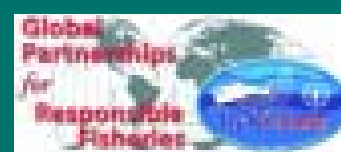


# Recent trends in monitoring, control and surveillance systems for capture fisheries



## PREPARATION OF THIS DOCUMENT

This Fisheries Technical Paper is intended as a guide for Fisheries Administrators. As an update of FAO Technical Paper 338, *An introduction to monitoring, control and surveillance systems for capture fisheries*, it includes information on recent legal agreements and management principles, coastal monitoring, control and surveillance (MCS) and fisher safety-at-sea. It is hoped that this technical paper 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.

The present paper was prepared within the framework of the FAO Interregional Programme of Assistance to Developing Countries for Implementation of the Code of Conduct for Responsible Fisheries (FishCode), under project GCP/INT/648/NOR. Principal contributors to the paper include the following individuals: Peter Flewwelling, an international fisheries management and MCS adviser based in the Philippines; Cormac Cullinan, an environmental and marine lawyer based in South Africa; David Balton, Bureau of Oceans and International Environmental and Scientific Affairs, United States Department of State; Raymond Sautter, National Marine Fisheries Service, United States Department of Commerce; and J. Eric Reynolds, FAO, Rome.

Staff of the FAO Development Law Service, Fishery Industries Division and Fishery Policy and Planning Division were especially helpful in their efforts to make this document useful to national fisheries administrators. David Lymer and Françoise Schatto provided important help with final manuscript preparation. The authors would also like to express their sincere appreciation to all the unofficial advisers who took the time to review and offer advice during the development of this paper. In particular we would like to thank Commander Mike Cerne (Commandant U.S. Coast Guard), Paul Steele (Chief Surveillance and Enforcement, Fisheries and Oceans Canada), Andrew Richards (MCS Manager, South Pacific Forum Fisheries Agency, Solomon Islands), David Graham (MCS Adviser for Luxembourg Development to the West Africa Subregional Fisheries Commission), Capt. Wan Fatah Omar (MCS Adviser for the Indonesian COREMAP), Capt. Per Erik Bergh (Adviser to the Permanent Secretary, Ministry of Fisheries and Marine Resources of Namibia), and Ms Sandy Davies (Fisheries Adviser for the Southern African Development Community). Finally, appreciation and memories go to Capt. Peter Derham, the well respected “elder brother” and adviser to many of us in the MCS field, for his advice and leadership in support of sustainable and responsible fishing.

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Flewwelling, P.; Cullinan, C.; Balton, D.; Sautter, R.P.; Reynolds, J.E.  
Recent trends in monitoring, control and surveillance systems for capture fisheries.

*FAO Fisheries Technical Paper*. No. 415. Rome, FAO. 2002. 200p.

#### **ABSTRACT**

The paper has been designed as a handbook for fisheries administrators for use when establishing or enhancing, monitoring, control and surveillance (MCS) systems in support of fisheries management initiatives. It updates the 1994 FAO Fisheries Technical Paper No. 338, An introduction to monitoring, control and surveillance systems for capture fisheries through a review of recent international fisheries agreements and new MCS approaches involving participatory management; preventive and deterrent MCS strategies; and the importance of safety-at-sea for fishers.

The paper is divided into eight chapters to:

- 1) provide an overview of MCS;
- 2) review the legal basis for MCS activities;
- 3) propose design considerations for MCS systems;
- 4) review organizational considerations for MCS;
- 5) discuss management measures and consultation and planning issues;
- 6) review operational procedures and equipment;
- 7) review patrol, boarding, inspections and prosecution procedures; and
- 8) address emerging coastal MCS strategies.

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

**Keywords:** fisheries management; capture fisheries; MCS

#### **Distribution:**

All FAO Members and Associated Members  
Interested Nations and International Organizations  
Directors of Fisheries  
FAO Fisheries Department  
FAO Fishery Officers in FAO Regional and Subregional Offices  
Interested Non-Governmental Organizations

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## ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank	ICM	Integrated Coastal Management
ALC	Automatic Location Communicator	ICOD	International Centre for Ocean Development
APFIC	Asia-Pacific Fisheries Commission	IFMP	Integrated Fisheries Management Plans
ASEAN	Association of South-East Asian Nations	IFR	Instrument Flight Rating
CARICOM	Caribbean Community	IMO	International Maritime Organization of the United Nations
CBM	Community-based Management	IOFC	Indian Ocean Fisheries Commission
CCRF	FAO Code of Conduct for Responsible Fisheries (adopted by the 28th Session of the FAO Conference on 31 October 1995)	IOMAC	Indian Ocean Marine Affairs Cooperation Programme
CECAF	FAO Fishery Committee for the Eastern Central Atlantic	IPFC	Indo-Pacific Fisheries Commission
CFP	Common Fisheries Policy of the European Union	IPOA	International Plan of Action
CFRAMP	CARICOM Fisheries Resource Assessment and Management Program	IRCS	International Telecommunications Union Radio Call Signs
CRM	Coastal Resource Management	ISO	International Standards Organization
CRMP	Coastal Resources Management Project	ITQ	Individual Transferable Quota
CSW	Circulating Sea Water	ITU	International Telecommunications Union
COREMAP	Coral Reef Rehabilitation and Management Program	IUU Fishing	Illegal, Unreported and Unregulated Fishing
DFO	Department of Fisheries and Oceans	LIMA	International Flag Signal Letter "L" Meaning "You Should Stop Your Vessel Instantly"
DWFN	Distant Water Fishing Nations	LUX-	Duchy of Luxembourg Development Programme
EU	European Union (formerly the European Economic Community)	m	Metre
EEZ	Exclusive Economic Zone	MECC	Maritime Enforcement Coordination Committee
ETA	Estimated Time of Arrival	MCM	Marine and Coastal Management
ETD	Estimated Time of Departure	MCS	Monitoring, Control and Surveillance
FAO	Food and Agriculture Organization of the United Nations	MTC	FFAs Minimum Terms and Conditions of Fisheries Access
Compliance Agreement	FAO Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas	MSY	Maximum Sustainable Yield
FFA	South Pacific Forum Fisheries Agency	NAFO	Northwest Atlantic Fisheries Organization
FFV	Foreign Fishing Vessel	NGOs	Non-governmental Organizations
GDP	Gross Domestic Product	Niue Treaty	Niue Treaty on Cooperation and Fishery Surveillance and Law Enforcement in the South Pacific Region
GNP	Gross National Product	nm	nautical mile
GPS	Global Positioning System	NOAA	National Oceanic and Atmospheric Administration
GRT	Gross Registered Tonnage	OECS	Organization of Eastern Caribbean States
ICAM	Integrated Coastal Area Management	RFMO	Regional Fishery Management Organizations

SAPS	South African Police Service	UNCED	United Nations Conference on Environment and Development
SAR	Synthetic Aperture Radar	UNDP	United Nations Development Programme
SOPAC	South Pacific Applied Geoscience Commission	UNESCO	United Nations Educational, Scientific and Cultural Organization
SQ3	Flag Signal - "Stop or heave to, I am going to board you"	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.
SRFC	Subregional Fisheries Commission (Northwest Africa)	USCG	United States Coast Guard
SWOT	Strengths, Weaknesses, Opportunities and Threats Concept	USAID	United States Agency for International Development
TAC	Total Allowable Catch	VMS	Vessel Monitoring System
UNCLOS	The 1982 UN Convention on the Law of the Sea, of 10 December 1982		

## CHAPTER 1

### INTRODUCTION

For many years, the Food and Agriculture Organization of the United Nations (FAO) has assisted national fisheries administrations in addressing the issues they confront in managing and developing fisheries. This paper is intended to enhance and update FAO Fisheries Technical Paper, No. 338, entitled *An introduction to monitoring, control and surveillance for capture fisheries*.<sup>1</sup> Since the release of the earlier paper, many new legal concepts and agreements have been forged in the international community and new management trends have emerged that affect monitoring, control and surveillance (MCS) policies, planning and operations. The present paper is intended to present these changes and to encourage fisheries administrations to update their practices accordingly.

To this end, the paper provides background on MCS strategies that should be taken into account as part of continuing efforts to deal with three basic problem areas facing fisheries administrators today – namely:

- a) the inability of many governments to monitor and control fisheries in waters under the jurisdiction of their State;
- b) the maintenance of “open access” fisheries, despite the difficulties for both fisheries managers and MCS personnel to regulate this type of fishery; and
- c) the lack of effective regional structures and organizations to manage international fisheries.

Options and guidelines are offered on how to strengthen MCS capability within states, subregions or regions. The paper expands on current MCS-related literature (see Annex A) and provides references for more detailed advice in certain areas. It focuses on MCS for both coastal and offshore fisheries and deals with both national and foreign-owned fleets. Topics discussed include the following.

- a) an overview of MCS, definitions of its activity components, the role of MCS in fisheries management, recent trends in MCS, and the relationships between the land, sea, and air components of an MCS scheme Chapter 1, following sections);
- b) the legal basis for MCS activities and how this can be strengthened and enforced (Chapter 2);
- c) design considerations for the components of an MCS system (Chapter 3);
- d) organizational considerations for MCS (Chapter 4);
- e) management measures, consultation and planning (Chapter 5);
- f) MCS operational procedures and equipment (Chapter 6);
- g) patrols, boardings, inspections and prosecution (Chapter 7); and

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<sup>1</sup> See Flewelling (1994).

h) MCS issues for coastal resource management (Chapter 8).

## 1.1 Overview – Status and Challenges

In the past, fisheries administrators have viewed MCS as little more than the policing of the various maritime zones controlled by the State. This paper attempts to provide a broader view of MCS – a view of MCS as the vital executive arm of fisheries management.

The rapid depletion of key fish stocks in the 1980s and 1990s has made it imperative that governments achieve greater control over fishing activities. At the international level, a number of new agreements have created a stronger legal basis on which to develop greater control. At the same time, new technological developments have facilitated the remote monitoring of fishing vessels and the collection of fisheries data.

The 1982 United Nations Convention on the Law of the Sea (UNCLOS), which entered into force in 1994, forms the backbone of the international legal framework for fisheries management. It sets out the rights and duties of coastal, port and flag States in respect of each of the principal maritime zones recognized by international law, namely the territorial sea, the exclusive economic zone and the high seas. It also deals with a range of other important issues that are related, including 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.

The provisions of UNCLOS relating to fisheries, though widely accepted even before the Convention entered into force, did not prevent the depletion of several valuable fish stocks. For this reason, the 1992 United Nations Conference on Environment and Development (UNCED) called urgently for the development of further instruments that would be necessary to re-establish and maintain sustainable fisheries worldwide.

One of these new instruments is 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), which entered into force on 11 December 2001. As discussed more fully in Chapter 2, the UN Fish Stocks Agreement sets forth a broad range of obligations designed to create greater control over fisheries for certain valuable stocks, including the strengthening of MCS capabilities.

Chapter 2 also reviews the pertinent aspects of several other new instruments developed under the auspices of FAO, including:

- a) the 1993 Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (FAO Compliance Agreement);
- b) the 1995 Code of Conduct for Responsible Fisheries (CCRF);
- c) four International Plans of Action dealing with various aspects of fisheries management, and particularly the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing; and
- d) guidelines for the marking and identification of fishing vessels.

Ideally, each State would implement the 1982 Convention and the more recent agreements through the development of a national “oceans policy.” 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 cooperative management of fisheries that occur outside these zones. From this oceans policy would flow the integrated oceans planning and management framework under which fisheries management plans would be developed.

Most States see this as a long-term development initiative. To shorten the process, they have chosen to develop oceans policy and fisheries management strategies (including MCS strategies) simultaneously. Consequently, although States recognize that fisheries management must be integrated into an 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 protect fish stocks and their habitats. This strategy is commendable. A “precautionary approach” recognizes that a first requirement for fisheries resource conservation is to prevent further degradation of the resource base.

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:

- a) assume a controlling role, where it actually runs the industry, impacts the potential income of fishers, and micro-regulates the harvesting sector; or
- b) maintain a less intrusive or co-management role, whereby the fishers and the fishing industry are encouraged to accept their resource responsibilities and roles within the framework of general government conservation principles and legislation.

Negative results of centralised, micro-management control mechanisms have become evident in both industrialised and developing States. Consequently, there is an emerging trend toward the second, *participatory co-management approach*. Fishers and the fishing industry want, and in fact are demanding, a more active role in management planning and implementation. Central governments are responding by devolving authority to smaller units of government (provinces, districts and municipalities) and by fostering 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, such as the Canadian experience described in Profile 1, the private sector is also becoming involved in MCS activities.

### 1.1.1 Misperceptions of MCS

Misperceptions surrounding MCS activities continue to impact how fishers and even fishery managers view the process of MCS and enforcement. A common misperception is that all fisheries problems stem either from a failure to control illegal foreign fishing, or from the fishers themselves. While foreign fishing fleets have had documented impacts on fisheries conservation efforts, the greater impact on fisheries often stems from the domestic fishing industry in the coastal and nearshore fishing zones.

On the issue of fishers, fisheries administrators must remember that most are hard working individuals often working in a hazardous environment:

While sometimes libellously assumed by the ill-informed to be crooks, [fishers] 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 ... [has one of the worst

industrial accident rates in the world], and [that] ... they operate increasingly in an economic climate of ever increasing overheads countered only by the proceeds of catches which [are] subjected to [ever 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.<sup>2</sup>

Another erroneous perception is that MCS is exclusively concerned with enforcement – thus ignoring the other two components of monitoring (data collection) and control (legislation, licensing, and controls on gear, season, areas, etc.). In focussing only on the “surveillance/enforcement” or deterrent aspects of MCS, fisheries administrators and supporting agencies cannot harness the full utility of MCS as the vital executive arm of fisheries management.

### **1.1.2 Civilian versus military involvement in MCS**

The expense of MCS activities is often a primary concern of any government designing and implementing an MCS system. Cost-effectiveness and efficiency is important if MCS operations are to be successful. A civilian approach to deterrent fisheries enforcement has proven in many cases to be the most cost-effective and responsive to fisheries priorities. Use of civilian assets also minimizes the political sensitivity of international fisheries incidents by avoiding the use of military equipment and personnel.

Those fisheries administrators who must rely on the use of military resources to carry out MCS activities may find that military agencies often accord low priority to that task.

Moreover, military involvement, except in a support role, is usually not cost-effective. Military aircraft and vessels are more expensive to build and operate than equivalent civilian equipment. Savings accrue from the use of a civilian vessel with fewer crew, and lower operating costs.

For many governments, however, the military can play a significant supporting role in a strong MCS system. The key for such governments is to establish an inter-agency mechanism that enables fisheries administrators to call upon their military counterparts as and when needed.

### **1.1.3 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. 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. As noted above, however, a number of different agencies may be called upon in a supporting role. In such situations, effective MCS requires a strong inter-agency control mechanism.

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<sup>2</sup> 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.

## ***Profile 1. Private Sector involvement in MCS – the Canadian Example***

### **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.

- Statistics:**
- 58 400 commercial fishers (42 700 Atlantic, 8 700 Pacific and 7 000 inland)
  - commercial harvest > 1 000 000 mt
  - landed value approximately \$1.9 billion (shellfish account for approximately 75% of the total landed value, with groundfish and pelagic fisheries making up the remainder)
  - 5 million Canadians and 900 000 visitors/year for the recreational fishery
  - 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 to 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 more efficiently to 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 misreporting, 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 fishers 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.

### 1.1.4 MCS tools for management

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

- a) an appropriate participatory management plan developed with stakeholder input;
- b) enforceable<sup>3</sup> legislation and control mechanisms (licences etc.);
- c) data collection systems – dockside monitoring, observers, sea and port inspections, etc.;
- d) supporting communications system;
- e) patrol vessels capable of extended operating to remain at sea with the fishing fleets;
- f) aircraft available for rapid deployment to efficiently search large areas;
- g) use, where appropriate, of new technology (VMS, satellite, video, infra-red tracking, etc.);
- h) linked, land-based monitoring;
- i) support of the industry and fishers;
- j) bilateral, subregional and regional cooperation with other MCS components; and
- k) professional staff.

These tools will be discussed in greater detail in later chapters, but the importance of professional staff should be highlighted at the outset. The development of a professional MCS staff is the most important, but often least talked about component of a comprehensive MCS plan. *A credible staff with a high degree of integrity and professionalism will ensure the success of the system. The use of preventive (voluntary compliance) MCS techniques in a participatory management approach is effective when combined with more traditional MCS approaches to deterrent and enforcement. Through training, MCS staff will become competent as communicators, planners, community/stakeholder educators, and implementers of approved management plans.*



*Rigid hulled inflatable for fisheries*



*Inter-Agency Communications - Indonesia*

<sup>3</sup> 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.



## 1.2 Definition of MCS

Fisheries are critical to the development of a State's plan to conserve and utilise marine resources, as fish and their habitat are significant renewable resources in the territorial sea and exclusive economic zone. The goal of fisheries management, including MCS, is to maximise 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.

An MCS Conference of Experts organized by FAO in 1981 developed a definition of MCS that is commonly accepted by fisheries personnel:

- a) **monitoring** – the continuous requirement for the measurement of fishing effort characteristics and resource yields;
- b) **control** – the regulatory conditions under which the exploitation of the resource may be conducted; and
- c) **surveillance** – the degree and types of observations required to maintain compliance with the regulatory controls imposed on fishing activities.<sup>4</sup>

Simply stated, MCS is the mechanism for implementation of agreed policies, plans or strategies for oceans and fisheries management.<sup>5</sup> MCS is an aspect of oceans and fisheries management that is often undervalued. In reality, it is key to the successful implementation of any planning strategy. The absence of MCS operations render a fisheries management scheme incomplete and ineffective.

Since the 1981 MCS Conference, the definition of MCS has been enhanced to promote the concept that MCS covers more than just fisheries enforcement – it is an integral and key component for the implementation of fisheries management plans. It encompasses not only traditional enforcement activities but also the development and establishment of both data collection systems, the enactment of legislative instruments and the implementation of the management plan through participatory techniques and strategies. A 1993 workshop in Ghana offered the following clarifications.

- a) **Monitoring** includes the collection, measurement and analysis of fishing activity including, but not limited to: catch, species composition, fishing effort, bycatch, 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.
- b) **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, subregionally, or regionally agreed. The legislation provides the basis for which fisheries management arrangements, via MCS, are implemented. For maximum effect, framework legislation should clearly state the management measures being implemented and define the requirements and prohibitions that will be enforced.

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<sup>4</sup> FAO (1981).

<sup>5</sup> 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.

- c) *Surveillance* involves the regulation 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.***<sup>6</sup>

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

### 1.3 Role of MCS in Fisheries Management

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

*Fisheries management* in its simplest terms comprise the following activities:

- a) ***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.
- b) ***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).
- c) ***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:
  - i) ***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.
  - ii) ***Operational and output controls*** – such as species and catch limits, by-catch limits, reporting requirements, air surveillance, sea patrols/inspections, boarding, logbooks, dockside monitoring, observers, port inspections, and catch documentation schemes.
- d) ***Implementation*** – this includes such measures as:
  - i) participatory community-based management (CBM);
  - ii) “preventive” MCS activities to encourage voluntary compliance;
  - iii) public awareness and education campaigns;
  - iv) assistance to small scale fishers for supplemental livelihood development to reduce coastal area pressures;
  - v) full enforcement to ensure compliance by those minority of fishers that persist in ignoring the law.

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<sup>6</sup> Doulman (1993).

Similarly, **MCS** involves:

- a) data collection and analyses for both operational planning and execution, as well as management planning, defined as monitoring (M);
- b) involvement in the participatory management planning to include discussions on appropriate implementing mechanisms;
- c) 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
- d) implementation of the plan through “preventive” and “deterrent” MCS techniques, included in the idea of surveillance (S).

Unfortunately, not all fisheries administrators understand MCS, or its critical role as an implementing mechanism for fisheries management. Some view arrests as the only relevant indication of the effectiveness of MCS efforts.<sup>7</sup> 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.

Effective MCS involves a two-pronged, parallel approach. The *preventive approach* is to encourage “voluntary compliance” through understanding and support for the management strategies and this includes:

- a) enhancement of community/fisher awareness and understanding of management practices and MCS through seminars, public awareness and information, education, and communication campaigns;
- b) 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 management of their fisheries in partnership with government;
- c) peer pressure towards voluntary compliance and support for the management regime;
- d) the institution of accurate and verifiable data collection regimes; and
- e) 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 compliance will fail if stakeholders see non-compliant fishers successfully evading the law and receiving economic returns from their illegal activity, at the expense of the fishers who comply with all requirements.

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<sup>7</sup> 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 *preventive MCS* (voluntary compliance) and *deterrent MCS* activities operating in parallel for successful and cost-effective fisheries and coastal resource management.

Key MCS components and their advantages and disadvantages are summarized in tabular form in Annex B.

Namibia has used an effective 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 Profile 2).

## **1.4 Emerging Trends in MCS**

Trends over in the past decade have significantly altered fisheries management in general and MCS strategies in particular. These have occurred in three areas — viz: *devolution of authority to lower levels of government; the encouragement of participatory management; and new technology.*

### **1.4.1 Devolution of authority**

Fisheries management can no longer be the sole responsibility of central governments. Rapid population growth, urbanisation and migration to coastal areas have created a greater need for local governmental units to address local fisheries management concerns. Growing literacy and educational levels, coupled with easy access to mass media, have helped ordinary citizens to acquire more knowledge of government processes and a desire for more transparency and a greater voice in decision-making. Central governments have responded by devolving more authority over fisheries management to provinces, states, districts, municipalities and communities.

This devolution of authority has vitally affected MCS. In the past, central governments controlled, or at least sought to control, all MCS activities on a national basis. Today, a more typical role for a central government is to set national policies and standards and to co-ordinate the implementation of these policies and standards. Responsibility for actually carrying out MCS activities is now typically shared by central governments with smaller governmental units. Central governments also monitor and evaluate local government performance to enhance future coordination and planning. MCS planning and operations still need this national coordination for consistency in implementation of management plans, and for conflict resolution. However, the overall trend is for central governments to devolve responsibility for MCS activities to lower levels of governmental authority.

## *Profile 2. Input and output controls for management – the Namibian example*

### NAMIBIAN FISHERIES AND MCS SYSTEM

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

Namibia, a State six times the size of the United Kingdom and with a population of 1.7 million, is on the West Coast of Africa just north of South Africa. It has a coastline of 700 nautical miles (1 500 km) and an EEZ of 275 000 km<sup>2</sup>. Since independence in 1989, Namibia has developed a progressive fisheries administration and a thriving commercial capture fisheries that is increasingly Namibian.

The fishing industry is based on the high productivity of the up-welling Benguela Current system. Fisheries contributed more than US\$50 million (10% Namibia's GDP) in 1999 and employed 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. This is 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 following the overexploitation before independence. Trends 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, recently, a general recovery. The total landed catch in 1999 was approximately 600 000 t. The key fisheries are as follows (TAC for 2000 in brackets):

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

Namibia uses a three-part access system to turn its policies of Namibianisation of the fisheries into practice: (i) rights to exploit the fisheries are allocated; (ii) quotas are allocated to rights holders; and (iii) vessels are granted licences. This allows Namibia to maintain control over the fishing companies, the vessels and the crews in order to assure that 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;

- input controls that relate to fishing effort and gear, seasons and areas, with the key ones being the limitation of total fishing effort and seasons; and
- 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 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 checked 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 two larger patrol vessels and one fixed wing aircraft in addition to maintaining 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.

### 1.4.2 Participatory management

Similarly, governments at all levels are giving private groups and individuals more opportunity to participate in the management of fisheries that affect them. This trend towards more transparency and openness is changing all aspects of MCS, including the development of fisheries laws and regulations, the collection of fisheries data, etc. As already indicated, enhanced public participation in the fisheries management process brings a number of advantages. Specifically, it fosters:

- a) greater public understanding of the rationale behind MCS activities;
- b) a greater sense of partnership between the government and fishers and others whose activities are being regulated;
- c) a greater sense of ownership and acceptance by private groups and individuals in the decisions that are ultimately adopted;
- d) voluntary compliance and the use of peer pressure to deter violations of fisheries rules;
- e) greater availability of MCS funding and other assets for dealing with cases of non-compliance.

### 1.4.3 New technology

Advances in technology, along with reductions in the cost of technology, have revolutionised MCS. Examples include:

- a) new vessel monitoring systems (VMS) in use in Argentina, Australia, Canada, Europe, Malaysia, New Zealand, United States, and member States of the South Pacific Forum Fisheries Agency, with systems also being considered in Madagascar, Namibia, Indonesia, and Sri Lanka; and
- b) inter-linked coastal radar systems in use in Senegal;<sup>8</sup>
- c) a combined VMS and satellite imaging system in use in the Maldives.<sup>9</sup>

Cheap cellular telephone and computer technology has also brought MCS into the computer age and has greatly improved the capacity of States to respond rapidly to situations. Over-the-horizon radar technology is evolving as well, but its cost has not yet fallen to a level that is appropriate for general fisheries management.

Currently the most popular VMS systems use INMARSAT C (and more recently D) and ARGOS. Others such as POLESTAR and EULTRACS are also making an appearance. FAO has prepared detailed guidelines as part of the *Code of Conduct for Responsible Fisheries* series for Fisheries Administrators contemplating the introduction and use of such technology.<sup>10</sup>

<sup>8</sup> 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.

<sup>9</sup> 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.

<sup>10</sup> FAO (1998).

The use of this new technology for coastal fisheries, particularly VMS, may not yet be cost-effective. However, many States can still monitor large numbers of coastal vessels effectively through other means, e.g. observers, dockside monitoring, monitoring of industry landings and production records, etc.

### 1.5 MCS Spatial Components

There are three main spatial dimensions or components to MCS: land, sea and air. The proper configuration of these spatial components for a given system will depend on such factors as cost, commitment, and organizational structure (national, subregional, or regional). All three components can now effectively use satellite technology (e.g. for vessel licensing, data collection and enforcement operations).

The *land* component of an MCS system serves as the base of operations, the co-ordinating centre for all MCS activities from which governments can regulate the deployment of resources to best address changing situations. The land component also entails port inspections, dockside monitoring, and the monitoring of transshipments and trade in fish products to ensure compliance with relevant rules. Governments must also undertake a variety of land-based activities in order to carry out their responsibilities as flag States of vessels that may be fishing in remote areas, including on the high seas and in waters under the jurisdiction of other States. New technology has allowed States to link the land components of their MCS system to those of other States on a regional or subregional basis, which can greatly foster co-ordinated and responsible management.

The *sea* component includes MCS activities undertaken in marine areas under the jurisdiction of a State and may also cover high seas areas. Technology that comes into play can include radar, sonar and vessel platforms. While physical presence through at-sea patrols remains a fundamental part of this component (necessary for arresting violators and securing evidence), the costs involved have prompted a growing number of States to employ “no force” surveillance techniques. Examples of such techniques include the placement of independent observers on board fishing vessels, national or regional vessel registers and VMS requirements. Developing coastal States are also requiring the flag States of vessels that wish to fish in their EEZs to ensure that those vessels do not violate the terms of the access granted. However, an at-sea presence remains necessary for the active enforcement of management measures to protect marine fisheries resources.

The *air* component covers the air and space equipment (aircraft, satellites, etc.) used in MCS activities. The flexibility, speed and deterrence of air and satellite based surveillance systems make these very popular tools for fisheries management. The air component provides for the rapid collection and dissemination of a wide range of information, including fishing vessel identification and reported fisheries data. Air, satellite or VMS surveillance can often provide initial information regarding fishing activity; they can also serve as first indicators of potential illegal activity and can thus trigger further MCS action. The cost of the air component is directly related to the sophistication of the technology used. Because governments can use air, satellite, video and advanced digital photographic technology, and VMS surveillance technology to address tasks beyond MCS (e.g. environmental and coastal zone monitoring, customs, immigration, and search and rescue), this equipment can improve the cost-effectiveness and efficiency of an integrated ocean management programme.

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 Profile 3.

### ***Profile 3. Inter-agency involvement in MCS – the USA approach***

#### **UNITED STATES OF AMERICA**

CDR. Michael Cerne , LTJG Matthew Barker & 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 km<sup>2</sup>). It hosts some 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 USA's waters in the early 1990s, as the United States fishing fleet increasingly encountered pressures of over capitalization similar to other States. 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 3 330 vessels in the Atlantic and Gulf of Mexico.

#### **MCS Agency Responsibilities:**

Each individual State is responsible for its 3 nm zone. The National Marine Fisheries Service (NMFS) under the National Oceanic and Atmospheric Administration (NOAA) 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.) The NOAA Office for Law Enforcement has five 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.



## CHAPTER 2

### LEGAL ASPECTS OF MCS

#### 2.1 Introduction

Law is central to MCS. 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 law and regulations to facilitate MCS, particularly the use of satellite-based VMS.

Laws fulfil a number of functions in relation to MCS. For example, laws:

- a) define the powers, duties and obligations of States and regional fisheries bodies to manage fisheries resources;
- b) establish rules to be observed by those harvesting fishery resources, including prohibiting certain activities, requiring that other activities be undertaken only with the authority of a licence, and prescribing the manner in which fishing and related activities must be conducted;
- c) grant enforcement powers to officials (e.g. to arrest, detain and seize);
- d) protect the interests of fishers, particularly in relation to confidential information;
- e) establish both the judicial process for penalizing those who violate fisheries rules and the procedures that govern the judicial process.

It is critical to understand the distinction between international law and domestic (national) law, as well as the relationship between those two spheres of law. As explained more fully in the following section, international law primarily regulates the relationship among States (and between States and international organizations). Domestic law regulates the relationships between persons (including legal persons such as companies) within a particular State.

Generally speaking, domestic law applies only within the territory of the State concerned and in areas over which the State exercises sovereign rights, such as the EEZ. Domestic law also applies to the activities of nationals and vessels of a State that occur on the high seas and, in some situations, even in waters under the jurisdiction of other States.

No MCS system is likely to be effective unless it is based on clear legal rules that set out the rights and duties 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 implementing those rules consistently.

## 2.2 International Law Relevant to MCS

### 2.2.1 International law

International law is the system of rules governing the relationship among States (and between States and international organizations). The rules of international law are reflected primarily in treaties,<sup>11</sup> which generally create obligations only for those States party to the treaty. Other rules of international law arise from general international practice accepted as law (so-called “customary international law”), although it is sometimes difficult to determine whether a particular practice has become accepted as law by States.

The most important rules of international law relating to MCS are those contained in treaties, such as UNCLOS and related agreements.<sup>12</sup> Customary international law plays a relatively minor role in governing MCS activities.

Fisheries administrators should be aware of at least the following three characteristics of international law:

- a) ***International law governs States (and international organizations).*** The subjects of international law (i.e. the parties who are bound by it) are States and international organizations. Generally speaking, a rule of international law cannot be enforced directly against individuals or companies unless there is some provision in the domestic law that authorizes its application as a matter of domestic law. In many States (notably those which follow the common law tradition originally derived from English law) it is necessary for parliament to pass an Act implementing a rule of international law before it applies at the domestic level. In other States (notably those following the civil law tradition), this is not always necessary.
- b) ***Treaties do not bind non-parties.*** A treaty only applies to the parties to it. States that are not parties to a treaty are not bound by its provisions unless they have consented to be bound by those provisions through some other means (or if the provisions reflect customary international law).

However, a number of recent international fisheries agreements, including the UN Fish Stocks Agreement and the FAO Compliance Agreement, require parties to ensure that their flag vessels comply with, and do not undermine the effectiveness of, conservation and management measures adopted pursuant to other international agreements (particularly those establishing regional fisheries bodies), even if the State is not a party to those other agreements.<sup>13</sup>

- c) ***Not all international instruments contain binding rules.*** Some international instruments contain political rather than legally binding commitments. Over time, such political commitments may become binding by “hardening” into customary international law or through inclusion in subsequent treaties. However, one should not underestimate the significance of non-binding instruments, particularly in the field of international fisheries. Some non-binding instruments have radically changed the behaviour of some States and the conduct of some fisheries.<sup>14</sup> Similarly, the CCRF and

<sup>11</sup> The term “treaty” generally covers all international agreements containing binding obligations, despite the fact that such documents carry a variety of different titles, e.g. convention, agreement, or protocol.

<sup>12</sup> Most important international fisheries agreements and a host of related documents, explanatory guidelines and the like are now available on the internet. See for example the Internet Guide to International Fisheries Law ([www.oceanlaw.net](http://www.oceanlaw.net)).

<sup>13</sup> See UN Fish Stocks Agreement, Articles 18-19; FAO Compliance Agreement Article III.

its subsequent International Plans of Action, though non-binding, reflect wide areas of consensus within the international community on many aspects of fisheries management.

### **2.2.2 The 1982 UN Convention (UNCLOS)**

All fisheries administrators should have a good understanding of the basic provisions of UNCLOS<sup>15</sup> relating to the management of living marine resources.

UNCLOS establishes a comprehensive framework for the use of the world's oceans. This treaty sets out the rights and duties of States concerning the oceans, particularly with respect to the different maritime zones (internal waters, territorial sea, EEZ, archipelagic waters and high seas). For most purposes related to fisheries management, the Convention divides the oceans into two basic areas:

- a) areas under the jurisdiction of coastal States (in which the coastal State has exclusive authority to manage fisheries); and
- b) the high seas, in which all States have the right for their nationals to fish, subject to certain important qualifications.

Since its entry into force in 1994, the Convention has also served as an “umbrella” treaty under which other more specific international instruments have been elaborated, including the FAO Compliance Agreement (discussed in 2.2.3 below), the 1995 UN Fish Stocks Agreement (discussed in 2.2.4 below) and the CCRF(discussed in 2.2.5 below).

### **2.2.3 FAO Compliance Agreement**

The FAO Compliance Agreement<sup>16</sup> seeks to strengthen the provisions in UNCLOS relating to high seas fishing. This treaty has two primary objectives. The first is to require all States whose vessels fish on the high seas to take a range of steps to ensure that those vessels do not undermine measures 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.

Article III of the FAO Compliance Agreement contains its most significant provisions for purposes of MCS, including three fundamental responsibilities of flag States:

- a) Flag States should ensure that their vessels do not undermine fishery conservation and management measures that apply in any high seas area.
- b) Vessels should not fish on the high seas except pursuant to express authorization to do so issued by the flag State.
- c) A flag State should not grant such authorization to a vessel unless it can ensure that the vessel will not undermine fishery conservation and management measures that apply in a high seas area in which the vessel will operate.

<sup>14</sup> For example, UN General Assembly Resolution 46/215, though non-binding, created an effective moratorium on large-scale driftnet fishing on the high seas.

<sup>15</sup> 21 International Legal Materials 1261 (1982). The Convention entered into force on 16 November 1994.

<sup>16</sup> 33 International Legal Materials 969 (1994). The FAO Compliance Agreement, which was elaborated as an integral part of the FAO Code of Conduct, will enter into force following the deposit of 25 instruments of acceptance with FAO. As of 1 February 2002, 22 instruments had been received.

Article III of the Compliance Agreement also requires each flag State to ensure that its fishing vessels are marked to be readily identifiable in accordance with generally accepted standards (such as the FAO vessel marking scheme), to obtain information on the operations of their vessels, and to impose sanctions for non-compliance that are sufficiently severe to deter further non-compliance.<sup>17</sup>

#### **2.2.4 1995 UN Fish Stocks Agreement**

The UN Fish Stocks Agreement entered into force on 11 December 2001, following the deposit of instruments of ratification or accession by 30 States. This treaty builds on several general provisions of UNCLOS in an effort to strengthen cooperation in the conservation and management of certain fish stocks that occur both within EEZs and on the high seas:

- a) “straddling” fish stocks, which are stocks whose natural ranges straddle the line dividing areas under the fisheries jurisdiction of one or more coastal States and the adjacent high seas areas. Examples of such stocks include cod in the Northwest Atlantic Ocean and pollock in the Bering Sea; and
- b) “highly migratory” fish stocks, which are stocks that migrate extensively across the high seas and through areas under the fisheries jurisdiction of many coastal States. Examples of such stocks include tuna and swordfish.

The 1995 UN Fish Stocks Agreement contains provisions on flag State responsibility that are very similar to those in the FAO Compliance Agreement. In the area of MCS, the 1995 UN Fish Stocks Agreement also includes rules under which States other than the flag State may board and inspect fishing vessels on the high seas:

- a) under certain circumstances, States other than the flag State may board and inspect vessels fishing on the high seas to ensure compliance with conservation and management measures established by regional fishery bodies;
- b) further enforcement action, including ordering a fishing vessel to port, may be taken in the case of serious violations by vessels whose flag State either cannot or will not exercise proper control over them;
- c) serious violations include fishing without a license; failing to maintain accurate records; fishing in a closed area or for stocks subject to a moratorium; using prohibited gear; falsifying markings or other identification; concealing, hampering with, or disposing of evidence; and multiple violations which together constitute a serious disregard for conservation and management measures; and
- d) States should act through regional fishery bodies to establish procedures for boarding and inspection and to implement the other provisions involving cooperative enforcement. If they have not done so by now, or have not established an alternative enforcement mechanism, then boardings and inspections may occur in accordance with procedures found in the Agreement.

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<sup>17</sup> Although the FAO Compliance Agreement allows parties to exempt vessels under 24 metres in length from some of the administrative requirements of the treaty, flag States must take effective measures to ensure that any exempted vessels that undermine the effectiveness of international conservation and management measures cease to engage in such activities. Article II (2) as read with Article III (1)(b).

The 1995 UN Fish Stocks Agreement also 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 cooperation between States, requires strict fisheries enforcement and the collection and exchange of fisheries data, and requires parties to settle disputes using the procedures established in UNCLOS.

### 2.2.5 FAO Code of Conduct

The FAO Code of Conduct for Responsible Fisheries (CCRF) is a broad and comprehensive but non-binding document.<sup>18</sup> It prescribes principles and standards for the conservation and management of all fisheries, as well as for fish processing, trade in fish and fishery products, fishing operations, aquaculture, fisheries research and the integration of fisheries into coastal area management. A fundamental objective of CCRF is “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.”

Other pertinent provisions of the CCRF include the following:<sup>19</sup>

- a) If world fisheries are to be sustainable in the long term, structural adjustment within the fisheries sector is required. Although policy decisions in this regard must be made by national governments, effective implementation of the Code requires the participation and cooperation of a wide range of stakeholders, including fishers, processors, NGOs and consumers.
- b) The Code is intended to be a dynamic or “living” document to be adapted by FAO, working through its governing bodies, to meet new fisheries developments and situations.
- c) The Code is intended to function as part of a package of international instruments (including the FAO Compliance Agreement, the 1995 UN Fish Stocks Agreement and the various international plans of action (IPOAs) discussed below), which are designed to work together to address the management and conservation of fisheries throughout the world.
- d) Implementation of the Code is primarily the responsibility of States. However, 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.<sup>20</sup>
- e) The Code will require regional and sectoral implementation in order to address the particular needs of fisheries in different regions or sub-sectors.
- f) FAO has developed several Technical Guidelines in support of the implementation of the Code of Conduct for Responsible Fisheries, including: *Fishing Operations, 1. Vessel*

<sup>18</sup> Some of its provisions are binding by virtue of the fact that they are included in other international treaties or reflect customary international law.

<sup>19</sup> See Doulman (2000), p. 2.

<sup>20</sup> The work done by FAO in this regard includes establishing an internet website to facilitate public access to the CCRF and the Compliance Agreement, which is linked to national sites ([www.fao.org/fi](http://www.fao.org/fi)), and establishing an Interregional Programme of Assistance to Developing Countries for the Implementation of the Code of Conduct for Responsible Fisheries (the FishCode Programme).

*Monitoring Systems* (Rome, FAO, 1998). These are available on the FAO Fisheries Department website ([www.fao.org/fi](http://www.fao.org/fi)).

### **2.2.6 Other international agreements and obligations**

To date, four IPOAs have been developed within the framework of the Code of Conduct. FAO adopted three of these instruments in 1999 to deal with the incidental catch of sea birds in longline fisheries, the conservation and management of sharks and the management of fishing capacity.

The fourth IPOA, and the one which is of the greatest relevance to MCS, is designed to prevent, deter and eliminate illegal, unreported and unregulated (IUU) fishing. A copy of this IPOA, adopted by FAO in 2001, is available on the website of the FAO Fisheries Department. The FAO Fisheries Department has also produced detailed Technical Guidelines to help governments and others implement this IPOA.

The IPOA on IUU fishing offers many tools for States to use to combat IUU fishing, individually and in collaboration with other States. Some of the tools are designed for use by all States. Others tools are tailored for use by flag States, coastal States and port States. The IPOA-IUU also calls for the use of “internationally agreed market-related measures.” These are tools designed to keep fish that have been harvested by IUU fishers from being sold or traded.

The IPOA on IUU fishing calls upon all States to develop and adopt, as soon as possible but not later than March 2004, national plans of action to further achieve the objectives of the IPOA. To the extent possible, each State’s national plan of action should consider how each of the basic tools in the IPOA could be put to use in the fisheries in which it is involved. States are encouraged to report to FAO on steps they have taken to implement their national plans and the IPOA itself.

## **2.3 The Powers of States to Make and Enforce Fisheries Laws**

### **2.3.1 Internal waters, the territorial sea and archipelagic waters**

Internal waters generally consist of waters landward of the baseline from which the territorial sea is measured (including ports and roadsteads). Under international law, a coastal State has sovereignty over its internal waters, including the power to make and enforce fisheries laws.<sup>21</sup>

The territorial sea may extend up to 12 nautical miles seaward of the baseline. As with internal waters, a coastal State has sovereignty over its territorial sea, which includes the power to make and enforce fisheries laws. Although a coastal State must observe the right of innocent passage of foreign vessels, including foreign fishing vessels, through its territorial sea,<sup>22</sup> a foreign vessel that conducts fishing activities in the territorial sea is not engaged in innocent passage.

<sup>21</sup> The sovereignty of the coastal State over its internal waters is subject only to a minor exception relating to the continuation of an existing right of innocent passage in waters enclosed by straight baselines. See UNCLOS Article 8.

<sup>22</sup> UNCLOS Articles 17 and 52(1). Vessels engaged in transshipment (including processing vessels such as so-called “klondykers”) are not considered to be engaged in innocent passage because their passage is not “continuous and expeditious” as required by UNCLOS Article 18(2).

Archipelagic waters established in accordance with Article 47 of UNCLOS are similarly under the sovereignty of the archipelagic State, subject to the right of innocent passage.<sup>23</sup> Sovereignty over archipelagic waters includes the power to make and enforce fisheries laws.

### **2.3.2 The exclusive economic zone (EEZ)**

The EEZs may extend out to 200 nautical miles seaward of the baseline. Within its EEZ, a coastal State has “sovereign rights for the purpose of exploring and exploiting, conserving and managing” living resources.<sup>24</sup> A coastal State shall 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 and may enact laws and regulations to require foreign vessels to provide “vessel position reports.”<sup>25</sup>

UNCLOS also contains additional guidance relating to fish that occur in waters under the jurisdiction of more than one State, migrate between areas under national jurisdiction and the high seas and that occur exclusively on the high seas.

### **2.3.3 The continental shelf**

Under UNCLOS, a coastal State has exclusive rights with respect to sedentary species of living organisms on its continental shelf.<sup>26</sup> For some coastal States, the continental shelf can extend beyond the seaward limit of its EEZ.

### **2.3.4 The high seas**

The high seas are those waters beyond the limits of national jurisdiction. All States have the right for their nationals to fish on the high seas. However, this right is subject to a number of significant qualifications, particularly the obligation to conserve high seas living resources, to cooperate with other States and to respect certain rights, duties and interests of coastal States.

Since the high seas lie beyond the limits of national jurisdiction, no State may create fisheries rules applicable to vessels of other States fishing on the high sea. Generally speaking, fishing vessels on the high seas are subject to the exclusive jurisdiction of the flag State. However, a number of recent international agreements have given States other than the flag State certain rights to take action with respect to fishing vessels on the high seas, primarily to help prevent, deter and eliminate IUU fishing.<sup>27</sup> Coastal States may also exercise the right of hot pursuit of foreign fishing vessels on the high seas in certain carefully defined circumstances.<sup>28</sup>

<sup>23</sup> UNCLOS Articles 2(1), 49(1) and 52(1). However, Article 51(1) provides that “an archipelagic State shall respect existing agreements with other States and shall recognize traditional fishing rights and other legitimate activities of the immediately adjacent neighbouring States in certain areas falling within archipelagic waters. ...”

<sup>24</sup> UNCLOS Article 56(1)(a).

<sup>25</sup> UNCLOS Article 62(4) and 62(4)(e).

<sup>26</sup> UNCLOS Articles 56(3) and 77.

<sup>27</sup> See, e.g. the 1995 UN Fish Stocks Agreement, articles 21-22; the 1992 Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean, article V; the 1994 Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea, article XI; the 2000 Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean, article 26 (not yet in force).

<sup>28</sup> UNCLOS Article 111.

### 2.3.5 Port State control

International law does not impose any significant restrictions on the powers of a State to regulate foreign fishing vessels voluntarily in its ports. A State may deny foreign fishing vessels access to its ports outright,<sup>29</sup> or may place conditions on access such as advance notice of arrival, requiring specified information be provided in advance, and boarding and inspection.

The 1995 UN Fish Stocks Agreement 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 subregional, regional and global conservation and management measures.<sup>30</sup>

Other international instruments, including the Code of Conduct, the FAO Compliance Agreement and the IPOA to Prevent, Deter and Eliminate IUU Fishing, also call upon port States to use their powers to promote sustainable fisheries.

A port State enjoys the advantage of being able to inspect a vessel in port and to control its movements with relative ease. A port State can enforce its laws (usually without the need to use the force which may be required at sea) and can obtain and forward to the flag State any information concerning suspected unlawful activities of the vessel.

Port States can also require foreign fishing vessels to obtain advance authorization to enter a port. If a State imposes conditions on entry into its ports, it may take necessary steps to prevent any breach of those conditions.<sup>31</sup>

### 2.3.6 Flag State powers

The flag State has responsibility under international law for controlling the fishing activities of a vessel, no matter where the vessel operates:

- a) If the vessel is fishing in waters under the jurisdiction of the flag State, the responsibility of the flag State is exclusive. Generally speaking, no other State has the right or responsibility to control the fishing activities of the vessel.
- b) If the vessel is fishing on the high seas, the flag State has traditionally had exclusive responsibility for controlling the fishing activities of the vessel. However, as noted above, a number of recent international agreements have given States other than the flag State certain rights to take action with respect to fishing vessels on the high seas.
- c) If the vessel is fishing in waters under the jurisdiction of a State other than the flag State (or is in the port of a State other than the flag State), the coastal (or port) State has rights and responsibilities with respect to the fishing activities of the vessel. In such situations, however, the flag State also continues to have responsibilities with respect to those fishing activities, including the responsibility to ensure that the vessel does not conduct unauthorized fishing in waters under the jurisdiction of another State.

<sup>29</sup> A State should nevertheless allow a vessel to enter its port for reasons of *force majeure* or distress or for rendering assistance to those in danger or distress.

<sup>30</sup> 1995 UN Fish Stocks Agreement Article 23.

<sup>31</sup> UNCLOS Article 25(2). 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. See Molenaar and Tsamenyi (2000).



Unfortunately, a number of flag States lack the means (and sometimes the will) to control the fishing activities of their vessels. To compound this problem, a number of States maintain so-called “open registries” in which some fishing vessel owners may register their vessels precisely to avoid such control. Concerns with this loop-hole led to the development of the FAO Compliance Agreement and to the inclusion of provisions in the 1995 UN Fish Stocks Agreement that focus attention on the duty of the flag State to exercise effective control over its fishing vessels.

In particular, the 1995 UN Fish Stocks Agreement requires a flag State to:

- a) ensure both that its vessels *comply* with applicable conservation measures and *do not undermine* their effectiveness;<sup>32</sup>
- b) grant an authorization to fish on the high seas only “where it *is able to exercise effectively* its responsibilities in respect of such fishing vessels;”<sup>33</sup>
- c) develop regulations “to ensure that vessels flying its flag do not conduct unauthorized fishing within areas under the national jurisdiction of other States;”<sup>34</sup>
- d) enforce compliance by vessels flying its flag with subregional and regional conservation and management measures, wherever the violations occur.<sup>35</sup>

## 2.4 Strengthening National Regulatory Frameworks for MCS

### 2.4.1 The role of domestic (national) law

As discussed in Section 2.2, international agreements impose obligations on States that must be translated into specific enforceable legal rules backed up by sanctions in national laws. Thus, an essential part of implementing international agreements is for each State to pass legislation to give effect to the obligations contained in treaties to which it is bound. In practice, MCS is primarily concerned with ensuring compliance with these domestic law rules rather than with the provisions of treaties.<sup>36</sup>

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 contains provisions that facilitate effective enforcement. In practice, the effectiveness of an MCS system in ensuring compliance with the law will depend very heavily on whether or not domestic laws provide appropriate mechanisms to facilitate this task.

### 2.4.2 Key issues

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

<sup>32</sup> 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.”

<sup>33</sup> Article 18(2).

<sup>34</sup> Article 18(3)(b)(iv).

<sup>35</sup> Article 19(1).

<sup>36</sup> Even where a State is a member of a regional fisheries body, national legislation usually requires that the State take steps under its domestic law to give effect to rules adopted by such bodies. In other words, enforcing the rule is still a matter of national law, even though the source of the rule may be a regional or international agreement.

- a) ensuring that fisheries administrators and enforcement officers can exercise all powers available to coastal, port and flag States under international law (this will usually require reviewing the powers of enforcement officers under domestic law and strengthening procedures under which the States grants authorization to fish);
- b) increasing regional and international cooperation 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;
- c) increasing the transparency of fishing efforts by improving monitoring programs (particularly by requiring the use of VMS);
- d) facilitating the use of information derived from monitoring and surveillance (particularly from new VMS technologies) to promote compliance; and
- e) strengthening existing sanctions and extending 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.

### **2.4.3 Introduction of VMS**

As discussed above, international law recognizes the sovereign rights of coastal States to explore, exploit, conserve and manage living resources in areas under their jurisdiction. With those rights come responsibilities, as set forth in UNCLOS and elaborated in subsequent instruments, to adopt and implement appropriate measures to conserve and manage those resources. For stocks that occur both within and beyond waters under its jurisdiction, coastal States have basic obligations to cooperate with other States to conserve and manage such stocks. Similarly, all States whose nationals fish on the high seas have obligations to conserve the stocks in question and to cooperate with other States in this regard.

The increasingly sophisticated legal framework for international and regional fisheries management requires States to develop more extensive, accurate and verifiable data concerning fisheries activities and their effects. The declining status of many fish stocks (and of the marine environment in general) has also created a strong incentive for States to adopt VMS as a component of an overall MCS strategy. Furthermore, advances in technology, particularly in relation to satellite-based VMS, have the potential to substantially improve the effectiveness of MCS systems by generating a wider range of useful data at a substantially lower cost than exclusive reliance on more traditional MCS measures, such as at-sea enforcement.<sup>37</sup>

A number of international fisheries instruments encourage or require States to use satellite-based VMS.<sup>38</sup> How VMS should be implemented is generally left to the States to decide, since this will depend on the circumstances. In most cases satellite-based VMS is more appropriate for large scale commercial fishing operations than to control nearshore artisanal or subsistence

<sup>37</sup> For a comprehensive discussion of legal aspects of satellite based vessel monitoring systems see Molenaar, E.J. and Tsamenyi, N (2000).

<sup>38</sup> For example, 1995 UN Fish Stocks Agreement, Article 5(j), 18(3)(e) and (g)(iii) and Annex 1, Articles 5 and 6; FAO CCRF 7.7.3; IPOA on IUU Fishing paragraph 24.3.

fishing. Different types of satellite-based VMS may be appropriate in different circumstances, depending on vessel size and areas fished.

A State must usually enact specific legislation to enable satellite-based VMS to operate as an integral and effective part of an MCS system. For example, legislation should provide that:

- a) fishing is subject to an authorization regime (e.g. a licensing system) that requires the installation of automatic location communicators (ALCs);
- b) vessels must be clearly marked for identification purposes, allowing the comparison of visually acquired patrol sightings and the satellite-based VMS data;
- c) fishing vessels must report regularly on their position, activities and catches;
- d) landings and transshipments must take place in designated ports or areas under specified conditions; and
- e) information derived from satellite-based VMS is confidential (e.g. precise locations and times of fishing activities).

#### **2.4.4 Security and confidentiality of information**

The ability of VMS systems to provide detailed real-time or near real-time information increases the sensitivity of all data collected. This may 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.

To protect the confidentiality of such information, a State should:

- a) categorise sensitive information derived from VMS as confidential;
- b) require that this information be used primarily for MCS and other fisheries management purposes;
- c) clearly define the situations in which secondary use of VMS information is permitted (e.g. for search and rescue);
- d) restrict access to premises where VMS information is processed or stored , as well as access to the information itself; and
- e) make breach of confidentiality an offence punishable by severe penalties.<sup>39</sup>

#### **2.4.5 Facilitating legal enforcement**

New legislation (and amendments to existing legislation) should facilitate effective enforcement with due consideration given to the rights of persons accused of contravening the law.

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<sup>39</sup> See Keumlangan (2000).

### ***Evidentiary issues***

Although different legal systems have different standards and procedures for establishing that an offence has been committed, most legal systems require the prosecution to place before the court evidence that is sufficiently reliable to establish the essential elements of the offence with an appropriate degree of certainty. The defendant will then have an opportunity to cross examine the prosecution's witnesses and evidence, as well as present their own witnesses and evidence, in order to refute or otherwise call into question the prosecution's case, or to establish a defense that would allow the defendant to avoid liability.

Fisheries offences are usually committed at sea, beyond the direct observation of enforcement officers (other than on-board observers). This creates a number of difficulties. For example, it may be difficult to identify the vessel, or to determine its precise position at the time of the alleged violation, or to determine the specific activities of the vessel at any particular time (e.g. whether it was fishing). It may also be difficult to obtain physical evidence of the alleged offence.

Defence lawyers can often exploit these practical difficulties and use technical aspects of the evidentiary rules to secure an acquittal for their clients.<sup>40</sup> Careful drafting of the evidentiary rules and fisheries laws can help the prosecution secure convictions in appropriate cases, while still retaining safeguards to address due process issues and to ensure that innocent parties are not convicted. A number of mechanisms can be used to achieve this, most notably the creation of offences with elements that are relatively easy to investigate and prove (e.g. possession of illegally caught fish in addition to illegal fishing, or failure to stow gear while in a restricted fishing area), and the use of "strict liability" offences where no proof of general or specific *mens rea* (criminal intent) is required.

In most legal systems, the prosecution bears the initial burden to prove that a violation has occurred. In many situations, if the prosecution succeeds in providing at least preliminary evidence of a violation, the burden may shift to the defendant to prove the elements of its defence. Most legal systems also specify the level of proof which is required (i.e. the "standard of proof"). In common law systems, the standard of proof in criminal cases is normally "beyond a reasonable doubt." In a civil case, the standard of proof is usually the "balance of probabilities" (i.e. the most likely conclusion) or by a "preponderance of the evidence".

### ***Presumptions***

Another widely used technique 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 authorization) then certain other facts or consequences will be presumed (e.g. that any fish on board were caught illegally). The defendant then has chance to show otherwise – to "rebut" the presumption.

Presumptions are most appropriate to establish facts that are difficult for the prosecution to prove (e.g. concerning the activities of the vessel while at sea) but can easily be rebutted by an innocent defendant. Examples include presumptions that:

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<sup>40</sup> Fisheries officers should be particularly conscious of rules that render certain evidence inadmissible (i.e. unusable 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) a vessel is a foreign vessel if it flies a foreign flag, flies no flag, bears the name of a foreign port or possesses foreign documentation;
- b) a fisher apprehended without a license in waters where authorization to fish is required was engaged in unauthorized fishing;
- c) all fish aboard a vessel that is arrested for illegal fishing were caught illegally;
- d) a fishing vessel apprehended transiting the EEZ without stowing its fishing gear has engaged in illegal fishing.

Some presumptions are inappropriate, however, and may be struck down as unconstitutional or as contrary to applicable conventions on human rights, particularly laws that “presume” someone to be guilty of an offence unless they are able to prove otherwise or that otherwise undermine the right of a defendant to a fair trial. Thus, caution must be taken in using presumptions.<sup>41</sup> For example, it is not appropriate to presume that a violation has occurred in the absence of even prima facie evidence of the violation. This would effectively place a burden on apparently innocent parties to prove that they had not acted unlawfully.

### *Using data from VMS in court*

In common law systems, prosecutors have experienced difficulty in using data derived from satellite-based VMS (e.g. to establish the position of a vessel at a particular time) because of the general rule that “hearsay” evidence is inadmissible. Although States have varying rules on “hearsay” evidence, the general idea is that courts are reluctant to accept evidence from witnesses who do not appear before the court itself, or who are testifying to matters that are not within their personal knowledge. A court may thus refuse to accept evidence from derived satellite-based VMS unless an expert in VMS technology appears before the court to confirm the accuracy and reliability of such systems in general, that the particular system was working properly, and that a qualified person interpreted the data correctly.

Some legal systems may nevertheless allow a court to take “judicial notice” of certain facts and accept them as true even in the absence of specific evidence. Courts generally take judicial notice of facts that are matters of general knowledge or are well-known (notorious) in the local area. As VMS becomes more widely used and understood, more courts may be willing to take judicial notice of the accuracy of data derived from VMS.<sup>42</sup>

Using expert evidence to prove the validity and accuracy of all information derived from a satellite-based VMS would be extremely time-consuming and expensive and would constitute a significant obstacle to prosecutions. In some situations legislative intervention may be required to deal with this problem. 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. This law empowers the Minister to designate certain classes of machines or instruments as “designated machines.”<sup>43</sup> 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

<sup>41</sup> See Freestone (1998).

<sup>42</sup> 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). However, 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 Kuemlangan (2000).

<sup>43</sup> Section 74.

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."<sup>44</sup> 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 utilized in conjunction with provisions relating to the tendering of documentary evidence which allow the Minister, a Fisheries Officer or an observer, to issue a certificate testifying to certain facts. The certificate is admissible and may be accepted as prima facie evidence of the facts stated therein. 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;<sup>45</sup> 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 to the interpretation of that information.<sup>46</sup>

### ***Administrative and civil processes and penalties***

Some States have avoided some of the difficulties associated with formal criminal trials (which involve considerable expense and a high standard of proof) by providing for administrative or civil penalties, rather than criminal sanctions, for certain fisheries violations.<sup>47</sup> In such systems, the fisheries administration typically notifies the alleged offender of its belief that a violation of law has occurred, presents a summary of its case with an indication of the penalties (usually fines) that it intends to impose, and invites 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.

### ***Fixed penalty systems***

Many legal systems have provisions that allow alleged offenders to pay a fixed penalty 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 technique in inappropriate circumstances, for example where the offences are of a complex nature.

### ***"Long arm" enforcement provisions***

The classic example of this type of law is the U.S. Lacey Act, which makes it unlawful for any person subject to U.S. jurisdiction to "import, export, transport, sell, receive, acquire, possess or purchase any fish ... taken, possessed or sold in violation of any ... foreign ... law,

<sup>44</sup> Section 76.

<sup>45</sup> Section 73(1).

<sup>46</sup> Section 76.

<sup>47</sup> For example, the U.S. Fisheries Conservation and Management Act makes it unlawful for any person to violate certain provisions of the Act; any person who does so is liable to the United States for a civil penalty. See section 1857 and 1858. This formulation replaces more typical language that a person is "guilty of an offence" which creates criminal liability. 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 penalty to which the person would be liable if convicted in court. New Zealand, Fisheries Act 196 sections 113ZA-113ZC.

treaty or regulation.<sup>48</sup> A number of other States have adopted similar laws including, Papua New Guinea, the Solomon Islands and Nauru.

As a result of cooperation between the United States and the members of the South Pacific Forum Fisheries Agency (FFA), the parties exchange fisheries information, including information on violations. The information exchanged in this manner has enabled the United States to use the Lacey Act to prosecute vessels importing fish taken contrary to the laws of FFA member states.<sup>49</sup> 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.

## **2.5 Synopsis of Implications of the Emerging International Fisheries Regime for MCS**

The 1990s saw very significant developments in international law relating to fisheries, with direct implications for MCS systems. The new international regulatory framework for fisheries, based on UNCLOS, the FAO Code of Conduct for Responsible Fisheries, the 1995 UN Fish Stocks Agreement, the FAO Compliance Agreement and the four FAO International Plans of Action, 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.

- a) The new regime calls for an “ecosystem” approach in which fisheries management is conducted in a wider context of the conservation and protection of the marine environment, biological diversity, and the integrated management of coastal areas.<sup>50</sup>
- b) All the international fisheries instruments adopted in the 1990s emphasise the importance of regional and global cooperation, particularly as a means of counteracting IUU fishing.
- c) There is increased emphasis on creating incentives for cooperation, disincentives for those remaining outside 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 body.
- d) Although the international regime continues to recognize the right of all States for their nationals to fish on the high seas, this right must be exercised in accordance with ever more stringent rules adopted at the regional and global levels. Flag States must ensure compliance by their vessels with agreed conservation and management measures. Flag States must enforce these measures, irrespective of where violations occur, investigate alleged violations fully and promptly, and 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.

<sup>48</sup> USC title 16, chapter 53. The Lacey Act was passed in 1900 and was named after its sponsor, Iowa congressman Lacey.

<sup>49</sup> See Kuemlangan (2000).

<sup>50</sup> See for example Agenda 21, Chapter 17, and the 1995 UN Fish Stocks Agreement, article 5(d)(e)(f) and (g).

The combined effect of these developments in the international fisheries regime is to enhance the importance of MCS and to provide added incentives for States to introduce 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 updated where necessary. Guidelines on the issues which should be considered in such a review are listed in Annex C.



## CHAPTER 3

### DESIGN CONSIDERATIONS FOR MCS

#### 3.1 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 in a particular State. These are:

- a) the geographic and demographic aspects of the State, including the nature of the fishing industry, the resource base, and the international profile of the fishery;
- b) social and economic factors; and
- c) the political will and commitment to sustainable and responsible fisheries management.

#### 3.2 Geographic and demographic aspects

##### 3.2.1 Size of the EEZ and the fishing area within the Zone

The area of fishing of both the domestic and foreign fleets will significantly influence the design of the MCS system for any State. For example, the Philippines central Government has delegated to local municipalities the responsibility for managing all artisanal fisheries, which involve more than 300,000 small vessels operating off of more than 7,000 islands. Each local municipal authority has jurisdiction over a zone out to 15 km from the shore. The central government retains authority for MCS over the remaining 2.2 million km<sup>2</sup> under national jurisdiction.

However, a very different MCS system will be required for a State such as Sri Lanka, which has an EEZ of 517,000 km<sup>2</sup> and 26,600 vessels in the marine fishery, including many foreign vessels.

A large zone and fishing area may require air surveillance and vessels to patrol the areas of concern. A small fishing zone, by contrast, might be surveyed cost-effectively using other technology, possibly land-based, such as over-the-horizon radar, coast watch systems, or VMS, coupled with less expensive “no force” strategies.

##### 3.2.2 Topography of the coastline

A coastline with multiple bays, rivers, and sensitive nearshore coastal habitat may require a more flexible MCS scheme than a relatively consistent coastline that is easily observable.

##### 3.2.3 Area of active fisheries

The specific area in which fishing occurs will also affect the MCS system design, due to the migration of fish stocks between fishing areas and States. This can also cause conflict between artisanal and offshore fishers, if there are incursions of vessels from the latter sector into areas in which small vessels operate. Such conflict can become especially critical when the EEZ of a State has a small yet very productive fishing ground and the fishing pressures from all fishing sectors is intense. A larger active fishing area is obviously more difficult to protect than a smaller area, but fishing intensity in a smaller area also creates its own unique enforcement problems. Most fisheries occur on the continental shelf or on its slope and into deeper water,

with only a few States exploiting very deep fisheries (e.g. Namibia for orange roughy). Because a natural tendency for local fishers is to fish as close to home as possible to conserve time and fuel, incursions into coastal areas are common. This creates a concern with respect to the creation and implementation of zones for the MCS system.<sup>51</sup>

### 3.2.4 Fishing fleet profile

The profile of the fishing fleets (domestic and 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, maximise the quality of landings, and minimize the risk of pollution at sea.

### 3.2.5 Precautionary approach

A State with overfished artisanal/coastal fisheries will likely experience growing pressure on its offshore fisheries. If the State has little knowledge of the offshore resource base, it should devote time and effort to gathering information on those resources and to adopting a precautionary approach to management of those fisheries. A key factor in this scenario may be the targeted species. Offshore resources are usually high value species fished for commercial profit, while artisanal fisheries often focus on any available fish, including lower value stocks harvested for subsistence.

### 3.2.6 International pressures

International pressures from distant water fishing nations (DWFNs) and the short-term economic benefits of foreign currency can be attractive to developing States, but often at the expense of sustainable exploitation of their fisheries resources. Of special relevance today is the economic temptation to register DWFN vessels in developing States that have no capability to control the activities of the “new flag” vessels. Some of these vessels operate in internationally sensitive areas without appropriate attention to conservation. As reviewed in Chapter 2, States that register fishing vessels without the ability to control their fishing activities are failing to fulfil their responsibilities under modern international instruments in the fisheries field.<sup>52</sup> Registration of these vessels should be avoided.

### 3.2.7 Bilateral and regional cooperation

Limited resources and the scarcity of trained staff in many States, particularly where large EEZs and fishing areas are involved, often mean that the only effective protection against uncontrolled overfishing and lack of compliance with regulatory MCS measures is through strong cooperation on bilateral, subregional and regional bases. Cooperative efforts can result

<sup>51</sup> 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 fishers 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.

<sup>52</sup> The obligations of the flag State in this regard are discussed in Chapter 4, sections 4.2 and 4.3, especially sub-section 4.3.9.

in economic and international pressures to comply with internationally respected conservation principles that would not otherwise be achievable by a single State.

As discussed in Chapter 2, UNCLOS and related international instruments encourage States to cooperate in fisheries management by establishing subregional or regional fisheries organizations. The advantages of regional cooperation and some of the potential problems are indicated in Profiles 4 and 5, for Northwest Africa and the European Union respectively, and in the South Pacific Forum Fisheries Agency (FFA) case study presented in Annex D. They will be mentioned again in Chapter 4. Participation in a regional fisheries organization will clearly have a major impact on the design of an MCS system.

### **3.2.8 Demographics of the domestic fishery**

Other issues may affect the type of MCS strategy to be adopted to ensure continued healthy fish stocks, 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 young people. This creates several unique challenges for these States. 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.

## **3.3 Socio-economic Factors**

### **3.3.1 Contribution of fisheries to the GNP**

The contribution of the fishery to the national economy will determine its profile and the importance placed on fisheries management activities. Generally speaking, a State will allocate resources to conserve and manage fisheries based on the total value of the fisheries, which can include some indirect benefits to the State.<sup>53</sup> Most States will not expend more on an MCS system than the total value of the resources in question.

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<sup>53</sup> In Malaysia, for example the value of fisheries is relatively high, even though their 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.

## ***Profile 4. MCS Initiative for the Subregional Fisheries Commission of Northwest Africa***

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### **Background**

The Subregional Fisheries Commission of Northwest Africa (SRFC) was established by Convention in 1985 and is made up of six Northwest African States (Cape Verde, Gambia, Guinea, Guinea-Bissau, Mauritania, Senegal) plus Sierra Leone, which participates actively in the work of the Commission but has not yet officially adhered to the Convention. The Commission has been responsible for a number of protocols on hot pursuit and legislative harmonisation. It has also been instrumental in establishing joint air and sea surveillance activity between States, though lack of funding is currently hampering the effectiveness of this activity. 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.

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. National coastlines vary in length from 70 km (The Gambia) to 718 km (Senegal), and shelf areas vary in area from 3 000 to 50 200 km<sup>2</sup>. Despite having a small shelf area, Cape Verde has the largest EEZ of the States within the subregion. 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. Localized 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) 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 (144 m long, hold capacity of 7 000 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 that serves a critical role for food security and employment. For example, over 70% of fish landed in Senegal comes from artisanal operations. Large numbers of foreign industrial vessels fish as joint ventures and under access agreements.

### **Control mechanisms**

In addition to licences, vessels are subject to gear restrictions and inshore exclusion zones, and zoning by type and species fished. Legislation is regionally sound as a result of an FAO project completed in mid-1997. Port pre-licence inspections are carried out in some States, and FAO vessel marking by callsign is either legislated or recommended throughout the region. Transshipping is widely monitored, although lack of sea-borne surveillance reduces its effectiveness. A pilot VMS scheme commenced operation in Senegal in 2000.

### **MCS assets**

The major focus initially was the provision and funding of fisheries aerial surveillance. Subregional flying commenced in July 1996. The original three aircraft were stationed in Cape Verde, Senegal and Mauritania. There are many patrol boats within the subregion, in various states of operational readiness. Many are unsuitable, either because of general condition or cost-effectiveness.

### **Achievements and future challenges**

The value of aerial surveillance as a control mechanism against illegal fishing in the subregion has been demonstrated and accepted. Future challenges include: the strengthening of the SRFC as an organization; solving problems of interaction and conflict between artisanal and industrial fishers; and the serious and ongoing 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. The use of special courts with legal experts and justices trained in the administration of fisheries law might also be considered. A future aim is also to rationalise the use of subregional patrol boats to allow operations in several states, using the cadre of officers trained under the Feb-June 2000 Chief of Maritime Mission Course as a base team.

### ***Profile 5. MCS and the Common Fisheries Policy of the European Union***<sup>54</sup>

The Common Fisheries Policy (CFP) of the European Union evolved over several years until 1983 when it became law by Council Regulation No. 170/83 *Community system for conservation and management of fisheries resources*. This was to address fisheries issues for a fleet of almost 100 000 vessels employing almost 300 000 full and part time fishers, with 70 000 of the vessels less than 12 m, and 2 500 being more than 33 m (freezer trawlers and ocean seiners). The budget of the EU for the CFP was approximately 1% (924.5 million euros in 1996), or less than that for the market support for wine and tobacco.

The implementation of the CFP has had its difficulties due to the differing legal systems (civil and common law), different operational areas (national versus third party, high seas and foreign waters); varying levels of commitment to conservation by Member States; and the lack of common national practices and operational standards to control their fleets in Community waters, on the high seas and in other third party or foreign waters. Lack of common MCS training and diverging priorities for sustainable fisheries management versus socio-economic factors of employment have further created difficulties in implementation. Over capacity and lack of political will and commitment in some Member States resulted in the first phase of implementation (1983-1993) showing a “major gap between the law in theory ... and the law in practice which revealed that non-compliance with the regulatory framework was widespread”.<sup>55</sup>This inadequacy extended to infrastructure for MCS, effectiveness of MCS operations, data collection and disbursement and inter-Member State MCS cooperation.

Issues of exclusivity of flag State enforcement, as opposed to coastal or port State action deterred from the effectiveness of MCS in Community waters and especially in developing State waters. This was exacerbated by the efforts to defer the fleet reduction by moving the fleets to developing State waters where history has noted non-compliance by the EU fleets with respect to sustainable fisheries schemes, factors that have detracted from the EU reputation in international conservation and fisheries management fora — a position from which it is difficult to recover, especially where this strategy and its results may have required international donor agency assistance to redress.

Phase II of the implementation of the CFP commenced with passage of Community Regulation No. 2847/93, *the Control Regulation*. This marked a shift in attitude in the Community towards acceptance of the need for more MCS and enforcement action to achieve sustainable fisheries. Policies were expanded to cover both the producer and the consumer and wider geographic areas (Community and non-Community maritime waters). Efforts were made to introduce satellite technology as a key MCS tool supported by integrated information technology. Efforts were also made in some cases to develop joint MCS agreements and operations (e.g. United Kingdom and Belgium) and flag State and coastal State merging of operations (e.g. Spanish inspectors and Mauritanian inspector/observers at ports in Spain).

MCS issues being addressed, in consideration or suggested include:

- Common inspection standards (ongoing);
- Compulsory control levels in Member States (being discussed);
- Common training to Community Inspection Standards for inter-Member/coastal State inspections in Community, high seas and third party waters, on agreement of common standards (future);
- Cross training (ongoing);
- Inter-agency/Member State mechanisms and operations (United Kingdom /Belgium example);
- Preventive MCS (future – with industry involvement); and
- Industry peer pressure mechanisms for voluntary compliance (future).

The intent for involvement of industry in management includes:

- Training on EU CFP as part of formal vessel master’s and mate’s certification;
- Enhanced awareness of long-term detrimental impacts of non-compliance;
- Reporting programmes for illegal activities;
- Observer programmes including introduction of satellite technology; and
- Re-assessment of “hard law” penalties, and enhanced “soft law” (reports, internal audits, etc.) mechanisms.

“As a consequence, the characterization of Community law enforcement [MCS] will no longer be solely one of authoritative prescription backed by sanctions, but of resource trusteeship and concern for common interests at a collective level.”<sup>56</sup>

<sup>54</sup> Information drawn primarily from Long and Curran (2000).

<sup>55</sup> Ibid p. 339.

<sup>56</sup> Ibid. p.346.

As noted above, some developing States permit significant foreign access to their fisheries in order to obtain much needed foreign currency. Unfortunately, some distant water fishing fleets exploit this circumstance in order to operate in poorly regulated fisheries. International efforts should ensure that fishing fleets granted such access are subject to appropriate controls and provide reasonable compensation to the coastal State.

### 3.3.2 Employment opportunities

Employment opportunities that can result from enhancing the fishing potential of the State are also a factor in the consideration of an MCS strategy. A State that seeks long-term displacement of foreign fishing fleets may require training of its own fishers who will eventually assume these fishing rights. Training of nationals can be a component of an access agreement with foreign fleets. Such access agreements can also promote appropriate safety-at-sea equipment and practices, in accordance with the Protocol to the 1977 Torremolinos Convention. This Protocol will bring fishing vessels under port State control with respect to safety certificates. Such training can also link with the CCRF to engender a new attitude toward conservation and safety.

### 3.3.3 Benefits to other ocean users

The importance of tourism (coastal as well as offshore, e.g. whale watching), enhancement of industrial capacity, requirements for sea transportation, and port and shipping activity can all have an impact on the strategy developed for fisheries management, with consequences for the MCS strategy adopted. All ministries involved in such issues will need to work cooperatively 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 realised for both the economy and employment in each sector. (Also see discussion in Chapter 8.)

***MCS should conserve fisheries resources and their habitats.*** In developing an MCS system, a State should ensure appropriate liaison between its fisheries managers and those who use the ocean for activities other than fishing. 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 and marine supply industries.

Small island States are now realising the negative effects of marine pollution resulting from uncontrolled industrial development and the excessive use of pesticides. All land-based activities on small islands eventually affect the marine environment, some of which have the potential to destroy the very marine resources and habitat, including the coral reefs that attract tourists. MCS activities for fisheries can also assist in addressing safety-at-sea through vessel tracking systems for national and foreign vessels, as well as for monitoring marine pollution and other environmental concerns.

Since the early 1990s, for example, Belize and Malaysia have promoted tourism and encouraged the development of marine parks. Each State has established appropriate surveillance initiatives to ensure the implementation of management plans. Similar initiatives are springing up elsewhere, including the coral reef rehabilitation and management program (COREMAP) in Indonesia and the coastal resources management project (CRMP) in Philippines.

### **3.3.4 Food security**

A further MCS system design consideration is the possibility of including a requirement for a percentage of the catch to be landed in the coastal State. Such an arrangement could yield benefits in the form of increased protein supplies for local consumption as well as employment generation within the domestic processing sector and increased export earnings from value-added product.

## **3.4 Political will and commitment**

A critical component of any ocean policy, planning and management system, which should include fisheries, is the degree of political will and commitment to implement and support such a policy. Profile 6 on the Argentinean experience underscores the crucial importance of this factor for sustainable fisheries. The actual or potential economic profile of the fishery in the national economy will undoubtedly determine the level of political support that 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, a State must balance the long-term benefits with the need to maintain the political support that is key to the successful development and implementation of MCS systems. Fisheries managers may gain government and popular support for their programmes by methods such as the establishment of a database for resource management that would also allow political authorities to receive timely information, a system to maximise potential revenues through 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 factors and their relative importance to the political objectives of a State make fisheries management, and the resultant MCS strategy, unique to each State.

### **3.4.1 Control domestic as well as foreign fishing**

A State will court disaster if it concentrates its MCS efforts to control illegal incursions and foreign fishing in the offshore area and devotes little attention to larger, domestic offshore fishing operations and to the coastal areas where intense IUU fishing often occurs. Yet such approaches arise all too frequently in States that are still in the process of instituting sustainable management programs. Although the targeting of illegal foreign fishing may have a high political priority in such States, the greater threat to the resource often comes from fishing by the domestic fleet, for which few if any controls may be in place.

### **3.4.2 Scientific advice and the precautionary approach**

Although there is a definite need for “pure scientific research” for fisheries management, there is a greater need for “applied research” to support sustainable and responsible fisheries management. Many States claiming to have insufficient scientific information available for informed fisheries management, continue to pursue research interests that have little positive influence on sustainable management strategies. Fisheries managers should ensure that their scientific research programmes are structured to provide relevant information upon which to base their management decisions.

## ***Profile 6. Sustainable fisheries and political will – the Argentinean example***

The Argentinean fisheries management regime is based on quota limitations by species. Only two species are split in areas with separate quotas – namely: hake (north and south of 42°S) and mackerel (north and south of 39°S). The Sub-Secretariat of Fisheries monitors a total of 28 quotas and a further three non-quota catches including grenadier, squid and shrimp. The national fleet comprises 731 vessels, of which 310 are artisanal/coastal vessels, 133 ice trawlers, and 288 processing fleet vessels (freezers, factory, jiggers, longliners, surimi, scallopers, and shrimp).

In 1997 the established TAC was 300 000 mt, 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. In previous years catches regularly exceeded the 1997 TAC level by 130% to 158%. 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, and **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 States 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 States 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:

- 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
- 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.

In this regard, Article 12 of the CCRF states that “conservation and management decisions for fisheries should be based on the *best scientific advice available...*” Article 12 also:

- a) recognizes the need for sound scientific advice for responsible fisheries management;
- b) calls for the establishment of institutional frameworks for applied research;
- c) urges that research results should be made available to the managers and stakeholders in a timely manner, respecting business confidentiality where appropriate;
- d) calls for the initiation of research as soon as possible where adequate scientific information is lacking;



- e) provides that reliable and accurate data (catches, by-catches, discards and waste) should be collected and shared as appropriate;
- f) recognizes the need to monitor and assess the state of stocks under national jurisdiction, including ecosystem impacts;
- g) suggests the “use of research results as the basis for the setting of management objectives, reference points and performance criteria”; and
- h) urges regional cooperation in research for management.

The CCRF 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.”<sup>57</sup> Many recent international instruments promote use of the precautionary approach. The concept reflects the recognition that environmental matters, including fisheries management, tend to be complex and multifaceted and that it is often difficult to obtain conclusive scientific proof of the causes of any phenomenon. 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 precautionary approach 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*.

### 3.4.3 Participatory management and MCS

The cooperation of the fishing industry and fishers is essential to cost-effective fisheries management. If the industry, fishers and their communities, organizations, cooperatives, unions and fishing companies actively participate in fisheries management, including MCS planning and implementation exercises, the potential for successful implementation of these plans is much greater. Alternatively, lack of attention to these aspects often results in non-compliance, alienation of the fisheries sector and even active subversion of the intended fishery management plan.

The well-known independence of fishers tends to hamper the creation of strong organizations in the fishery industry. Fisheries managers should nevertheless help fishers recognize the advantages of developing such organizations in order to enter into successful partnerships with governments in the management of fisheries. Through such organizations, fishers can provide collective input into management plans, including MCS.

There are simply not enough resources to monitor all fishing activities adequately and to ensure compliance with fishing regulations. MCS can no longer be viewed solely as a police function, with enforcement as its only real focus. Although MCS activities do include enforcement, many States are involving stakeholders in the development of acceptable, responsible and sustainable management planning *and implementation*.

<sup>57</sup> CCRF, Article 6, para 6.5.

In the past, most States did not involve MCS personnel in fisheries planning due to a perception that MCS is only concerned with enforcement and has no relevance in planning. This frequently resulted in management plans that could not be fully implemented. Another common mistake regarding offshore fisheries was to involve the fishing industry at initial stages, but then to produce the final plan without input from either the industry or MCS experts.

In the late 1970s and early 1980s, the emphasis shifted to community-based management in the coastal sector. Many non-governmental organizations (NGOs) were engaged to educate the fishers to take over the management of their fisheries. Here the pendulum swung to the opposite extreme, resulting in increased confrontation between fisheries organizations, NGOs and local authorities. Again, very seldom were MCS personnel involved in these educational campaigns or the ensuing management planning exercises; often little attention was given to how community-based management measures would be monitored and enforced.

Stakeholder involvement is an essential element in all integrated marine resource management. Stakeholders must participate with government officials as joint resource stewards 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 by keeping them informed, States will greatly increase the probability that management plans will be successfully implemented. Involved stakeholders will not only know and understand the rules and the rationale for their development, but will also be more inclined to comply with them voluntarily. This, in turn, makes it possible for a State to focus its limited enforcement resources on a smaller percentage 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. In some cases the cost of MCS activities may even be reduced.

### **3.5 Synopsis of Design Considerations**

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

- a) There are no universally applicable models; each MCS system must be adapted to the cultural, geographic, political and legal framework of the State or region concerned.
- b) The political will of the State (or strong national government support of a regional body) is an absolute requirement for a successful MCS scheme.
- c) The operational character of the system will depend on management decisions.
- d) Legal and policy considerations must always be taken into account when establishing an MCS system.
- e) National and regional MCS activities must complement each other.
- f) Stakeholder involvement is key to successful implementation of management and MCS plans.

After assessing the geographic, demographic, economic and political context for the MCS system, a State should consider how the MCS system will be implemented. This will influence the design of an appropriate MCS system. Consideration should include: the most cost-effective and efficient system for the agency; the legal framework that will be required and will be accepted by the fishers; the coordination of agencies and ministries; training, infrastructure, organizational support mechanisms; and funding sources. The following chapter highlights these points, with examples of options that have proved effective in the past.



*Community meeting for participatory management - Indonesia*

## CHAPTER 4

### ORGANIZATIONAL CONSIDERATIONS FOR MCS

#### 4.1 National, Subregional and Regional Structures

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

Regional and subregional cooperation is also increasing. UNCLOS requires States to cooperate with one another in:

- a) the conservation and management of the living resources of the high seas;<sup>58</sup>
- b) the establishment of subregional or regional fisheries organizations where the nationals of more than one State are engaged in exploiting the same living resources or different living resources in the same area;<sup>59</sup> and
- c) the management of straddling and highly migratory fish stocks.<sup>60</sup>

The UN Fish Stocks Agreement, the 1995 FAO Compliance Agreement and the Code of Conduct for Responsible Fisheries, discussed in Chapter 2, all reinforce these calls for cooperation.

The IPOA on IUU Fishing also suggests a number of ways in which States, acting through regional fishery management organizations (RFMOs), can do more to prevent, deter and eliminate IUU fishing. Among other things, RFMOs can:

- a) collect and disseminate information relating to IUU fishing;
- b) identify vessels that are engaging in IUU fishing and co-ordinate measures against them;
- c) identify States whose vessels are engaging in IUU fishing and urge identified States to rectify such behaviour;
- d) call on their members to take action against vessels without nationality that are fishing in the relevant region;
- e) adopt rules to ensure that vessel chartering arrangements do not lead to IUU fishing;
- f) adopt port inspection schemes, restrictions on transshipment at sea and schemes creating a presumption that fish harvested by non-member vessels in the relevant region should not be permitted to be landed in ports of members;

<sup>58</sup> UNCLOS Article 117.

<sup>59</sup> UNCLOS Article 118.

<sup>60</sup> UNCLOS Articles 63 and 64.

- g) adopt catch documentation and/or trade documentation schemes; and
- h) adopt other market-related measures to combat IUU fishing.

There are many reasons for coastal States to cooperate with other coastal States in their region to establish a regional MCS system, particularly where the States have a rich marine resource base that is vulnerable to IUU fishing. Regional cooperation among developing States can yield the exchange of fisheries data for MCS and fisheries management purposes, harmonised legislation, extradition agreements, cost savings and increased negotiating power, implementation of flag and port State control agreements, and combined measures to address IUU fishing activities. In practice, the cost of implementing MCS measures is often a decisive factor in encouraging States to join subregional and regional MCS initiatives.

Regional or subregional cooperation will often be more successful when:

- a) there is an existing organization that will serve the purpose;
- b) the States in the area have a common interest in fisheries;
- c) there is a common language and/or cultural ties;
- d) fish stocks are shared;
- e) maritime boundary delimitation issues between the States in question have been resolved; and
- f) the political ideologies and policies of the governments are compatible.

However, regional and subregional cooperation can be problematic, particularly where these circumstances are not present. Regional cooperation will also create additional responsibilities. These include: the security of sensitive data; how differences between the participating States will be resolved in order to present a unified regional position; and how to take into account the difference in the economic situations of potential member States when devising cost-sharing arrangements to support an international organization. Each State must balance the advantages and disadvantages before deciding whether to make a commitment to regional, subregional, or bilateral cooperation regarding international fisheries and MCS activities.

Despite difficulties, there are many examples of fisheries organizations that have successfully dealt with these issues and have gone on to deliver benefits to their members. These include:

- a) the South Pacific Forum Fisheries Agency (FFA);<sup>61</sup>
- b) the Organization of Eastern Caribbean States (OECS) Fisheries Unit;
- c) the Caribbean International Community (CARICOM) Fisheries Resource Assessment and Management Programme (CFRAMP);
- d) the Northwest Africa Subregional Fisheries Commission (SRFC); and

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<sup>61</sup> The evolution of the FFAs regional MCS system is described in Annex D.

e) the Indian Ocean Tuna Commission (IOTC).

The experiences of long-established regional fisheries organizations 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 distant water fishing States; and regional training. In addition to the fisheries organizations referred to above, a number of other regional fisheries organizations are available to provide useful advice. Contact information for these organizations can be found on the Fisheries Department homepage of the FAO website, [www.fao.org](http://www.fao.org).

## 4.2 Roles and Responsibilities

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

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 seek 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 increase efficiency by reducing duplication of effort and jurisdictional conflicts and by facilitating exchange of information required for operations.

MCS surveillance resources can be expensive. 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. An alternative approach could be an alternating chair for the co-ordinating committee or the inter-agency mechanism adopted to maximise efficiency in operational MCS activities. Whatever strategy is selected, the lead role and authority for coastal and oceans fisheries and environment management, whichever strategy is selected, should be formalised in legislation.

## 4.3 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 administration.

### 4.3.1 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. These data can be used to verify licensing conditions and to assess catch and effort for resource assessment and fisheries management planning.

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 computerised. When planning the data management system, it is important to consider 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.

It will be necessary to determine the number of entry points for data and to establish a network capability so that the resulting analyses can be redistributed to all fisheries offices. This means offices in major fisheries landing points, collection schemes for sea, land and air data, and a central office for analysis, distribution and operational decision-making. Furthermore, consideration might be given to providing links on a “read-only” basis to other maritime agencies to promote information sharing and cooperative MCS activities, e.g. Environment, National Defence, Customs, Immigration, and even an edited version (to protect business security information) to the fishing industry.<sup>62</sup> In view of the growing trend for transparency, each fisheries company should be able to retrieve data on its own fisheries

## **Control**

The *control* component of MCS will require appropriate and enforceable legislation to implement the approved, participatory fisheries management plans.<sup>63</sup> 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 any contract personnel that are part of the MCS scheme;<sup>64</sup>
- b) international conservation agreements such as UNCLOS, UN Fish Stocks Agreement, FAO Compliance Agreement, the CCRF and the IPOA on IUU Fishing;
- c) national fishing activities;
- d) minimum terms and conditions for fishing;<sup>65</sup> and
- e) penalties for non-compliance.

Legislation can also provide for the devolution of authority, establish mechanisms to involve stakeholders in decision-making and increase the transparency of the management

<sup>62</sup> 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.

<sup>63</sup> Key issues to be considered in reviewing and strengthening national legislation for MCS purposes are reviewed further in Annex C.

<sup>64</sup> Some countries are utilizing contract personnel and the private sector for observer programs, dockside monitoring, and air surveillance.

<sup>65</sup> Minimum conditions which a State may wish to implement could include vessel identification; catch and reporting requirements; conditions for transshipment; 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.

system.<sup>66</sup> 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 that 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 Section 2.2) 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. This training should include advice from members of the judiciary or lawyers with extensive court experience regarding the presentation of evidence.

### 4.3.3 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. These personnel must 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. For international MCS activities, UNCLOS requires that all surveillance ships or aircraft must be “clearly marked and identifiable as being on government service” and authorized to that effect.<sup>67</sup> 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 to facilitate identification of assets, especially when the Government charters vessels for surveillance activities.

A State may find it more cost-effective to share the equipment for fisheries surveillance with other enforcement agencies involved in other oceans-related MCS operations.<sup>68</sup>

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

- a) A ***national headquarters*** for the coordination of fisheries operations with a network of linked field offices.
- b) A ***central operations room*** where current status of fishing operations can be shown.
- c) A ***communications system*** to all fisheries centres and mobile platforms in the field for both safety and control of operations.
- d) A ***computer data system*** for licensing and vessel registration, data collection and analysis.

<sup>66</sup> 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).

<sup>67</sup> UNCLOS 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.

<sup>68</sup> It is not appropriate for fisheries administrations to pay the additional costs involved in using large and costly military equipment for fisheries patrols.



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<sup>69</sup> and satellite imaging technology, radar, GIS equipment and land transportation.

A State should consider the equipment necessary to implement the MCS operational plan at an early stage. A central policy on equipment standards, training and overall coordination capability should be adopted. There is clearly a need for a computerised data system, networked with the coastal and inland area field offices for data collection and surveillance. Communication systems and transport in the form of land, sea, and possibly, air patrol platforms are an integral part of most MCS programs. In addition, where appropriate, provision should 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 overall coordination, and support of monitoring operations.

#### 4.4 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. An observer scheme is only appropriate if capable, honest and dedicated personnel are available, preferably with offshore sea experience. In many States, close supervision of the Observer program is necessary to ensure safe working conditions and a minimum of interference with the observer’s duties.

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 a requirement for these individuals.

The control component requires individuals with a comprehensive working knowledge of fisheries and the law. This will include fisheries managers responsible for drafting fishery management plans, as well as the licensing staff and assigned technicians. These individuals should be capable of working 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 surveillance personnel, including those qualified to operate small and large patrol vessels. Fisheries Officers will be needed for offshore, coastal, river and lake patrols, as well as management of the offices and liaison with the fishers. A recruitment process should be initiated that surveys all sectors of the population for qualified candidates. The personnel needed for air surveillance are usually seconded from the military to minimize training requirements and the purchase of aircraft. Support personnel will also be required from local administrative staffing pools. Maintenance personnel for specialised equipment must be appropriately qualified.

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<sup>69</sup> See the FAO Technical Guidelines for Responsible Fisheries supplement on VMS (FAO, 1998).

Proper training for all these personnel is vital. For example, observers require very focused and specialized training to ensure that they understand their role and can complete accurate reports. In selecting fisheries officers, a State must keep in mind that these people are no longer involved in just enforcement operations. The officer must be able to handle multiple tasks as a development officer, a communicator and educator for voluntary compliance and transparency in MCS, and as an enforcement officer. Further reference to training needs of enforcement officers and observers appear in subsequent chapters and also in Annex E (for enforcement officers) and Annex F (for observers).<sup>70</sup>

## 4.5 Financial Aspects

In considering the development of new MCS systems, States tend to look for the most advanced technology that can meet their work requirements. This is usually also the most expensive equipment on the market. *It is more prudent to look for the appropriate and cost effective technology for each fishery situation.*

### 4.5.1 Resource rent

There are two schools of thought on the subject of resource rents. One is that fishers should not have to pay for fishing, as fish are a common property resource and fishing is often seen as the employment of last resort. This school holds to the “open access” management approach, even when the resources are at a critical, and possibly non-recoverable state. This approach has now been discredited in most States. Today there is general recognition that fishing must be a sustainable activity, and that rights of access should not include the right to deprive future generations of protein and enjoyment of marine resources and their habitat.

The second school of thought seeks contributions from fishers, boat owners, port owners and fish processors in exchange for the privilege of access to these resources to help offset government and taxpayers costs for sustainable management and MCS.<sup>71</sup> Under this view, fishers must receive and pay for a license from the State in the same way that others who extract raw materials must have licenses. Today, decreasing stocks and increasing costs of effective management have meant that many States are charging fishers more significant license fees.

An appropriate resource rent system should have license fees that:

- a) are reasonable and relatively stable (not fluctuate dramatically from year to year);
- b) result in a reasonable return to the resource owner (usually the State);
- c) are 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 that taxpayers must make up); and
- d) are simple for fishers to calculate in advance, so that they can include such fees in their financial planning.

In the past, States have based fees for fishing on a percentage of a vessel’s total catch. This practice creates an unfortunate incentive for fishers to underreport catches. A more

<sup>70</sup> Also refer to Davies and Reynolds (2002) for a review of at-sea fishery observer training procedures.

<sup>71</sup> Paraphrase from Bergh (2000).

successful fee strategy is based on a fee per vessel or allocated quotas, and **not** on catches.

Moreover, *a State should not set its fees strictly in accordance with costs and profits*, 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. Some States base license fees on a percentage of the vessels reported catch.

In determining the fees for fishing licenses, governments must also consider other fees levied for use of port facilities, transshipment fees, import and export fees, etc. Licence fees could therefore be based on:<sup>72</sup>

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

Resource rents can therefore address the size and harvesting capacity of the vessels, the time approved for the fishing privilege, the value of the fish approved for catching and an additional amount to reduce the cost to the public of managing the marine resources.

#### **4.5.2 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 including the period, quantity, and value of 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. The most cost-effective strategy is to have data collectors in each or many of the large fishing communities.

The initial data collection task is to compile an accurate record of fishers. One cost-effective strategy in some States is to do this in connection with a regular census of the population. 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.

Fishers may believe that officials are collecting data solely to document a fisheries violation, particularly where States use personnel for both data collection and enforcement purposes. In such cases respondents may sometimes provide misleading information. Data collection reliability is often enhanced when the individual collecting the data is known and respected in the community. Extension officers from other field ministries can also provide a wealth of basic social information about the local communities within which they work.

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<sup>72</sup> Mees and Parkes (1999).

Since the information being sought is often of a sensitive nature, confidentiality of individual and company sources must be assured throughout the data collection and analysis process.

### ***Coastal fisheries data***

The key to ensuring quality data from the domestic fishers is to maintain credibility and close contact with them in their communities and to seek their ideas and support for new management and regulatory measures. One example of a low-cost method to gain information on fisheries close to the coast has been used successfully in New Zealand and some South Pacific Island States, and is now being tested in Indonesia. This involves the deployment of part-time coast/reef watchers, usually from the coastal 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.

### ***Offshore fisheries data***

There are several options for the offshore portion of fisheries MCS, depending on the value of the fisheries to both domestic and foreign fishers. In a limited entry system, participants in these fisheries pay a fee for the privilege of conducting fisheries, which can offset the costs of management, including MCS.

Under UNCLOS, a coastal State should grant foreign fishing vessels access to its EEZ if it cannot harvest all the total allowable catch. However, as discussed in Section 2.3, the coastal State may establish the terms on which such access is granted. This could include setting a potential “resource rent” for the privilege and opportunity of fishing in a particular zone. In many developing States, the resource rent imposed on foreign fishing vessels is too low, often less than 1 *percent* of the landed value of catches. Setting of an appropriate fee level can offset a significant portion of the costs of MCS.<sup>73</sup>

### ***Port inspections***

It is safer and more cost-effective to conduct inspections and require trans-shipment of fish in port rather than at sea. The fishing industry generally resists these options, due to the additional costs involved and the loss of opportunity to circumvent regulations at sea (where monitoring is usually lacking). Where possible, maximum use of port surveillance and inspection are recommended; these can be very cost-effective and more thorough and safer than at-sea inspections. These port inspections also permit an opportunity for port States to implement international port State control mechanisms. However, at-sea surveillance is still a necessary component of most fisheries regimes to monitor against closed area violations, prohibited species retention, gear infractions, as well as dumping, discarding and culling for high value species.

## **4.5.3 Fisheries management strategy**

The choice of management measures, as reviewed further in the following chapter, will greatly affect the cost of the MCS system. ***Effort controls*** are much easier and cost-efficient to implement than multi-species or multi-area quota and species controls. The

<sup>73</sup> 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.

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. Although this approach is ideal for surveillance, it may be a bit impractical in terms of optimum utilisation 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 be an option, however, for a single species fishery.

*Quota controls* are effective only if there is very timely acquisition and processing of accurate catch data, including discarded fish that have been removed from the resource base. The acquisition of these data, which is also helpful for stock assessment, requires at-sea observations and inspections for quality control and verification of the data being collected. This latter requirement is an expensive undertaking. A State might consider increases in resource rents to offset the costs of observer coverage, VMS, and dockside monitoring, if quota control is the strategy the fishers support for fisheries management.

#### 4.5.4 Legislation

Fisheries legislation forms a major part of the *control* component 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 include:

- a) the time to enact the law;
- b) 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);
- c) legal complexities;
- d) enforceability and costs; and
- e) credibility loss due to laws that cannot be enforced.

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

#### 4.5.5 Licences

Licences are a key tool in most management 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 to place stricter obligations on them (e.g. to install ALCs ) and to 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, the government should consider imposing an appropriate fee for granting this right to some while excluding others from the resource.

#### 4.5.6 “No force” strategies

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

- a) granting fishing authorization only to vessels that are in “good standing” on a national or regional register;
- b) observer programmes;
- c) VMS, satellite imagery, remote video and digital photography and infrared tracking; and
- d) 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, 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.

#### **4.5.7 Private sector MCS**

Some States are shifting MCS responsibilities (and costs) 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 MCS operations in a business-like, cost-effective manner. Experience has shown this to be the case for air surveillance in some States (e.g. Canada and Malaysia).

The concept of community-based fisheries management and the deputising of private sector personnel to work with local authorities can 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. Privatisation 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 States.

## CHAPTER 5

### MANAGEMENT MEASURES, CONSULTATION AND PLANNING

#### 5.1 Management Measures

Management measures are the specific elements of fisheries control that are embodied in law and regulations. Individually and in combination, they are both a focus of and tool for surveillance activities. Cost-effectiveness is a consideration for each management measure. Fisheries authorities 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. Management measures reviewed here include the following:

- 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, VMS, satellite imagery; digital photographic technology; and
- “no force” measures.

##### 5.1.1 Mesh size

*Mesh size* requirements can only be enforced by two methods:

- a) inspection prior to going to sea, with the provision that no other gear can be carried on board for that trip; or
- b) inspection at sea, which can only provide a snapshot of the fishing operations while the officer is onboard the vessel.

*Many States have adopted mesh size requirements that have never been adequately enforced, often 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, small fish are often unable to escape from the net. Square mesh nets maintain their open shapes, while diamond mesh nets 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, especially if it is not properly enforced. For gillnets and entangling nets, mesh size can be a significant conservation factor. Further details on measuring nets follow in Chapter 7, Section 7.4.

### 5.1.2 Chafers and strengthening ropes

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 nets by reducing wear and tear from rubbing on the seabed. Topside chafers can be made of netting, while bottom chafers can be made of twine, net and leather strips. These attachments are common and necessary fixtures to the gear, but can 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.

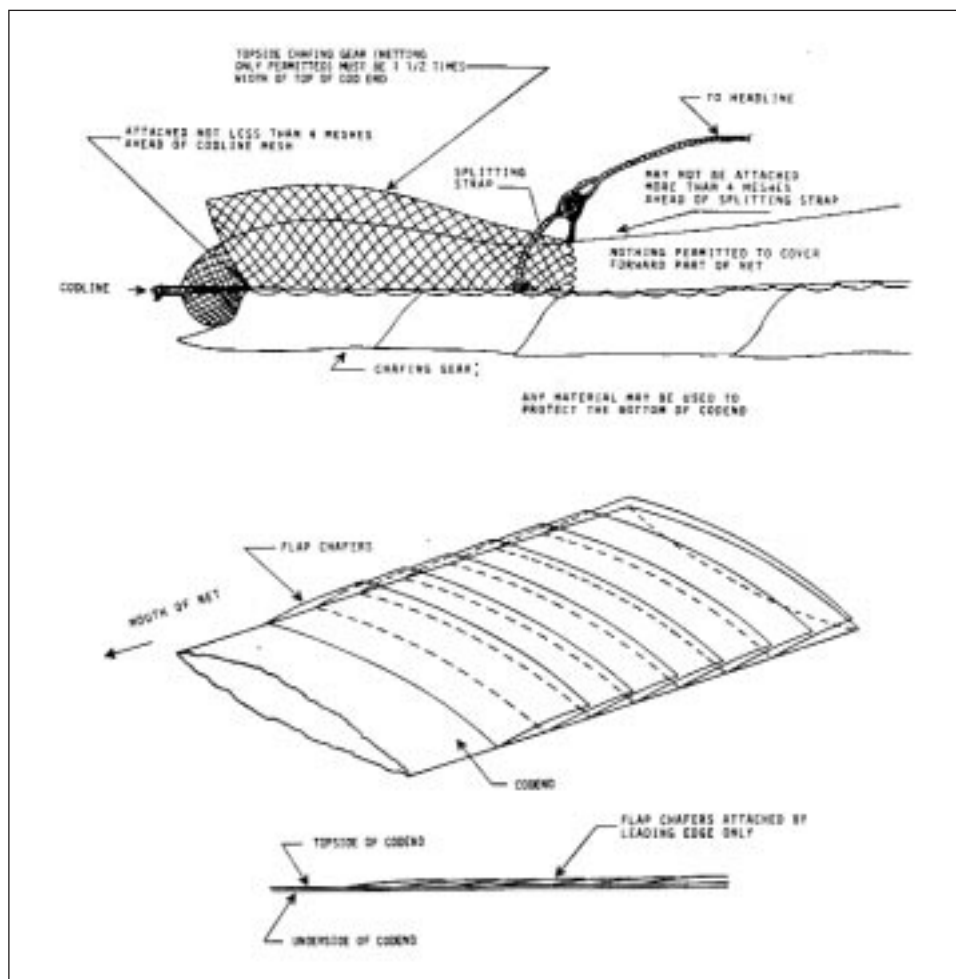
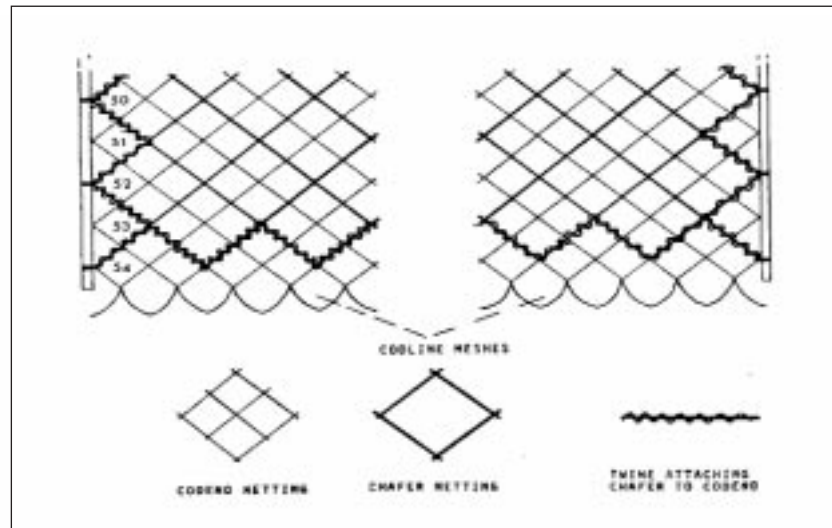


Figure 1. Topside and flap chafers.



Strengthening ropes are attachments to hold the net together to 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. Where attached across the net, they 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 illustrates this point. One mesh of the chafer should cover four meshes of the cod end.



**Figure 2. Strengthening rope attachments.**

Strengthening ropes and chafers can only be checked during inspections in port and at sea. Because they can be re-laced to the net at sea, they are difficult management measures to enforce.

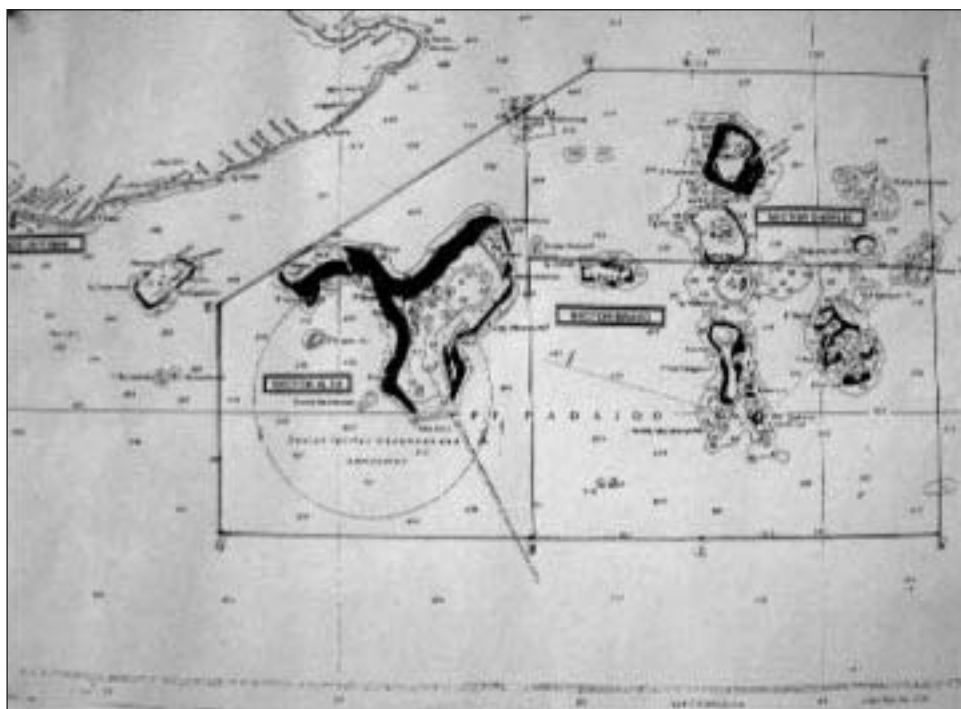
### 5.1.3 Area closures

*Area closures* are a management tool recommended to protect spawning areas during known breeding seasons, juvenile aggregating areas, and other resource sensitive areas. This tool is also used to separate different types of fishing gear. For example, a State may permit one type of gear (such as set gear) in an area and prohibit other types of gear (such as towed gears and trawls) in that area. Area closures should be defined by latitude and longitude co-ordinates rather than by depth of water, which is effectively unenforceable. This tool does not require at-sea boardings and inspections unless there is a prohibition on different types of stationary gear, such as traps and nets. The surveillance of area closures can be accomplished with properly equipped aircraft and patrol vessels that have integrated photographic and navigational equipment, and that have night flying and surveillance capability.

### 5.1.4 Windows or zones

Some States use *windows or zones* as a tool to control fishing. In this case, areas for authorized fishing are established by latitude and longitude, by depth or distance from the coast, and all other areas are closed to all fishing (see example, Fig. 3). Geographical zones or areas are recommended because they are often easier for fishers to understand and comply with, 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 established for different gear, size of vessels or based on fisher status (e.g. subsistence fishers) and can be patrolled by aircraft, patrol boat or radar. Windows or zone closures can be used effectively to reduce gear conflicts between offshore commercial and artisanal fishers. Some States have established area and time closures to permit different gear types to use the same area, but at different times. Another advantage of using windows or zones as a surveillance tool is that sea patrols can be concentrated on these areas for at-sea inspections. The disadvantage of this strategy is the impact it may have on fishers, as it affects their ability to follow fish throughout their migratory ranges.



**Figure 3. MCS Zone Map for Padaido Islands - Indonesia**

### **5.1.5 Catch or quota controls**

There are various types of *catch or quota controls* used by States today. These can be daily, seasonal or trip limits, zone quotas, vessel quotas and annual catch quotas. In each case, a State must be able to verify, on a timely basis, the actual catches of fish by vessel, species, and possibly by area. This becomes a very complex administrative and operational programme involving significant financial and human resources to monitor landings. It is commonly accepted that controlling 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 affect the cost of fisheries management and MCS operations. If estimates of stock abundance are accurate, catch controls can maximise the benefit to the fishers by permitting them the maximum removals and corresponding economic benefits.

### 5.1.6 Individual transferable quotas (ITQs)

A popular management scheme is the use of *individual transferable quotas* (ITQs). This system is employed for those fisheries where it is desirable to limit access to the resource, and the numbers and identification of fishers and associated gear type are known. The system provides for an allocation of fish to each fishing enterprise to permit maximising economic benefits in the fishery and eliminating the “grand rush – winner take all” approach to fishing. ITQs are often set by species and stock area for a specific period of time. The fisher can also allow the transfer of all or a portion of the allocation to another fisher.

The complexity of the system and the requirement for an advanced communications and data network to effectively manage this strategy makes it difficult for many developing States. However, the decreasing costs of electronic logbooks and data transmission are making the management of ITQ systems more affordable.

### 5.1.7 Trip limits

*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, 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 the ability to verify these periods through VMS or sightings at sea. The growing use of VMS for licensed fishing vessels is making this management option more effective.

### 5.1.8 Minimum or maximum fish sizes

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 minimum size is to prevent the harvesting of non-commercial, juvenile fish. The prohibition against large fish is usually intended to preserve mature stock of breeding age. Unfortunately, neither of these regulations can be enforced without continual monitoring at sea. 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 inspections at sea.

### 5.1.9 Vessel movement controls

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. The vessel movement reports include zone entry and exit reports, port entry and exit reports, and area changes. 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*, commonly required by the central fisheries control well before departure from the zone, verifies 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.<sup>74</sup> The zone exit report thus triggers the action for decisions regarding the control of the vessel prior to its departure. The coastal State may wish to include in its legislation and fishing agreements the provisions to ensure that information needed for management purposes is received prior to a vessels departure from the zone..

#### 5.1.10 Vessel sightings reports

*Vessel sightings reports* are collected to confirm the fishing vessel monitoring information database. A standard reporting format 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 if the vessel was photographed. This documentation of a sighting may become critical information for the courts if it is later discovered the vessel was not fishing in compliance with its licence, or was fishing without a licence.

#### 5.1.11 Vessel inspections

*Vessel inspections* are a key management tool for monitoring and surveillance. However, actual operations — fishing, bycatch, discards, waste handling, processing, etc. — can only be observed at sea, and their direct observation may be of benefit to management in terms of information collection and negotiations regarding catch methods and efficiencies.

The accuracy of information collected during 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 provide information on the safety-at-sea capability of the vessel.

#### 5.1.12 Observers

The use of fisheries *observers* can be one of the most cost-effective MCS schemes available, though it may not be appropriate for all States. Observers can immediately check for compliance with regulations and report possible violations to enforcement authorities, who subsequently take enforcement action. A large measure of the success of any observer program depends on the professional competence and personal integrity of the observers. To be effective, these programs need close supervision and appropriate checks and balances to validate the accuracy of the data collected. A system of incentives to compensate observers is sometimes helpful.<sup>75</sup>

Some observer schemes have been less than successful, particularly where there have been insufficient safeguards to ensure the observer is able to accurately record data and observations without being subject to pressure from the master of the vessel. Observer programmes are unlikely to be successful when the observers are employed in a dual role of observer/crew

<sup>74</sup> Legislation in the Maldives provides that all foreign vessels must come to port for inspection prior to departure from the EEZ. Unfortunately, this is not always enforced.

<sup>75</sup> A very effective multi-graded observer programme for the offshore fisheries has been developed recently in Namibia. See: Berge and Davies (1996/97).

member and are paid directly by the vessel master, thus creating a conflict of interest and compromising their role and loyalty to their fisheries duties.

Success in observer programmes has resulted when observers:

- a) are funded by the fishing enterprises through the government, or some other co-ordinating body, such as the private sector;
- b) are employed solely as such — that is, as monitors for the government (also in gathering scientific and technical data) and as advisers to the vessel masters regarding authorized fisheries activities;
- c) are not granted enforcement powers;
- d) receive appropriate training and evaluation;
- e) paid appropriately for their often hazardous duties; and
- f) are trained and promoted in a phased manner and see the programme in career terms, e.g. as a step to becoming a fisheries officer.

### 5.1.13 Licences

One of the most powerful tools available is the *fishing licence*. This document establishes the legal rights, privileges and obligations of fishers. In order for a licensing regime to be introduced, legislation must be enacted to require licenses as a precondition for fishing access, require that fishing be conducted in accordance with license conditions, and provide penalties for violations of such conditions. Enforcement officers must be given the necessary authority to control compliance with license conditions.

Fishing licences are analogous to contracts in the sense that the fisher voluntarily agrees to be bound by the terms and conditions in the licence in return for being granted access to the resource. This right of access also carries other benefits, including the exclusion of non-licence holders. A fisher loses his access to the resource by failing to comply with the terms and conditions.

Fishing licences issued to foreign fishing vessels may not impose conditions that are contrary to 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.

The licence can be used to gain a wide variety of information related to fisheries activities in the area to which it applies. A license can require appropriate reports on fishing gear, activities in terms of time, location and catches, and can also require cooperation in fisheries management objectives. Furthermore, it is the primary mechanism for a State to receive a resource rent for the privilege of fishing.

### 5.1.14 Participatory management

*Participatory management* has been discussed earlier in this paper as an emerging management trend. It will be further amplified in Chapter 8.

### 5.1.15 Use of new technology

The use of *new technology* is always an attractive option, including new satellite capabilities, VMS, new aircraft, radar, infrared equipment and photographic technology (see Section 6.6).

States should look carefully at the use of technology relative to operating conditions. A decision should be made based on these results, with appropriate attention to the cost of procurement and, just as importantly, to the operations and maintenance costs and local capability to meet these responsibilities. The suppliers of new equipment should be responsible for testing to assure that it meets the criteria established by the fisheries management authority. It remains the responsibility of the Fisheries Administrator to assess that performance and determine if a product meets specific management needs. The operations and maintenance training for new equipment should be included in the initial cost of the equipment.

#### **5.1.16 “No force” measures**

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 that can be used to exercise sufficient monitoring and surveillance controls at the lowest cost possible. The most popular “no force” strategies include the use of a national or regional register of “vessels in good standing.” Only vessels on this list would be eligible for licenses to fish. Information in the register includes the identification of the vessel and master and a record of performance and compliance. In a regional example, information is shared between participating States in the region and decisions can be made regarding a vessel and master in the entire area. The FFA experience in the South Pacific (see Annex D) 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 for both MCS purposes and also vessel safety requirements. The potential exists for this to be a credible international management tool for both flag State and port State control. For example, developing States would benefit from being able to access information on third party vessels applying for registration.<sup>76</sup>

Other tools that can be applied in this category of “no force” mechanisms include:

- a) port State control mechanisms and inspections;
- b) flag State responsibility for the actions of its vessels;
- c) observer programmes;
- d) the requirement for a representative from a foreign fleet that is authorized to fish in a State’s waters to be resident in the State, with full authority to act as an Agent for the vessels, direct vessels as required by the coastal State, and accept legal service for the vessels;
- e) VMS and satellite technology that allow real-time analysis of data; and
- f) remote video and digital photographic technologies including infrared tracking.

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<sup>76</sup> For further information, see FAO (2002).

## 5.2 Consultation

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 parties to accept. The harvesting of any natural resource by a party 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 to understand and accept MCS management plans.

### 5.2.1 Fishing industry inputs

Effective fisheries management provides benefits to the fishers of current and future generations. Despite the obvious need to involve fishers in fisheries management decisions, States too often provide very little opportunity for input from fisheries practitioners. As a consequence, fishers are often suspicious of government actions.

Contact with fishers can often be facilitated through liaison with fisher groups, unions, or cooperatives, where these are in existence. Where these are not in place, community organization, extension and development officers can serve as appropriate links with fishers and their families. When fishers become confident that their interests are genuinely being served, the government will have a very influential ally in developing and implementing its management measures and its MCS plans.

The input of large commercial fishing enterprises that are connected to the international market for fishing vessels, joint venture 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 on other sectors (usually 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 in determining the balance between interests of the large fishing industry and the often less organized local artisanal and subsistence fishers.

### 5.2.2 Inter-agency liaison

The large number of ministries, departments and other government agencies involved in the marine sector creates the potential for administrative complexity. The respective roles of these agencies in an MCS system are discussed briefly below.

The *Ministry of Justice and the judiciary* need to understand the fisheries management objectives, policies and the importance of the resources and the ecosystem to the State and the fishers. They must also have a good understanding of the intent behind the fisheries management plans and the standard MCS procedures in order to reflect those objectives in implementing fisheries legislation. They will often be responsible for prosecuting violations of fisheries law.

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 shortage of Fisheries Officers. The cooperation of all enforcement agencies through shared databases, shared training, and shared resources has proven to be very cost-effective in many States.

**Port Authorities** can be of considerable assistance in fisheries MCS, both for monitoring and surveillance. A port authority can facilitate coastal State port inspections, and efficiently monitor fish transshipments.

Cooperation with *customs, immigration and defence agencies* for surveillance purposes and to share resources can be cost-effective, especially when priorities coincide. In cases of joint patrols, fisheries MCS must often compete with other activities 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. All these agencies will have an interest in fishing vessels during their port visits. In the Maldives, for example, Customs, Immigration and Coast Guard are often called upon to assist in monitoring and controlling port inspections, port transshipment and export of fish products as a secondary task when fisheries personnel are not available. The sharing of the fisheries database with the military can encourage cooperation. In Argentina, fisheries officials 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 aerial patrol support, who in turn readily shared information on fisheries activities from their surface and air patrols.

The **Ministry of Health** usually has an interest in the condition of foreign fishing vessels and crew when they enter port, and in the quality of any fisheries product that is being imported or exported. The Fisheries Administrator can often gain assistance from these officials regarding fish product inspection concerns.

In several States, the **tourism agency** plays a key and complementary role vis-à-vis the fisheries administration, especially in coastal areas. The parallel demands of tourism and the fishing industry often give rise to conflicts with regard to operational areas and use of the resources. 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.<sup>77</sup> Valuable guidance on how to avoid these conflicts and on how to resolve any conflicts that do arise is discussed in the FAO Technical Guidelines for Responsible Fisheries series, in the volume on *Integration of fisheries into coastal area management*.<sup>78</sup>

The Department responsible for **environment** 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 the environment and the sharing of monitoring resources and 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. Fisheries administrations can benefit significantly by close cooperation with transport authorities to reduce fatalities at sea through implementation of safety-at-sea regulations and inspections. Cooperation on vessel registration and standard vessel marking requirements is also an area for potential cooperation.

**Foreign Affairs** has a significant interest in fisheries, especially where it involves foreign fishing partners and negotiations. Foreign Affairs usually 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

<sup>77</sup> 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.

<sup>78</sup> FAO, 1996a.



negotiations. Key to the negotiations is the principle of cost effective MCS consistent with conservation of the stocks. Any negotiated change that increases the costs of MCS should consider a mechanism for cost recovery from those parties who will benefit from the management plan.

An example is the case where the foreign 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 then 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 prevent or offset this loss:

- a) require all vessels to enter port for a vessel inspection, or require the fleet commander's vessel to carry observers, paid by the foreign fleet, to all other vessels to estimate fish onboard prior to commencement of fishing in the zone;
- b) a fisheries officer would be transported by the fleet vessel to every vessel, and then returned to port; or
- c) 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 officer, 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 State's zone. Similarly, any attempt to minimize the control mechanisms to verify catches from the State'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 State, need to be current with the fisheries MCS strategy. This is critical to maintain operational standards and standard information collection efforts. 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 a reliable communications system. A telecommunications network is essential in the current fishing environment, both for efficiency and safety. Lack of information creates insecurity, concern and difficulty in supporting government policies. The Fishery Officer's ability to provide current information on management measures is critical to maintaining credibility in the fishing community. All field units must be fully aware of the current policies and the rationale behind resource management decisions. On the other hand, it is also important that fisheries officials in headquarters realize the benefits of the information that can be provided by their field units for all aspects of fisheries management and MCS operations. Argentina (Profile 6) has established one of the more successful inter-agency liaison arrangements between fisheries and the supporting military agencies.

### 5.3 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. Thus, MCS must be an integral part of planning from the very commencement of fisheries management. Once it is determined which control mechanisms (effort, catch, quota, area, and fishing gear type, or a combination of these) will be used for fisheries management, MCS officials can assist in planning an enforceable fisheries management plan for both the domestic and foreign fleets. The involvement of MCS from the start of the negotiations and planning is doubly important for foreign fishing negotiations, in order to ensure enforceable agreements.

MCS planning stems from the approved management plan for the area in question. It results in a detailed sequence of activities for implementation of the management plan. Guidelines for this process are noted below.

#### 5.3.1 How to write an Action Plan<sup>79</sup>

Key points to bear in mind when drafting MCS action plans include the following.

- a) Only one person should write an action plan after brainstorming, participatory involvement and information gathering.
- b) 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.
- c) 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.
- d) Frequently update action plans – they are not static and require at least monthly updates.
- e) Each action should have a time line for activities and a deadline for completion for accountability and to reduce panic.
- f) All tasks should be prioritized for information of all staff and the leader for implementation of the plan.
- g) Above all be realistic and do not promise what cannot be achieved.

Next, a State must design an MCS system that is most appropriate for the fisheries management plan. The following steps are involved:<sup>80</sup>

- a) identification of all resource users and interest groups;
- b) assessment of MCS measures to implement the management plan (gear/area/season restrictions; licenses; limited access/catch/ bycatch; control checks and frequency; market restrictions, etc.)
- c) review of legal requirements and their status (e.g. has the relevant law been brought into effect or is it still a draft?);

<sup>79</sup> Drawn from Bergh and Davies (2000).

<sup>80</sup> Ibid.

- d) assessment of current assets (human and equipment) and professional capability (e.g. training requirements);
- e) MCS operation to address management needs, e.g. air surveillance, VMS, satellite imagery, data collection, port controls, sea inspections, surveys, etc.;
- f) list objectives for the chosen MCS operation, and the human and equipment resources required;
- g) note available resources and options to address shortfalls, e.g. supplement existing equipment by buying, chartering or sharing equipment, and increase human resources by increasing and training staff to meet new challenges, by employing staff on a part-time basis, or by contracting the private sector to undertake specific tasks; and
- h) calculate the investment requirements – procurement and operating costs by year.

Answers to the above queries will provide the information required for the budget exercise of implementing the MCS plan. These results can then be used to determine if current government budgets are adequate to achieve the plan requirements. The full plan will be the summary of the budget and operational requirements for legislation to meet MCS operational intentions, equipment and human resource needs, training, and the information or data management system requirements with cost projections to cover the period set for the exercise.

## CHAPTER 6

### OPERATIONAL PROCEDURES AND EQUIPMENT

This chapter and the next review procedures and core features of MCS operations that have been applied with some success in various parts of the world, beginning with the use of licensing in the field, vessel marking, data collection, catch verification, and MCS equipment and infrastructure. State fishery authorities or, as appropriate, regional fishery management bodies, will normally need to set out basic MCS procedures and standards to be followed in fisheries officers' operational manuals, as outlined in Annex G. Training of fisheries enforcement officers and observers will also entail thorough familiarization with various types of fishing gear (Annex H), reporting forms and procedures (Annex I) and vessel identification and marking systems (Annex J).

#### 6.1 Licensing

The importance of licensing and its potential use as a mechanism for recovering resource rents was noted earlier. The use of the licence in the field has however, not been addressed. Other than vessel marking and identification, the licence is the first document the MCS officer checks when boarding a vessel. Licences are normally issued to a particular vessel, the individual fisher and a specific type of fishing gear to control all three aspects of the fishing activity. 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. Sometimes the quantity of the catch is also specified (quotas and ITQs).

Licence data, to facilitate verification by the MCS Officer, needs to be up-to-date at all times and must apply to all fishers and vessels. Many States do not require licences for subsistence or artisanal fishers. Failure to license, or at least to register<sup>81</sup> these individuals creates a major gap in the data system for stock assessment and fisheries management. It is recommended that artisanal and subsistence fishers at least be registered. It is further suggested that the registration and licensing system be integrated into a national system for both management and stock assessments.

Another problem often encountered in the licensing of fishing vessels is the involvement of multiple agencies, e.g. transport, harbours, Coast Guard, etc. Without a mechanism for inter-agency coordination (see sections 4.2 and 5.2.2) confusion can be created for the fishers and result in licensing errors. A further problem arises when only mobile fishing gear is licensed, instead of licensing all fishing vessels actually carrying this gear. Finally, there is the problem of lack of controls and licensing for vessels and fishing gear operating outside national EEZs. This creates a serious gap in data for management of the resources and in the information necessary to determine the viability of the fishing fleet. A flag State that fails to exercise control over the activities of national vessels fishing in areas not under its jurisdiction may be in breach of its obligations under international law. As discussed in Chapter 2, UNCLOS, the UN Fish Stocks Agreement, the FAO Compliance Agreement, the

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<sup>81</sup> For the purposes of this document it is suggested that licensing of subsistence fishers be without a fee of any sort, at least initially until the benefits of such a system become apparent.

CCRF, and the IPOA/IUU Fishing all stipulate that flag States should exercise varying degrees of control over the fishing activities of their vessels.

## 6.2 Vessel Marking

All surveillance activities (sea, air, and satellite) depend on rapid identification of fishing vessels. In the mid-1980s, FAO proposed international standard specifications for a vessel identification and marking system.<sup>82</sup> 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 character is dependent upon the length of the vessel. The markings must be in visible locations on the sides of the vessel, and the top of the wheelhouse for air identification. Advantages are for both control mechanisms and rapid identification for aerial patrol efforts and safety-at-sea.

One of the better vessel marking and identification systems for coastal waters has been developed by Malaysia (Profile 7).<sup>83</sup> This system has now achieved an International Standards Organization (ISO) 9000 rating. It was designed to address several factors, including:

- a) the need to identify fishers, gear and boats in a secure manner that is difficult to duplicate;
- b) the need for rapid identification of the vessel home state;
- c) the need for rapid identification of the permitted area for which the vessel is licensed to operate; and
- d) the need for rapid identification of destructive fishing gear.

The Malaysian state in which a vessel is registered is signified by colour coding on the wheelhouse. The operational limits of the vessel are indicated by a highly visible zone mark on 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 vessels and a metal plate with the Fisheries crest and special identification number for each vessel is affixed to the bow post with non-removable nails.

Further details of the FAO system and the Malaysian variant appear in Annex J.

## 6.3 Data Collection

In the case of data collection (the monitoring side of MCS), fisheries officials should be involved in verifying the fishers' licensing information, the vessel registration, and the catch as part of the effort monitoring system. Fisher and vessel monitoring databases, whether manual or computerized, will allow an initial census of fishers in the State, both domestic and foreign. The information ideally includes the personal identifying data for fishers. Further monitoring information by fishing trip, if included, serves to collect and cross reference fish landings, area of fishing activities, time of fishing, and the returns from the fishing activities

<sup>82</sup> Endorsed by the FAO Committee on Fisheries in 1989, and updated in 1999.

<sup>83</sup> Salehan (2000). Also see Annex J.

## *Profile 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 km<sup>2</sup> (127 320 mi<sup>2</sup>) and an EEZ of some 475 600 km<sup>2</sup>, 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 State with a production of some 1.2 million tonnes at a value of Malaysian Ringgit 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 gillnets, hook and line, and traps. The commercial vessels use trawls and purse seines. Only 600 vessels fish outside 30 nm.

In the early 1990s Malaysia took dramatic steps to gain control of its fishing areas and to deal with problems of overfishing, illegal fishing, and 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 national fishers 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. It features:

- 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 nearshore fisheries management system linked to the 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;
- 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 the 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 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 cooperations in fisheries management through regular meetings with Thailand, Indonesia and the Philippines.

Vessel registration is intended to capture data which can be 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 any information on specialized equipment, communications, navigation, and processing capabilities, if any.<sup>84</sup>

The census of fishers and vessels active in a domestic fishing fleet must be periodically updated, a task that can be facilitated through annual licensing procedures and standardized reporting during the fishing season.

Most of this information is used to ensure that fishers are in conformity with the agreed fishing plan, but it can also be used by the fisheries managers to assist in stock assessment exercises. Fisheries economists and sociologists can use the information to determine the importance of the fishery to both the national and local economy.

## **6.4 Verification of Catches**

When a management strategy is based on catch and quotas, data collection on harvests from vessel inspections at-sea or in port can be a challenging task. There are many different aspects to the catch verification process. The first concerns the product form of the fish in 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 tonnes of product from several species, the task can be onerous. In most cases, verification of catches becomes a mathematical calculation exercise.

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

Catch estimates must be both independent of those recorded by the vessel captain, and as representative as possible of what is occurring in the specific fishery. The catch of domestic vessels, which is offloaded in a domestic port, should be easier to verify than that of large offshore foreign vessels. Measuring techniques appropriate to each State 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.

### **6.4.1 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.

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<sup>84</sup> The potential for regional and other international cooperation on developing and implementing standards for vessel registration has already been noted with regard to the common terms and conditions that apply for FFA foreign licensing (Section 5.1).

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.

#### ***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 separating the codend into smaller volumes to estimate these sections. The 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 fish tonnage per strap when the cod end is full, depending on size of the cod end, and the species and size of fish. This gives the fisheries officer a visual estimate before asking the vessel master for his estimate of the catch. This visual method is the roughest and most inaccurate for estimating catches. The sampling of smaller sections of the codend usually yields a more accurate result.

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 fish contained therein. Thus, the estimated number of baskets should be multiplied by the average weight of fish per basket, allowing for variations in catch densities. The sampling procedures used in a particular fishery should be scientifically based and tested. The sampling method and calculations used to estimate the catch should be understood and accepted by fishers.

#### ***Volumetric calculation of pre-processing holding bin capacity***

The 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 must 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.

#### ***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, from ship's drawings or previous inspections. Estimating techniques vary considerably, depending on whether the fish storage is wet or dry. If it is dry and the fisheries officer has access to the hold, it is a matter of sampling the fish, probably frozen in boxes, and averaging weights of the product in the boxes. If possible, the number of boxes in the hold should be counted and the weights calculated using the average for each species. If it is not possible to 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 in the hold, which should be recorded on the storage manifest. Conversion rates (discussed later) will be required for estimation of processed fish.

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 of fish in the hold. On factory-type processing 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 and comparing these to the estimates in the hold to verify if the records seem to be reasonably correct.

#### **6.4.2 Catch estimation for other fisheries and product types**

Other fisheries, using different gear, 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.

##### ***Wet or salt fish***

The estimates for wet or dried fish (such as salted fish) are very difficult to obtain. The duration of the catch in the salt, density, and hold capacities again come into play in these estimates. Some States 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.

##### ***Longline fishery***

The nature of the longline fishery rarely allows one to see the whole catch at one time. The entire longline set recovery must be completed. 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 each species. Occasionally, the fish are stored in a holding bin on deck before processing. This provides an opportunity for volumetric calculation estimates.

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

The estimate of the weight of large fish that are frozen whole, such as tuna, is often difficult to obtain due to the manner of storing the fish on board the vessel. A sampling of the fish can produce an estimate for extrapolation, but these estimates are only approximate. The best figure one can expect is from the landing weights and through a cross check of the fishing and storage logs.

##### ***Purse seining***

In the case of wet fish storage, such as refrigerated circulating sea water (CSW) systems for herring and mackerel, or refrigerated brine systems for tuna, several catch estimation methods have been used. Herring and other “wetfish” have a tendency to move to the

bottom of the tank or fish well in a CSW system. Estimates before landing can be time-consuming and may result in damage to the fish.

One 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 second 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.

A third method relies on the detailed information available for a particular fishing vessel that lists confirmed hold and fishing well capacities. This information should be periodically verified throughout the season as landings are physically monitored.

### **6.4.3 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:

#### ***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.

#### ***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 well) occupied by each species in the catch. The percentages are applied to the total estimated catch to obtain the estimated weight of individual species. This method should be used with caution, as some species may not appear on the surface.

#### ***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.

#### ***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.

### **6.4.4 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 determining a round weight of species *retained* for further processing and round weight of species *discarded*. Discards are subtracted from the total catch weight to determine the retained weight.

A final variable in the calculation for fisheries records is the conversion of the product weight back to the round weight of the catch, for this is the figure most often used in determining the

total catch that 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 production efficiency of the vessel, which allows a more accurate calculation of the catch. This is important when assessing the catch efficiency in a particular fishery and determining quota species caught by a particular vessel.

There are several variables in the rough estimation methods that should be noted. These include: the space occupied by the fittings in the hold; the space between boxes; and 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 species of fish once processed, such as fillets, is another potential problem. These points are noted to emphasize that without monitoring 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 undermine the credibility of the Department to carry out its duties effectively. The bottom line is an acceptable level of *tolerance*. This may vary according to the potential impact on the management plan, circumstances at the time, the amount of fish onboard, the value of the fishery, the location of the vessel, past performance of the vessel and master, etc.

## 6.5 Transshipment

Transshipment of fish at sea is one of the most 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. The fisheries official should 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 transhipped. 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, making observation from the deck of the movement of the fish impossible.

If a State refuses to permit the transshipment of fish inside its fisheries waters, then the vessels will, in all likelihood, tranship the cargo outside the zone and then re-enter to continue fishing. This can result in the loss of important data on the fish removals from the zone. Such data can sometimes be calculated from other records, but it cannot be verified and on some occasions is lost from the system. It is recommended that Fisheries Administrators, in designing their

MCS strategy, use negotiations to encourage the fishing vessels to tranship in their ports. This might be accomplished through an incentive of reduced port administration costs or reduced docking and offloading fees. The State would then be able to monitor and accurately document the transfer of fish and fishery products.

Another international concern that can partly be addressed through the encouragement for fisheries transshipment in port is the issue of obtaining information on fisheries support vessels involved in the transshipment. 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.

## 6.6 MCS Equipment

*The equipment requirements for an MCS system must reflect the needs of the State and its fisheries priorities.* Consequently equipment answers vary according to the intent and degree of commitment of the State 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. States 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. Inter-agency linkages and information sharing to benefit other agencies will always assist in justification of the costs of system development. Each State should 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. Assessments should be made through feasibility studies prior to the procurement of particular equipment items.

Annex B provides estimates for MCS equipment in the following list. Pre-procurement feasibility studies are especially needed if MCS staff members are not familiar or are only partially familiar with any of the types of equipment noted therein.

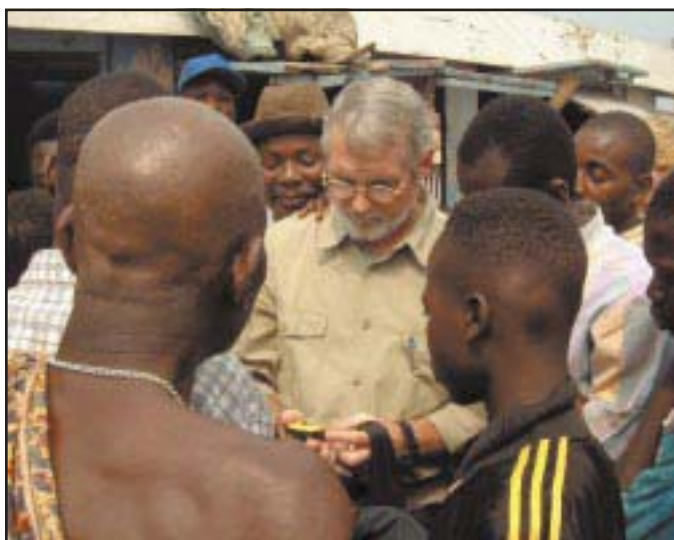
- a) Air Surveillance options.
- b) Radar for coastal areas.
- c) Patrol vessels – coastal, and offshore (7-9, 17, 22, 27 m vessels).
- d) Safety equipment including:
  - i) Radio communications;
  - ii) Global positioning systems (GPS);
  - iii) Binoculars and night vision equipment;
  - iv) Cameras – still and video;
  - v) Flashlights;

- vi) Vessel safety flares and emergency equipment; and
  - vii) Solar electrical systems and generators for isolated locations.
- e) Office equipment.
- f) New technology:
- i) Vessel monitoring systems (VMS);
  - ii) Satellite imagery; and
  - iii) Geographical information systems (GIS).

VMS is relatively new, but has gained increasing acceptance as an MCS tool since the early 1990s. Digital technology has enabled most electronic equipment to be miniaturized, making it much more flexible to use, providing higher levels of security and reducing costs. Computers, cameras, telecommunications and even satellite technology are 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 presently beyond the budgetary limits of most fisheries administrations.



*Hand Held Global Positioning System*



*GPS Familiarization for Coast Watch in Mumford - Ghana*

A few remarks on the newer radar, VMS, satellite imagery and GIS tools are provided below, prior to discussing the minimum MCS equipment requirements.

### **6.6.1 Radar**

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 far offshore, with the advantage of being able to direct patrol vessels to prime target areas. Inexpensive coastal radars can be utilized to protect coastal zones from



*Coastal Radar - Indonesia*

incursions and are being utilized in Senegal. They are also being set up in coral reef areas as a pilot project in Indonesia.<sup>85</sup> The advantage of coastal radars is the potential for involvement of local fishers in the conservation of their coastal zones through cooperation with fisheries monitoring systems.

### 6.6.2 Vessel monitoring systems

VMS for fisheries appeared in the early 1990s. 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 transmit 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*<sup>86</sup> is an excellent guide for any Fisheries Administrator contemplating the introduction of this technology. ***It must be noted that VMS is a satellite tracking system that will only provide information on those vessels carrying the equipment. Non-licensed vessels and all other vessels without compatible transponders will not be shown on the VMS.*** However, VMS is one of the better tools available to assist in monitoring closed areas when all licensed vessels are equipped and maintain functioning VMS units.

Concerns in developing a VMS include:

- a) the confidentiality of information;
- b) preventing access to the information by third parties (i.e. how to maintain the security of commercially sensitive information); and
- c) admissibility of evidence (i.e. whether the information obtained from VMS can be used in court).

Legislative measures to address these concerns are discussed in Chapter 2.

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

<sup>85</sup> 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.

<sup>86</sup> FAO (1998).

- a) the security of the system;
- b) whether or not the VMS is a tamper-proof system, or at least can record attempts to tamper with it;
- c) the reliability of the system under all environmental conditions;
- d) the timeliness of data;
- e) the back-up systems in case of onboard system failure; and
- f) the development of new features, which can benefit fishers.

The FAO VMS Guidelines respond to these concerns and further note that VMS units can be protected against tampering (or indicate that tampering has occurred), can be highly reliable (over 99% of the time), and can be provided with back-up manual systems to accommodate any system failures. A VMS system, designed with currently available software, can automatically respond with an alarm to indicate a monitored vessel has entered into a closed area or zone. Individual vessels or entire fleets (e.g. FFA VMS system) can be polled to immediately report position, course and speed requests. The automatic polling interval between reports can be decreased down to a few minutes, but this will result in a corresponding increase in telecommunications charges. Any VMS implementing 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 (ALCs) on vessels to ensure they are compatible with the designed system.

Many new VMS features found in the more advanced systems have benefits for fishers. 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 communications 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 develop a common message format 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 to have VMS data accepted by the courts as being generally reliable (i.e. unless proven otherwise) so that it can be admissible as primary evidence of a violation as opposed to supporting evidence as is now the case in most States.

### **6.6.3 Satellite imagery**

Available satellite imagery includes “optical/infrared” and “Synthetic Aperture Radar” (SAR) technology. The latter appears more useful for fisheries, but until recently the cost was prohibitive for most fisheries budgets. Satellite imagery provides a scanned image of an area in a time period but does not provide vessel identification. If it is used in conjunction with VMS, however, it can rapidly point out larger vessels that are not licensed, assuming that the latter are required by legislation to carry VMS. This permits a focussing of MCS resources to identify the latter vessels and their activities. A further advantage of the SAR technology is its all-weather capability, thus increasing its utility as the prices decrease. As the cost of SAR technology decreases, and a focused MCS response is desirable in a particular area, it can be combined with VMS to become a very efficient tool to monitor larger offshore vessels.

#### **6.6.4 Geographic information systems (GIS)**

Geographic information systems have the ability to transfer data rapidly 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 State's fisheries administration.

### **6.7 Operational Infrastructure for MCS**

The basic MCS infrastructure required for operations is discussed below.

#### **6.7.1 Land-based activities**

##### *National headquarters*

A central headquarters near the departmental decision-makers for the coordination 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 their networks through two-way VMS, or simply communications satellites. The modern digital HF radio and data systems on the market could assist in minimizing costs without losing effectiveness and are an effective back-up system. The increasing versatility of reasonably priced cellular phone technology should be evaluated

*Computer data systems* for licensing and vessel registration, data collection and analysis are now very affordable, with several licensing and vessel registration systems in use today. The Fisheries Administrator must choose the system that best meets 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.



***Field offices***

Office space is required for the field staff and supporting administrative staff. The office should be equipped with communications equipment to maintain contact with the headquarters and also 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 or other types of vehicles. It is highly recommended that staff patrol in pairs for safety and personal security.

***Key documents for each field office***

Every Fisheries Administrator should ensure that each field office has a reference library containing the necessary documents and publications to assist officers in the performance of their duties. These should include the following:

- a) current fisheries legislation, acts, regulations, notices and the official publication in which they were published (e.g. the Government Gazette);
- b) departmental guidelines for MCS activities including those for prosecutions;
- c) copies of any applicable treaties including those between States in the region, and current license and permit information for the area of responsibility;
- d) a set of charts with updated baselines, territorial seas, EEZ and any specifically noted areas for fisheries management;
- e) past fisheries cases, details and penalties for reference during the preparation of a case; and
- f) safety procedures and guidelines for MCS.<sup>87</sup>

Each officer should have in their possession, at all times, an official photographic identity card that clearly identifies the individual as a government-authorized fisheries officer. This requirement should also be in the fisheries legislation. Each officer should be issued communications equipment to maintain contact with the base of operations. Each officer must have the appropriate equipment to record findings during the patrol; e.g. a patrol book with clear identification of the owner and sequentially numbered pages. This notebook could be used in court proceedings for identification of events, and as an aide-mémoire for the officer. It is essential that it is properly maintained.

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<sup>87</sup> Paraphrased from: Coventry (1991).



*Field Base - Take Bone Rate, Indonesia*

### **6.7.2 Air surveillance**

The *air surveillance* requirements for MCS may appear expensive, but are still seen as one of the most effective methods to receive time-critical 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 reasons of 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 must be accurate, for it will form the basis for prosecution of any closed area infractions. It is 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 or video equipment for the identification and 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 access VMSs are now available, and can result in a technologically advanced air surveillance platform. However, these are expensive tools that might be inappropriate for the budgets of developing States. The expense would be easier to accommodate through multi-agency or regional cooperation and shared use.

The choice and equipping of the aircraft will depend upon 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. It is highly desirable to ensure there are local resources capable of supporting and provide long-term maintenance for the aircraft.

The added advantages of GIS has already been noted. If it can be afforded it continues to be a recommended tool for MCS and fisheries management.

### 6.7.3 Surveillance at sea

The *sea-going requirements* will vary considerably between States, depending on the MCS strategy. The *offshore* fishery will require larger, and hence more 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. 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 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 going capability as the fleet 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 Officers to the fishing vessel for boarding and 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 vessels. There may be a requirement to overtake a departing vessel where there are no other diplomatic arrangements in place to halt an alleged violator, but this capability should not overshadow the need for staying at sea and cost-effectiveness on a daily basis. Vessel charters may be a viable option when compared to the capital costs of purchasing patrol vessels. In this manner, variables such as fuel, maintenance, insurance and other vessel associated 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 communications system should have a back-up system 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 armed vessels.

*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. 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 frequency to communicate with air surveillance platforms when these are operating in the same vicinity.

Equipment for boarding and an appropriate boarding craft are recommended. Most States use smaller rigid hulled inflatable boats to transport boarding teams. 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, taking advantage of FAOs assistance in training and legal assistance. A summary of the Thai fisheries situation and MCS arrangements is shown as Profile 8.

#### **6.7.4 Provision of firearms**

A final item for careful consideration is the provision of firearms to trained Fisheries Officers. There are many considerations with respect to this matter but *in general firearms are not recommended for fisheries MCS*. However, it is recognized that there are situations when it could be very dangerous for fisheries officials to do their job. A State's laws and Fishery Department policies may regulate when a Fisheries Officer should be armed to ensure their ability to adequately protect themselves. It is also important to continually assess compliance trends in the fishing industry and the history of difficulties with fishers, both domestic and foreign, regarding the safety of Boarding Officers and fisheries staff. The protection of fisheries MCS staff is a priority requirement. Where possible other non-lethal means of protection are encouraged. The issuance, carriage and use of firearms should be considered as a tool for staff protection only.

If it is determined that firearms will be issued to Fisheries Officers, new considerations apply. The first of these is the specific designation of the individual officers who will carry firearms. The Canadian experience in fisheries recognized this fact, and they now administer a battery of psychological tests as part of their selection process to screen fishery officer applicants for their suitability to carry firearms. The second major consideration is the initial training, and the need for ongoing refresher training and weapons qualification (at least annually).

The decision to arm patrol vessels for fisheries enforcement purposes is one that should not be taken lightly. This decision may be necessary where fishing vessels commonly do not comply with the orders to halt for fisheries inspections. Such a situation may arise 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. In such a case it may be necessary to permit police action to apprehend alleged offenders. 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.

### ***Profile 8. Emerging MCS system in 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 for 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 1995 census revealed 54 715 fishing boats within the country, while the DOF had registered only 17 657 vessel fishing gear for that same year. A situation of open access wherein many vessels go unregistered coupled with the practice of registering only mobile gear contributed to the inaccuracy of the DOF figures. According to the registration records for 1995, only 154 vessels (less than 1% of the total 17 657 fisheries registered vessels) were over 25m.

Trawlers and gillnetters comprised 75.5% of the total gear 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 for "trash species" (estimated as high as 70%+). Pressure thus mounts on fishers to catch more fish in order to maintain their economic status. The incidence of illegal fishing also increases, especially when the perception of deterrence is low.

It is estimated that more than 4 000 Thai fishing vessels fish outside national 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 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);
- licensing and gear conflicts within the domestic fleet internal and external to Thai waters;
- overfishing of Thai fisheries stocks;
- lack of judicial and political support and commitment for this sector; and
- an inefficient and complex licensing system;

#### **MCS**

MCS operations in Thailand are well planned, and while under-funded for their 80 vessel patrol fleet, they are professionally executed and staff appear very committed to the work. 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 State) MCS Training Course in July 2000. Further, Thailand have recently opened discussions with Malaysia to address fishing and MCS concerns of both States.

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

## CHAPTER 7

### PATROLS, BOARDINGS, INSPECTIONS AND PROSECUTION

This chapter continues the review of MCS operational procedures with a focus on patrols, boarding and inspection procedures, navigational positioning, evidence gathering and handling, and preparation for prosecutions.

#### 7.1 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 a State to target air and sea patrols on areas or vessels of concern, as opposed to random patrolling. All patrols should commence with a planning and briefing session for key participants to ensure that everyone knows what to expect. Upon completion of a patrol, de-briefing of key participants should be carried out, with appropriate documentation for record purposes and for confirming follow-up actions and lessons learned as required.

##### 7.1.1 Land patrols

Land patrols along rivers, lakes, and coastal areas can be effective if focused on fishing activity, areas of historical illegal activity or zones where the fisheries resources are particularly vulnerable to over-exploitation by licensed and non-licensed fishers. Coastal areas where domestic artisanal fishers operate can be monitored for incursions by unpermitted larger vessels. Intelligence reports can be relayed to specific coastal areas for action. Use of coastal radar for these coastal patrols will enable effective planning, risk assessment and again, the focusing of resources.

##### 7.1.2 Air patrols

Random air patrols are often conducted when there is an absence of reliable fisheries information or current intelligence regarding potential violations. 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 and provided with a summary of authorized vessels and their markings and the expected activity in the zone. If possible, the patrol aircraft should link directly to the VMS system cross-referenced with its own radar to increase the flexibility and effectiveness of the patrol. A high transit to the patrol area is recommended for both fuel efficiency and to increase radar coverage. This strategy also increases patrol time on station. Priorities should include: closed areas; patrol routes to detect and prevent incursions of offshore vessels, and areas of heavy fishing concentrations where non-licensed vessels may mix with licensed vessels to screen their illegal fishing operations. If stocks migrate near the boundaries of a State's fisheries jurisdiction, 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 systems, satellite imagery, and radar technologies, working in unison with air surveillance platforms, can provide information to effectively deploy other resources such as offshore patrol vessels.

### 7.1.3 Coastal patrols

Coastal patrols are most effective if smaller patrol vessels are 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 monitor the coastal fishing fleet. The presence of a fisheries patrol vessel can also contribute to fisher safety, but this can be abused.<sup>88</sup> In some areas the use of coast watchers and reef watchers from the local community has increased community involvement in the management and MCS process, and has strengthened joint stewardship of the resources with the government.

### 7.1.4 Offshore patrols

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

Each patrol vessel should have the necessary equipment to carry out assigned duties, e.g. clear identification that it is on government service, clear MCS officer identification,<sup>89</sup> copies of regulations, inspection gear, including a handheld GPS if possible, communication and safety equipment. Patrol checklists are provided in Table 1.

## 7.2 Boardings

### 7.2.1 Pre-boarding procedures

The master of a patrol vessel must determine if weather and sea conditions permit a safe boarding. The Fisheries Officer is the leader of the boarding team and must decide if the boarding party will actually board a particular vessel. On a fisheries patrol there should be no doubt that the patrol vessel is for support of the fisheries activity. The Senior Fisheries Officer is in operational command of the patrol (what areas it will cover, etc.) while the Captain is responsible for the safety 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 carefully recorded by designated fisheries staff and boarding personnel both in the boarding team and onboard the patrol vessel.

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<sup>88</sup> 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.

<sup>89</sup> 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.**

**Table 1. Pre-patrol to vessel sighting actions**

1. Pre-Patrol Briefing	2. Pre-Patrol Checks	3. The Boarding Kit
<ul style="list-style-type: none"> <li>• Current Status of activities.</li> <li>• Objective of the patrol.</li> <li>• Area of the patrol.</li> <li>• Tolerance level, if any.</li> <li>• Expected duration of the patrol.</li> <li>• Rules for USE OF FORCE/Rules of Engagement (Protection only).</li> <li>• Expected boarding type – routine/opposed or hostile, etc.</li> <li>• Stress safety and back-up</li> <li>• Communications – Call Signs of participants; frequencies for monitoring and safety (HF 2182 Mhz and VHF Channel 16).</li> <li>• Special instructions for particular situations or patrols.</li> <li>• Questions from the patrol vessel crew.</li> </ul>	<ul style="list-style-type: none"> <li>• Navigation equipment – radar, GPS, echo sounder, charts, DF.</li> <li>• Ship's logbook open and duly noted for the commencement of the patrol.</li> <li>• Radios for ship-to-shore, boarding boat and boarding team<sup>90</sup></li> <li>• Boarding boat, life jackets, binoculars, rifle, hand guns, flares, boarding flags.</li> <li>• Boarding team.</li> <li>• Boarding kit.</li> <li>• Raise international fisheries pennant to show that you are on a fisheries patrol.</li> </ul> <div style="text-align: center;">  <p><i>The Net Gauge</i></p> </div>	<p>There are several items that are required for a boarding, including, but not limited to:</p> <ul style="list-style-type: none"> <li>• Acts and Regulations;</li> <li>• Fishery Officer Identification Card;</li> <li>• Fish identification cards;</li> <li>• Boarding Report Forms/Arrest Forms, Seizure tags and forms;</li> <li>• Translation cards;</li> <li>• Radios – (must be checked);</li> <li>• Notebooks with numbered pages;<sup>91</sup></li> <li>• Net gauges and standard weight;</li> <li>• Weather gear;</li> <li>• Gloves;</li> <li>• Flashlight;</li> <li>• Camera (with film);</li> <li>• Tape Measure;</li> <li>• Safety equipment (lifejackets, flares, etc.)</li> </ul>

Many States board fishing vessels by bringing the patrol vessel directly alongside. This is not normally recommended as it places the patrol vessel and the entire crew at risk. As noted earlier in the report, a small boarding craft to carry the boarding team is recommended. This leaves the larger patrol vessel in a position to observe and monitor the safety of the boarding party.

Language differences may pose an initial concern for both fisheries officials and foreign vessel masters. There are two common solutions to this problem. One is to require that logbooks and reports must be completed in the language of the coastal State. The responsibility then rests with the foreign vessel to make any translations. Alternatively, some States obtain copies of the relevant logbooks, reports and documents from the foreign vessel and make the translations themselves. A further tool is a small handbook of questions in various languages with a common numbering system so that the appropriate numbered question can be asked and shown

<sup>90</sup> Radios are essential for operational communications of events and note taking onboard the patrol vessel of reports, as well as for safety reasons.

<sup>91</sup> 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.**



to the fishing vessel master in his/her language. This procedure has been used effectively by many fisheries organizations. Where possible, at least one member of the boarding team should be able to 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 in Table 2.

**Table 2. Pre-boarding, the boarding kit, and the approach**

1. PRE-BOARDING BRIEFING	2. Sighting the Target	3. Flags and Approach
<ul style="list-style-type: none"> <li>• Identification of vessel.</li> <li>• Weather and sea state.</li> <li>• Type of boarding – routine/ resistance expected.</li> <li>• Boarding team composition and order for boarding.</li> <li>• Boarding team tasks – radio communications, security of crew, note taking on both the patrol vessel and boarding boat, search of vessel, etc.</li> <li>• Communications – call signs and frequencies.</li> <li>• Security cover from the patrol vessel.</li> <li>• Boarding positions of patrol vessel and boarding boat for security.</li> <li>• Equipment checks.</li> <li>• Special instructions as are appropriate.</li> </ul> <p style="text-align: center;"><i>Key is:</i> <b>SAFETY, SAFETY, SAFETY.</b></p>	<ul style="list-style-type: none"> <li>• Confirm sighting.</li> <li>• Check position.</li> <li>• Identify the vessel</li> <li>• Call the fishery officer to discuss the type of expected boarding.</li> <li>• Call the boarding team for the boarding briefing.</li> <li>• 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).</li> <li>• Call the vessel and notify her that you intend to board.</li> <li>• <i>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.</i></li> </ul> <p style="text-align: center;"><i>Key is:</i> <b>SAFETY, SAFETY, SAFETY.</b></p>	<p>The boarding procedure should include the following steps:</p> <ul style="list-style-type: none"> <li>• 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);</li> <li>• check both sides of the fishing/target vessel for any unusual activities;</li> <li>• order the vessel captain to steer a course that provides a lee for boarding;<sup>92</sup></li> <li>• order the fishing vessel captain to gather his crew in a designated open space before boarding;</li> <li>• position the patrol vessel for launching the boarding craft;</li> <li>• launch the boarding craft and approach from the leeward side of the fishing/target vessel;</li> <li>• for routine boarding, place 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;</li> <li>• place the boarding craft on the opposite quarter for security, and to facilitate disembarkation; and</li> <li>• patrol vessel maintains security watch and regularly checks communications with the boarding party.</li> </ul> <p style="text-align: center;"><i>Key is:</i> <b>SAFETY, SAFETY, SAFETY.</b></p>

<sup>92</sup> The master of the fishing vessel may communicate that he/she 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.



*Measuring Nets - Ghana*

### 7.2.2 Boarding procedures

This section considers the actual *at-sea inspection* of fishing vessels. 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 enable a Fisheries Officer to reconstruct the fishing activities of the vessel since entry into the waters under the jurisdiction of the State.

In several States 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 standardized inspection forms be completed for each inspection. This has a number of advantages. First, 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. Second, 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 any discrepancies noted by a previous boarding officer. Third, this permits the recording of a compliance history of the vessel and master. Operational patrols should concentrate on those vessels or fleets with a poor record of compliance.

There are cases when the boarding team consists solely of the Fisheries Officer and an assistant. Generally a minimum of four persons should be in the boarding team. In cases when the boarding team might meet some resistance, a full and equipped boarding crew (minimum of six persons) is advised. It would include: the Fisheries Officer, a navigating officer and an engineer with three crew. Table 3 provides possible check lists to follow for: a) routine boarding procedures; b) boarding with a suspected violation; and c) boarding where there may be resistance.

**Table 3. Boarding procedures**

<b>A. ROUTINE BOARDING</b>	<b>CHECKED</b>
<ul style="list-style-type: none"> <li>• Radio check prior to departing the patrol vessel and again on gaining access to the fishing vessel.</li> <li>• Senior Fishery Officer greets the Captain and crew, identifies him/herself, asks the Captain for identification, and explains the inspection process.</li> <li>• One of the boarding team meets and talks with the Observer as soon as possible on boarding, if an Observer is on board.</li> <li>• <i>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.</i></li> <li>• Check vessel position from Captain and check vessel navigation equipment.</li> <li>• Check vessel documents (licensing, vessel documents, fish log, navigation log, engineering log, processing logs, etc. as appropriate to verify fishing operations).</li> <li>• Check for transshipments and details of the operations.</li> <li>• Check the fishing gear and fish catch on deck.<sup>93</sup></li> <li>• Measure the net and check the mesh size if a net is on deck.</li> <li>• Check the fish storage areas and processing plant, if applicable, to get packing weights and conversion rates.</li> <li>• Take pictures where possible of all events – net measuring, storage, fish verification, etc.</li> <li>• Return to the bridge and complete the inspection report.</li> <li>• Draw a line under the last fishing logbook entry, sign and date the log.</li> <li>• Explain the report to the vessel captain and seek his signature on the form.</li> <li>• Provide a copy of the inspection report to the Captain, including any comments from the Boarding Team and the Captain.</li> <li>• If no major concerns, thank the Captain, and disembark from the vessel.</li> </ul> <p style="text-align: center;"><i>Always debrief the patrol and boarding team after the inspection, complete the documents and reports, and prepare for the next inspection.</i></p>	

<sup>93</sup> 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.

**Table 3. (Cont.)**

<b>B. BOARDING WITH SUSPECTED VIOLATION</b>	<b>CHECKED</b>
<ul style="list-style-type: none"> <li>• Note taking is extremely important during these events for court preparation and processes.</li> <li>• Tag and secure the evidence where it can be guarded or secured against tampering.</li> <li>• Complete the inspection.</li> <li>• Complete the inspection report and note the infraction to the Captain.</li> <li>• Report the event and time to the patrol vessel.</li> <li>• Request the Captain to return to port for further investigation – if he/she refuses, order him/her to do so (the necessary authority to do so must be set out in the Fisheries Legislation).</li> <li>• 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.</li> <li>• <i>(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).</i></li> <li>• Maintain security of the vessel and crew during the trip to port.</li> <li>• Notify the Base of the incident and planned action.</li> <li>• 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.</li> <li>• 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.</li> <li>• Debrief the Base Commander and Legal Officer and arrange for witnesses for the court hearing.</li> </ul>	

### ***Use of force***

Particular care must be taken when using force. Typically, State officials such as fisheries officers are only authorized 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 but 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 it should be warned by radio and loud hailer. Only if no response is received should force be considered to physically stop the vessel (i.e. halt or, potentially, sink it). States should ensure that appropriate higher authorities are involved in the decisions to escalate the use of force.

The use of force when fired upon is usually controlled by established rules of engagement. Captains of patrol vessels have the right and obligation to protect their ships and crew.

**Table 3. (Cont.)**

<b>C. BOARDING WITH POTENTIAL RESISTANCE</b>	<b>CHECKED</b>
<p>In cases of boarding when there is an expectation of resistance resulting from discussions and responses to halt the vessel for inspection, or other intelligence, it should not be carried out as an aggressive action. Such boarding should be planned with the sole purpose of protecting your crew and still enabling them to carry out their duties.</p> <ul style="list-style-type: none"> <li>a) During the Pre-Boarding Briefing - stress safety.</li> <li>b) Carefully detail the boarding approach.</li> <li>c) Detail boarding teams duties and check all equipment carefully, especially radios for each of the boarding teams.</li> <li>d) Do not board until the vessel is stopped and the crew are in a visible position on deck.</li> <li>e) Division of boarding team into three teams of at least two persons each: <ul style="list-style-type: none"> <li>• Team 1- bridge control and security</li> <li>• Team 2 - crew security with team 3</li> <li>• Team 3 - vessel search and inspection, after assisting with crew security</li> </ul> <p>(<b>Note:</b> Additional to other boarding is the issuance of firearms – only to trained officers).</p> </li> <li>f) 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.</li> <li>g) Team 2 crew security; Team 1 secures and reports control of the bridge; Team 3, when completed crew search, conducts a vessel search – <b>REMEMBER SAFETY, SAFETY, SAFETY!!!</b></li> <li>h) 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.</li> </ul> <p><b>NOTE 1:</b> It may be that the Boarding Party finds no resistance on boarding and that the Captain simply did not understand the instructions from the Patrol vessel. A written warning in the fishing vessel logbook may be appropriate. The Senior Fishery Officer should continue with a modified routine boarding or continue in a hostile boarding mode as required, but it is still essential that boarding teams continue their security duties.</p> <p><b>NOTE 2: Remember again</b> - 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.</p> <p><b>NOTE 3: Note-taking and debriefing sessions are important at all times, but they are absolutely essential for all alleged violations and hostile boardings.</b></p> <p><b>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.</b></p>	

### 7.3 Verification of Position

The verification of the position of a 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. Courts in some States have accepted this as evidence of the position of the vessel, provided that the

prosecutors 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 prior to conducting the boarding. The fisheries officer should ask the vessel master for the position of the vessel upon boarding. If there is a variance, the officer should watch the master take another position fix. If the officer is not satisfied, it is recommended that an appropriately certified deck officer from the patrol vessel take a position fix on the boarded vessel.

Enforcement officers should be on the alert for subterfuges and deceptive conduct by the crew of vessels engaged in illegal fishing. To avoid detection or to create doubt as to the vessel's actual position, Masters have removed a fuse from key navigation equipment, and have then claimed the equipment is not operational. If the navigational instrument 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. 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 fishing vessel positions easy to confirm (and more difficult for the fisher to refute).

The requirements for VMS 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 not all vessels 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 determining the position and any methods used to verify the position of the vessel. This will form the basis for the verification of all vessel activities while in the zone, especially in the case of an alleged infraction of fisheries law in a closed area.

Most larger vessels carry a variety of compasses (both magnetic and gyros) as well as radars, satellite navigation equipment, omega positioning gear, a sextant, direction finding equipment, echo sounders, fish finders and sonars. Navigation publications and area charts are also standard items. All such equipment and documents and the observation of their use and status on boarding the vessel can be very useful in court proceedings. For example, one could note if the radar has been set on a very short range, one mile or less, which could indicate searching for a transponder from a fishing buoy, whereas the safety range is 10 or 12 miles. The satellite navigation system often provides printouts of positions over a period of time and can show where the vessel has been. Radio directional finding gear 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 markings on charts could assist in the determining the past course of the vessel. The charts and logbooks might indicate positions, fish catches, times when freezers were operated, engine hours and times of operation at what speeds and temperatures, etc. These observations can all assist in building and supporting a prosecution if a 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.

## **7.4 Fisheries Prosecutions**

One of the most onerous yet important tasks for fisheries officers and administrators is preparing for, and successfully prosecuting, those who contravene fisheries laws. Prosecutions are an essential part of MCS. These actions will not only penalize offenders but also deter others from breaking the law. On the other hand, if fisheries officers obtain clear evidence that the law has been violated and the matter is not prosecuted, this can have a detrimental effect on the morale of enforcement officers and may encourage further non-compliance by fishers.

Fisheries administrators and prosecutors are sometimes reluctant to prosecute all but the most blatant violations of the law because it can be a time-consuming task (particularly for senior officers) and the perceived risk of embarrassment if the case is lost. Although no administration is likely to have a 100% success rate, it is important to note 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.

### **7.4.1 Preparation and training**

Many fisheries prosecutions have resulted in the alleged offender being acquitted in court due to lack of proper preparation and training by the fisheries prosecutions team. It is essential for States to train officers and prosecutors in how to gather evidence and to prepare and present 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 when every well-publicized successful prosecution is likely to deter a number of other violations.

One way to improve the success rate of fisheries prosecutions is to compile standard training manuals and to conduct training courses with practical exercises. For example, both the South Pacific Forum Fisheries Agency and the ASEAN States have compiled standard manuals on prosecution procedures for their regions.<sup>94</sup>

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 component 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 sponsor 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

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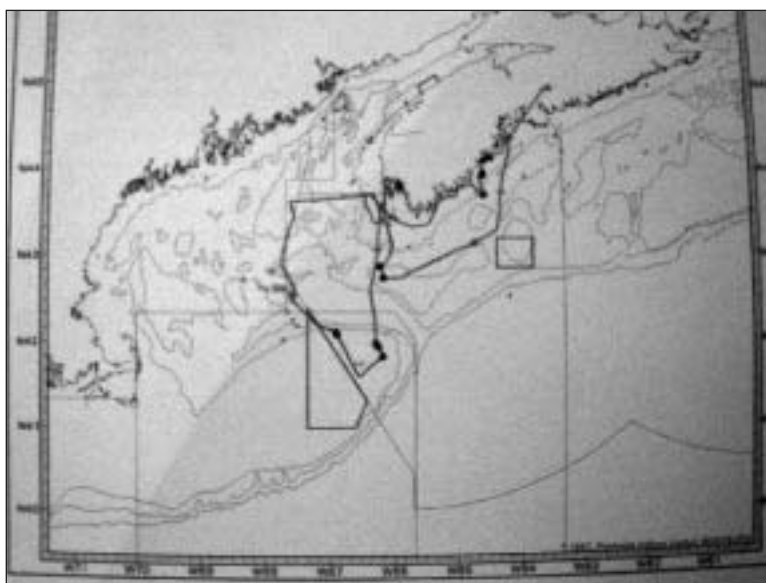
<sup>94</sup> For example the FFA Fisheries Prosecutions Manual (Coventry, 1991) provides a very useful guide for fisheries officers in common law jurisdictions who may have to prosecute a case. Contact details for the FFA are given on their website: [www.ffa.int](http://www.ffa.int).

is boarded, inspected, detained, ordered to port and charged. The moot court can also prepare all parties for the types of questions and explanations that a judge will ask of a prosecutor to ensure an understanding of the alleged infraction. The exercise can as well be used to test the effectiveness of institutions and established procedures in dealing with a detained vessel, cargo and crew.

#### 7.4.2 Recording observations

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 recognize 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 when the trial is held long after the actual event.

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 inaccurate 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 States 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. ***The more observant the fisheries officer and the more accurate the notes, the easier it will be to reconstruct the events to support the decision 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 encountering and boarding a vessel suspected of illegal fishing should consider the following questions and record all relevant observations.

***Observations to be 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 responses to the following questions in the ship’s log.

- a) What is the time, weather, the state of the sea, the temperature and the direction of the wind and waves?
- b) 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 recognize the patrol vessel?
- c) 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), or the absence of radio buoys from normal storage areas.
- d) Is there any evidence the vessel has been fishing? Examples of such evidence would include: fish on the deck or in deck bins, wet decks or fishing gear, dead fish or fish offal in the sea near the vessel; 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.
- e) 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?
- f) What is the reaction of the fishing vessel when the patrol vessel communicates with it and orders it to prepare to be boarded?
- g) What activities are seen on deck when the boarding team approaches the vessel? (If hostile, the bridge officer must warn the boarding team).

- h) 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 recorded by members of the boarding team

The minimum boarding team should comprise 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 improperly 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 authorized 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 recognized 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 be guided by the legal advice from their particular State 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 cooperation 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 arrival in port.

### ***Observations enroute to port***

During the passage to port the fisheries officer should begin the preparation for the case. The points listed below should be considered.

- a) Is there a need for an independent expert witness (or witnesses) to check the state of the navigation gear, the freezers or the engine machinery?
- b) What evidence has been gathered and how strong is it? Has it been cross-checked and verified through different sources?
- c) 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?
- d) 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?
- e) Which charge(s) should be laid and against whom? (This must be discussed with the prosecutor in some detail.)
- f) Has all the evidence including all exhibits been secured? Is there need for any more documentation? Are any other photographs necessary?
- g) 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.)
- h) What arrangements should be made for the preservation or disposal of the catch?
- i) 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?
- j) What are the procedures for setting bail for the accused and what is a reasonable amount?
- k) Where can the crew and master be accommodated?
- l) Have all the notes for the case been completed for use by the prosecutor?

### **7.4.3 Decision to prosecute**

Armed with the answers to the above questions, the fisheries officer is ready to meet and brief the prosecutor and the Fisheries Administrator on arrival in port. This briefing should be chronological and thorough. At the conclusion, the fisheries officer should have a list of recommendations or action to be taken if a determination is made to proceed with the case. The master should then be formally charged, witness statements taken and certified, if not already completed, 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 review the evidence, exhibits and statements and then prepare the case for the appearance hearing.

## CHAPTER 8

### COASTAL MCS

This final chapter focuses on MCS specifically in regard to coastal fisheries and the management of coastal areas. Although a number of points related to coastal MCS have already been mentioned in previous discussion (see especially sections 3.4.3, 4.5.2, 7.1.3), separate treatment seems warranted due to the global importance of coastal fisheries and the critical links between coastal environments and the sustainability of these fisheries. Most marine and large lake capture fisheries across the world are based on coastal stocks. Furthermore, offshore fisheries often exploit stocks that depend on inshore areas during part of their development cycle (e.g. for nursery or feeding needs). Primary productivity processes in the coastal area are also fundamental to the food chain that supports fish stocks. Finally, coastal area space and resources are essential to the operation of various types of aquaculture activities.<sup>95</sup>

#### 8.1 Coastal Areas and Integrated Coastal Management

An estimated one quarter of the world's population lives in coastal areas. Humans continue to migrate towards the coast; the current population of 220 million people in coastal cities is projected to almost double in the next twenty to thirty years.<sup>96</sup> In some States, particularly island States, a very high percentage of the population lives on or near the coast. For example, an estimated 60 percent of Indonesia's population of 200 million lives in coastal areas.<sup>97</sup>

Coastal areas typically have both highly valuable and productive ecosystems and extraordinarily high levels of human economic activity. In many States, this has led to over-exploitation of coastal resources and severe degradation of the environment. In response, the integrated coastal management (ICM)<sup>98</sup> approach has been developed as a means of managing human interactions with coastal ecosystems in a holistic manner, seeking 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.<sup>99</sup> To support implementation of Agenda 21 in this area, FAO issued the *Integrated Management of Coastal Zones*,<sup>100</sup> which identifies actions that governments can take to manage coastal resources more effectively. The 1998 publication on *Integrated coastal area management and agriculture, forestry and fisheries* (the FAO ICAM guidelines) also 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.<sup>101</sup> Many States have adopted the ICM approach. A 1997 review of ICM efforts throughout the world concluded

<sup>95</sup> Clark (1992).

<sup>96</sup> Scialabba (1998). This publication is referred to hereafter as the "FAO ICAM guidelines".

<sup>97</sup> Ministry of State for Environment statistics, 1996.

<sup>98</sup> 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 recognized as a geographical entity even though the boundaries have not been demarcated.

<sup>99</sup> Agenda 21, chapter 17, programme area A, "Integrated management and sustainable development of coastal and marine areas, including exclusive economic zones".

<sup>100</sup> Clark (1992).

<sup>101</sup> Scialabba (1998).

that approximately 90 coastal States had been involved in at least 180 programmes, projects or feasibility studies in relation to ICM.<sup>102</sup>

Article 10 of CCRF also emphasises the importance of integrating fisheries management into coastal area management. It suggests that States:

- a) 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;
- b) include fisheries and their habitat in coastal resource management (CRM);
- c) take into account the fragile nature of the coastal ecosystems;
- d) involve the fishers and fisher communities in the decision-making processes;
- e) take into account rights of coastal communities in setting rights of access;
- f) set fisheries practices that avoid conflict among fishers; and
- g) establish conflict resolution mechanisms.

Articles 10.2, 10.3 and 10.4 address policy, regional cooperation and the implementation of coastal management processes.<sup>103</sup>

Volume 3 of the FAO Technical Guidelines for Responsible Fisheries, *Integration of fisheries into coastal area management*,<sup>104</sup> calls for 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 fisheries administrations have no control. For example, coastal fisheries may be severely affected 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. 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.

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 at the coast or on the coast, but never in 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

<sup>102</sup> Sorensen (1997).

<sup>103</sup> Paraphrased from FAO (1996a).

<sup>104</sup> Ibid.

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.<sup>105</sup>

The territorial sea (from the shoreline out to 12 nautical miles) is typically the area for coastal fisheries. Usually other zones are established both within and beyond the territorial sea for other management reasons — e.g. protection of subsistence fisheries and fixed fishing gear, delineation of restricted areas for mobile gear, and reduction of gear conflicts, to name a few.

## 8.2 Challenges Facing Fisheries Administrators in Coastal Areas

Administration of coastal fisheries is often faced with difficulties arising from the sheer number of people, coastal geography, and the multiple uses and activities common to coastal areas. The registration or licensing of subsistence fishers, and monitoring gear and landings requires considerable effort. Without checks and balances and consistent funding, the system can easily be disrupted.

Integrating fisheries management into coastal area management poses a number of challenges to fisheries administrators beyond those that arise in relation to the management of offshore fisheries. Attempts to meet these challenges have led to new approaches to management. 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.<sup>106</sup>

### 8.2.1 Stakeholder participation in ICM

In many parts of the world, central governments try to manage coastal fisheries without involving local communities. This approach has often resulted in failure due to the lack of participation by stakeholders, and has 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.<sup>107</sup>

For example, in the latter part of the 1970s and early 1980s, “the Philippines embarked on several initiatives towards community-based coastal management in response to the failures of more centralized approaches.”<sup>108</sup> The evolving concept of collaborative or joint

<sup>105</sup> Clark (1992).

<sup>106</sup> Christie and White (1997).

<sup>107</sup> Pomeroy (1995:149-150).

<sup>108</sup> Christie and White (1997).

stakeholder and government management of coastal activities is one of the powerful and important aspects of ICM today.<sup>109</sup>

### 8.2.2 Socio-economic status of coastal fishers and “open access”

In many coastal areas, rural artisanal fishers are the poorest of the poor – people who work in the sector as an “employment of last resort.” Depending mostly on the sea for their very survival, often lacking in formal education, and occupying the lowest end of the socio-economic ladder, they are among those most in need of assistance from the State. Families migrate to the sea and often settle unofficially in coastal areas, thus further increasing the pressures on stressed coastal resources.

The combination of the increasing numbers of subsistence fishers and the “open access” policies in many States contributes to increased over-fishing and over-capacity in coastal areas. It is essential to limit access to fisheries resources as part of a broad strategy of reducing fishing effort and developing alternate livelihood opportunities to encourage fishers to leave the sector.

As the FAO Technical Guidelines on Integration of fisheries into coastal area management points out:

A major cause of problems in coastal area management is the free and open access to coastal renewable resources. This has long been recognized as a problem in the fisheries sector, but also effects many other coastal resources, particularly water, space and primary productivity.

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.<sup>110</sup>

### 8.2.3 Coral reefs and mangrove nurseries

Another challenge not present in the offshore commercial fishery is linked to coral reefs and mangroves. These are the nurseries of tropical fisheries, the base for the lucrative 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 serve 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 1020 mt/km<sup>2</sup>/yr and the world’s coral reefs have been estimated at a value of approximately US\$345 billion per year.<sup>111</sup> However, losses are estimated at up to US\$100 000/km<sup>2</sup> for each of the 3 000 km<sup>2</sup> of pristine reefs destroyed annually.<sup>112</sup>

<sup>109</sup> 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.

<sup>110</sup> FAO (1995).

<sup>111</sup> Caesar (1996:16).

<sup>112</sup> World Bank (2000).



#### 8.2.4 Non-fisheries interests

The desire of industries involved in transportation, trade, tourism and other coastal development initiatives to locate near the sea increases pressure on the coastal ecosystem. These other interests typically have investment capital that far exceeds that of subsistence fishers, such that fisheries management often receives a lower priority. As noted in the FAO Technical Guidelines on *Integration of fisheries into coastal area management*, the fisheries agency, as representatives of fishers, needs to ensure a strong and appropriate fisheries input into multi-sector discussions on coastal area development.

#### 8.2.5 Political context

As discussed earlier in the paper (Section 3.4), 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:

- if the political will is not present, there will not be successful implementation of coastal fisheries management and MCS systems; and
- provision must be made for the devolution of management responsibilities to coastal communities and other stakeholders.

#### 8.2.6 Research and information

The cross-sectoral scope of ICM and its highly participatory nature generate a need for considerably more research to make informed 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 stakeholders<sup>113</sup> 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 opportunity 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 resource assessments to determine priorities and timing of corrective action;

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<sup>113</sup> These issues apply equally to management issues on lakes and rivers where multi-sector development and potential conflicts can arise.

- 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;<sup>114</sup>
- h) assessments of coastal agriculture, the use of pesticides and the extent of 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 beneficial and conflicting interactions with fisheries management;
- k) studies of coastal/subsistence fisheries activities versus commercial fisheries to show the potential interaction between the two 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
- m) assessments of destructive fishing activities assessments which can be used to provide information for MCS needs for either education (a preventive approach to MCS), or for a more forceful and deterrent approach to MCS.

### 8.3 The Role of Fisheries MCS in ICM

In order for traditional fisheries MCS to be integrated into MCS systems for other coastal activities, fisheries administrations (including personnel responsible for MCS) should be involved in the preparation of ICM programmes. Furthermore, relevant information needs to be shared among all agencies involved in ICM, programme implementation needs to incorporate the preventive MCS elements discussed below, and enforcement activities need to be closely coordinated between the agencies operating in coastal areas.

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 omitted, or added at a later stage for enforcement purposes only. Inclusion of MCS principles at the very outset will:

- a) result in a better understanding of the requirements for MCS activities and community-accepted legislative measures to support the management plan;
- b) encourage community participation in actual implementation of the plan, e.g. through educational seminars at schools, local community clubs, local fishers meetings, coast and reef watch networks, and observer programmes; and therefore
- c) encourage voluntary compliance with the plan.

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<sup>114</sup> This point is not the subject of this paper, but it is an influencing factor in CRM that can have impacts on coastal MCS.

An example of participatory involvement in management and preventive MCS is the USAID Coastal Resource Management Project (CRMP) in the Philippines, shown as Profile 9.

Coastal MCS can be seen as one of the key mechanisms for achieving integrated implementation of participatory management plans. Inclusion of an MCS perspective into the educational, public awareness and outreach elements of an ICM programme will encourage most people to comply with the laws and ICM plans voluntarily. Policing aspects of the MCS system can then be focused on a smaller group of persistent offenders.

The South African experience in combating abalone poaching (described in Profile 10) shows both the benefits that can flow from cooperation among enforcement agencies and local communities and the inherent limitations of a primary focus on the policing element of coastal MCS. As is clear from the conclusions, involving the community from the start in developing proactive and preventive strategies, and addressing the root causes of the problem, are essential to achieve long-term success.

### ***Profile 9. Coastal resource management in the Philippines – CRMP***

The key elements of this CRM project were:

- education of communities in management processes through public awareness campaigns, seminars and specific technical training;
- 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;
- scientific verification of the resource mapping exercises, where possible;
- 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 coastal resource management opportunities, constraints and issues, and on this basis formulating recommendations for the **management plan**;
6. monitoring and evaluation on the basis of CRM plans finally adopted by communities;<sup>115</sup>
7. developing and implementing fisheries and coastal management legislative instruments to support the implementation of CRM plans;
8. establishing and training coastal law enforcement teams and bringing them into operation;
9. declaring, monitoring and protecting marine fisheries sanctuaries and protected areas;
10. placing mangrove areas under community conservation management;
11. enforcing municipal waters boundaries; and
12. establishing environment-friendly enterprises to provide alternative livelihoods<sup>116</sup>.

The project demonstrated the importance of stakeholder participation. This should be encouraged in three key ways – viz.: **consultation** for input into management planning; **involvement** in the planning; and **empowerment** and full participation of the community at all levels of management.

<sup>115</sup> Walters, Maragos and White (1998).

<sup>116</sup> Courtney and White (2000).

## ***Profile 10. Participatory MCS – the South African experience***

### **Background<sup>117</sup>**

In 1994 poaching of abalone rocketed along the Southwest coast of South Africa. This was partially related to the transition of the State 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 it 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. The rapid escalation of the problem meant that it was no longer the sole concern of Marine and Coastal Management (MCM), which did not have the capacity to deal with major local and international criminal networks. In response to outcries from coastal communities and environmental organizations who were angered by the rapid destruction of the resource and the increased lawlessness in the areas, a cooperative 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 commenced in February 1999 and lasted for an initial period of six months. A second operation (Neptune II) was launched when the termination of the first operation resulted in a massive increase in illegal fishing.

The geographical focus 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 destruction 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 organizations (such as local authority enforcement officers and a community-based organization, Sea Watch). Personnel from other areas in South Africa were brought in to assist with the operation and officers were rotated regularly to prevent illegal fishers from getting to know them and then 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.

### **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 several positive consequences, including: a) increased coordination and cooperation 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; b) a drop in general crime in the area of operation; c) an increased feeling of security in local communities and an improved sense of trust between fishers and the SAPS; and d) creation of a strong deterrent to illegal fishing.

A number of negative aspects were also identified by the authorities and local community members. These included: a) the short time frame of the operation (subsequently addressed by reinstating the operation as Operation Neptune II); b) reduction in supply and consequent increased black market price of abalone; c) adoption by poachers of more sophisticated ways of operating (more organized networks, movement into other fishing areas); d) insufficient fines and jail sentences imposed by the courts; e) insufficient training in of Neptune taskforce members in marine species identification and handling of confiscated abalone or rock lobster; f) inadequate funding; and g) insufficient assistance to allow local people 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.

### **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 affected 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 it: a) is implemented with a long-term vision; b) works closely with local community structures, fishers and fishing groups; and c) is closely linked with a serious programme to improve equitable access rights to inshore resources for local communities.

<sup>117</sup> Source: Hauck and Hector (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](http://www.uct.ac.za/depts/sjrp/neptune)).

## **8.4 Establishing an MCS System for Coastal Waters**

This section discusses four basic steps to establish MCS systems for coastal waters:

- a) assessing the relevant influencing factors;
- b) establishing appropriate inter-agency mechanisms;
- c) incorporating preventive MCS approaches in CRM planning; and
- d) evaluating various options for coastal MCS and combining these appropriately.

### **8.4.1 Step One: Assessment of the influencing factors**

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 define the “umbrella” under which the MCS system will operate.

For example, the review should assess whether or not:

- a) a policy of “open access” is ensured through the current legal system, which places limitations and pressures on MCS activities (without limited entry, the promotion of “exit” schemes will fail);
- b) devolution of authority will enable subsistence fishers to be registered or licensed to assist in obtaining data for sustainable and responsible fisheries management;
- c) the re-application for fishing licences, gear, and fishers can be done locally;
- d) there is a national data information system for linkage with the local system being established for CRM, providing feedback for local management purposes;
- e) there are national guidelines for the marking and identification of fishing vessels to which the CRM system must link;
- f) there are national standards for staffing, training and MCS operations that the local CRM MCS system can access, or with which it must comply;
- g) there is a national policy regarding participatory management; and
- h) policies exist regarding fishing zones, inter-agency mechanisms, and their potential impact on the MCS design.

### **8.4.2 Step Two: Inter-Agency Mechanisms**

The next challenge for coastal area management is to address the mix of overlapping mandates of the agencies involved in the coastal area. The positive interaction of local agencies will be critical to the success of the coastal MCS programme.

As pointed out in the 1998 FAO ICAM guidelines, it is in the interests of fisheries sector institutions to take the initiative in coastal area management processes. There are a number of advantages to be gained through such initiative, including the following.

- a) Fisheries sector institutions would be able 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) As an extension of this, fisheries administrations would be able to influence decisions 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 subsistence fishers.
- c) Sector institutions would also be able to build alliances with other institutions or interest groups around issues of common interest that may be politically important in protecting fisheries' interests.

ICM requires inter-agency mechanisms to discuss and resolve conflicts of interest at the local level, and often at higher levels as well. Such conflicts arise from the overlapping mandates of different branches of government with regard to coastal areas (industry, transportation, tourism, customs, security, fisheries, etc.). They often first become evident in two ways – namely: area jurisdiction and registration/licensing of fishers, boats and gear.

In Sri Lanka, Special Area Management (SAMs) Committees on which local stakeholders are represented have proved very successful for lagoon and coastal management. Such Committees can form the basis for cooperative efforts with respect to licensing and registration of coastal fishers, conflict resolution, decision-making on development activities (including for fisheries), and education on management processes.

#### **8.4.3 Step Three: Preventive MCS in CRM planning**

CRM planning should encourage voluntary compliance by coastal fishers through various means. First, MCS should be introduced as part of the participatory community resource assessment exercises. These exercises should identify the need to protect the resources as they are mapped, and any problem areas needing special attention. This establishes MCS as an activity integrated with management.

Second, MCS requirements should be taken into account in the development of a community-based data system for management of the coastal area, such as a means of identifying fishers, vessels and landings. MCS requirements can be highlighted during the planning process through education seminars and workshops to demonstrate their role in the management process.

Third, strengths, weaknesses, opportunities and threats (SWOT) sessions should address development of an appropriate and acceptable MCS system for the coastal area. The MCS information requirements, equipment, and staffing needs should be considered, along with the idea of acceptable limits for quotas, zones and methods to address subsistence fishers.

Finally, training requirements need to be identified for MCS in coastal areas, either for community-based monitoring programmes (e.g. reef watch or coast watch) or for integrated, inter-agency law enforcement activities. Criteria for personnel to provide this training and for selection of trainees must be developed.

#### **8.4.4 Step Four: Coastal MCS options**

There are several options for MCS strategies in coastal areas that warrant discussion between the government and the fishers, and other interested parties.

##### ***Licensing/registration***

As noted earlier, failure to license or register subsistence fishers creates a major gap in information on those using the resources, the effort, and the landings. The absence of a licensing system is often justified on the basis of some or all of the following considerations:

- a) open access policies of governments;
- b) the difficulties of processing the very large numbers of operators involved in subsistence fisheries;
- c) the idea that subsistence fishers have an inherent right to continue fishing under the concept of “employment of last resort;”
- d) illiteracy among subsistence fishers; and/or
- e) the inability of subsistence fishers to pay for licences.

For management and MCS purposes, however, licensing or registration is essential to determine numbers of fishers, boats and gear. Otherwise it will not be possible to address fishing over-capacity in most coastal areas. Where there is devolved fisheries management authority, licensing (with fees as appropriate to the capacity of fishers to pay) can be implemented at the local level. Alternatively, registration without fees can be implemented to serve both fisheries management purposes and future social assistance programmes.

If fishers can see a 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. A system could be established through the local communities, which would be more likely to ensure that the registrations were correct if the area in question were to be set aside for their exclusive use and management.

A photograph of the fisher with his or her address and age, and a simple vessel licence containing a photograph and details of the vessel size and propulsion equipment, could be utilized for this basic registration process. In addition to fisheries management the benefits of such a system often include a means of identification for the individual (who may have no other identification) for such purposes as hospital services, social assistance, certification of professional status as a fisher, etc.

##### ***Data collection***

It is also easier to develop and verify a data collection system (see Section 4.5.2) that includes information on fishing effort and landings if this responsibility is devolved to 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 for data input and analysis and to facilitate training. Many States have effectively used a network of part-time data collectors at the landing sites, especially where special coastal landing stations are designed with facilities and services that



will attract users (e.g. ice, boat repairs, buyer stands, etc.). Data systems for coastal resource management need not be complicated, but they must be accurate.

### ***Community involvement in MCS***

Coastal MCS systems need to be developed with regard to growing trends towards devolution of government authority and community participation in management. Options already alluded to in this and earlier chapters (sections 3.3.3, 3.4.3, 4.5.2, 5.2, and 7.1) include:

- a) introducing education and public awareness component(s) of MCS to promote voluntary compliance;
- b) considering MCS options that directly support conservation of coastal resources and including these in the coastal resource management plan;
- c) ensuring that communities are consulted during the process of drafting local legislation, and by-laws and ordinances needed to implement the management plan; and
- d) 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.

Individuals participating in watch programmes should not have 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 watch programmes be included in legislation.***

### ***Equipment***

The selection of MCS equipment for coastal MCS varies widely. Basic equipment for coast watchers would include:

- binoculars;
- radios;
- identification vests;
- life vests (if at-sea duties are included);
- hand-held GPS;
- transportation;
- standardized report forms; and
- a base station for communications and back-up support.

Coastal MCS requirements in transportation could include small patrol vessels — either speedboats or rigid-hulled inflatables. Vessels of 7-9 m are often required for inshore waters while vessels of 18-25 m are more appropriate for the near-shore to commercial offshore seas.

A definite “must” for equipment in coastal areas is an appropriate radio and telecommunications system for contact with MCS assets and resources to ensure back-up support. ***No personnel should be permitted to go into the field without appropriate back-up support available and reliable 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 is the hand-held

global positioning system (GPS). GPS enables field personnel to determine 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 established by the management plans. A small coastal radar system in Senegal provided community leaders and government officials with inter-linking coastal radar to protect the six nm coastal zone. Officials noting an intruder would seek assistance from a local 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 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.<sup>118</sup>

The Race Rocks Marine Protected Area in Canada has provided an innovative experience in MCS technology by using *an interactive web page* to promote public awareness. The web page allows the internet visitor to activate *a real time remote camera* on location to actually view various sites within the park. The Department of Fisheries and Oceans has received calls from visitors to the web page to report illegal activities in the area.<sup>119</sup>

Coastal area MCS system can also 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 use of computer technology and GIS systems noted earlier in the paper (Section 6.6) are also applicable for coastal management and operations. However, *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 to acquire the latest technology.*

### *Staff and training*

As with all MCS systems, a paramount requirement for coastal MCS is appropriately selected and trained staff. MCS systems can only be successful through the involvement of professional staff with integrity, enthusiasm and the ability and willingness 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 an array of administrative duties. Training courses must be developed to address each coastal management situation in a participatory manner.

## **8.5 Safety-at-Sea and Coastal MCS**

Safety-at-sea in the context of fishing operations is addressed as part of Article 8 of the CCRF and its associated Technical Guidelines.<sup>120</sup> Problems of fisher safety are increasing in many States as effort is transferred to offshore zones. Local fishers “...are now taking more

<sup>118</sup> 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.

<sup>119</sup> International News and Analysis on Marine Protected Areas, Vol. 2, No. 5 November 2000.

<sup>120</sup> FAO (1996b).

risks by ranging beyond their ‘normal’ fishing grounds and going farther 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.”<sup>121</sup>

One factor driving this trend is the depletion of resources in traditional inshore grounds in the face of mounting fishing pressure and other non-fishing activities within the coastal zone that lead to pollution and habitat degradation. Limited access to coastal areas due to conflicts between coastal resource interest and user groups, including different fisher groups, has resulted in fishers going farther offshore with increased safety risks. Finally, domestic fishing interests may push for expansion of domestic fleet operations to displace foreign fishing operations and/or to access under-exploited marine resources.

### 8.5.1 Strategy and cost

Annual mortality rates reaching one (1) *percent* are impressing on fishers and fisheries administrators the need for greater attention to safety. However, for many tropical fisheries the high cost of “northern” sea safety programmes are not realistic. Northern solutions are based on heavy seas, high labour costs and low capital costs that result in heavily constructed vessels and extensive safety gear. In the tropics, the opposite is sometimes true, the seas are not as heavy and fishers generally 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 actions that they can take to improve their safety at sea at a *reasonably low cost*, there is a good chance the recommendations will be followed.

The fundamental strategy for safety at sea relies on three approaches, namely:

- a) prevention;
- b) survival and self-rescue; and
- c) search and rescue.

Methods, equipment and techniques exist to facilitate use of each of these approaches in artisanal and smallcraft fisheries. Costs are not as prohibitive as “northern” approaches, can be supported by tropical fishers, and can work to reduce fatal incidents.

### 8.5.2 Institutional supporting structures

Institutional supporting structures that can assist in the implementation of such approaches include: mutual insurance groups, fisher’s sea safety committees and communication links with MCS systems.<sup>122</sup>

#### *Mutual insurance groups*

The idea behind mutual insurance groups is that it is in the interests of the whole group to ensure compliance with sea safety standards and procedures. Any individual loss will affect the premiums for the entire group. Peer pressure thus ensures compliance with insurance requirements for safety equipment and good safety-at-sea practices.

<sup>121</sup> Johnson (1999).

<sup>122</sup> Ibid. p. 4.

### *Fishers' sea safety committees*

Sea safety committees are based on fishers' self-help groups and can fulfil a number of important functions. They can:

- a) act as a strong lobby group to press for compensation for loss of equipment caused by industrial vessels;
- b) use members' dues for search and rescue costs;
- c) support sea safety training and procurement of safety equipment for small vessels, such as basic communications equipment, etc.; and
- d) link with MCS Systems to augment Search and Rescue (SAR) operations.

### *Links with MCS systems*

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 rescues. In some instances it may be possible to mobilise Navy or Coast Guard assets to assist with rescue missions, and this again is an area where inter-agency coordination is important. However, military and policy units are often not available on a permanent stand-by basis for SAR operations within coastal fisheries. MCS assets, on the other hand, are often at sea during the same periods and in the same areas as fishers. By default, the fisheries MCS units will be called upon for SAR duties as fishers become better equipped with safety and communications equipment, and as the level of professionalism within the units themselves increases through training and practice.

### **8.5.3 National, regional and international responsibilities**

Government agencies responsible for safety at sea can encourage greater levels of industry responsibility by legally requiring fishers to have more up-to-date training and safer onboard equipment as part of vessel registration procedures.

In addition, it is suggested that the following measures be considered:<sup>123</sup>

- a) forming national safety- at-sea services for commercial *and* artisanal fishers to include relevant government agencies, NGOs, and representatives of fishers and vessel owners;
- b) developing of a national monitoring capability to analyse incidents and recommend practices to address concerns;
- c) developing instructors' courses to raise awareness for safe practices at sea for fishers, boat builders, owners and rescuers;
- d) developing effective marketing for safety equipment and through fishers groups promoting the acquisition of this equipment;
- e) ensuring the integrity of vessel inspection schemes;
- f) assigning full-time professionals to a national safety-at-sea programme;

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<sup>123</sup> Ibid. p.7.

- g) developing SAR capabilities in regions and locally where possible; and
- h) establishing a continuing national programme for Safety-at-Sea education.

National efforts can be encouraged and assisted through the sharing of fishing vessel safety information and training experiences on a subregional or regional basis. Safety-at-sea is thus another area in which States can cooperate for mutual advantage on MCS activities (see sections 3.2.7 and 4.1).

Where possible, IMO, FAO and other interested organizations can also assist by:

- a) developing and presenting guidelines for fisher safety-at-sea;
- b) developing and establishing minimum safety equipment for various sized fishing vessels where none currently apply;
- c) developing and facilitating training of fishers at all levels in the use of safety-at-sea equipment and practices; and
- d) providing a pool of information, both written and through electronic means for safety instructors in developing States for access by fishers, boat owners and suppliers of fishing apparatus as part of a global awareness and promotion of safety-at-sea practices.

### ***Vessel identification in coastal waters***

As remarked earlier (Section 6.2), appropriate marking systems are also important for safety-at-sea operations in that they allow for rapid vessel identification. The FAO Committee on Fisheries has approved the Standard Specifications for the Marking and Identification of Fishing Vessels for adoption by States on a voluntary basis. Reference has also been made to the very effective vessel marking and identification system applied in Malaysian coastal waters, which has achieved an International Standards Organization (ISO) 9000 rating. Further information on both the FAO specifications and the Malaysian system are given in Annex J.

## **8.6 Synopsis of Coastal MCS Considerations**

This chapter has drawn attention to the following major points that should be taken into account in the development and operation of coastal MCS systems.

- a) There is a need for the integrated coastal management (ICM) approach as a means of managing human interactions with coastal ecosystems in a way that seeks balance with the competing demands of different user groups on coastal resources (including fisheries resources) so that resource benefits are optimized but coastal environments are not degraded.
- b) There is a movement away from reliance on centralized management towards integrated collaborative management of coastal resources by government and stakeholders;
- c) It is becoming ever more apparent in many places that limited access/entry management is required to control access and to allow for the development of “exit strategies” to reduce pressures on over-exploited coastal resources.

- d) Community involvement in MCS system design and other decision-making on MCS operations will encourage voluntary compliance as a “preventive” approach, as opposed to a punitive approach that focuses on deterrence through traditional law enforcement.
- e) Advancements in technology and reduced equipment costs permit more effective MCS strategies in the coastal areas. However, equipment options must be carefully weighed in terms of the real needs of the area, and not by the desire to employ the latest (and often most expensive) technology.
- f) As with all MCS systems, coastal MCS can only be successful through the involvement of professional staff with integrity, enthusiasm and the ability and willingness to learn.
- g) Fisher safety-at-sea concerns can often be effectively addressed through appropriate coastal MCS arrangements.

## ANNEX A

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**ANNEX B**  
**MCS COMPONENTS AND EQUIPMENT COSTS**

Table B1. 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				
<b>By vessel</b>	Sighting and inspection	2-3 per day/officer <sup>a</sup>	High	High	Med.	Med.	Low	High	Visual 300 nm /hour radar 600 nm	Yes
<b>By air</b>	Sighting and photography <sup>b</sup>	200-300 per flight	High	Low	None	Low <sup>c</sup>	Low	High	3500-4800 nm/hr	No <sup>d</sup>
<b>Shore based controls</b>	Coast patrols, market checks, port inspections	3-5 per day	None	High	High	High	Med.	Med <sup>e</sup>	0-20 nm/hr	Yes
<b>Observers at sea</b>	Continual observation <sup>f</sup>	One vessel per day	Med./High	High	High	High	High	High on assigned vessel	High for assigned vessel	No
<b>Dockside monitors</b>	Landing checks	3-5 per day <sup>g</sup>	None	Low	High	Med.	Med.	Med.	None	No
<b>VMS</b>	Periodic monitoring of licensed vessel positions and activities <sup>h</sup>	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.
<b>Satellite imagery</b>	Periodic monitoring of all contacts in a set area	All contacts at time of scan	High	None	None	Low	Med. <sup>i</sup>	High for unlicensed if linked to vms	Complete for scan	No – as per air surv.
<b>Radar</b>	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
<b>Real time video</b>	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
<b>Coast/reef watch</b>	Sightings at sea	Contacts in 3nm of patrol line	Med.	Low	Low	Low	Med.	High if in range	18 nm/hr	No

<sup>a</sup> This depends on the fishery, bycatch and method of capture, e.g. purse seine inspections can be more rapid than trawlers.

<sup>b</sup> Effectiveness increased if night time infrared tracking and night photography is available.

<sup>c</sup> 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.

<sup>d</sup> Secondary information or possibly from helicopters.

<sup>e</sup> Depends on thoroughness and time involved in port inspection.

<sup>f</sup> Effectiveness dependent upon technical capability of observers, for GPS, catch estimates, processing conversion factors, storage estimations, and time observer works.

<sup>g</sup> Dependent upon the method of offloading, individual boxes and scales or by pumping and weigh outs in holding tanks.

<sup>h</sup> The capability for electronic catch reporting could enhance the capability of this component.

<sup>i</sup> Depends on frequency of scans.

Table B2. Advantages and disadvantages of MCS components

Key MCS Component	ADVANTAGES	DISADVANTAGES
<b>By Vessel</b>	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.
<b>By Air</b>	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.
<b>Shore-based controls</b>	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.
<b>Observers at sea</b>	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.
<b>Dockside monitors</b>	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.
<b>VMS</b>	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.
<b>Satellite Imagery</b>	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.
<b>Radar</b>	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.
<b>Real time video</b>	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.
<b>Coast/reef watch</b>	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 CB CRM educators for community liaison and preventative approach for MCS. Low cost.	<b>Need legal protection against harassment, adverse and negative reaction of public and fishers.</b> Needs selling to community that "watchers" are on side of the community conservation.

## **B1. MCS EQUIPMENT COSTS\***

### **B1.1 Air Surveillancer**

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 this service and pay an hourly rate, which can be as low as US\$400/hour or as high as US\$3000/air hour depending on the aircraft, patrol time and equipment.

The countries of the South Pacific Forum Fisheries Agency 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 based in 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 by the United States Drug Enforcement Administration.

A few countries have their own fisheries surveillance aircraft, but these are expensive to procure, operate, and maintain. 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.

### **B1.2 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.

### **B1.3 Patrol Vessels**

Vessels come in various sizes, including very large naval units (for which operational costs are unavailable) for offshore and high seas patrols. Nearshore and coastal patrols more commonly would use commercially available steel or fibreglass vessels. The following table shows costs of vessels used in the Indonesian MCS system.

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\* For a fuller treatment of this topic, see Kelleher (2000).

**Table B3. Vessel costs per unit**

VESSEL TYPE	PROCUREMENT/ UNIT	COST/DAY		COST/MONTH	
		ltr/hr & 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\$ 1 416
22 m Fibreglass (twin 680 hp engines)	US\$ 560 000	12 hr x 240L x \$0.20	US\$ 576/day	12	US\$6 912
7-9 m Fibreglass (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\$1 280
<b>Notes:</b> 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.					

#### **B1.4 Safety Equipment**

This is a package that can also vary. Using the Indonesian model for COREMAP, it could include the following items:

SSB/HF radios @ US\$2 900/unit  
 VHF Base radios @ US\$ 1 430/unit  
 VHF Hand held radios @ US\$700/unit  
 GPS hand held @ US\$ 500/unit  
 Binoculars @ US\$ 220/unit  
 Binoculars – night vision @ US\$ 1 700/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

#### **B1.5 Office Equipment**

Major items include computers (ca. US\$ 3 000/unit with peripherals) and photocopiers (up to US\$5 000 each for high-end units).



## **B1.6 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.

## **B1.7 New Technology**

VMS is being utilized with greater frequency as a tool for MCS in many countries and RFMOs. Examples include: Argentina; Australia; Canada; European Union (EU); Iceland; Japan; Malaysia; Maldives; New Zealand; Norway; Peru; South Africa; the United States of America; 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 VMSs are being used in conjunction with other tools such as radar, forward looking infrared systems and satellite imagery.

VMSs are becoming more sophisticated, and costs will vary over a wide range. Base stations can be established from around US\$ 50 000 upwards, and onboard units run from US\$ 3 000 to 5 000/unit. 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, which would automatically become 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 legal issues emerging with the use of new technology, and it is recommended that the CCRF guidelines, and other FAO legal publications be consulted prior to procurement to ensure that a State can maximize the benefits from such equipment.\*

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\* E.g.: Molenaar and Tsamenyi (2000); Cacaud (1999).

## 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 questions listed in the following table give an indication of some of the issues that are useful to consider when reviewing national regulatory systems in order to strengthen MCS frameworks. 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 State concerned, the particular circumstances of the fisheries management in that State, the international or regional agreements to which that State is a party, and whether or not these agreements have entered into force.

The references cited in the right column of the table are intended to direct fisheries administrators to relevant articles in recent international documents. The CCRF is voluntary and neither the FAO Compliance Agreement (CA) nor the UN Fish Stocks Agreement (UNFSA) is yet in force. Even when these two Agreements enter into force, they will not be applicable in many situations. This is because the CA relates to fishing on the high seas whilst the UNFSA applies to straddling and highly migratory fish stocks. Provisions of the CCRF and the two Agreements nevertheless serve as useful guides on how national regulatory systems can be strengthened to facilitate and develop MCS.

**Table C1. Reviewing national regulatory systems**

ISSUES TO BE CONSIDERED	REFERENCES AND NOTES
<p><b>1. Scope of legislation</b></p>	
<p>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?</p>	
<p>(a) fishing related activities such as transshipment and bunkering, both within the maritime zones of the coastal State and on the high seas;</p>	<p>UNFSA Article 18(3)(f) and (h).</p>
<p>(b) the activities of mother ships and fishing support vessels;</p>	<p>CA Article 1(a). See also the distinction between “fishing operations” and “fishing activities” in the CCRF.</p>
<p>(c) the fishing activities of national fishing vessels even when beyond the area of jurisdiction of the State;</p>	<p>CA Article III generally, UNFSA Article 18.</p>
<p>(d) the fishing activities of national fishing vessels of less than 24 metres in length;</p>	<p>CA Article III(1)(b).</p>
<p>(e) the activities of masters, officers and crew of national fishing vessels;</p>	
<p>(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;</p>	<p>UNFSA Part VI generally.</p>
<p>(g) measures to minimize pollution and waste.</p>	<p>UNFSA Article 5(f).</p>
<p><b>2. Collection of information</b></p>	
<p>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?</p>	<p>CA Article III(7). This should include information regarding operations, catches, landings and mother ships and support vessels.</p>
<p>2.2. Must fishing vessels and fishing gear be marked for identification in accordance with a uniform and internationally recognized marking system such as the FAO “Standard Specifications for the Marking and Identification of Fishing Vessels”?</p>	<p>See UNFSA Article 18 which specifies duties of the flag State. CA Article III(2).</p>

<b>ISSUES TO BE CONSIDERED</b>	<b>REFERENCES AND NOTES</b>
2.3. Records of fishing vessels	
a) Is the fisheries administration under a duty to maintain a record of fishing vessels entitled to fly the national flag and authorized 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 FAO to the extent practicable.
b) Are fishers under an obligation to provide vessel-related data for standardizing 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.
c) 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 vessel, changes in ownership etc.
2.4. Reporting	
a) 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 subregional, regional and global standards for collection of such data?	UNFSA Article 18(3)(e).
b) 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?	
c) 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 Annex 1.

ISSUES TO BE CONSIDERED	REFERENCES AND NOTES
2.5. Verification	
a) Is the national fisheries administration under an obligation to verify fisheries data, either independently or in conjunction with subregional or regional fisheries management organizations?	CCRF 7.7.4.
b) Is failing to maintain an accurate record or failing to report or misreporting an offence that attracts adequate penalties to deter the offence?	
c) Is it a legal requirement for national and foreign fishing vessels to install automatic location communicators (ALCs) or vessel tracking units (VTUs)?	UNFSA Article 18(3)(g)(iii) and Annex 1(6)(a). See also CCRF Article 7.7.3.
d) 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?	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.
e) 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?	
f) Is it an offence to destroy, damage, render inoperative or otherwise interfere with the operation of an ALC?	
<b>3. Information, exchange and dissemination</b>	
3.1. Data protection	UNFSA Article 10(f) & Annex 1 Articles 1(1) 7(1)
a) Are there legally enforceable provisions protecting the confidentiality of commercially confidential data, including requirements to restrict access to it?	CA Articles VI(8)(a)
b) Are there sanctions for the unauthorized disclosure of confidential information?	CCRF Articles 7.4.4, 7.4.7 & 12.4
3.2. Information exchange	
a) 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 organizations?	UNFSA Article 14(1) and Annex 1(1).
b) Does the legislation empower the fisheries administration to publish and disseminate fisheries data and information in an aggregated form?	

ISSUES TO BE CONSIDERED	REFERENCES AND NOTES
<p>c) Is the national fisheries administration under an obligation to exchange relevant information, including evidentiary material, with other States, regional fisheries bodies and international organizations (e.g. FAO) in accordance with applicable international agreements?</p>	<p>CA Articles V and VI.</p>
<p><b>4. Management plans</b></p>	
<p>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?</p>	<p>CCRF 7.1.1.</p>
<p>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?</p>	
<p>4.3. Does the legislation prohibit the granting of authorizations for fishing or related activities which would undermine the effectiveness of national, regional or international fisheries, management or conservation plans?</p>	
<p><b>5. Licensing of fishing</b></p>	
<p>5.1. Flag State responsibilities</p>	
<p>a) Are national vessels prohibited from (a) fishing or undertaking fishing-related activities on the high seas without authorization from the flag State, and (b) contravening the terms of the authorization?</p>	<p>CA Article III(2) and UNFSA Article 18(3)(b)(iii).</p>
<p>b) Are national vessels fishing on the high seas obliged to carry their authorization on board and to produce it for inspection by duly authorized persons?</p>	<p>UNFSA Article 18(3)(b)(iii).</p>
<p>c) Can an authorization to fish on the high seas be suspended on the basis of extra-jurisdictional infringements of international conservation and management measures?</p>	<p>CA Article III(5).</p>
<p>d) Are national vessels prohibited from fishing in areas under the jurisdiction of other States without authorization by the coastal State concerned?</p>	<p>UNFSA Article 18(3)(b)(iv).</p>
<p>5.2. Coastal State responsibilities</p>	
<p>a) Is it prohibited to issue fishing authorizations if the vessel is not registered in a national or regional or fishing vessel record?</p>	

ISSUES TO BE CONSIDERED	REFERENCES AND NOTES
b) 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?	
c) Are the conditions imposed on licensed fishing vessels appropriate to promote proper fishing conduct and compliance with conservation and management measures?	
d) 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?	
e) Can fishing authorizations be suspended, amended or revoked to protect the environment or a fish stock?	
<b>6. Enforcement powers</b>	
6.1. Authorized officers	See UNFSA Articles 21 and 22.
a) Does the legislation make it clear who is authorized to enforce fisheries legislation (e.g. fisheries officers, police, navy, environmental conservation officials, etc)?	
b) Does the law provide for the appointment of individuals from coast-dependent communities to monitor compliance with fisheries laws (usually without enforcement powers)?	
c) Are inspectors and observers required to carry appropriate identification?	
d) Must inspection vessels be clearly marked to indicate that they are in government service?	
e) Does the legislation clearly specify the pre-conditions for the use of enforcement powers in various maritime zones?	e.g. In some circumstances “clear grounds”, are required, in others “reasonable grounds” etc.
f) Are fisheries and naval officers empowered to engage in hot pursuit?	See UNCLOS Section 111.
6.2. Inspection	
a) Does the law facilitate inspections (e.g. by requiring landings to take place only at specified landing stations and transshipments in designated areas)?	
b) Does legislation permit the establishment of a system of observers on fishing vessels and grant such observers appropriate powers and protection?	

ISSUES TO BE CONSIDERED	REFERENCES AND NOTES
c) 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?	
d) 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?	
e) Are inspectors granted appropriate powers to inspect not only vessels, but also documents, log books, catches, equipment etc.?	
6.3. Boarding	
a) Are the preconditions which must be met before a vessel can be boarded in each maritime zone, clearly specified?	
b) Have basic procedures for boarding and inspection been established?	
c) 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	
a) Do authorized 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?	
b) Is provision made for releasing foreign fishing vessels and crews arrested in the EEZ on the posting of a reasonable bond or other security?	See UNCLOS Article 73(2).
c) Do authorized 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?	
d) Is the master and the crew of the vessel under a duty to cooperate with and assist in the inspection of a vessel?	
e) Is it an offence to obstruct, intimidate or interfere with authorized officers (including fisheries officers, officers enforcing environmental laws, observers on board vessels and individuals from coastal communities participating in coastal MCS programmes) in the performance of their duties?	



ISSUES TO BE CONSIDERED	REFERENCES AND NOTES
f) Is it an offence to fail to comply with a lawful instruction of a fisheries officer?	
<b>7. Offences</b>	
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 subregional, 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?	
<b>8. Evidentiary provisions</b>	
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.

<b>ISSUES TO BE CONSIDERED</b>	<b>REFERENCES AND NOTES</b>
<p>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?</p>	<p>Examples of such presumptions include:</p> <ul style="list-style-type: none"> <li>(a) that the ALC is accurate and functioning correctly;</li> <li>(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</li> <li>(c) that a vessel found fishing without appropriate authorization is undermining the relevant conservation and management measures in that area.</li> </ul>
<p>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?</p>	<p>For example, the law may provide that instead of bringing VMS operators to 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.</p>
<p>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?</p>	
<p><b>9. Penalties</b></p>	
<p>9.1. Does the law provide for appropriate administrative penalties in addition to criminal penalties?</p>	
<p>9.2. Does the law allow for the “compounding” of offences (i.e. the payment of specified fines in order to avoid prosecution)?</p>	
<p>9.3. Are the sanctions sufficiently severe to be effective in securing compliance and to discourage violations wherever they occur?</p>	<p>CA Article III(8). CCRF Article 8.2.7.</p>

ISSUES TO BE CONSIDERED	REFERENCES AND NOTES
9.4. Will convicted offenders be deprived of the benefits accruing from their illegal activities?	UNFSA Article 19(2); CA Article III(8); CCRF Article 8.2.7.
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 authorizations to service masters or officers on such vessels?	CCRF Article 7.7.2.
9.7. Can licences be refused, suspended, varied or cancelled in response to a serious violation or persistent violations?	CA Article III(8).
<b>10. Other matters</b>	
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 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

### REGIONAL MCS

#### THE SOUTH PACIFIC FORUM FISHERIES AGENCY EXPERIENCE

#### **Introduction**

The Pacific Islands region (30 million km<sup>2</sup> of ocean and 23 countries and territories) is host to the most productive tuna fishing grounds in the world, supplying over 50 percent of the world's canning tuna. The total land area of 0.5 million km<sup>2</sup> (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 km<sup>2</sup> and 26 km<sup>2</sup> of land respectively. However, on a global scale, the exclusive economic zones (EEZs) of the small island States of the region are large, covering 19.8 million km<sup>2</sup> (excluding Australia and New Zealand). Kiribati's zone covers almost 3.6 million km<sup>2</sup> and that of the Federated States of Micronesia, 2.9 million km<sup>2</sup>.

Approximately 50-60 percent 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 *percent* 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 gear (purse seining, longlining and pole-and-lining) operated by a variety of fishing nations. A variety of other non-target species (bycatch), 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 misreporting 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 cooperation 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 D1.

### *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, recognizing 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 State 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.

*Transshipment:* 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 transshipment operations. Since 15 June 1993, the licensing country determines the time and place (at designated areas or designated ports) where transshipment 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.

*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 fisher'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 Fisher's Associations Responsibility:* Flag States, or in the absence of access arrangements with flag States, the appropriate Fisher'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.

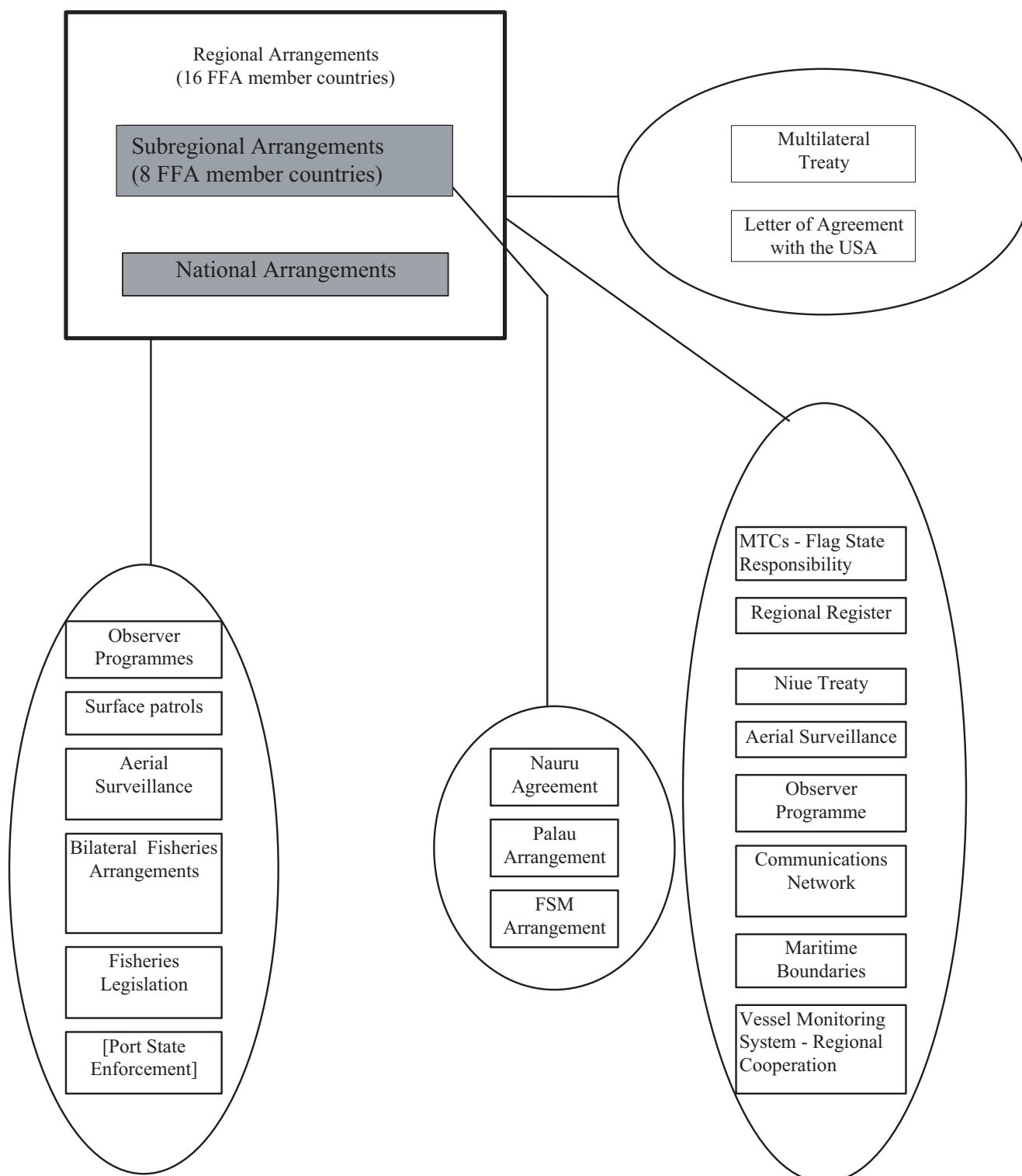
### **The Niue Treaty**

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-utilized 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.

**Figure D1. RELATIONSHIP BETWEEN NATIONAL, REGIONAL AND SUPRA-REGIONAL VESSEL MONITORING AND SURVEILLANCE ARRANGEMENTS**





## **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 recognized 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 UNCLOS and the First and Second Implementing Arrangements of PNA, and which recognize 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 cooperation 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 cooperation 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 FFAs 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. organizations 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 subregional 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 subregional 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.

### **Harmonization 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 transshipment 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 United States National Marine Fisheries Service participated as an observer.

Utilizing 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.

FFAs 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 FFAs Surveillance Contacts in each member country. FFAs 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 misreporting 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 realize 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.

## ANNEX E

### 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
- fishing methods
- fish handling
- navigation and safety
- extension field work
- communications
- administration
- resource management principles
- basic biology
- fishing gear design and construction
- gas and diesel maintenance
- vessel repairs and maintenance
- small fish business practices
- 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
- resource assessment applications
- aquaculture
- data collection techniques
- socio and economic principles
- fish technology
- fisheries development
- fisheries law
- marketing
- processing
- sea use planning introduction
- extension field training
- policy and planning skills
- introduction to oceanography
- advanced computer skills

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
- stock assessment
- environmental impact assessment
- survey descriptions
- value added product skills
- finance and administration
- data interpretation and analyses
- project management
- aquaculture
- personnel management
- survey methodologies
- general management skills
- human resource development
- integrated sea use planning
- advanced fish marketing strategies

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
- program development and management
- policy development and management
- fisheries development and management
- Convention on the Law of the Sea
- donor agency programs
- international affairs
- socio and economic analyses
- communications skills
- legal interpretation
- personnel management
- senior management skills
- finance and administration
- MCS strategy and policy development and implementation.

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\* O'Reilly, A. and Clarke, K. (1993).

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 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
- habitat management
- data collection and analysis
- enforcement/surveillance
- public relations
- administration
- personnel supervision
- policy development and implementation
- integrated management
- 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 subregional 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

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\* 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.

- 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 cooperation 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.

## ANNEX F

### CORE COMPONENTS OF OBSERVER TRAINING

#### F1. INTRODUCTION\*

The complexity of an observer programme should 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.

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.

Material presented here draw heavily on the FFA and Canadian experiences. 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.

#### F2. TRAINING COURSE COMPONENTS

##### F2.1 Role of Observer

The role of the observer will be stressed as such, i.e. observers 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, namely:

- Monitoring compliance of fishery laws: and
- Conduct of biological sampling.

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\* For a more extensive review of observer training programmes, see Davies and Reynolds (2002).

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.

## **F2.2 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.

## **F2.3 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
- Prohibited 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.

## **F2.4 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 difficulties of estimating when mixed species are involved.

- a)
  - i. 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.
  - ii. Emphasize the importance of accurate estimates in relation to monitoring the vessel's catch recording/reporting practices.
- b) Total Catch Estimation techniques are discussed:
  - i. Codend estimation once on deck, highlighting the use of strengthening straps.
  - ii. Utilizing the bunker which holds a known quantity which can be determined by interview.

- iii. Use of baskets to determine a density figure applied with a measurement of the bunker.
- iv. 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.
- c) Species Composition Estimates:
  - i. Utilization of percentage estimate while catch is being dumped.
  - ii. An actual estimate of weight in codend when species are of small quantities during dumping of codend.
  - iii. An estimate based on how many baskets that species would fill, while being dumped, compared to what a basket of that species would weigh.
  - iv. 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.
  - v. Observation of catch culled in factory.
- d) Verification Techniques:
  - i. Bunker capacity density
  - ii. Crew member estimates
  - iii. Icer's figures/processed fish
- e) Discard/Reduction Estimates:
  - i. Weighing of all fish
  - ii. Weight of fish/time period/processing time

## **F2.5 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 nonutilized 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.

## **F2.6 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.

## **F2.7 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.

## **F2.8 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

## **F2.9 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.

## **F2.10 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.

## **F2.11 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.

## F2.12 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).

## F2.13 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	Observer Activity
Daily Trip Summary	Comparison of Observer Estimates & Vessel's
Fishing Log	
Sampling Inventory	Vessel Sighting
Fishing Pattern	Unique Areas
Fishing Operations	Logbooks
Discards	Hold capacity
Trip Summary	

**N.B: This is only one example of possible observer training scenarios. All modules may not be 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 G**

### **CORE COMPONENTS OF A FISHERIES OFFICER 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 comprises 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.

A reasonable place to include the authorities and powers vested in fisheries officers is immediately after the introduction section. 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. An example of the South Pacific Forum Fisheries identification card follows:

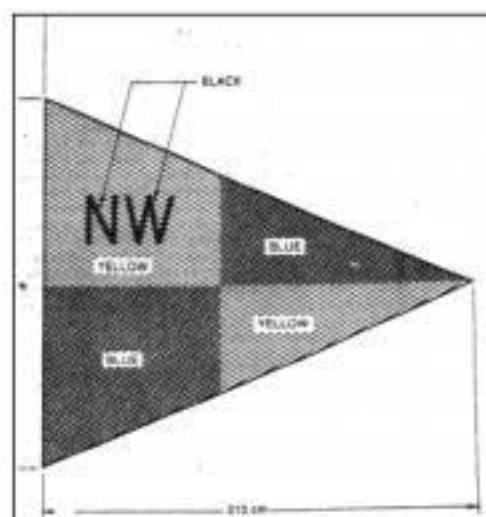
**FFA Identification Card**



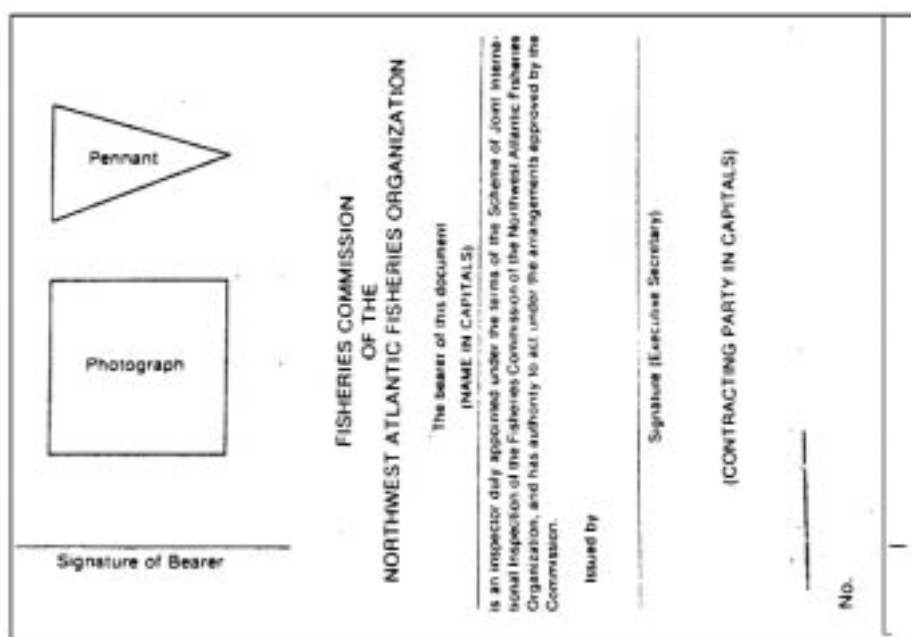
The image shows a rectangular identification card for the FFA. At the top left is a circular logo with a fish and a star. To the right of the logo, the text reads: "TREATY OF COOPERATION IN FISHERIES SURVEILLANCE AND LAW ENFORCEMENT IN THE SOUTH PACIFIC REGION". Below this, it states: "THE HOLDER OF THIS CARD IS AUTHORIZED TO ENFORCE THE FISHERIES LAWS OF THE COUNTRIES LISTED BELOW WHILE ON BOARD THIS CRAFT".

The bottom half of the card contains a form with the following fields: "NAME OF HOLDER", "SIGNATURE", "ISSUED BY" (with a sub-field for "Date of issuing officer"), "DATE", and "THIS AUTHORIZATION IS VALID UNTIL". To the right of these fields is a rectangular box labeled "Photograph".

**NAFO Vessel Flag**



**NAFO Identification Card**



The image shows a rectangular identification card for the NAFO. On the left side, there is a triangular box labeled "Pennant" and a square box labeled "Photograph". Below these is a line for "Signature of Bearer".

In the center, the text reads: "FISHERIES COMMISSION OF THE NORTHWEST ATLANTIC FISHERIES ORGANIZATION".

Below this, there is a section for "The bearer of this document (NAME IN CAPITALS)".

At the bottom, there is a section for "Issued by" with a line for "Signature (Executive Secretary)" and a line for "(CONTRACTING PARTY IN CAPITALS)". To the right of this is a line for "No.".

At the bottom right, there is a small box labeled "No." with a line for a number.

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 alongside 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 UNCLOS, 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, the possible contents of an operational 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, transshipment and storage
- Witness statements
- Certificates, where these are appropriate
- Data collection reports - biological, social and economic
- Patrol reports
- Port State Controls and Contacts

## 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.

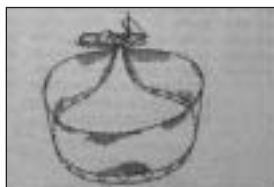
Fisheries Officers come upon fishing gear during their patrols. In the case of gear which is set illegally, it is advantageous to be able to identify the owner of the fishing gear for further discussions. In the case of legal gear, it may also be necessary to identify the owner. Many fisheries laws now 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..

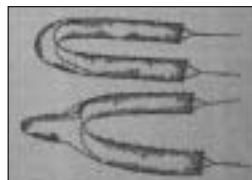
**Purse Seine**



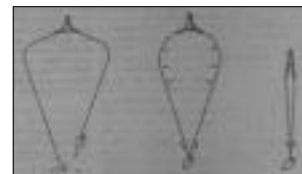
**Lampara**



**Beach Seine**

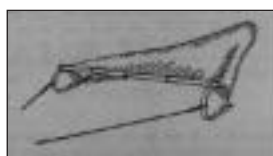
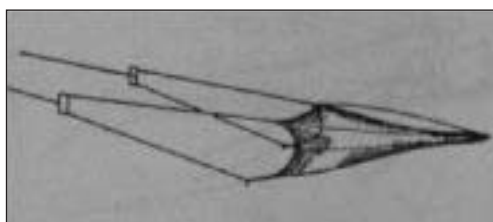


**Boat Seine**



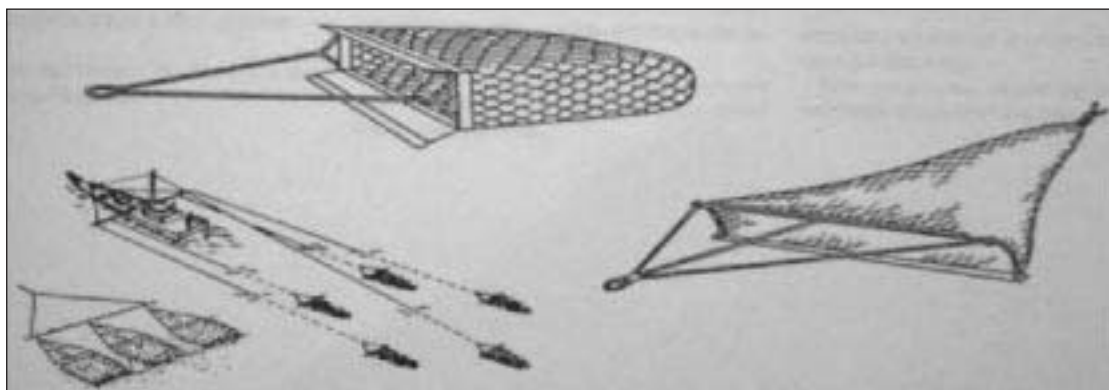
#### ***TRAWL NETS***

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**

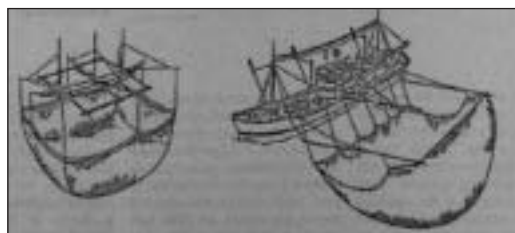
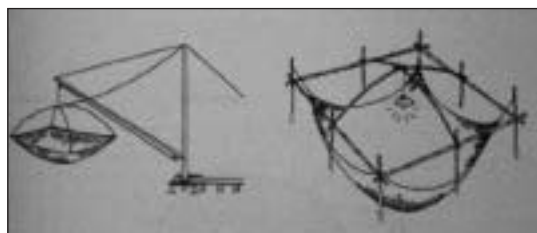
### ***DREDGES***

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***

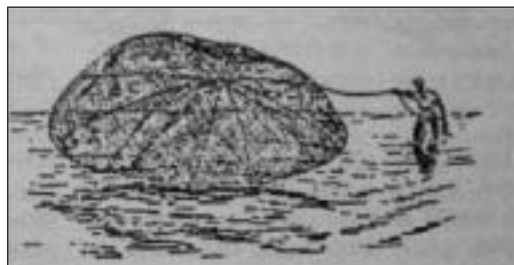
These nets are set in such a manner as to allow the fisher to attract fish with lights or bait. When they are over the net it is raised or hauled in to capture the fish. Lift nets come in various shapes and sizes. The two examples shown are for boats and smaller shore mounted apparatus.

**Boat Lift Nets****Shallow Lift Nets**

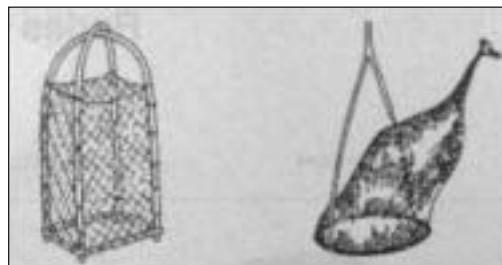
### ***FALLING GEAR***

This gear includes cast nets and other falling gear operated from boats or from shore.

**Cast Nets**



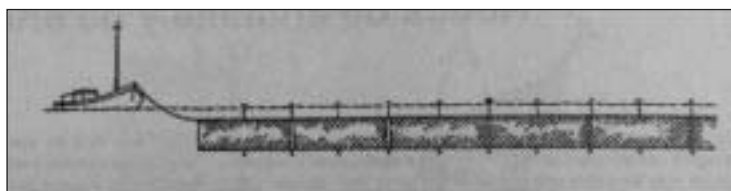
**Other Falling Gear**



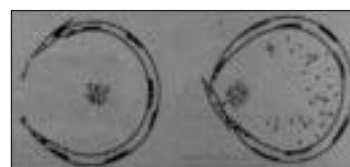
### ***GILLNETS AND ENTANGLING NETS***

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 gillnets; 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**



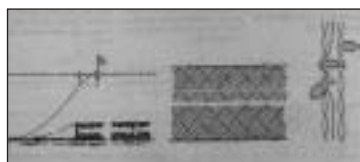
**Encircling Nets**



**Fixed Gillnets**



**Trammel Nets**



**Combined Trammel/Gillnet**



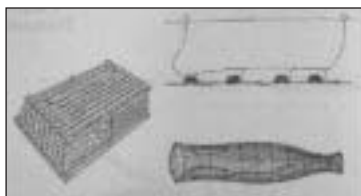
## TRAPS

These include: stationary 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";

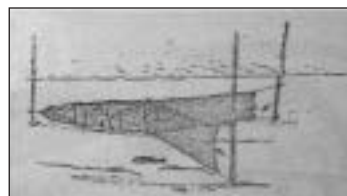
**Stationary Pound Nets**



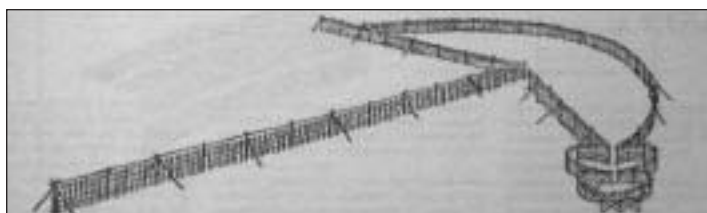
**Pots**



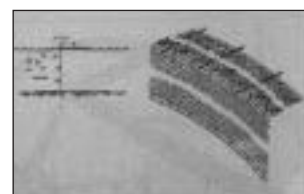
**Fyke Nets**



**Barrier/Fence/Wiers & Corrals**



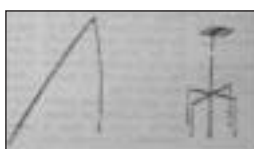
**Aerial Nets**



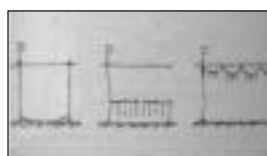
## HOOKS AND LINES

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.

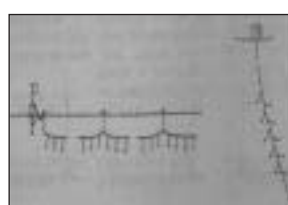
**Handlines and Poles**



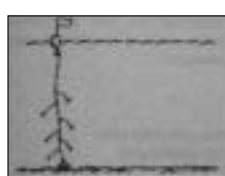
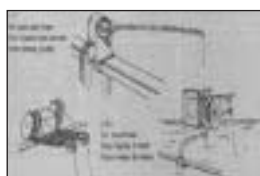
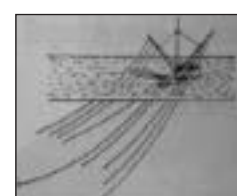
**Set Longlines**



**Drift Longlines**

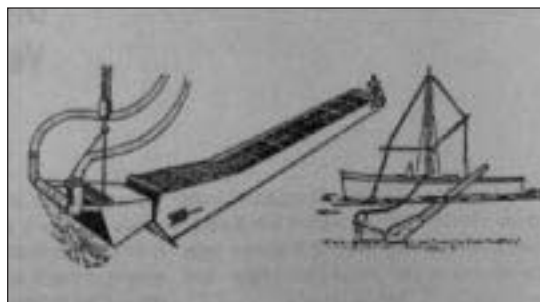
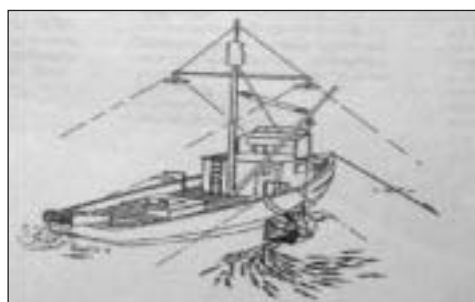


**Trolling Lines**



***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. Core information to be included in these reports is suggested instead.

#### II. 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.

## **I2. VESSEL MOVEMENT REPORTS**

### **I2.1 Zone Entry and Exit**

- date/time of report,
- vessel name,
- vessel call sign,
- vessel side number (if different 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.)

### **I2.2 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

### **I2.3 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

## **I3. 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.

## **I4. 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 transshipment.

### **I4.1 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.

### **I4.2 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.

### **I4.3 Transshipment**

- 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.

## **I5. 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.

## **I6. 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,
- transshipments 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.**

## ANNEX J

### FISHING VESSEL IDENTIFICATION AND MARKING (FAO and Malaysian systems)

#### J1. 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 “FAO System” of identification is set out in *The standard specifications for the marking and identification of fishing vessels*,\* paraphrased below.

#### FOREWORD

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. GENERAL PROVISIONS

##### 1.1 Purpose and scope

1.1.1 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.

##### 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.

##### 1.3 Basis for the Standard Specifications

The basis for the Standard Specifications, the IRCS system, meets the following requirements:

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\* FAO (1989). Also see FAO (1985).

- 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.

## 2. BASIC SYSTEM AND APPLICATION

### 2.1 Basic System

#### 2.1.1 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:

<u>Length of vessel overall (LOA) in meters (m)</u>	<u>Height of letters and numbers in meters (m) to be not less than</u>
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.

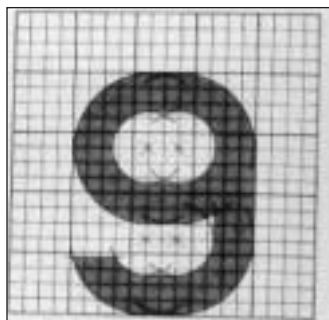
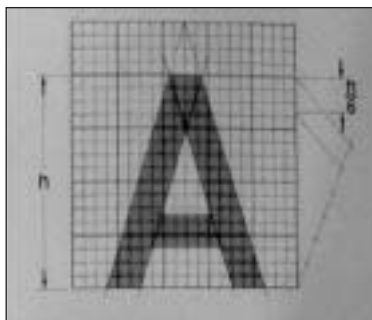
3.2.2 The background shall extend to provide a border around the mark of not less than  $h/6$ .

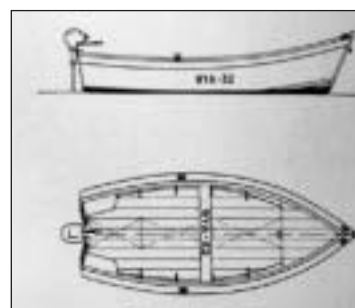
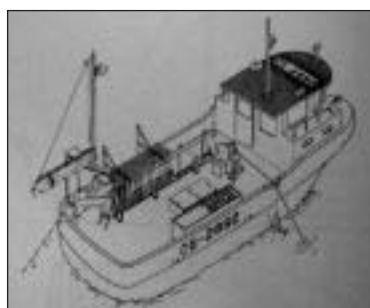
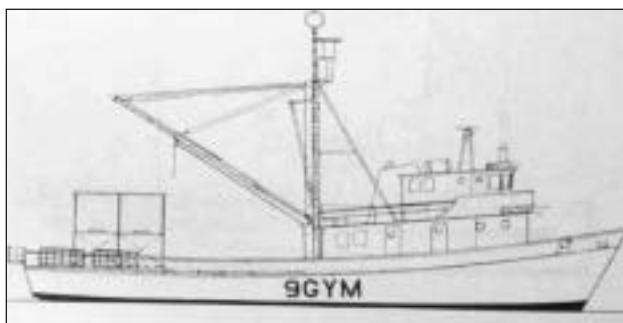
3.2.3 Good quality marine paints to be used throughout.

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.

## J2. FAO SYSTEM SAMPLES





### J3. MALAYSIAN SYSTEM\*

The Malaysian vessel identification system comprises the following:

- 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.
- 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.
- The wheelhouse colour for the state of registration, e.g. Johor is blue.
- 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 (INCHES)		
	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

\* Personal discussions with Mr Salehan, Chief of Fisheries Resource Protection in Malaysia, May 2000.



- e) 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.

Fishing Zones are as follows:

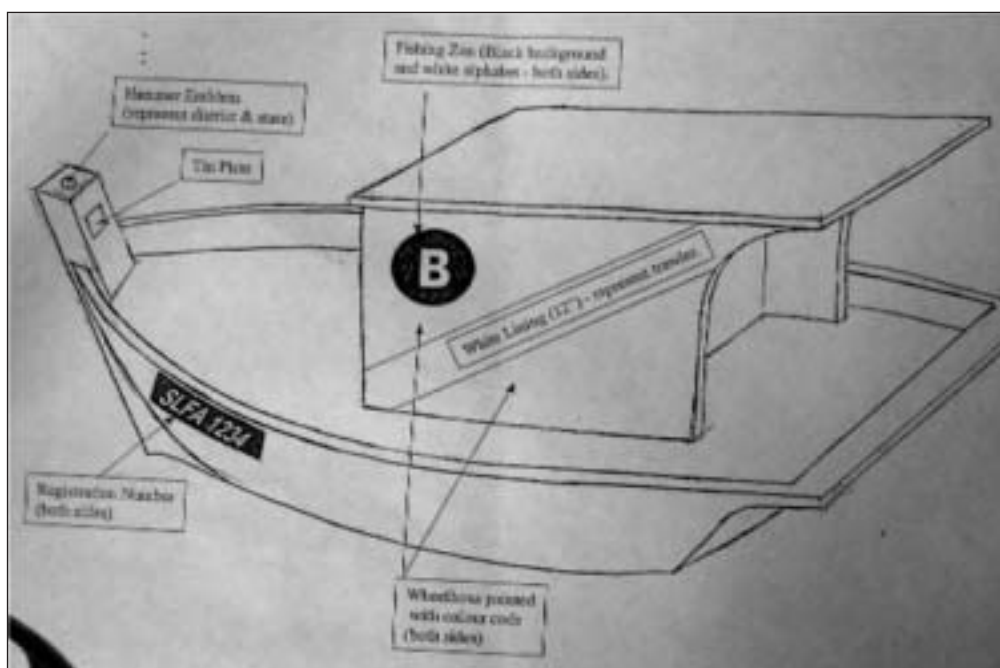
ZONE	GEAR USED	GRT	FISHING AREA
A	Artisanal	--	Free
B	Trawler/P. Seine	<40	>5 nm from shore
C	Trawler/P. Seine	40-69.9	>12 nm from shore
D	Trawler/P. Seine	>70	>30 nm from shore

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.

#### J4. MALAYSIAN EXAMPLES



#### Summary of the Malaysian Vessel Marking System



The paper has been designed as a handbook for fisheries administrators for use when establishing or enhancing, monitoring, control and surveillance (MCS) systems in support of fisheries management initiatives. It updates the 1994 FAO Technical Paper No. 338, An introduction to monitoring, control and surveillance systems for capture fisheries, through a review of recent international fisheries agreements and new MCS approaches involving participatory management, preventive and deterrent MCS strategies, and the importance of safety-at-sea for fishers. The paper is divided into eight chapters to: provide an overview of MCS; review the legal basis for MCS activities; propose design considerations for MCS systems; review organizational considerations for MCS; discuss management measures and consultation and planning issues; review operational procedures and equipment; review patrol, boarding, inspections and prosecution procedures; and address emerging coastal MCS strategies. Annexes provide further details of operational issues and options for MCS system design and implementation.

ISBN 92-5-104876-2 ISSN 0429-9345



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TC/M/Y4411E/1/2.03/1500