the stern shall be avoided.

2.2.3 The marks shall:

i) be so placed that they are not obscured by the fishing gear whether it is stowed or in use;

ii) be clear of flow from scuppers or overboard discharges including areas which might be prone to damage or discolouration from the catch of certain types of species; and

iii) not extend below the waterline.

2.2.4 Undecked vessels shall not be required to display the markings on a horizontal surface. However, owners should be encouraged, where practical, to fit a board on which the markings may be clearly seen from the air.

2.2.5 Vessels fitted with sails may display the markings on the sail in addition to the hull.

2.2.6 Boats, skiffs and craft carried by the vessel for fishing operations shall bear the same mark as the vessel concerned.

3. TECHNICAL SPECIFICATIONS

3.1 Specifications of letters and numbers

3.1.1 Block lettering and numbering shall be used throughout.

3.1.2 The width of the letters and numbers shall be in proportion to the height as set out later in this paper.

3.1.3 The height (h) of the letters and numbers shall be in proportion to the size of the vessel in accordance with the following:

a) for marks to be placed on the hull, superstructure and/or inclined surfaces:

Length of vessel overall (LOA) in meters (m)	Height of letters and numbers in meters (m) to be not less than
25 m and over	1.0 m
20 m but less than 25 m	0.8 m
15 m but less than 20 m	0.6 m
12 m but less than 15 m	0.4 m
5 m but less than 12 m	0.3 m
Under 5 m	0.1 m

b) for marks to be placed on deck: the height shall not be less than 0.3 m for all classes of vessels of 5 m and over.

3.1.4 The length of the hyphen shall be half the height of the letters and numbers.

3.1.5 The width of the stroke for all letters, numbers and the hyphen shall be h/6.

3.1.6 Spacing:

i) the space between letters and/or numbers shall not exceed h/4 nor be less than h/6;
ii) the space between adjacent letters having sloping sides shall not exceed h/8 nor be less than h/10, for example A V.

3.2 Painting

3.2.1 The marks shall be:

i) white on a black background; or
ii) black on a white background.

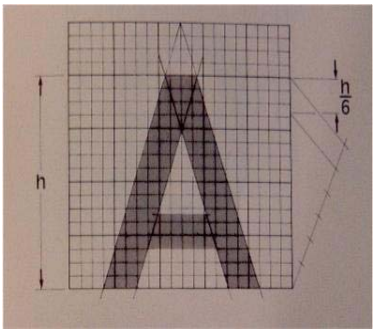
3.2.2 The background shall extend to provide a border around the mark of not less than h/6.

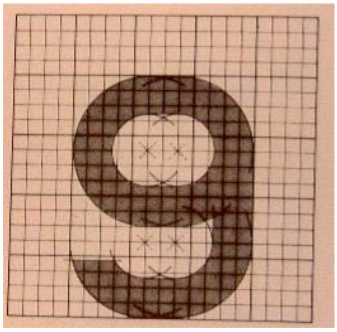
3.2.3 Good quality marine paints to be used throughout.

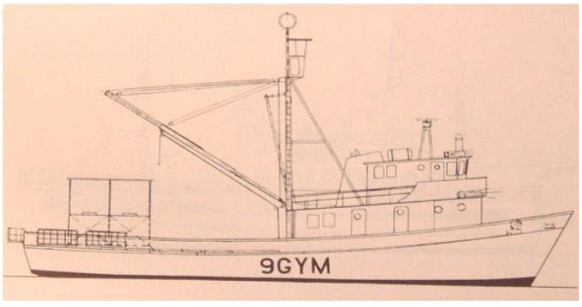
3.2.4 The use of retro-reflective or heat-generating substances shall be accepted, provided that the mark meets the requirements of these Standard Specifications.

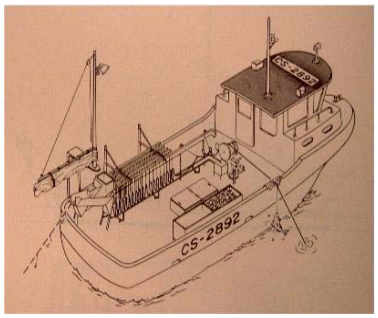
3.2.5 The marks and the background shall be maintained in good condition at all times.

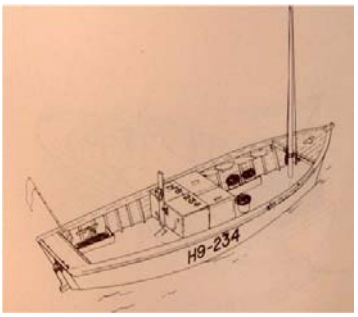
FAO SYSTEM SAMPLES

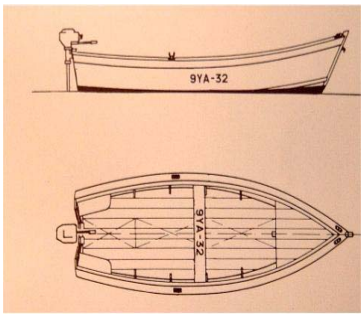












MALAYSIAN SYSTEM[187]

The Malaysian vessel identification system is comprised of the following:

1. A three to four letter code and number designating the state, use of vessel and number for the vessel. This is hammered on to the hull of the vessel, e.g. JHF 1 – JH meaning the state of Jahor, F for fisheries, and 1 for the number of the vessel.
2. The "tin plate" with the Department of Fisheries logo and the signature of the Director General is placed on the inner side of the hull with non-removable nails, currently for vessels above 70 GRT.
3. The wheelhouse colour for the state of registration, e.g., Johor is blue.
4. The registration number for the vessel is white with a black background and sized depending on the size of the vessel:

VESSEL SIZE (GRT)	SIZE OF ALPHABET/NUMBERS (INSCHES)		
	HEIGHT	WIDTH	THICKNESS
Canoe/skiff with outboard engine	6	4	1.25
< 25 GRT with inboard engine	9	6	1.75
25-40 GRT with inboard engine	12	8	2.5
>40 GRT	18	12	4

5. Each vessel (except a canoe/skiff without a wheelhouse) is marked according to its appropriate fishing zone (Zone A, B, C, and C2). The letter is coloured in white with a black, round background and painted on both sides of the wheelhouse. The diameter of the background ranges from 10-22 inches according to vessel size.

6. Fishing Zones are as follows:

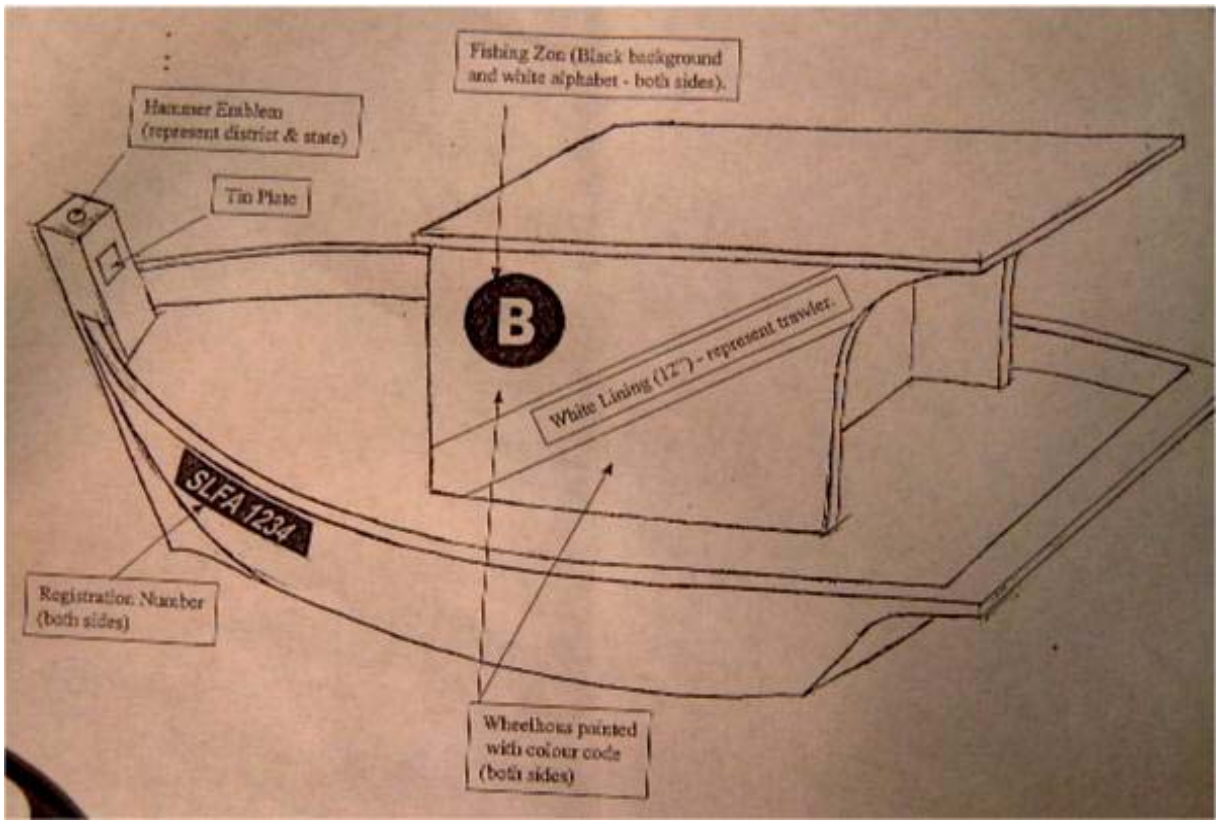
ZONE	GEARS USED	GRT	FISHING AREA
A	Artisanal	--	Free
B	Trawler/P. Seine	<40	>5 nm from shore
C	Trawler/P. Seine	40-69.9	>12 nm from shore
D	Trawler/P. Seine	>70	>30 nm from shore

[187] Personal discussions with Mr. Salehan, Chief of Fisheries Resource Protection in Malaysia, May 2000.

7. As trawlers are considered to be "unfriendly" to the environment and resources, their activities are closely monitored by the Department of Fisheries. A special marking was imposed on the vessel for ease in identification. All trawlers are required to have a white diagonal stripe across each side of the wheelhouse.

MALAYSIAN EXAMPLES

Summary of the Malaysian Vessel Marking System



ANNEX H

FISHING GEAR IDENTIFICATION

All Fisheries Administrators and their staff have a need to be able to identify fishing apparatus and have knowledge as to how it entraps fish. This annex provides basic knowledge of the various fishing gear types in use in the world today.

Fisheries Officers come upon fishing gear during their patrols. In the case of gear which is set illegally, it is advantageous to be able to identify the owner of the fishing gear for further discussions. In the case of legal gear, it may also be necessary to identify the owner. Many fisheries laws now require fishers to mark their fishing gear with tags in a prominent part of the apparatus where it is easily seen. The markings are often the same as required for vessels, the call sign or name of the owner.

This annex draws heavily from FAO Fisheries Technical Paper, Definition and classification of fishing gear categories, 222 Rev.1. The original publication provides greater detail in English, French and Spanish. The division of the diagrams of the fishing gear follows the same sequence as the original publication.

SURROUNDING NETS

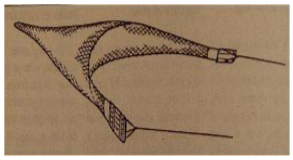
These nets surround the fish on the sides and extend underneath so the fish cannot escape. These include: purse seines that can be pulled together at the bottom; lampara net that does have a scoop like a spoon as seen in the following diagram; the ring net is more like a purse seine with bridles to help pull in the net; beach seine and boat seines..

Purse Seine **Lampara** **Beach Seine** **Boat Seine**

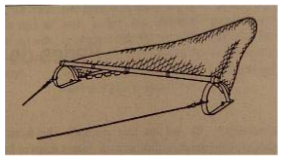
TRAWL NETS

These are towed nets consisting of a cone-shaped body, closed by a bag or codend and extended at the opening by wings. They can be towed by one or two vessels and different nets are used for bottom and mid-water trawling. In certain cases they can be rigged to sit off the side of the vessel (outrigger), or multi-rigged with more than one net being towed at the same time. These include: bottom trawls that operate at or near the bottom for demersal fish, or with a higher opening for semi-demersal and pelagic species; beam trawls; bottom pair trawls towed by two vessels; midwater trawls for pelagic fish; midwater pair trawls for two vessels; and twin otter trawls.

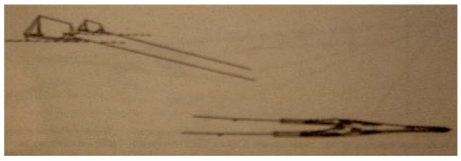
BOTTOM TRAWLS



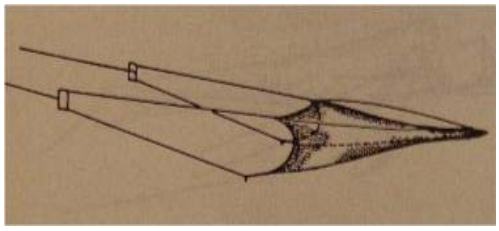
BEAM TRAWLS



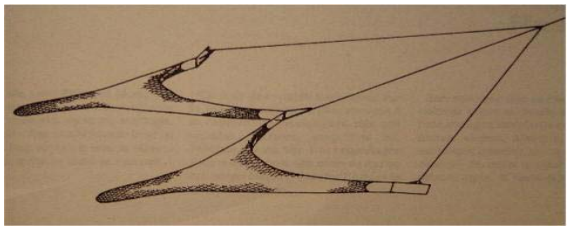
BOTTOM PAIR TRAWLS



MIDWATER TRAWLS



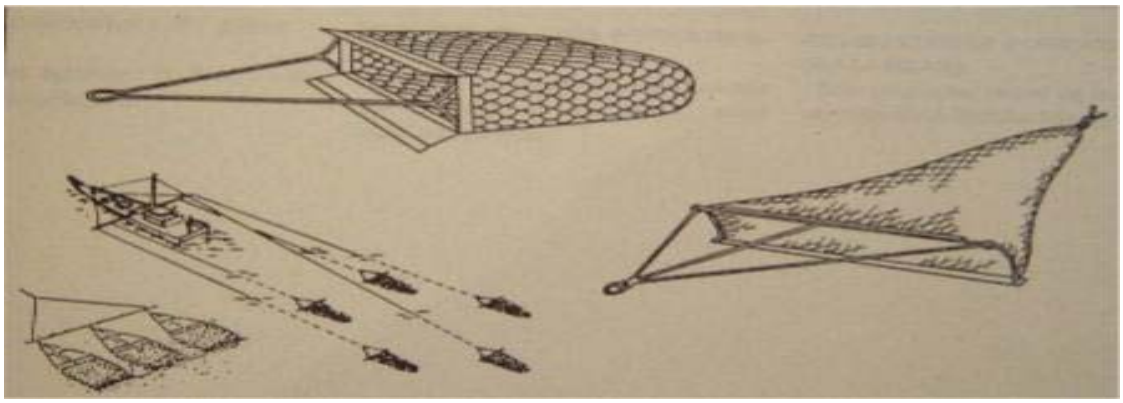
TWIN OTTER TRAWLS



DREDGES

These are gear dragged along the bottom, usually to collect molluscs such as mussels, oysters, scallops and clams. The catch is held in a sort of bag or sieve which allows water, sand and mud to run out.

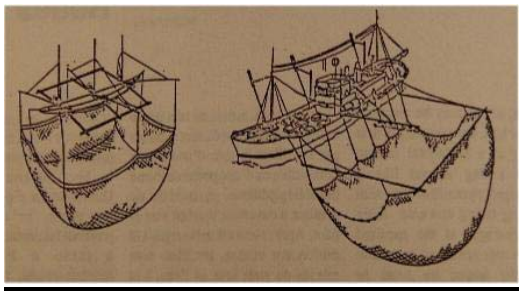
DREDGES



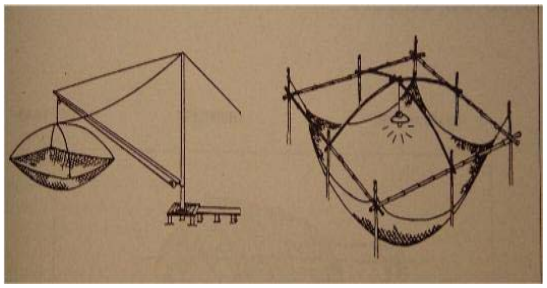
LIFT NETS

These nets are set in such a manner as to allow the fisher to attract fish with lights or bait. When they are over the net it is raised or hauled in to capture the fish. Lift nets come in various shapes and sizes. The two examples shown are for boats and smaller shore mounted apparatus.

BOAT LIFT NETS



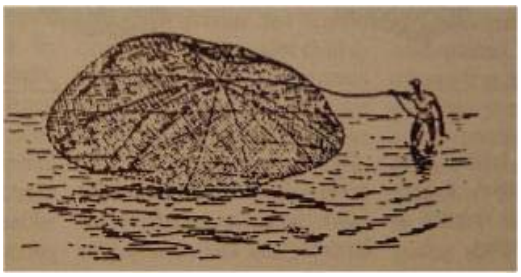
SHALLOW LIFT NETS



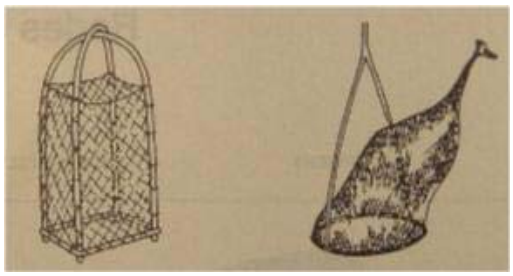
FALLING GEAR

This gear includes cast nets and other falling gear operated from boats or from shore.

CAST NETS



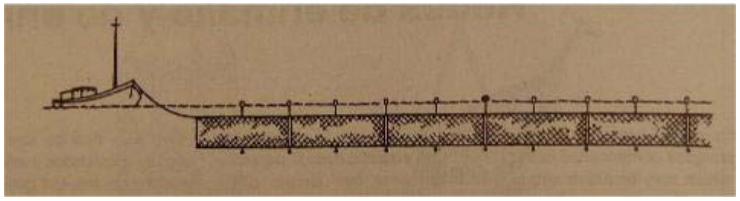
OTHER FALLING GEAR



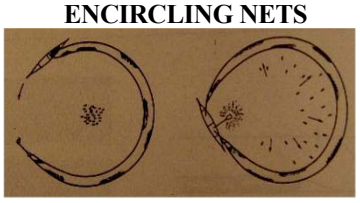
GILLNETS AND ENTANGLING NETS

These nets are used to enmesh, or catch the fish by the gills, entangling them in the net itself. Different types of nets can be used together in one gear and they may be set in long lines, called "fleets". These nets can be set at any depth and can drift or remain fixed to the sea bottom. These include: set gillnets; drifting gill nets; encircling nets to trap fish in the circle of net; fixed gillnets (on stakes); trammel nets, bottom nets made of three walls of net with the two outer walls larger mesh than the inner wall; and combined gillnet-trammel nets to catch both demersal and semi-demersal/pelagic fish – the bottom being trammel with a regular gillnet on top;

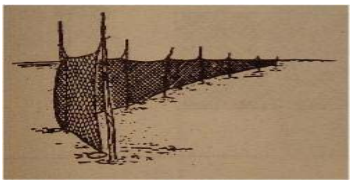
DRIFTING GILLNETS



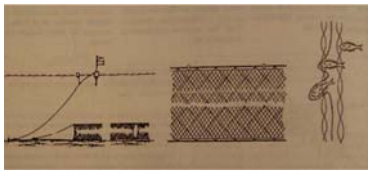
ENCIRCLING NETS



FIXED GILLNETS



TRAMMEL NETS

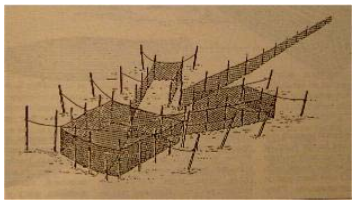


COMBINED TRAMMEL/GILLNET

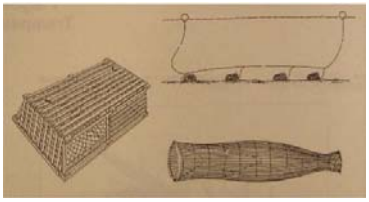
TRAPS

These include: stationery uncovered pound nets to herd the fish into the final"room"; pots with or without bait; fyke nets; stow nets for rivers and use in strong currents; and various barrier or fence nets, wiers and fish corrals; and aerial traps to trap jumping fish onto the "veranda";

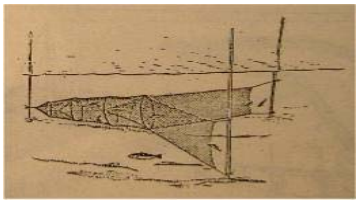
STATIONARY POUND NETS



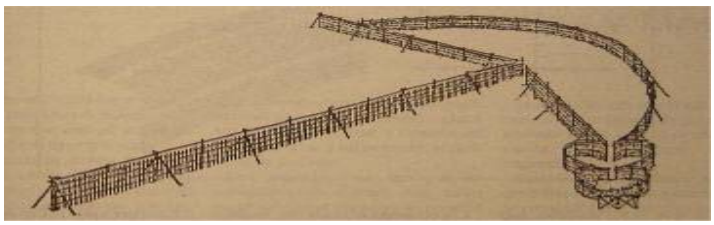
POTS



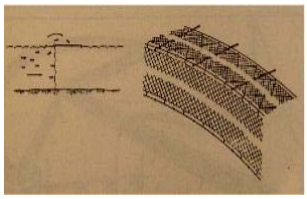
FYKE NETS



BARRIER/FENCE/WIERS & CORRALS



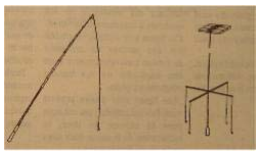
AERIAL NETS



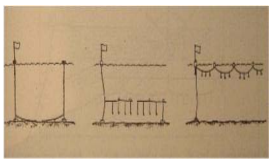
HOOKS AND LINES

Some fish are attracted to natural or artificial bait on a hook. There are many arrangements which can be constructed to catch fish in this manner with either single hooks or in a series. Some fish are attracted to hooks and then "jigged" when the hooks are hauled up and down in jerky movements. This is the principle behind the attraction of squid to the jigs on which they are caught. Hooks and lines include: handlines and poles; set longlines; drifting longlines; and trolling lines.

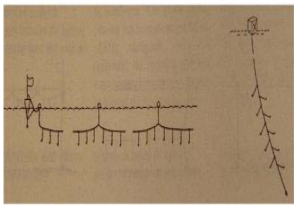
HANDLINES AND POLES



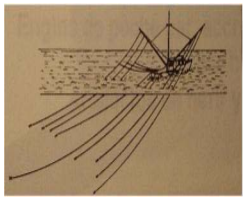
SET LONGLINES

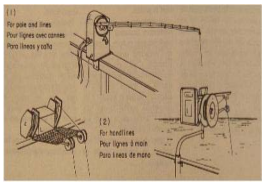


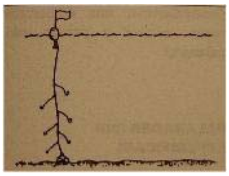
DRIFT LONGLINES



TROLLING LINES



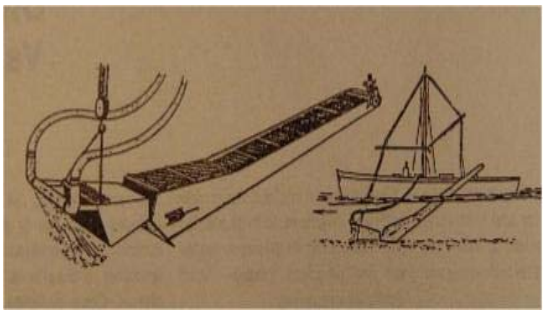




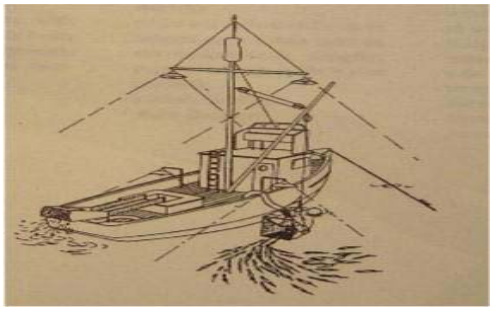
OTHERS

This section covers several gear types for which there are no diagrams. These include harpoons, spears, arrows, prongs, tongs, clamps and various scoop nets, hand implements used for fishing, poisons, explosives and electrical fishing. The two last gears are the pumper and mechanical dredges. These are methods of extracting fish and molluscs from the sea.

MECHANICAL DREDGE



PUMPER



ANNEX I

CORE COMPONENTS OF MCS REPORTS

This annex is intended to provide examples of the elements included in existing report forms for consideration by Fisheries Administrators. It is recognized and suggested that the uniqueness of each MCS system will necessitate that each Fisheries Administrator will wish to design report forms to meet their State's requirements. It is for this reason that actual report forms from countries, which would soon be outdated, are not presented, but instead the core information to be included in these reports is suggested in lieu of the former.

1. LICENCE APPLICATION

The following information is common to collect for licence applications. This is the first document which will set up the information database, consequently the information collected here is crucial for accuracy in identifying the vessel.

name of vessel,
country and port of registry,
registered number,
international radio call sign (for vessel marking and identification),
side number (if different from the radio call sign),
type and class of vessel (longliner/stern trawler, etc.),
length overall,
registered net and gross tonnage,
engine type and power,
description of the vessel (construction material, year built, colours and profile, sometimes a picture is requested),
fishing gear aboard,
communications equipment aboard and listening frequencies,
name and address of owner with fax number and telephone number,
name and address of vessel master,
name of the representative for the vessel in the country,
number of crew,
hold capacity and type (wet freezer),
processing equipment,
freezing equipment,
VMS registration number,
regional registration number.

The application would also include the request for the fishing privilege in accordance with the State's requirements, the fishing plan.

2. VESSEL MOVEMENT REPORTS

a. Zone Entry and Exit

date/time of report,
vessel name,
vessel call sign,
vessel side number (if diferent from the call sign),
VMS registration number,
date of entry into/exit from the EEZ/fisheries waters,
position of entry,
weight of fish onboard by species and product form,
intended area of fishing (This is after the first entry. First entry should result in a visit to the regulatory port for a briefing.)

b. Port Entry/Exit

date/time of report,
vessel name,
vessel call sign,
vessel side number (if different from the call sign),
estimated time of arrival/departure (ETA/ETD) to port,
designated port

c. Area Change for Fishing

date/time of report,
vessel name,
vessel call sign,
vessel side number (if different from the call sign),
current position,
area for intended fishing
time of entry into area

3. CATCH AND EFFORT REPORTS

These would be in a format **and time frame** as set by the coastal State.

date/time of report,
vessel name,
vessel call sign,
vessel side number (if different from the call sign),
VMS registration number,
regional registration number,
current position.

Fishing report - most countries require the vessel master to provide data on the position at a standard time each day and a summary of catches for the period from the same time the previous day.

date,
time,
number of sets,
number of hooks/type of gear,
total fishing time that day,
catches by species,
total daily catch.

This report is sent to the fisheries authorities as required. Some countries require this each week and others, daily.

4. LOGS

Logbooks pertaining to fishing operations are as varied as the number of countries and companies fishing. It is for this reason and for ease in computerized data entry that some countries issue their own logbooks for all vessels fishing in their waters. The information collected usually falls into three main categories, fishing, processing and transhipment.

a. Fishing

Fishing logs commonly require information similar to the catch and effort report, but in a more detailed fashion:

vessel name,
side number,
licence number,
date,
position at the set reporting time,
area being fished,
target species,
time commenced for each set or tow,
time of completion of each set or tow,
hours fished,
position at the start/end of each set or tow,
type of gear,
number of hooks/lines/nets,
depth of fishing where applicable,
catch by set or tow by species and weight/size,
discards,
round weight processed for human consumption,
round weight of fish reduced to meal,
cumulative totals,
surface sea temperature,
observations - sea, currents, weather, wind, temperature, etc.

activities other than fishing/remarks.

b. Processing

vessel name,
side number,
licence number,
date,
product form by species and weight (frozen round, gutted, gutted head on, fillets, salted, pickled, canned, oil, etc.),
meal,
cumulative totals,
remarks.

c. Transhipment

sending vessel name,
side number,
licence number,
receiving vessel name,
side number,
licence number,
position of transfer,
date and time of transfer commencement/completion,
product transferred by species, product form and weight,
cumulative totals,
remarks.

This information can be cross-checked against the catch and effort reports, observer reports, position reports and sightings to verify the accuracy of the reports. This information can be utilized for patrol planning as well as for the biological assessment of fish stocks. It is recognized that all information is not required for all fishers, but the majority of this information from large vessels can be of assistance to fisheries management and planning, including MCS operations.

5. VESSEL SIGHTING REPORTS

These reports are fairly standard from both sea and air sightings. The main components include:

vessel name,
side number,
nationality,
description of the vessel,
vessel type,
position,
activity (course, speed, fishing, etc.),
licensed/unlicensed.

6. VESSEL INSPECTION REPORTS

These are the reports that are used to collect additional data on the fishing operations of vessels and also for the verification of the reports sent by the vessel to the fisheries departments. These at-sea and in-port inspections, when conducted carefully, will assist the Fisheries Administrator in confirming the vessel master's compliance with the country's fisheries laws. The following are the common generic components of fishing vessel inspection reports:

vessel name,
port of registry,
nationality,
vessel type,
length/breadth/draught,
gross registered tonnage,
net registered tonnage,
fish processing capacity,
fish storage capacity,
fish processing equipment,
freezers/capacity/frozen storage,
side number,

licence number,
validity for fishing/area/species/dates,
date and time of inspection commencement and departure from the vessel,
name and address of the master,
name and address of the owner,
name of the inspector,
name of vessel carrying the inspector,
position as determined by the vessel master,
position fixing equipment,
position as determined by the inspection vessel master,
position fixing equipment,
fishing gear on deck/type/material/attachments/net measurements/number of hooks etc.
number of crew,
estimate of fish caught since last inspection by species and weight/product form etc.,
estimate of fish on board,
transhipments of fish/to whom/species/weight/when/where,
fish processed since last inspection,
discards,
fish meal/oil produced,
summary of fishing from logs/species/area/weight/dates,
records inspected,
VMS registration number,
regional registration number.

last port of call/dates,
next port of call/dates,
apparent infringements,

photographs taken,
comments from the inspector,
comments from the vessel master,
signatures/dates,
witness signatures/dates,
copy of report left with the vessel master.