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Monitoring, Control and Surveillance)

REPORT OF A REGIONAL WORKSHOP ON FISHERIES MONITORING, CONTROL AND SURVEILLANCE

**MUSCAT, SULTANATE OF OMAN,
24 - 28 OCTOBER 1999**

OPENING OF THE WORKSHOP

The Regional Workshop on Fisheries Monitoring, Control and Surveillance in the in the Northwest Indian Ocean took place in the Sheraton Hotel, Muscat, Sultanate of Oman. It was funded by the FAO/Norway Inter-Regional Programme of Assistance to Developing Countries for the Implementation of the Code of Conduct on Responsible Fisheries (FISHCODE) (Sub-programme C: Assistance to Developing Countries for Upgrading their Capabilities in Monitoring, Control and Surveillance). About 45 participants attended the workshop. A full list of participants and resource persons is given as Appendix B.

The Honourable Minister of Agriculture and Fisheries of the Sultanate of Oman, Dr Ahmed bin Khalfan bin Mohammed Al-Rawahi, officially opened the workshop. He welcomed the participants and extended his thanks to the Norwegian Government and FAO for allowing the workshop to take place in the Sultanate. He said the Sultanate's government accorded special attention to appropriate management of fisheries, and had embarked on reorganization of monitoring and surveillance so that management could be strengthened. Ministry staff had been retrained in monitoring, and a new satellite-based monitoring system had been introduced. This was in addition to taking decisions that increase controls on quality of the products.

On behalf of FAO, Mr G.V. Everett, Senior Fishery Planning Officer, Department of Fisheries, FAO, Rome, set out the background to the workshop, which was part of a programme to assist countries in their efforts to implement the Code of Conduct for Responsible Fisheries, and emphasized the importance of fisheries monitoring, control and surveillance (MCS) to the whole management process. It was at the Ninth Session of the Committee for the Development and Management of the Fishery Resources of the Gulfs, held at Sharjah, UAE, in April 1997, that the proposal for a regional workshop on the topic of fisheries MCS was made. He thanked the Government of the Sultanate of Oman, more particularly the Director-General of Fisheries as well as the Director of International Relations and Training of the Ministry of Agriculture and Fisheries, for the support and detailed arrangements that it had provided in hosting and organizing the workshop.

PROGRAMME OF WORK AND THE OBJECTIVES

Mr Everett explained the proposed structure of the programme of the workshop, and noted that the workshop was not intended to result in definitive conclusions or recommendations regarding the future of fisheries MCS in the region of the northwest Indian Ocean. The workshop was primarily designed as a forum where presentations on MCS could be made by specialists involved in fisheries management, and then discussed, and where participants could outline their fisheries management and MCS activities, and the related challenges, with the opportunity to discuss how management and MCS could be improved. This workshop was a follow up to similar regional workshops, and in particular to the one held in Malaysia in June-July 1998. A number of papers presented at the Malaysia workshop were made available for participants at the Oman workshop. A full list of documents supplied to participants or made available for reference purposes is provided as Appendix C of this Report.

The Programme and Timetable are given as Appendix A. The workshop took the form of presentations during plenary sessions, and working group discussions on specific topics. Participants made brief presentations on their respective national experiences in the formulation and implementation of MCS systems, and sought to identify national and sub-regional problems encountered.

SUMMARY OF PRESENTATIONS

Sunday, 24 October 1999

Oceanographic conditions and fish resources in the region

Based on figures in Mr Siddeek's resource review for the area (the paper is presented in full as Technical Paper 1 of this Report.), Mr S.C. Venema, Project Manager for the FISHCODE project, drew attention to the links between the environment, resources, stock assessment, management planning and MCS. Managers should have a good understanding of the environmental factors that might influence fish behaviour and abundance, and consequently also that of fishing fleets. The northern Arabian Sea was well known for its strong upwelling on the eastern and western side, resulting in not only high productivity, but also lower oxygen levels that could affect fish distribution. When licensed vessels were assigned an area where oxygen levels became too low, the direct result would be a move to (illegal) areas where fish could be found.

Management measures should also be based on the conclusions of the work of fishery scientists. The role of fishery scientists was to provide the managers with predictions of future catches, to monitor the catch and effort data, and to revise the prediction (yearly) as necessary. The quality of predictions depended on the quality of data obtained from the fisheries and on knowledge of environmental influences on the resources.

The role of managers was to make proper use of the predictions made by the scientists, to heed their warnings, and to ensure a good data collection system.

The main problems in most countries were:

- absence of strong links between managers and scientists;
- lack of strong links between stakeholders in the fishery;
- lack of a clear management plan; and
- lack of data or data of very poor quality.

Possible strategies to overcome these problems included:

- preparing management plans for each important resource, to be produced in agreement with all stakeholders;

- improving data collection, through effective MCS systems; and
- organizing regular working groups on fish stock assessment, followed by the provision of advice to managers.

Mr Venema drew attention to two new FAO Publications: *Guidelines for the routine collection of capture fishery data* (FAO Fisheries Technical Paper No.382) and *The history of the Dr Fridtjof Nansen 1975 – 1994*, a vessel that operated from 1975 to 1984 in the Arabian Sea, which was to appear as FAO Fisheries Technical Paper No.391.

Overview of issues of concern to fisheries MCS in the region

Mr Everett presented the paper *An outline overview of issues of concern to fisheries monitoring control and surveillance in the Northwest Indian Ocean*. The paper is presented in full as Technical Paper 2 of this Report. Initial points to be emphasized were the importance of MCS as part of the management process and the need to exploit stocks at an appropriate level, so that overall earnings were considerably higher than overall costs. India's catch was nearly two thirds of the regional total catch of some three million tonnes, and so it was crucial to assist improved fisheries management in that country. Most countries in fact gave little attention to effective fisheries management. The diverse nature of fisheries in the region extended from subsistence and trap fishing through to offshore trawl and tuna fishing, and all these situations meant that management and MCS were challenging issues to be tackled in particular ways. In many countries, certain marine areas were being protected specifically because of their importance for tourism.

The discussion that followed presentation of the paper also noted the advantages of possible cooperation at a regional level to improve MCS.

Legal aspects relating to MCS

Ms A. Van Houtte, Legal Officer, FAO, presented briefly a paper on *Legal issues relating to MCS*. The paper is presented in full as Technical Paper 10 of this Report. After a brief introduction on the concept of MCS, she presented the different issues that would be dealt with in the course of the Workshop, especially reporting requirements, enforcement aspects, legal issues relating to the introduction of VMS systems, regional cooperation in MCS, and the legal framework for establishing marine areas and reserves.

Data collection within the countries of the region appeared to be still a challenging task, with under-reporting, non-reporting and double-reporting frequently occurring. Carefully drafted terms and conditions, not only in fishing authorizations and fishing access agreements but also in joint venture agreements and/or arrangements, were more likely to provide effective collection and sharing of data. International legal instruments, such as the 1982 UN Agreement on the Law of the Sea, the Code of Conduct for Responsible Fisheries, the 1995 UN Fish Stocks Agreement and the 1993 FAO Compliance Agreement, recognized the need to collect and exchange information (e.g., catch and effort data) on fisheries activities for the purposes of conservation of the fisheries resources within national EEZs and on the high seas.

To meet the challenge of protecting fisheries resources at a regional or sub-regional level, FAO had always strongly supported cooperation towards ongoing and progressive harmonization of fisheries laws and regulations, and this process was now well advanced in a number of regions (Eastern Caribbean, South Pacific, West Africa).

MCS: experience in the Sultanate of Oman

Ms Lubna Hamoud Al-Kharousi, Fishery Specialist of the Ministry of Agriculture and Fisheries of Oman, provided a background description of the fisheries in the Sultanate of Oman over the last decade, and a brief description of the manner in which MCS was conducted by various units

within the Ministry of Agriculture and Fisheries of Oman, the Coastguard and the Navy. She reviewed some challenging issues that the government was encountering in the implementation of effective MCS. She recognized the benefits of close collaboration between the various entities involved in MCS activities. The Fisheries Department had been assessing possible use of a vessel monitoring system (VMS). The large foreign trawlers fishing in Omani waters normally carried observers on board.

Despite all the challenges, the Government of Oman had taken important steps towards sustainable management and conservation of its fisheries resources.

The paper is presented in full as Country Paper 1 in this Report.

The changing face of MCS and the Asian experience of MCS

Mr P. Flewelling, FAO MCS Consultant, introduced two papers simultaneously. Those papers are presented in full as Technical Papers 3 and 4 of this Report. The paper on *The changing face of MCS* brought out the growing thrust for stakeholder participation – the fishers from the community and the commercial fishing associations – in the fisheries management planning and implementation exercise, to foster sustainability. The emphasis was on a participatory process for MCS at the coastal community and industrial fisheries levels to promote voluntary compliance through *preventative MCS* activities. The intent of this change would be to then be able to focus the *deterrent MCS* activities – traditional enforcement operations – on the remaining smaller percentage of fisheries that still would not comply with the appropriate fisheries legislation in support of the agreed management plan. The final intended result was to lower costs for overall MCS activities by fostering support and stewardship of *their* marine resources by the stakeholders. Particular attention was given to revising the definition of MCS to reflect this change, and the linkage of MCS with overall fisheries management, MCS being the implementing mechanism for the approved fisheries management plan.

MCS – The Asian experience was a summary of the MCS systems and issues that needed to be addressed in eight Asian countries, namely Bangladesh, Cambodia, India, Indonesia, Myanmar, Philippines, Thailand and Viet Nam, that had been visited by Mr Flewelling following the regional workshop on fisheries MCS held in Malaysia in June/July 1998.

The general results of the visits to the eight countries included the fact that in general the fisheries resources were overfished, especially those in the coastal areas. The offshore fishery was almost completely uncontrolled and illegal foreign fishing was common. Efforts to control the coastal fisheries were very weak.

Weaknesses noted in the Asian MCS systems included: lack of political will, weak management strategies, lack of understanding of fisheries management, and lack of appropriate legislative instruments and of an understanding of the legislation. The judiciary and prosecutors in many countries were unaware of the significant negative impacts of inappropriate management practices on conservation, and, more importantly, the social and economic impacts. Furthermore, deliberate lack of application, or misapplication of the law for short-term personal gain or corruption; weak fisheries licensing and registration systems; lack of infrastructure; lack of attention to new and appropriate technology; lack of credibility of data management systems: all these contributed to the inefficiency of MCS. For MCS operations to be credible and successful, there was an obvious need for a strong lead agency for fisheries management and an effective inter-agency mechanism for sharing information.

Factors affecting the type of MCS system chosen included: size and variety of the resource base; the access regime – open access or limited fisheries; value of the fisheries resources; and political commitment to fisheries management.

Steps to be taken in development of an MCS system in Asia included:

- (i) Reviewing management status and capacity, and MCS capacity.
- (ii) Reviewing infrastructure, licensing, and resource rent or cost recovery potential.
- (iii) Reviewing legislative instruments; inter-agency overlaps in mandates, jurisdiction and authorities; and deterrent levels.
- (iv) Establishing reasonable MCS objectives, noting that the system would lack credibility if the objectives were too complex and not achievable.
- (v) Developing – in parallel with the MCS system – a sustainable and joint plan for MCS involving the community and promoting voluntary compliance.
- (vi) Establishing appropriate resource rents for cost recovery of the expenditures to manage the fishery.
- (vii) Refining legislative instruments to address the above concerns, enhancing the deterrent potential, protecting MCS officials against “nuisance” suits when exercising official duties, and providing for severe penalties to eliminate corrupt practices.
- (viii) Fostering strong inter-agency mechanisms between maritime agencies.
- (ix) Procuring and maintaining appropriate infrastructure and equipment for the MCS system.
- (x) Developing and implementing appropriate training to enhance professionalism in the areas of: community orientation to fisheries management and MCS; law enforcement training; judicial and prosecutors seminars; and specialized training as appropriate (e.g., procedures for boarding and inspection).
- (xi) Developing – in parallel to the management and MCS programmes – an effective alternative income generating or supplemental livelihood programme to enhance the economic status of the coastal fishers and reduce pressures on the resources.

A well managed fishery: MCS in Namibia

Captain P.E. Bergh, Special Adviser to the Permanent Secretary of the Ministry of Fisheries and Marine Resources of the Government of Namibia, presented the paper *Focus on MCS for fishery compliance: experiences from Namibia*, based on recent experiences in Namibia. The paper is presented in full as Technical Paper 6 of this Report. A video was also shown on the topic.

General description of Namibia and its fisheries

Namibia was situated on the west coast of Africa, north of South Africa and south of Angola. The country was six times the size of the United Kingdom, with a population of only 1.7 million people, and a coastline of 1 700 nautical miles.

Since Independence and the establishment of the EEZ in 1990, Namibia had developed a fisheries administration and a thriving commercial capture fisheries industry that had grown rapidly, while becoming increasingly more Namibian. The principal characteristics of Namibian fisheries were the following:

- The fishing industry was based on the high productivity of the Benguela Current system, one of the four eastern boundary upwelling current systems in the world.
- Fisheries currently contributed about 7% to the country's gross domestic product (GDP).
- The fishing industry employed an estimated 12 800 people.
- In 1998, more than 300 vessels were licensed to fish in the Namibian EEZ, with 76% of these carrying the Namibian flag.
- All fish were landed in Namibia through two ports.
- The export value of the fish was estimated in 1997 to be US\$ 400 million.

- The outlook for Namibian fisheries looked promising, with environmental conditions returning to an apparently more normal state, and further expansion occurring in the deep-sea and other fisheries.

The Ministry of Fisheries and Marine Resources had adopted two broad categories of management and control measures:

- *Input controls* These had an impact on fishing effort and gear, and on when and where fishing could take place, mainly by limiting total fishing effort and seasons.
- *Output controls* These set limits and regulated the amount of fish that could be caught, and the size and other characteristics of the fish that could be landed. The main control occurred through the setting of Total Allowable Catches (TACs) and quota allocations.

Monitoring, Control and Surveillance

The management of Namibian fisheries required an integrated approach to MCS, involving the deployment of fishery officers to air, sea and land patrols; observer coverage on fishing vessels; and remote electronic monitoring. Monitoring and protection activities were designed to ensure compliance with the legislation, policies and programmes that related to the conservation and protection of Namibia's marine resources.

The Ministry of Fisheries and Marine Resources operated two patrol vessels on the coast to patrol closed areas, boundary areas, and to conduct inspections at sea to ensure compliance with all of the regulations designed to ensure well managed fisheries. Random inspections were undertaken at sea.

As a part of the Ministry of Fisheries and Marine Resources' conservation and protection efforts, the Ministry deployed contracted observers on all vessels fishing in Namibian waters. These observers gathered scientific information on the catches, and provided on-site monitoring of compliance with fisheries regulations. They were able to report infractions such as dumping or discarding, fishing in closed areas, off-shore pollution, mis-reporting of catch, retention of prohibited catch or use of illegal gear.

Captains were required to complete logsheets on a daily basis and observers were to check that information. This provided important information on catch and effort, which complemented the observers' scientific data. Researchers also ran regular survey cruises to assess the biomass of the fish stocks.

Aircraft were used to monitor, locate and track fishing fleets and detect violations such as fishing in closed areas. The aerial presence also served as a visible deterrent to illegal fishing and allowed more effective deployment of patrol vessels.

Fisheries Inspectors provided another means of verifying the amount and type of fish landed. Inspectors monitored the off-loading of fishing vessels as they landed their catch at either of the two ports. This provided the accurate landing information required for calculation of levies and for quota control, scientific evaluation of fish stocks and fisheries management. This effort was complemented by random vessel inspections, carried out by Fisheries Inspectors from the patrol vessels.

Remote electronic monitoring of fishing vessels, using satellite tracking (VMS), was still at the pilot stage. Currently, five Namibian fishing vessels were voluntarily carrying satellite-tracking devices. If the pilot project were successful, the use of satellite transponders might be extended to a larger number of Namibian fishing vessels.

Training

The government, early in its development of an MCS capacity, identified training as the key factor in building up local knowledge and experience. The short-term MCS goals of reduced

illegal fisheries were quickly reached; the larger challenge remained in terms of human resource development.

The patrol vessels (initially three, but currently two) were at first manned with Norwegian and Danish officers and crew, but a successful training programme provided a Namibian crew within the first year. However, as officers required a more long-term perspective, a cadet programme was established, aiming for internationally recognized maritime certificates as well as specialized fisheries training for the patrol vessels. The first intake of cadets was in February 1992 and the latest intake in February 1997. The total number of cadets stood at 48, with 14 officers having completed their training.

The inspectors and the observers that were employed in the early 1990s were confused by the expectations they met from the industry, due to low levels of education and little or no practical experience. Therefore it was clear that an education programme was needed to reach the goals of the Ministry. The documentation for such training was finalized in May 1995, and first implemented in July 1995. To date, three courses had been run, each comprising 6 months of theoretical and 3 months of in-service training. The course included legal as well as biological and maritime subjects.

The observers, currently numbering around 230, typically worked as the eyes and ears of the Ministry at sea. Their duties revolved around monitoring the compliance of fishing vessels with fisheries law; their tasks included checking gear specifications, monitoring the by-catch, ensuring that no dumping occurred, and compiling data on catches and operations. However, in 1996, the Ministry expanded the mandate of observers to meet the information needs of stock assessment by also training them in monitoring and collecting biological information on the fish catches. The programme that evolved became known as the Commercial Sampling Programme.

Experiences related to building up an MCS organization

Hardware and equipment

Hardware, in the sense of vessels, aircraft and equipment, was often a crucial factor in the cost effectiveness of any operation. The level of control needed, knowledge, experience and running costs should be given serious considerations in the planning phase.

Lessons learnt included:

- a desire for advanced technology could later become an obstacle in a project due to underestimated training needs and capability of human resources;
- high investment costs and underestimated running costs could result in low MCS efficiency as efforts were made to keep costs within budget limits; and
- second-hand items purchased without sufficient knowledge of the task terms of reference and analyses of actual needs often resulted in equipment unsuitable for the task, and, consequently, low MCS efficiency.

Human resources

Good documentation or manuals, although a major asset, would never be able to replace the quality needed by the personnel allocated to perform the task. It was also necessary to assess whether a well-trained, better paid but smaller work force would result in higher productivity than a less competent, larger work force. This should be considered in the light of:

- knowledge levels;
- recruitment procedures;
- probability of corruption;
- training capacity;

- professional attitude of the organization; and
- political and social requirements of the country.

These factors were often underestimated, and obtaining a balanced evaluation could be difficult. It could not be stressed enough how important a well conducted needs analysis – including an integrated approach to hardware and human resources – was to the development of any MCS project.

Training

Knowledge was one of the main keys to success in any MCS operation. Basic knowledge would be needed immediately if the organization wanted to gain respect from stakeholders and to initiate a professional and functioning operation. Training had to be planned for and started as one of the first actions in developing an operation or organization.

- In order to plan for training, an analysis was required of needs and current levels of knowledge within the recruited staff.
- The programme should include a well designed training plan for all levels of staff, which would run throughout their career structure.
- It was recommended that modular vocational training be used for the lower-level jobs in the organization.
- It was also important that quality criteria were demanded from instructors to ensure that a certain level of quality was maintained in the teaching. The instructors had also to be suitably rewarded and trained for their work.
- Education should be officially acknowledged, such as through permanent employment, higher rank, bonuses or higher salary. This was important for motivation and recruitment.

Information management

Large amounts of varied information were generated in MCS activities. Some of this was required almost immediately for surveillance activities, while other information was needed on a more long-term basis. These different requirements for information made good information management vital. The definition of 'good' was not an easy one: striving for accurate and timely information was important, but also the concerns of what information and in what format were vital questions. It was far too easy to collect too much information, which then became a burden on administration and database systems to compile, check and store.

Indeed, information systems could easily become overambitious, and this was especially true where previous systems had been manual. System implementation and the training of personnel to maintain the system would often take longer than envisaged. In these cases, a sensible approach would be to design and implement a phased approach, with one or two aspects of the system being implemented at any one time, with total integration occurring later.

An analysis of good working practice was also needed to improve working routines before the database was designed, in order to avoid unnecessary and expensive changes at a later stage.

The following should be considered:

- Identify information needs through analyses of working practices and management requirements.
- Avoid unnecessary information.
- Do not be overambitious in the design and implementation phases – keep it simple.
- Do not underestimate the need for training.

Other MCS platforms

Governmental duplication of MCS tasks was common and often created some discussion on where responsibilities should be allocated to maximize efficiency or to reduce costs. This could easily result in compromises where the fisheries surveillance element lost. It was quite obvious that a diverse task required a broad knowledge of operation, with priority being directed to the main purpose.

The Navy was normally neither designed, educated nor particularly trained for fisheries MCS operations. While the organization could be a valuable asset in the sense of border violations by unlicensed vessels, it was seldom efficient with catch or equipment controls.

A Coastguard was far more appropriate for the fisheries protection task, although usually less advanced than a navy in terms of training and equipment. A Coastguard was normally designed round the United Nations Convention on the Law of the Sea, with basic policing tasks to perform, with emphasis on border violations, fisheries protection, search-and-rescue operations, and custom and immigration tasks.

Conclusion on the Namibian Experience:

- It was of vital importance to invest time and resources in analysing the actual needs of the organization, not only for hardware but also for human resources and training. A lot of money has at times been wasted because of poor decisions based on weak planning. A clear definition of purposes and needs was therefore a valuable investment for the future.
- Training facilitated the efficient use of resources. Lack of training could result in unprofessional behaviour, costly maintenance, poor decision making and lack of respect from the industry. Training was therefore a natural and key part of the development of the MCS organization.
- It was sensible to initially create a basic and simple organization if local experience was limited. A good practice was to begin with only one segment of the industry, to gain the necessary experience before expanding the programme in a phased manner. A larger part could then be implemented when the organization was confident and ready to meet larger challenges.

MCS in Iran

Mr S. Aminollah Taghavi, General Manager Fisheries Affairs of Shilat (Iranian Fisheries Company, a parastatal entity), provided a general overview of ongoing MCS activities in the Islamic Republic of Iran. The paper is presented in full as Country Paper 5 in this Report. Following a description of the institutions governing fisheries in Iran, and in particular of Shilat, the speaker presented the status of fisheries along the coast of the Gulf of Oman and the Persian Gulf, as well as in the Caspian sea. Fisheries production from the region of the Persian Gulf and the Gulf of Oman amounted to about 52.5% of the total fish production of the country. The fishery in the Caspian Sea was relatively smaller and less complex, but very valuable in view of the catch of three sturgeon species. About 14 000 fishers fished with large gillnets for sturgeon. The sturgeon fishery was a state monopoly, well controlled, with a programme of stock enhancement with hatchery-bred fingerlings.

Control of fishing activities occurred mainly through an important licensing and zoning policy, established under the 1994 Fisheries Law (currently being amended). Iran had introduced a VMS system at Bandar Abbas, provided through a company called KAFA and based on a system developed by RACAL. The system would cover the Strait of Hormuz, with stations located at regular 20-km intervals. Enforcement was undertaken by the Disciplinary Forces of the Ministry of Jihad-e-Sazandegi.

Monday, October 25, 1999

Inspection procedures at sea and on land

These topics were addressed, through a team approach, by Captain Bergh and Mr Flewwelling, using a video showing non-hostile boarding exercises by the Norwegian Coastguard. Differences for hostile boarding exercises were also presented, with the accent on safety of the boarding party. These are summarized in Technical Paper 8 of this Report.

The session covered the general organizational structure involved in the inspection procedures; key equipment requirements; and steps taken from sighting of the target vessel to be boarded, through to the end of the boarding. The operational steps included the team briefing and its components; the relative positions of the boarding and target vessels; the boarding and inspection; the follow-up activities; and the de-briefing. Emphasis throughout the session was on safety for the patrol vessel and safety of the boarding party.

The role of observers

Captain Bergh presented the paper *Developing an at-sea fishery observer programme for developing countries*. The paper is presented in full as Technical Paper 7 of this Report. He said that needs and requirements would determine the framework for recruitment as well as training. It was necessary to determine if the necessary resources were available to run and utilize an observer programme.

Observers were differentiated from fisheries inspectors or other law enforcement officers, from the Navy, Coastguard or Police, as they held no enforcement powers. This is important for the safety of the observers, who were employed to observe, record and report. In summary, the aims of such a programme should be to (i) monitor the compliance of domestic and foreign fleets with the nation's fisheries laws and regulations, (ii) gather biological information on catches, and information on fishing techniques and gear, and (iii) promptly report pollution to the proper authorities.

Surveillance in the Sultanate of Oman

Mukadam Abdullah Ali Al Yahyai and Mukadam Adullah Nasser Al Shabib, Officers of the Royal Navy of Oman, presented a paper on *The role of the Royal Navy of Oman in the protection of fishing grounds*. The paper is presented in full as Country Paper 2 of this Report. They described the mandate, the structure and the operations of the Royal Navy of Oman. It had the role of protecting the fisheries resources by detecting the fishing vessels illegally entering the EEZ of Oman. It cooperated with the Royal Air Force and the Oman Police (Coastguard) in undertaking surveillance activities. Difficulties were apparent in the judiciary proceedings because of lack of evidence and in stopping, boarding and bringing vessels into port.

Information systems for MCS

Mr Everett talked about the importance of supervision of the data collection systems for information purposes. He covered other uses of information for diverse purposes, such as research, management, and international obligations under the FAO Compliance Agreement, the Code of Conduct for Responsible Fisheries, and others. The importance of information in the MCS process was emphasized.

MCS in India

Messrs V.S. Somvanshi, Director General of the Fishery Survey of India, G.D. Chandrapal, Deputy Commissioner Fisheries, and P. Paleri, Deputy Inspector General Indian Coastguard, presented an overview of the MCS experiences in India. The paper is presented in full as Country Paper 3 of this Report. India was the biggest fish producer in the region, with an annual fish

production of 2.92 million t of finfish, crustaceans and cephalopods, and exports of approximately 380 000 t, valued at nearly US\$ 1 000 million.

The size of the EEZ (2.02 million km²), the long coastline (8 040 km), multiple fleets, the participation of foreign vessels and the decentralized States structures rendered efficient MCS difficult. The maritime States of India (nine) with the exception of the State of Gujarat had enacted their own marine fisheries legislation (laws and regulations) and had their own Coastguards, that were responsible for the surveillance of India's territorial waters, while the Navy was responsible for surveillance of the EEZ. Coastguard officers received a week-long fisheries training course at the Central Institute of Fisheries, Nautical and Engineering Training (CIFNET) to learn about fisheries and enforcement in their areas of competence (e.g., fishing material, fishing gears, fishing licences, logbooks and endangered species). The control of foreign fishing vessels was based on the Maritime Zones Act of India, 1981, and the regulations adopted thereunder in 1982.

The Central Government was primarily responsible for fisheries research, with the maritime States and the Union Territory Governments taking responsibility for regular and systematic collection of data on number of fishing units and landings. The domestic fleet comprised 172 000 traditional craft, 35 000 mechanized boats and 180 deep-sea shrimp trawlers, accounting for 61%, 38% and 1% respectively of total production.

MCS in the United Arab Emirates

Mr Al Matrooshi, Assistant Deputy Minister of Fisheries, presented an overview of the MCS experiences in the UAE. The paper is presented in full as Country Paper 7 of this Report. Artisanal fishing vessels were responsible for most fishing in UAE waters. Total production in 1998 amounted to 114 739 t, having almost doubled since 1976. The number of fishers had increased substantially, from 4 000 to 18 758, as well as the number of fishing boats, from 1 065 to 7 681 respectively in the 1980s and 1990s. The Government provided several incentives to fishers, such as subsidized loans to purchase engines.

The Marine Resources Research Centre, created in 1984, had undertaken various studies and experimental activities (pilot projects) in fisheries and aquaculture. It advised the Government regarding fisheries policy and the related legal framework.

The municipalities were responsible for enforcement of the fisheries regulations. The Coastguard assisted the municipalities, and, in relation to fisheries, was responsible for (1) the safety of fishing vessels, e.g., ensuring that the required equipment is on board; (2) emergency search-and-rescue operations; and (3) certification of the size (e.g., GRT) of fishing vessels for registration purposes. Joint meetings of staff from the Fisheries Department of the Ministry of Agriculture and Fisheries (MAF), Coastguard (Ministry of the Interior), Navy and Air Force occurred from time to time. The Coastguard had permanently vessels at sea, involved in routine searches of small craft. Vessels caught using undersized mesh, prohibited monofilament nets, or fishing in prohibited zones, had their gear and craft impounded, with the nearest municipality responsible for setting and collecting the fine, and, on presentation of the receipt, the Coastguard released the vessel and gear. There were some 20 fast patrol craft in the Dubai Coastguard. Repeated prosecutions might lead to permanent withdrawal of licences. The level of fine for a first offence was about Dh 1 000 (about US\$ 300).

Since 1980, the use of trawlers had been prohibited in waters up to 24 n.mi. from the coast. Shrimps have not been caught in UAE waters due to the ban on trawling.

MCS in Pakistan

Mr Q.H. Baloch, Director of Fisheries, Sindh, presented very briefly an overview of MCS in the southeastern region. The paper is presented in full as Country Paper 4 of this Report. Pakistan had two coastal provinces (Balochistan and Sindh) which covered the 990-km coastline of the country. Each province had its own fishery law and access arrangements. The Sindh Fisheries Ordinance 1980 and the Balochistan Sea Fisheries (Amendment) Act 1986 regulated fisheries in the respective provinces.

Sindh Province was suffering from overfishing and authorities faced difficulties in enforcing control measures such as closed seasons and a ban on shrimp trawling, etc.

Vessel Monitoring Systems

Captain Bergh presented an overview of Vessel Monitoring Systems.

VMS was one of many tools for fisheries management, providing more timely and cost-effective monitoring and control of authorized and participating fishers. VMS could provide an effective tool for MCS, particularly for developing countries that lacked the financial and physical resources to support an effective, conventional MCS capability. VMS was essentially technology that permitted automatic satellite-based tracking of fishing vessels participating in the system. It also had the added capability of a two-way communications function to forward additional information such as catch and environmental data.

VMS provided monitoring agencies with accurate locations of fishing vessels that are participating in the system, both on a periodic basis and on a historical basis at set intervals. The information could be provided to monitoring agencies in near-real-time (10-30 minutes). As the position information was automatically generated and did not require manual input, the accuracy of this technology was becoming more attractive to monitoring agencies. Further, the information requirement could be expanded for operator input to provide cost-effective and timely catch, effort and other fishing and environmental information direct from the vessel, thus decreasing the potential for errors from multiple handling of data. VMS had the added benefit for the industry of providing the capability for fleet management and improved safety-at-sea.

The shortfalls of VMS were the following:

- VMS would not locate a vessel not participating in the system. It was not a radar system that covered all contacts on the sea. VMS did not replace traditional MCS activities; it supplemented them and enhanced their efficiency.
- VMS information acceptance in court needed to be tested. Experiences indicated that an additional sensor, such as a patrol vessel, plane or observer, was needed to secure sufficient evidence in judicial procedures.
- VMS security and confidentiality placed considerable demands on staff and infrastructure.
- VMS maintenance required highly qualified information technology (IT) support or the system would fail.
- VSM coverage on only some vessels in an area reduced its potential benefits for patrol planning.

Before implementing VMS, consideration should be given to the following issues:

- IT capability and support for VMS.
- Operations Centre capability, staffing and procedures.
- Local technical support.
- Security of the system and data.

➤ Supporting legislation.

In the light of the above, one could conclude that VMS was a powerful tool that could enhance the efficiency and effectiveness of an MCS organization if implemented and used properly. A cautious approach was recommended to ensure that policy and legislation were prepared to implement such a system. It was also important that fisheries agencies realized the limitations and possible difficulties related to the implementation of VMS technology.

Enforcement aspects and legal issues relating to the use of VMS

Ms Van Houtte covered a few issues relating to both enforcement and the use of VMS systems, based on Cacaud's paper on legal issues related to VMS, which is presented in full as Technical Paper 11 of this Report.

To achieve its purpose, important consideration had to be given to the enforcement aspects within any proposed legal framework. Enforcement had institutional and legal connotations and it was important to bear in mind aspects relating to the powers of the inspection officers; to the offences; to the related sanctions, both penal and administrative; to the role of the judiciary and of the fisheries administration; and last but not least, the role of the fishers, etc.

Ms Van Houtte listed types of behaviour that could be considered as seriously infringing the fisheries rules of a country. They related to: failure to cooperate with the authorities responsible for monitoring; failure to observe the conditions to be met when fishing; failure to comply during fishing operations; and failure to comply in respect of information for monitoring. She further stressed that an enforcement section needs to be carefully drafted in the legislation. It was not an easy task and rules alone would not provide effective implementation of a legal framework. Experience had shown that the following factors might influence an individual's behaviour: liaison between fishery managers and fishing industry; the level of surveillance (surveillance should increase the fisher's perception of probability of being caught operating illegally); knowledge of legislation (manuals); and effective sanctions (an optimal penalty calculated on the basis of factors such as the value of the vessel, the value of the fishery, etc.)

Ms Van Houtte then dealt with legal issues arising from the implementation of VMS. They could be grouped into four broad categories:

- (i) Confidentiality of VMS information.
- (ii) Copyright issues.
- (iii) Evidence.
- (iv) Maritime boundaries.

Typically, a principal fisheries law enabled a government agency responsible for fisheries management to collect information, including VMS data, which was relevant and necessary for the conservation and management of fisheries. The corollary being that the authorized agency was also required to ensure confidentiality of the information collected. The problem was not restricted to the non-disclosure of such information, but also involved other aspects relating to access to and use of data transmitted as part of the VMS requirements. These aspects were mainly related to the question of the extent of protection that an administration was required to provide when it received the information. The granting of copyright was certainly questionable since copyright implied the existence of intellectual creativity as a distinctive human intervention, as well as the concept of originality.

With regard to evidentiary matters, the central issue was to determine whether a VMS, by itself, provided evidence of a standard likely to satisfy most criminal courts of an offence that involved fishing activity. At the current stage of development, VMS, which merely indicated a probable activity of a vessel, failed to furnish evidence of a sufficient calibre to warrant, on its

own value, a conviction. However, in criminal prosecutions the standard of proof was higher than in civil proceedings. Depending on the legal systems in place, VMS information could suffice, by itself, to determine whether or not the activity of a vessel needed to be further investigated.

Uncertainty regarding boundaries of maritime zones might destroy a case, whether civil or criminal, and provoke tension between the countries involved. Caution should be exercised in the implementation of VMS projects in areas where maritime boundaries were contested between two or more countries or where a case involved a position fix in the direct vicinity of a maritime boundary.

Presentation of the Crystal Information Technology Satellite Monitoring system

Dr A.M. Behbahani, Director, Crystal Information Technology, FZE, provided a short overview of an Information Technology System provided by his company. With fisheries protection as the goal, an integrated solution had been developed for fisheries that included:

- Satellite-based Fisheries Information Service
- Environmental Protection
- Fisheries Fleet Management and VMS
- Data Messaging System for Fisheries

The vessel monitoring system had been tested in the European Union and by other countries, and had been developed jointly with Racal Tracs of the UK. The system was being introduced to Iran.

Presentation of the OHI Pole Star Satellite Monitoring system

Mr David Clements, General Manager, Ghdeer Brothers LLC, gave an overview of the activities of OHI Telecommunications Company and in particular the Purple Finder Project. The project entailed vessel position tracking using a global positioning system (GPS), e-mail for logistics management, and regular monitoring of other fishing activities as required. Trials with the VMS had started in Oman, involving locally based trawlers.

MCS experiences in Yemen

Mr Abdul Rashid Ghafoor Omer, General Director, Department of Control and Marine Inspection, provided an overview of the MCS experiences in Yemen. The paper is presented in full as Country Paper 8 of this Report.

Fisheries contributed approximately 8% of the GDP of the country and were a major source of food protein. Catches over the last 20 years had varied from 80 000 to 130 000 t/year.

The major fishing areas were located along the Arabian Sea and Gulf of Aden (1 500 km) and the Red Sea (700 km) coasts. Most of the fisheries production (more than 50%) came from the artisanal sector. The country was suffering from overfishing of rock lobster, shrimp, cuttlefish and sharks, while some stocks of small pelagic fish were underexploited.

Industrial fishing continued to be undertaken by national fishing vessel and in the framework of access agreements and joint venture agreements with China, Egypt, Korea and former Soviet bloc countries.

The Ministry of Fish Wealth (MFW) had overall responsibility for the sector. Within this Ministry, the General Department of Control and Surveillance (GDCS) was responsible for the control of fishing activities and the protection of the marine environment and aquatic resources.

Artisanal fisheries and community-based fisheries management.

The emphasis by Mr Flewwelling in this session was on the need for considerable efforts in preventative MCS activities. These were required to sensitize the communities and fishers and enhance their understanding and seek their support for fisheries management activities and MCS operations, and thus promote voluntary compliance with the legislation. It was further emphasized that this awareness enhancement needed to be accompanied by a fishers, gear and boat registration system, as well as alternative and supplemental income-generation opportunities to reduce fishing pressures on coastal marine areas. If the administration did not consider the grave plight and socio-economic situation of the fishers prior to implementing deterrent MCS activities, it would not succeed and there would be no support for fisheries management.

Social sensitization and registration of the fishers could prepare the way for other MCS activities to commence, such as reef- and coast-watch monitoring programmes involving community members, etc.

In summary, it was suggested that the steps for MCS introduction into communities in rural areas should be:

- (i) commence awareness building of fisheries management and MCS;
- (ii) register fishers, boats and gear;
- (iii) implement preventative MCS activities, including reef- and coast-watch, school tours, etc.; and
- (iv) commence deterrent MCS operations as required to deter habitual offenders.

Tuesday, October 26, 1999

Field trip

Participants went by coach to the Muttrah Fish Market, where small, fibreglass boats unload direct to the market. Many varieties of fish, including sardines, ribbon fish and tuna, were on sale and the process of cleaning fish and salting tuna was observed.

The group then went to the port to board a Coastguard patrol boat (Japanese built and some 40 m long). This can be at sea for six days. The rigid inflatable and other equipment were examined. A Korean trawler was also visited and the trawl gear was seen to have a chafer that blocked or partially blocked the inner openings in the cod end.

At Coastguard headquarters, the Commanding Officer showed the group a video demonstrating Coastguard work, and questions were answered. The Coastguard evidently had an important role to play in stopping border violations by unlicensed fishing vessels.

The Fisheries Research Institute was visited en route through Muscat to finally reach Quriyat. Here the group visited the new fish harbour for artisanal vessels. Fortunately, four small outboard-powered craft were in, with good landings of grouper (from traps), tuna (from handlines) and mixed fish (from gillnets). All the fish was kept on ice in insulated boxes. Small, insulated vehicles were waiting to take the fish to Muscat and markets inland. The group were given an Omani lunch in the training room of the fish landing Administration. Prior to returning to Muscat, a short visit was made to a wadi and a mango farm.

Wednesday, October 27, 1999

Vessel identification and patrol boats

Mr Flewelling presented the FAO vessel identification and marking system as the recommended minimum standard for fishing vessels. The paper is presented in full as Technical Paper 9 of this Report. He also summarized the Malaysian system, that was based on the FAO system and then enhanced with zone markings, colour coding of vessel hulls, an irremovable identification plate, and special paper for licences that would be difficult to reproduce.

Captain Berg presented a paper on patrol boats. The paper is presented in full as Technical Paper 5 of this Report. He started with a brief definition of the concept of a fisheries patrol boat. A fisheries patrol vessel was a vessel used to ensure compliance to fisheries laws and regulations both of a national and international nature. A patrol vessel started to become a coastguard vessel when additional tasks were added to its mission, such as immigration control, pollution control, search-and-rescue, and police activities. Such additional responsibilities might require a vessel with different technical abilities, beyond those of a purely fisheries patrol vessel. A coastguard vessel could soon turn into a Navy vessel if additional tasks of national security and defence purposes were assigned to it.

The use of patrol vessels could be justified, *inter alia*:

- to prevent fishing in areas closed for management reasons;
- to prevent fishing out of season, i.e., in closed seasons;
- to prevent the use of illegal gear among licensed vessels;
- to prevent unlicensed vessels fishing in any area;
- to prevent illegal catches, i.e., taking undersized fish, illegal by-catch, etc.;
- to prevent dumping;
- to ensure correct reporting of catches;
- to ensure correct reporting of fishing activity;
- to deploy observers or scientific personnel on fishing vessels;
- to provide support to other platforms, such as patrol aircraft and VMS; or
- to provide a service function to the fishing fleet, including a diving facility, medical assistance, technical assistance, etc.

If a country were considering using a fisheries patrol vessel for any of the above or other reasons, a first step would have to be to clearly define the overall needs and the relevant stakeholders within the fishing sector. This was a simple but important starting point that had to be systematically observed so as to cover all possible considerations. It was recommended that all relevant stakeholders be involved in this discussion and invited to provide comments on the official findings. This process would clearly define the type of vessel needed and the requisite equipment needed on board. However, care had to be taken to distinguish between “*need to have*” and “*nice to have*.”

In addition, the Government needed to undertake a feasibility study and collect relevant information in order to allow it to assess and decide whether the use of a patrol vessel was the most suitable and effective solution. To this effect, the steps described below would have to be carefully followed:

1. Information gathering

Examples of the type of information that would be useful included:

- a list of the fisheries and management methods in use;

- status assessment of each fishery, i.e., new or old, vulnerable or steady;
- an estimate of levels of illegal activities and related economic losses;
- value of each fishery;
- nature of the area(s) to be patrolled;
- level of political support for enforcement of fisheries laws;
- alternative control measures;
- other MCS platforms or operations in the area(s);
- other solutions, with cost estimates; and
- the legal framework, both the applicable legislation and action when broken (powers; legal action; fines).

2. Suitability analysis

It was important to determine if a patrol vessel would be suitable to satisfy the identified needs, and if a patrol vessel could do this alone or whether it should be part of an integrated MCS solution. This was an analytical assessment that could be approached in many different ways. A matrix was often an easy way to present the results of such an assessment (see the discussion in Technical Paper 5 of this Report).

All matrices required in-depth explanation in supporting text, where all conclusions were justified clearly.

3. Human and logistics assessment

This part of the assessment addressed the available resources and constraints at government level. Analyses of the following factors were required:

- (v) *Human resources capability* Did the personnel have the required knowledge to operate and develop the operation, or would outside assistance and/or training programmes be required?
- (vi) *Resources available* What budgetary resources were likely to be available in the short and long terms? This included human resources (salary, training, equipment, etc.) as well as investment and running costs (maintenance, fuel, food, spare parts, technical assistance, etc.) of the vessel. There had to be reasonable certainty that there would be adequate resources available to operate the platform after the initial investment.
- (vii) *Support, maintenance and logistics* Would local or regional organizations or companies be able to support and maintain the new platform? What kind of purchase routines were required within the government system (i.e., would they complicate an otherwise efficient operation)?
- (viii) *Infrastructure* Were the necessary port facilities in place? Would the requisite support and assistance from Navy or Coastguard be ensured through a concept of cooperation?

4. Preliminary cost assessment

A preliminary cost assessment was necessary to ensure that resources available covered the requirements for the proposed vessel, as well as to determine the long-term needs for operating the vessel. It was advisable to investigate the second hand-market price as well as the price for new construction. A shipyard should be able to provide the necessary information.

5. Feasibility analysis

The last part of the assessment should always include a feasibility analysis for the new vessel. There were obvious factors that would stop the project immediately, like lack of infrastructure or

money. Other issues might not become obvious unless a careful and comprehensive study had been made.

6. Alternative solutions

Alternative solutions should always be identified and compared to the primary idea (in this case the patrol vessel) to give a complete assessment. Options to consider included:

- *Regional cooperation* Regional sharing of MCS resources was an alternative that could enhance regional or bilateral cooperation and increase efficiency in a larger perspective.
- *Charter* Charter of a vessel could in many cases be a cheaper solution than running one's own vessel. This depended on the experience of the government, local policy, and timeframe of the operation. It was possible to charter a vessel for a certain number of days per year, thus reducing costs.
- *Donor assistance* Help could be sought from other countries with expertise in the field. This was particularly favourable if the country qualified for donor assistance. However, this solution could also have pitfalls, such as:
 - the assistance provided might not fully meet the needs identified in the analyses;
 - the donor country could specify unsuitable or technically outdated equipment; or
 - the donor country might have unstated commercial interests related to technical support, subsidization of its own industry or involvement in the fishery. This could result in the provision of an unsuitable vessel.
- *Use of an alternative MCS platform or sensor* Other solutions and different MCS platforms might provide the same or even better results at more favourable prices, as well as with less training required. These solutions should be included in the comparisons to ensure the best possible solution within the economic limits.

6. To buy a new patrol vessel

If the analysis of the situation led to the conclusion that a new patrol vessel was needed, the next step was to establish the preliminary specifications of the new vessel. This would be a technical report and it was recommended that either marine consultants or an internationally recognized association be employed to produce such report. This report should outline main and secondary functions, operational requirements, national and international regulations and obligations, technical specifications, required infrastructure, market evaluation, product identification, and cost estimates.

If there were no suitable solutions immediately available, the next step would be to hire a naval architect to design a new vessel. These drawings and specifications could then be used as the basis for tendering procedures, where shipyards were invited to give cost and time quotations.

Access arrangements, licensing and administrative procedures

Mr Everett introduced the subject of administrative procedures associated with fishing. In a well managed fishery, an applicant for a licence would need to provide a certain amount of information to the licensing authority. If the authority chose to issue a licence to the applicant, a summary of the government management policy should be provided. In addition, a number of conditions and guidelines should be attached as an annex to the licence. These should include details of requirements such as keeping logbooks, reporting procedures, guidelines on discarding incidental by-catch, and details of mesh sizes, closed areas, etc.

The need to balance surveillance costs against capacity for overall enforcement was important. It was impossible to ensure that there was no illegal fishing, but high deterrence penalties would reduce the incidence. Licence fees should be set with an eventual target of

recovering costs of administration, MCS and research. In the case of industrial fishing and foreign fishing, the aim should be to gain revenue for the state.

A film was shown of procedures involved in boarding a fishing vessel suspected of illegal fishing, as well as the subsequent court case.

MCS experiences in Eritrea

Mr Semere Ghebremariam, Head of MCS Division, provided an overview of the MCS experiences in Eritrea. The paper is presented in full as Country Paper 9 of this Report.

The marine fish catch plays an important role in meeting the food needs of the country. There had been training in MCS provided as part of a recent UNDP/FAO project, and the staff of the Department of Fisheries continued to employ MCS approaches to assist fisheries management.

The Red Sea waters of Eritrea covered about 56 000 km², from a coastline of roughly 1 200 km. Eritrean fishery resources included various types: reef fishes like snappers, groupers and emperors; small demersal fishes; large pelagic fishes, such as tuna, jacks and mackerels; sharks; crustaceans, including lobster and shrimp; and aquarium fishes.

The Government of Eritrea recently adopted a Fisheries Proclamation, which encompassed the following legal texts:

- (i) The Fishery Product Proclamation.
- (ii) The Foreign Fishing Vessel Regulations.
- (iii) The National Fishing Vessel Regulations.
- (iv) The Fishery Product Hazard Analysis Critical Control Points Regulations.
- (v) The Potable Water Regulations.

MCS activities were the responsibility of the Ministry of Fisheries, with about 56 persons working in MCS-related matters. Awareness of ongoing illegal fishing activities had stimulated moves to reinforce the MCS division, with the consequence that a lot of effort had been put into training of personnel and into providing relevant equipment.

MCS experiences in Saudi Arabia

Mr Khalid Mohammad Abbas Allam, Director of Fish Stock Assessment, provided an overview of the MCS experiences in Saudi Arabia. The Gulf and the Red Sea coasts had small but important fisheries. There was a closed season for the shrimp fishery in the Gulf. There was also a shrimp fishery in the southern Red Sea, on stocks shared with Yemen. The Department of Fisheries was giving increased attention to fishery management.

MCS experiences in Sudan

Mr Mohamed Osman Hassan El Dardiri, Director Marine Fisheries Department, provided an overview of the MCS experiences in Sudan. The paper is presented in full as Country Paper 10 of this Report.

About 2000 t was fished annually from the Red Sea, compared to 45 000 t taken from inland waters. There were no Sudan-flag industrial vessels, but some foreign-flag vessels were licensed to trawl along the coast. The Marine Fisheries Administration had responsibility for control of the fisheries.

Marine parks and reserves

Ms Van Houtte gave a brief overview of the critical policy, institutional and legal challenges which a country was likely to face when setting up marine protected areas. The management of marine parks was not an easy task because of the social issues (resource-dependent communities),

the pressure of tourism or other interest groups, the need for innovative financial mechanisms for controlling the area, etc. A video was shown on the marine parks programme in Malaysia.

Training as a key factor for building up local knowledge and experience

Captain Bergh and Mr Flewwelling made an oral presentation on this subject, supported by visual summaries.

It was important to identify the tasks to be addressed, assess current staff, and identify the actual requirements for training. For example, the persons to be trained could be fisheries officers, observers, managers or officers concerned with legal matters. Use could be made of a number of documents already prepared for training of staff in other countries. There was always a need to build on existing experience, and develop specific documentation and modular training concepts. It was useful to describe the hierarchy of competencies necessary to perform the duties, tasks and activities of the various staff categories, and use a performance appraisal system for assessment of occupations. There was always potential for improving course curricula.

Regional cooperation in MCS

Following a brief introduction on the reasons for and the constraints in regional collaboration in MCS, Ms Van Houtte presented a brief overview of the relevant international legal instruments that could constitute a legitimate basis for developing regional collaboration in MCS and for cooperation in the conservation and management of high seas fish stocks, in particular straddling fish stocks and highly migratory species. She then illustrated aspects of regional collaboration in MCS by two case studies: the South Pacific Fisheries Forum Agency (FFA) and the Sub-regional Fisheries Commission (West Africa).

Undoubtedly, MCS was a key component in fisheries management and it deserved a common policy at regional or sub-regional level. A critical requirement for effective regional MCS was a strong political commitment to regional cooperation in MCS and to making it work.

Working Groups

In order to provide a more informal framework for discussion of MCS, three *ad hoc* working groups were formed to examine in more detail aspects of fisheries management, of operations, and of legal, institutional, economic and cooperation matters.

The working group on management discussed current practices followed in implementing MCS measures related to closed seasons, closed areas, mesh size regulation, minimum size of fish, and limitation of effort or entry. The experiences of each country were diverse, and participants examined possible solutions, and problems posed by attempts to improve fisheries management.

Topics that were the focus of attention in the working group on operations included licensing, training, inter-agency mechanisms for cooperative and cost-effective MCS operations, and information sharing between agencies.

The third working group first examined the Code of Conduct for Responsible Fisheries, the UN Fish Stocks Agreement and the FAO Compliance Agreement. Forms of regional cooperation were assessed. The working group discussed the well known catch curve in fisheries and agreed that public opinion, fishers and politicians should be reminded of the grave consequences of unlimited expansion in the number of vessels, which would lead to an overall decline in the catch. Other issues examined were methods of raising revenue from fisheries, and possibilities for ensuring adequate prosecution when cases were presented in court.

The reports of the Working Groups are given as Appendix D to this Report.

Thursday 28th October

CLOSING OF THE WORKSHOP

The main findings of the three working groups were summarized by the three rapporteurs, namely Dr Somvanshi for management, Mr Paleri for operations, and Mr Abdul Rashid Ghafoor for institutions.

Mr Everett thanked all the participants and resource persons for their contributions to the successful outcome of the workshop, and thanked Norway for their financial support for the project. He pledged to keep in touch and to follow up at the national level when possible. He thanked the Director General and staff of the Department of Fisheries of Oman for their consistent interest in and support for the workshop. He expressed gratitude to the Under-secretary of the Ministry of Agriculture and Fisheries, Engineer Khalfan bin Saleh bin Mohammed Al-Nabi, for inviting all participants to a dinner on 24 October.

The Project Manager for the FISHCODE project reiterated his thanks to the Department of Fisheries for their support and noted with pleasure the excellent participation of all who had attended the workshop. It was evident that much important information had been exchanged that would be of overall benefit to fisheries management.

On behalf of the participants, Mr Baloch thanked FAO for organizing this regional workshop and acknowledged that he had considerably improved his knowledge of the subject, which would be of great benefit when he undertook his fisheries responsibilities in the future.

The workshop was declared officially closed by the session chairperson, Ms Lubna Hamoud Al-Kharousi.

