JCOMM CAPACITY BUILDING STRATEGY

WMO/TD-No. 1063

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JCOMM Technical Report No. 11

WORLD METEOROLOGICAL ORGANIZATION

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N O T E

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JCOMM Capacity Building Strategy

Executive Summary

Introduction

The increasing population of the world imposes new challenges on society to manage the finite resources of the planet in a sustainable and environmentally responsible manner. The WMO/IOC Joint Technical Commission on Oceanography and Marine Meteorology, JCOMM, is committed to improving and expanding the availability of operational marine data necessary for monitoring, understanding and forecasting both short and long term meteorological variations. JCOMM also needs to respond, within the limits of its own responsibilities, to assist in bringing accurate and dependable information to all countries of the world.

It will be the vision of the JCOMM Capacity Building programme to understand the needs of Member States and to address these deficiencies through the dedication and mutual cooperation of all countries, under the guidance of a global plan for JCOMM.

General Principles

The JCOMM is jointly sponsored by the WMO and the IOC and therefore its Capacity Building programme must operate within, and draw upon, the overall principles of its governing bodies. The programme must also cooperate with other programmes, such as WWW, GOOS and GCOS and seek partnerships with funding agencies to pursue mutual objectives.

Following along the lines of the goals and objectives of the capacity building programmes of the two governing bodies, the general principles for the JCOMM, include the following:

- The programme will have, as its prime directive, a focus on increasing the national participation in JCOMM activities and on the improvement of operational ocean and meteorological services to the users and peoples of all countries.
- The programme will maintain consistent goals over a long term.
- Emphasis will be laid on the development of local expertise, so as to provide sound advice to policy-makers for the sustainable development of marine resources and preservation of the marine environment.
- For a sustainable capacity building programme, a partnership must be forged between the donor and the recipient organization(s) or country(ies).
- Programmes must be tailored to the requirements of the targeted country or region. In all cases the active involvement of the community in the recipient country is essential.
- Clear methods must be used to measure how effective each mission is in meeting its goals.
- For all programmes attention must be paid to the interaction among local, regional

- and global systems, without which the full benefits of JCOMM cannot be achieved.

- Where possible regional cooperation should be used to maximize resources, to encourage mutually beneficial activities amongst countries with similar requirements and to establish robust regional systems.

- Every effort shall be made to entrain the support of governments, international organizations, the private sector, and other donors.

- Creation of awareness in the minds of the public and policy makers is essential for raising national and international support.

Programme Considerations

Capacity Building programmes come in a huge variety of forms and it will be up to JCOMM to choose the most effective forms of delivery. Priority must be given to those programmes that are aimed at the expansion and improvement of JCOMM. For example, JCOMM can identify, but not respond to basic educational deficiencies in any country. It should, however, provide oversight for the preparation and provision of documents directly related to JCOMM activities and by identifying relevant bibliographies.

In many ways training courses are the easiest way to address capacity building efforts, but success is difficult to assess. The JCOMM capacity building programme must pay attention to the expected outcomes from each course. The electronic age may revolutionize training methods over the next decade and produce new challenges.

Capacity building programmes must not ignore the need for the transfer of knowledge so that scientists from all countries can be involved in the planning and execution of global and regional programmes. Equally important is the more practical requirement of technical assistance to set up and operate observational and predictive systems, including the provision of hardware. For the latter, JCOMM itself has no access to such equipment and requests must be channelled to other potential donor sources.

Access to regional and global data, especially those that could have potential to save life and property or prevent hardship is essential. Of particular importance are satellite data, which have universal coverage and have no jurisdictional problems other than ownership and the access to the output from computer models. The maximum use should be made of the new WMO Virtual Laboratory for Training in Satellite Meteorology, expanded as necessary to also include satellite oceanography.

Infrastructure is needed in all countries, but putting it in place is a type of programme best addressed by substantial bilateral aid programmes.

A consistent failure of most capacity building programmes in intergovernmental organizations is in addressing the accountability and results of the activities. Successful programmes must be recognized and failures must be noted and used to amend approaches. It should be assumed that all assistance programmes would have specific objectives that could be used, in retrospect, to judge the relative success of projects and programmes and it should be the responsibility of the recipients to comment on whether the results met or failed to meet expectations.

To oversee the Capacity Building Programme, the JCOMM should establish a panel of experts drawn appropriately from both recipient and donor communities.

Priorities and Actions

The JCOMM Capacity Building Strategy outlines a set of principles and actions to guide the JCOMM capacity building efforts. The priorities and actions that should provide the initial focus for the programme are outlined below.

National organizations and governments must take responsibilities for capacity building actions whether they are donor or recipient countries. Technically advanced countries must commit to capacity building objectives and actively pursue ways of contributing. Commitments must be made by the receiving governments and institutions to develop and maintain an infrastructure that will continue to participate in the JCOMM activities over the long term.

The regional subsidiary bodies of the WMO and IOC should be informed of JCOMM activities at every meeting and actions should be requested or recommendations received. JCOMM members, under JCOMM guidance and/or through regional WMO and IOC bodies, should address how regional observational and information resources can be best used to mutual advantage. They should investigate how resources may be made available through collective regional submissions to funding agencies. The efficiency and effectiveness of using regional bodies to coordinate and facilitate common requirements in a region from training through operational systems must be emphasized.

At the global level, JCOMM itself must provide the necessary guidance through the identification of global objectives and the overall deficiencies in the programme. These must be spelt out clearly, as must the potential benefits to the programme and to the recipient nations from capacity building efforts. JCOMM must oversee the preparation of suitable standards, manuals and guides against which the national and regional programmes can be judged and deficiencies recognized. It must also prepare brochures, and assist in the development of proposals, on potential benefits from the JCOMM programme, in particular how these relate to the overall aim of raising the social and economic wellbeing of developing countries.

JCOMM must provide a clear outline of how capacity building programmes are monitored and audited for success and failures. There must also be a mechanism for updating the programme based on what is seen to be happening. The task for the JCOMM panel of experts is to maximize the available resources by ensuring that the JCOMM capacity building principles are adhered to, that priorities are addressed and that the results are audited. JCOMM can work with governments and space agencies to increase the timely availability and use of remotely sensed data. Finally the JCOMM Secretariat and elected officers must take advantage of partnering opportunities where these can further the JCOMM objectives.

C O N T E N T S

1. Introduction

1.1 The Context

The increasing population of the world imposes new challenges on society to manage the finite resources of the planet in a sustainable and environmentally responsible manner. Technology can assist in many ways, but new developments themselves generate additional capabilities and activities that introduce more complexities to manage. Management requires accurate and dependable information available in time to meet decision deadlines and that information depends on an adequate reporting network.

In populated areas, the in situ networks are relatively easier to install and maintain than in remote locations, however local observations are still not sufficient for many information requirements, such as those depending on regional and/or global processes. For those products, observations are needed from a spatial network of in situ observations, now often complemented with satellite coverage. For the oceans the problems are doubly severe, because there are no population centres to rely upon, they involve a three-dimensional medium that is impervious to most satellite sensing capabilities and which demand knowledge of a dynamically coupled system of oceans and atmosphere.

The WMO/IOC Joint Technical Commission for Oceanography and Marine Meteorology, JCOMM, is committed to improving and expanding the availability of operational marine data necessary for monitoring, understanding and forecasting both short and long term meteorological variations. This increase in data will be invaluable to marine meteorological and oceanographic forecasting serving a variety of management needs. At one time the major clients were shipping related, but recent change in social and industrial behaviour has broadened the requirements in many ways. In particular, there has been a huge demographic shift of population into coastal areas, increasing both the vulnerability of life and property and the magnitude of anthropogenic impacts on the fragile coastal zone.

The economic and social benefits from accurate and robust monitoring and forecasting systems of the ocean and of marine meteorology are very real and can be even more valuable in those countries where the infrastructure for management and protection is poorly developed.

Both developed and developing coastal countries, through the United Nations Convention on the Law of the Sea (UNCLOS), have been given the right and obligation to protect and manage their marine resources within at least 200 nautical miles of their coasts (the Exclusive Economic Zone, EEZ). At the UN Conference on Environment and Development, UNCED, in 1992, nations committed themselves to the implementation of a programme of sustainable development of the planet, including contributing support to those countries less able to help themselves. In most cases, the developing countries with the lowest capacity in marine activities are the ones which are most vulnerable to marine pollution and natural disasters and the same countries lack the expertise to explore and develop the various marine resources within their EEZ.

The transfer of knowledge and technology to improve observational systems and predictive capabilities in developing countries is not only an undertaking that must be followed to raise the living standards of all peoples to acceptable levels. The additional contribution of those countries will also improve the accuracy and dependability of regional and global systems around the globe. The most telling example of such inter-dependence is the recent impact of El Nino occurrences, where changes in the temperature of the tropical Pacific Ocean affected local climates worldwide.

1.2 The Vision

Poverty, in monetary terms and in the quality of life, is a deterrent to peace and to the ability of the human race to sustain the environment on which we ultimately depend. A Capacity Building Programme under JCOMM cannot be expected to make any large impact on the overall world situation. However, it can be used to improve the capability of countries in the area of marine

forecasting and management, which will contribute to the necessary solutions. JCOMM, through training, transfer of technology and provision of equipment, can assist all countries to become involved in the implementation of JCOMM programmes and to share in the benefits produced. When countries have an adequate system for the operational observation of the ocean and marine meteorology, there will be increased economic returns, improved quality of life, less loss of life and enhanced protection from environmental events.

It will be the vision of the JCOMM Capacity Building Programme to understand the needs of its Member States and to address the deficiencies of the operational observing and information system wherever they may be. This shall be done through the dedication and mutual cooperation of all countries, through the development of partnerships, through the collective focus of effort and assistance on the identification and solution of problems in ability and capacity and under the guidance of a global plan for JCOMM.

2. General Principles

The JCOMM is jointly sponsored by the WMO and the IOC and therefore its Capacity Building programme must operate within, and draw upon, the overall principles of its governing bodies. The WMO and IOC can also assist with the development of partnerships with potential donor agencies and with links with other UN and other relevant regional and global organizations. The programme must also be compatible to, and work with, similar efforts in other WMO and IOC programmes, especially those with observational objectives, such as WWW, GOOS and GCOS. Finally, the JCOMM programme should seek partnerships with funding agencies to pursue mutual objectives in the development of capability and capacity and the improvement of the quality of life for all.

2.1 The Role of the WMO

The WMO has an extensive programme of education and training activities encouraging the exchange of scientific knowledge through special courses, seminars and training materials. It has a Technical Cooperation Programme (TCO) that seeks to bridge the gap between developed and developing countries by the systematic transfer of meteorological and hydrological knowledge and information. TCO assists Members, especially developing countries in obtaining the technical expertise and equipment for the development of their national Meteorological and Hydrological Services. The WMO Executive Council Panel of Experts on Education and Training serves as an advisory body to the Council on all aspects of technical and scientific education and training in meteorology and operational hydrology. Its specific functions include the coordination of activities of the WMO Technical Commissions in the field of education and training within their respective fields of competence. In addition the technical commissions and regional associations may appoint rapporteurs, or establish working groups, on education and training. These and other capacity building programmes of the WMO can be of assistance to JCOMM and are further elaborated in Annex A.

2.2 The Role of the IOC

Although smaller than WMO, the IOC has an important advisory, coordinating, and facilitating role to play in supporting the creation and strengthening of national oceanographic infrastructure. It has established several regional subsidiary bodies that can assist in making national efforts more sustainable and effective and provide mechanisms to stimulate capacity building for IOC programmes. The IOC regional bodies formulate and agree on cooperative regional projects built on national actions and addressing identified national and regional needs and priorities. They aim at regional pooling of resources and joint capacity building, and draw upon the global programmes of the IOC, for expertise, results, and advice. The IOC-TEMA (Training, Education and Mutual Assistance in marine sciences) capacity building programme is central to the overall IOC role and supports the capacity building efforts that are focussed within the programmes of the Commission. Funding is mostly found from a combination of the IOC funds and contributions from Member States. More substantial sources of support must be found from donor agencies

(including the private sector) and from other appropriate and creative means. Additional information on the goals of IOC capacity building is given in Annex B.

2.3 The Capacity Building Programme of JCOMM

Following along the lines of the goals and objectives of the capacity building programmes of the two governing bodies, JCOMM will attempt to enhance the participation and capabilities of Member States in the JCOMM programme. In so doing, it will both strengthen the ability of the programme to deliver accurate and timely ocean and marine meteorological products and also bring the benefits of those outputs to all Member States. The general principles for the JCOMM, again relevant to those of the WMO and IOC, include the following.

- The programme will have, as its prime directive, a focus on increasing the national participation in JCOMM activities and on the improvement of operational ocean and meteorological services to the users and peoples of all countries.

- The programme will maintain consistent goals over a long term. Capacity Building is a continuing and deliberate activity.

- Emphasis will be laid on the development of local expertise, so as to provide sound advice to policy-makers for the sustainable development of marine resources and preservation of the marine environment.

- For a sustainable capacity building programme, a partnership must be forged between the donor and the recipient organization(s) or country(ies).

- Programmes must be tailored to the requirements of the targeted country or region. For some it will be necessary to assist in the identification of needs, for others it will be a question of building on and improving the existing operational systems. In all cases the active involvement of the community in the recipient country is essential.

- For all programmes attention must be paid to the interaction between local, regional and global systems, without which the full benefits of JCOMM cannot be achieved.

- Where possible regional cooperation should be used to maximize resources, to encourage mutually beneficial activities amongst countries with similar requirements and to establish robust regional systems.

- Capacity building activities can take the form of a single training course or the installation of a complete regional monitoring system. The size will be dictated by the needs, by the available resources and by priorities. It is not useful to waste scarce resources on an unnecessary programme.

- The demands upon the JCOMM will always exceed the resources available within the organization and those available from the governing bodies. Every effort should be made to entrain the support of governments, international organizations, the private sector, and other donors. In many instances funding agencies will appreciate guidance on scientific and technical issues that can further socio-economic goals. The most acceptable instruments for capacity building are those in which scientists, engineers, socio-economists work closely with the beneficiaries.

- Creation of awareness in the minds of the public and policy makers is essential for raising national and international support.

3. Programme Considerations

Capacity Building programmes come in a huge variety of forms and it will be up to JCOMM to choose the most effective forms of delivery. Priority must be given to those programmes that are aimed at the expansion and improvement of JCOMM. With this in mind, the following types of Capacity Building programmes are examined in terms of how they relate to that priority. This section deals with the programme responsibilities and priorities of JCOMM and leaves the other dimension of funding to a later section.

3.1 Education

It cannot be the responsibility of JCOMM to respond to basic educational deficiencies in any country. Such needs are of fundamental importance, but beyond the ability and scope of a technical organization such as JCOMM, even when such deficiencies may be the major obstacle in a nation's ability to participate in JCOMM activities. Where possible JCOMM assistance could be given to bring these basic needs to the attention of funding agencies. Other forms of JCOMM assistance would be available.

The provision of places for students to attend university and technical colleges in subjects relevant to JCOMM, and the education of teachers in operational ocean and marine meteorology offer legitimate and valuable directions for JCOMM capacity building programmes.

3.2 Materials

The value of instructional material cannot be overstated. From basic texts on oceanography and meteorology to scientific papers, from manuals on instrument maintenance to guides on the provision of services and from standards for the archiving and exchange of data to those governing the digital transmission of predictions, adequate documentation is essential. Again JCOMM cannot be expected to provide all the associated materials that a country may require, The burden of preparation, publishing, translation and distribution, even for those documents that are directly related to JCOMM, must be shared. Those countries having the necessary tools should assist in providing them to others. JCOMM will have the responsibility of providing oversight for the documents directly related to JCOMM activities, by bringing together, or identifying, experts to write the texts, by assisting in finding countries willing to translate or distribute materials and by identifying relevant bibliographies of related materials etc.

3.3 Training

In many ways training courses are the easiest way to address capacity building efforts. They can be most effective, but they can also be frustratingly difficult to assess. The JCOMM capacity building programme must pursue its training courses with care, paying particular attention to the expected outcomes from each course and how it will contribute to the major objective of improving the use and value of operational services.

The effectiveness of training courses also depends upon the quality of the instructors, the training material, the numbers and quality of the participants and their relevance to the JCOMM programme. It is usually more efficient to hold regional courses, where an additional benefit is gained from the interaction of regional experts and the mutual sharing of experiences. National and international workshops may also be warranted, depending on desired results.

In some cases, field training may be necessary and this will usually restrict numbers and locations and increase the cost. Invitations from experienced organizations and institutions can provide an important contribution, whether it comprises receiving individual trainees at national facilities or holding training courses at those facilities. Secondment of experts from technologically advanced countries to institutions in less fortunate areas is equally beneficial.

It should be noted that the electronic age may revolutionize training methods over the next decade. The ability for supplying technical training via the Internet, complete with electronic materials and video tutoring cannot be ignored. However, the challenge will be in the preparation of the course material, the training of the teachers themselves in such modern methodology, the setting up of the infrastructure to allow countries to receive the instruction and addressing the many other complexities that usually accompany such radical changes in methodology.

3.4 Knowledge

Scientists in member countries want to share in the planning of scientific programmes and technological advances. In order to convince their own governments to invest in the benefits of operational forecasting, they must be able to argue from a basis of knowledge. To do this they need to understand the processes involved and the consequences of action or inaction. Capacity building programmes must not ignore the need for the involvement of scientists from all countries in the planning and execution of global and regional programmes.

The transfer of knowledge may also take the form of direct advice from experts in specialized areas such as modelling, in the assessment of plans for national systems or even with the preparation of funding proposals to aid agencies. Mutual trust and interaction can be built up between and amongst institutions and such twinning between advanced and less advanced organizations should be encouraged.

3.5 Technical assistance

Equally important as the sharing of advice is the more practical requirement of technical assistance. This can take the form of providing interim predictive services from one country or region to another, as yet unable to perform such coverage, software sharing necessary to interpret and analyse data or the secondment of technicians to help set up operational systems. Upon request JCOMM could review such requirements directing the more feasible to implementation bodies such as DBCP and SOOP.

3.6 Hardware and maintenance

Responding to requests for the provision of hardware, whether instruments for observation or computer systems for analysis, is always difficult. JCOMM itself has no access to such equipment and demands would usually be expensive. A brokerage service bringing requirements for equipment and inventories of surpluses would seem to be a novel and worthwhile idea. It must always be remembered however, that successful equipment transfer must include the ability of the recipient to operate and maintain the equipment and access to replacement parts.

Establishing funding support for regional centres that included the training, maintenance and replacement abilities to support national systems would be an ideal solution.

3.7 Monetary support

In many cases, JCOMM can apply direct grants to capacity building programmes. The Secretariat itself can, and does, provide support for travel of participants from developing countries to meetings and workshops. It can support the travel of experts to courses and can fund the arrangements for them.

If a central JCOMM fund existed, resources could be dispensed to any of the activities described in this section, however such a fund would likely be a modest one and it would be more reasonable to limit direct use of funds to travel and administration of training courses.

The possibility of a UN system body such as JCOMM entering into fund raising activities is less remote in this millennium than hitherto. The pursuit of resources for causes with reasonable

expectations to improve the quality of life in the recipient countries is a worthwhile objective and, with the Rio +10 Conference taking place in 2002, the potential should be explored.

3.8 Data and information

Access to regional and global data, especially those that could have potential to save life and property, or prevent hardship, is essential.

Of particular importance are satellite data, which have universal coverage and have no jurisdictional problems other than ownership. Given that satellites provide global coverage of remotely sensed ocean properties, it is glaringly apparent that only a fraction of remotely sensed ocean data has been put to actual use. Many developing countries would find remotely sensed data from satellites extremely useful for the purposes of management of their coastal seas and EEZs. However, many of these countries find it very difficult to access these data at high resolution and in real time. Indeed, even if they could access the data, they commonly lack the personnel trained to use them for practical purposes.

Thus a potentially hugely valuable resource is wasted by the collectors, and unavailable to the needy. The remote-sensing community needs to address this deficiency and JCOMM can provide a stimulus. Of particular relevance here is the developing concept within WMO of a Virtual Laboratory for Training in Satellite Meteorology. This concept should be expanded to cover also satellite oceanography, and would thus provide an ideal medium for JCOMM to enhance the capacity of its Member States to access and apply ocean satellite data to all support marine users.

The Pan-African Conference on Sustainable Integrated Coastal Management (PACSICOM), held in Maputo, Mozambique, 18-22 July, 1998 (IOC, 1999) identified the following need: "To encourage the formation of a network of specialists trained in the use of remotely-sensed data from space satellites, and to ensure the increased access to regional satellite receiving stations in Africa, so as to ensure that coastal managers have ready access to the rapidly increasing wealth of spatial data on the coastal environment."

Obviously the need applies to the whole of the developing world and lays down a challenge for the space agencies and the countries that own them. JCOMM can encourage the rapid development of a programme to build the capacity of the developing world to access and make use of remotely sensed ocean data from satellites, thereby immediately improving their ability to develop useful products and services. Such a programme could in particular make use of the WMO Virtual Laboratory, as noted above.

Another area involves the data available from computer models, where regional and local predictions at a variety of time scales would be of value to countries where no in situ data existed. Countries in a region can reduce the impact of low observational coverage by sharing their data amongst themselves.

Regional and global data sets on CD-ROM, or accessed from a distributed system, can form a valuable part of capacity building. In this regard partnerships with other relevant bodies that deal with data collection and environmental prediction would prevent unnecessary duplication and create synergy.

3.9 Infrastructure

No operational system can work without an adequate infrastructure to collect and analyse the data, to prepare and distribute the information, and to disseminate the services to the user community in a timely manner. In some cases the time will be urgent, in the case of warning the public of an imminent tsunami or storm surge, in others the service may address long range changes needed for planning. Putting infrastructure in place is a type of programme best addressed by substantial bilateral aid programmes. The requirements are comprehensive and need to be integrated with government structures to be sustainable over time.

4. Results and Accountability

A consistent failure of most capacity building programmes in intergovernmental organizations is in addressing the accountability and results of the activities. Too often, success is counted, not by results but by the numbers of workshops, participants and national attendance. Successful programmes must leave a legacy and failures must be noted and used to amend approaches to avoid making similar mistakes in the future.

It is never easy to audit the results of capacity building activities. Take the example of training courses. The participants change careers, are promoted or disappear from the scene for other reasons. It cannot be the sole responsibility of the JCOMM Secretariat to undertake the task of monitoring the results. The countries involved must make some commitment themselves. There are however certain steps that can be taken to make the process more feasible. Each course should specify its intended goals before the activity takes place. These goals would specify the results and expected schedule against which the success of the activity can be judged. Participants would be expected to know and accept the goals before attending the course and should agree to report at an appropriate future date on progress. Reporting arrangements could be standardized, providing some flexibility was allowed to accommodate different types of training and regional differences.

It should be assumed that all assistance programmes would have specific objectives that could be used in retrospect, to judge the relative success of projects and programmes. In fact, it is hard to visualize any programmes that would take place in the absence of such anticipated results. It should therefore be a relatively simple matter, before embarking on a capacity building programme, within JCOMM alone or with partners, to specify the expected results, when they should be manifested and to which benefiting organization or person(s) that is best placed to report. It should be the responsibility of the organization or person(s) that receive the expected benefit to comment back on whether the results met or failed to meet expectations.

5. JCOMM Capacity Building: Approaches and Responsibilities

5.1 Funding

Finding the resources to carry out an effective Capacity Building Programme is always difficult, but nevertheless it is a problem that must be addressed. At the basic level, if no exterior funds are found, the relatively small amount of funds available to JCOMM will be spent on travel and training workshops. The preparation of manuals, guides and other material will be carried out as an essential part of JCOMM, but special needs, translation and distribution will be slow.

JCOMM, and its Member States can use the larger, but still modest resources of the governing bodies, where these can be applied to priorities which satisfy both the specific requirements of JCOMM and the more general objectives of the IOC and WMO.

Improved use of resources can be made through partnering, where another organization, or organizations, with similar observational and operational goals, would share the costs of mutual workshops or programmes.

The largest amount of capacity building resources can be found in the international or bilateral funding agencies, but the application and justification for such funds to be used in JCOMM related activities is an added and arduous task for a Secretariat already burdened with programme related matters.

The potential benefits to the JCOMM capacity building programme are so great, however, that attempts to entrain such resources should be made. The following outlines some approaches:

(i) A fund raising staff officer could be placed within the Secretariat, either by a new position being found by the governing bodies or by secondment. This would certainly give JCOMM short-term advantages, but if the practice was repeated in all technical programmes requiring capacity building resources, even within the UN system, the advantage could be neutralized.

(ii) The visibility and benefits of JCOMM activities to the wellbeing of citizens and economies of developing countries could be publicized and made available to funding agencies. Brochures could be prepared by JCOMM for such purposes, joint workshops could be run to bring funding officers and technical experts together in settings where regional priorities could be discussed. On a more general level, there needs to be a coming together of the organizations that are funding programmes aimed at socio-economic progress and the technical bodies which can assist in the construction of sustainable infrastructure that will supply the information and services the society will need. Capacity building is a single objective and the many separate entities within that objective must eventually work in concert.

The greatest opportunity to access exterior resources lies in the hands of JCOMM members and this concept is expanded in the following paragraphs.

5.2 Partnerships

JCOMM cannot effectively work in isolation and mechanisms must be found to facilitate mutually beneficial programmes with other organizations and institutions to achieve common goals. In terms of the related subsidiary bodies of the WMO and IOC, this task should not be difficult. Any administrative or bureaucratic hindrances that jeopardize such cooperation must be faced and resolved.

It may be expected that cooperation with other UN Specialized Agencies may be more difficult and the WMO and IOC governing bodies should assist in such partnerships as necessary. For the IOC, it should also be possible to employ UNESCO resources in this regard.

As has already been mentioned, the technical contribution of JCOMM and the financial resources of funding agencies can combine to produce mutually beneficial results for both. This type of partnership also implies another level of partnering between the donor and recipient countries. The former supplying the necessary expertise and resources and the latter establishing the national organization and priorities, both combining in a truly sustainable capacity building outcome.

5.3 The national approach and responsibilities

One problem to be overcome is the tendency for Member States to leave the capacity building to the intergovernmental organization. In the same way as the operational programmes, the real ability of JCOMM to carry out an effective CB programme will be to convince countries to apply their own programmes and resources to JCOMM capacity building objectives.

Firstly, those countries in need of capacity building programmes can apply individually or collectively for assistance. Bilateral programmes in particular respond to national requests rather than those from intergovernmental organizations. Secondly, although JCOMM Members contribute large amounts of resources to their national observational and information services in response to the technical requirements of the regional and global programme, there is no such commitment to the capacity building requirements. Accepting that the national agencies and institutions will not have a specific responsibility in capacity building, nevertheless, if JCOMM, which is also not a funding organization, sees a requirement, then that requirement should be part of the national obligation towards JCOMM. These national agencies and institutions could do more, within their own budgets, to accept trainees, second experts, hold regional workshops, prepare materials and offer cooperative information services, than is taking place at present.

When resources have been found, the recipient country must also make commitments to the programme. Although donor funds assist and accelerate the participation of developing countries, without a commitment by the receiving government, programmes will be as transient as the funding source, and without a national framework to provide cohesion and continuity, each separate source of funding will risk duplication or fragmentation. The benefits of the increased capacity must be real and visible extensions of the JCOMM programme.

Programmes that do not show promise of continuity are obviously of low priority for an operational programme. It will be better for a country to move slowly and maintain a low-key viable programme than a high priced but short-lived effort.

5.4 The regional approach and responsibilities

Sustainable programmes are built on the needs and commitment of national governments and institutions, however regional cooperation can assist countries to participate in, and enjoy the benefits from JCOMM activities, where individually the countries may be unable to support national systems alone.

Regional cooperation increases programme visibility and can emphasize the importance of collective local priorities. Regional cooperation can increase and enhance capacity building programmes, not only through programmes such as regional training workshops, but also through more permanent shared facilities such as common data management and analysis centres, regional satellite data reception, GTS and product dissemination. Equitable sharing of the responsibilities for such facilities leads to gains for all.

Donor agencies will respond positively to collective regional requests and to programmes that promise national and regional commitments. Expertise must be sought to prepare quality proposals that will have an optimum chance of being received and funded. It is recognized that the process of preparing a proposal itself needs financial support.

Both the WMO and IOC have regional structures that should be used to develop regional cooperation, generate regional programmes and priorities, coordinate JCOMM activities with other programmes in the region and to implement capacity building projects.

5.5 The global approach and JCOMM responsibilities

The role of JCOMM will address actions at the global level and provide the framework under which the global, regional and national efforts retain integrity and continuity. The national, regional and global activities will take place under this common framework.

The identification, preparation and dissemination of material needed for a global programme is clearly the responsibility of the JCOMM, whether the individual tasks are assigned to national entities or partners. Such material may be technical in nature, such as manuals and guides, promotional brochures for public awareness or documents in support of resource proposals. All are necessary for capacity building programme development.

The Secretariat, the elected officers, the meetings of the Technical Commission and the intersessional activities of the JCOMM will all have responsibilities with regard to the maintenance of a cohesive programme.

A JCOMM Capacity Building Panel should carry the responsibilities of managing the programme by ensuring that accepted programmes comply with the principles and objectives set out, that partnership opportunities are pursued, that resources are sought and that national responsibilities are carried out.

6. Organization

6.1 Composition of the Panel

A JCOMM Panel should be formed with representatives from both the recipient and donor communities as decided by JCOMM, which will also allow for appropriate liaison with organizations with similar interests through invitation and by invitations to observers.

6.2 Terms of reference

The Terms of Reference will be finalized by JCOMM, but will no doubt follow the intent expressed by the JCOMM transition meetings when setting up the process to establish the capacity building programme. These original Terms of Reference included the following:

(a) Plan, initiate and implement the JCOMM Capacity Building Strategy;
(b) Keep under review existing training and guidance material (paper and electronic) and advise on procedures for updating, as well as for the development of new material;
(c) Monitor regional requirements for capacity building and develop regional projects as appropriate;
(d) Develop and implement integrated training and support activities, in collaboration with other programme areas and external bodies and programmes (e.g. WMO ET/TCO, IOC-TEMA, GOOS, GCOS, IGOS).

The Panel will also be expected to cover the resources questions, namely to:

(a) Monitor the existence, fields of interest and procedures of international and national aid programmes, foundations and all other possible sources of funding and advise on proposal development;
(b) Where possible, develop links and contacts to funding sources and aid programme management;
(c) Develop a plan for obtaining resources for JCOMM Capacity Building, in collaboration with GOOS and GCOS.

7. Priorities and Actions

The above sections have outlined a set of principles and a strategy to guide the JCOMM capacity building efforts. It is not expected that all the potential actions can be implemented and therefore the priorities and actions that should provide the initial focus for the programme are outlined below.

7.1 National Level

The IOC and WMO can only carry out their extensive programmes in meteorology and oceanography through the collective efforts of their Member States. This applies equally to capacity building activities, but the concept is more difficult to establish. National organizations and governments must devote more attention to these responsibilities and make efforts to contribute materials, facilities, personnel, financial assistance, etc., to further the global capacity of the JCOMM programmes. For the recipient countries the responsibilities include the commitment to direct and dedicate the assistance provided to the objectives of JCOMM and to the improvement of the local benefits to be derived from the activity.

- Technically advanced countries must commit to capacity building objectives and actively pursue ways of contributing.

- Commitments must be made by the receiving governments and establishments to develop and maintain an infrastructure that will continue to participate in the JCOMM activities over the long term.

7.2 Regional Level

The benefits of regional cooperation and the efficiencies of building regional capacity are very evident. The six Regional Associations of the WMO cover the globe more comprehensively than the regional subsidiary bodies of the IOC, however the JCOMM should have the advantage of both networks. JCOMM must address the question of structure and overlap between the two sets of regional organizations and suggest ways of using both to advantage, without unnecessary duplication.

- The regional subsidiary bodies of the WMO and IOC should be informed of JCOMM activities at every meeting and actions should be requested or recommendations received.

- JCOMM members, under JCOMM guidance and/or through regional WMO and IOC bodies, should address how regional observational and information resources can be best used to mutual advantage. In this respect, regions should consider undertaking the type of study carried out in RA III and summarized in Annex C below.

- JCOMM members should investigate how resources may be made available through collective regional submissions to funding agencies. The efficiency and effectiveness of using regional bodies to coordinate and facilitate common requirements in a region from training through operational systems must be emphasized.

7.3 JCOMM and the Global Level

- JCOMM itself must provide the necessary guidance through the identification of global objectives and the overall deficiencies in the programme. These must be spelt out clearly, as must the potential benefits to the programme and to the recipient nations from capacity building efforts.

- JCOMM must oversee the preparation of suitable standards, manuals and guides against which the national and regional programmes can be judged and deficiencies recognized.

- JCOMM must prepare brochures, and assist in the development of proposals, on potential benefits from the JCOMM programme, in particular how these relate to the overall aim of raising the social and economic well-being of developing countries.

- JCOMM must provide a clear outline of how capacity programmes are themselves monitored and audited for success and failures. There must also be a mechanism for updating the programme based on what is seen to be happening.

- The task for the JCOMM panel of experts is to maximize the available resources by ensuring that the JCOMM capacity building principles are adhered to, that priorities are addressed and that the results are audited.

- The JCOMM Secretariat and elected officers must take advantage of partnering opportunities where these can further the JCOMM objectives.

- JCOMM should make an effort to engage the Space Agencies and their respective governments to make available remotely sensed data and to assist in the development of the capacity needed to generate operational meteorological and oceanographic data and services using those data.

ANNEX A

WMO Capacity Building

The education and training activities of WMO encourage the exchange of scientific knowledge through special courses, seminars and training materials. Training programmes place several hundred specialists in advanced courses each year. Other activities include surveys of personnel training requirements, the development of appropriate training programmes, the establishment and improvement of regional training centres, as well as the organization of training courses, seminars and conferences.

The Technical Cooperation Programme (TCO) seeks to bridge the gap between developed and developing countries by the systematic transfer of meteorological and hydrological knowledge and information. TCO assists Members, especially developing countries in obtaining the technical expertise and equipment for the development of their national Meteorological and Hydrological Services. In its efforts to bridge the technology gap between the national Services of developing and developed Members, WMO works with major international partners such as the United Nations Development Programme, UNEP, the Global Environment Facility and regional development banks.

The role played by WMO in educating and training personnel in meteorology and its applications originates from the related purpose of the Organization which is "to encourage research and training in meteorology and, as appropriate, in related fields and to assist in co-ordinating the international aspects of such research and training" as cited in Article 2, sub-paragraph (f) of its Convention. This role is executed through a number of tasks and projects of the sub-programmes of the Organization's Education and Training Programme.

The actual education and training of meteorological and hydrological personnel is done in and by the Member countries. The institutions in which these activities are carried out include research centres and universities WMO Regional Meteorological Training Centres (RMTCs) national meteorological training institutions, and sometimes the Services themselves for on-the-job training. A Standing Conference of Heads of Training Institutions of National Meteorological Services (SCHOTI) also cooperates with, and contributes to, the WMO Education and Training Programme.

A WMO Executive Council Panel of Experts on Education and Training serves as an advisory body to the Council on all aspects of technical and scientific education and training in meteorology and operational hydrology. Its specific functions include the co-ordination of activities of the WMO Technical Commissions in the field of education and training within their respective fields of competence. In addition the technical commissions and regional associations may appoint rapporteurs, or establish working groups, on education and training undertaking a significant role in the implementation and monitoring of the programme.

The overall capacity building activities available within the WMO are extensive and will be of significant assistance to the JCOMM effort.

ANNEX B

IOC Capacity Building

Recognizing that many coastal states lack the capabilities in marine science required for them to fully participate in, contribute to, or benefit from the four main themes of the IOC:

1. To develop, promote and facilitate international oceanographic research programmes to improve our understanding of critical global and regional ocean processes and their relationship to the sustainable development and the stewardship of ocean resources;

2. To ensure effective planning, establishment and co-ordination of an operational global ocean observing system to provide the information needed for oceanic and atmospheric forecasting, for ocean and coastal zone management by coastal nations and for global environmental change research;

3. To provide the international leadership for education and training programmes and technical assistance essential to systematic observations of the global ocean and its coastal zone and related research;

4. To ensure that ocean data and information obtained through research, observation, and monitoring are efficiently handled and made widely available;

The IOC has developed a cross-cutting theme focussed on the development of national capabilities in marine sciences and services. The IOC Programme for this building of capacity involves a wide range of activities, depending on the starting capacity (or level of ability) of the country concerned. The activities fall under the general headings of Training, Education, and Mutual Assistance, and are managed through the TEMA Programme, which includes technology transfer. A first step in building capacity is raising awareness of the activities involved, the benefits that may accrue from participation, and the likely costs. Within the IOC, the TEMA programme is coordinated by a management committee consisting of the Executive Secretary and the Heads of the major programmes of the Commission.

ANNEX C

Identification of the capacity building needs of RA III
(in the context of the JCOMM)

The following has been extracted, as an example of a regional approach, from the extensive study undertaken for JCOMM by Miriam Andrioli, Chief, Maritime Division, National Meteorological Service of Argentina. The full report is available.

Introduction

The homogeneity of the countries that form the WMO Regional Association III (RA III) could be considered as a sample of the regional situation, but this surficial concept of uniformity is erroneous. Each Member country possesses unique characteristics with different resources, objectives, needs, possibilities and expectations. The disparity of interests is enhanced by strong national individualism and objectives, that together thwart attempts to extrapolate from national to regional points of view.

It was necessary to conduct a survey among the maritime countries of the RA III region, and to accomplish this purpose, a questionnaire was prepared and distributed, via the WMO Regional Office for the Americas, to the Permanent Representatives of Argentina, Brazil, Colombia, Chile, Ecuador, French Guyana, Guyana, Peru, Suriname, Uruguay and Venezuela. It is important to point out the fact that this survey is the first in its type ever conducted in the Region. Seven countries returned the questionnaire duly completed. Unfortunately, no responses, within the time allocated, were received from French Guyana, Guyana, Peru and Suriname.

The objective of the questionnaire was to determine the real and specific needs in human resources, financial support, equipment, technology and education in the areas of services, data and information management, observation and ETIS/TEMA. The possibility to include additional information on other subjects of interest was open to every Member.

Results of the survey

The responses included invaluable additional information on the present status and future evolution of the CMM/IGOSS programmes now in progress in each country, along with comments and suggestions to JCOMM. The variation among the Member's answers made it impossible to generalize them into a single regional summary. The information presented here is only a summary of the information, the full text however is available to JCOMM.

National summaries

ARGENTINA identified the following needs:

For the Servicio Meteorologico Nacional (SMN)

- Training: personnel to be trained as PMOs.
- Technical Assistance: Trained PMOs to evaluate the VOS weather observations quality and to perform ship inspection reports; advice to automatically plot the SHIP reports in the synoptic weather maps;

technological development for the input of ship reports received via INMARSAT-C, in real time, into the operational database;

- Hardware and Maintenance: equipment, replacement and repair of meteorological instrumentation for ships;

- Funding: daily expenses and transportation of PMOs to the Argentine ports;

- Data and: Information: digitizing and analysis of the maritime meteorological data currently stored in paper logbooks;

and for the Servicio De Hidrografia Naval (SHN) de la Armada Argentina

- Materials: catalogues and schedules for data available in real time, including new satellite sources and modelling products; effective and efficient access to publications; free on-line access to the OMM/IOC manuals and guides (codes, formats, meeting proceedings, etc.)

- Training: courses in the use of quality control software; courses on marine meteorological and oceanographic observations;

- Technical Assistance: the maintenance, updating and enhancement of the current numerical model capacity; the use of software for the exchange of data and products in new binary formats (BUFR, CRIB, etc.), and visual and post-processing tools to integrate, for instance, different products in GIS; the development of visualization tools;

- Hardware and Maintenance: moored buoys installation; ways to decrease the costs of the telemetry for collecting data platforms;

- Data and Information: processing software for real time data, including quality control software; real time access to the radar altimeter data and to the dispersion data from the ERS satellite; higher speed and more reliable communications; access to SAR radar images such us ERS, RADARSAT, etc.; software and tools in the field to obtain geo-reference data; availability of global numerical model products in real time with suitable temporal and spatial resolutions for the nested of regional models; access to the data available in the different regional centres; establish links with the regional or local data centres; software to code meteorological and oceanographic messages.

- Infrastructure: to maintain a communication structure that allows to input, in real time, boundary conditions, global numerical models products, etc. into the regional meteorological and oceanographic models run by the SHN; implementation of a regional and global network to link all the national agencies involved in the JCOMM objectives; procedures at the regional level, for the exchange of data via GTS.

BRAZIL identified the following needs for the Centro De Hidrografia Da Marinha, Marinha Do Brasil:

- Education: advanced educational tools like software, videos, multimedia, etc.;

- Materials: adequate codes and formats for the storage of data from ADCP, currentmeters, waves and drifting and moored buoys;

- Training: courses in the elaboration of sea surface current charts; courses on the creation of climatological records and other products; data management; instrument calibration;

- Knowledge: education on marine climatology;

- Technical Assistance: professionals trained in the operation of GTSPP and on the processing of data; establishment of quality control codes; an Internet site for automated drifting buoys and tide data;

- Hardware and Maintenance: telemetry ARGOS for the automatic reception of data; installation, maintenance and modernization of 3 platforms to transmit data via Argos; sensors for the calibration of tide gauges; installation of tide gauges and automatic GPS stations and modernization of the existing analogue tide gauge stations; an independent high resolution Internet server for data exchange; stations for the reception of high resolution satellite images; a drifting and moored buoy network and platforms for data collection;

- Funding: for increased data collection;

- Data and: Information: enhancement of computing capacity; software for the reception, pre-processing, processing, analysis and dissemination of automated tidal data; historic data retrieval; creation of a waves data bank; creation of a data bank for level references for GLOSS; reorganization of data into metadata format;

- Infrastructure: system to broadcast SST charts, wind/sea state forecast charts and synoptic charts; establishment of a regular broadcast service for coastal shipping; major participation of ships in the VOS programme.

CHILE identified the following needs for the Direccion Meteorologica De Chile, the Servicio Hidrografico Y Oceanografico De La Armada De Chile (SHOA) and the Servicio Meteorologico De La Armada De Chile:

- Materials: technical publications on marine meteorology, on the modification of the format regulations, on methods and on the broadcasting of marine meteorology services;

- Training: a Regional workshop on methodology and expertise in the use of oceanographic, meteorological and wave numerical models for coastal areas.

COLOMBIA has identified the following needs for the Instituto De Hidrologia, Meteorologia y Estudios Ambientales (IDEAM):

- Education: marine biologists; oceanographers and technicians; remote sensing experts; visual and written educational material, educational software and programmes; training on the education of marine meteorology and oceanography;

- Materials: publications; bibliographies, codes and formats; methodology to exchange information in a more effective way;

- Training: workshops/courses on information services; on numerical models; on sea wave models; on the Internet; on data management; on AVHRR: courses for observers; workshops/training courses for ship crews;

- Knowledge: courses oriented to research; programmers and instructors on oceanographic and marine models;

- Technical Assistance: software and models; meteorologists and oceanographers with expertise in numerical models; webmasters and programmers; professionals to manage the marine database;

- Hardware and Maintenance: laboratory equipment; communication equipment; instruments to measure sea waves; equipment for data collection; radio and telecommunication equipment;

- Funding: financial support for GMDSS;

- Data and Information: software and wave forecasting methods; quality control and analysis; maintenance of data; software to interpret and analyse data; analysis of physical-chemical information; high capacity equipment and software to automate Quality control;

- Infrastructure: a remote sensing network; data processing and telecommunication systems.

ECUADOR has identified the following needs for the Instituto Oceanografico De La Armada De Ecuador (INOCAR):

- Education: education on statistics; educational material, equipment, softwares, etc.;

- Materials: a bibliography on marine meteorology and oceanography;

- Training: course on uses of codes and format; use of software for QC; data exchange; on the different software and technologies used by other Institutions;

- Knowledge: professionals (M.Sc. or Ph.D.) with numerical models expertise;

- Technical Assistance: recalibration of the existing models; updating of codes and formats; management of metadata; data exchange; courses/workshops on meteorology and oceanography, on PMO, VOS, GLOSS, etc.; instructors on Internet;

- Hardware and Maintenance: a DGPS referential station; sensors for the acquisition of met/oceanographic data in real time; transmission-reception communication equipment; buoys for real time data collection; XBT probes;

- Data and Information: workstations and new models for met/oceanographic forecasts; a shallow water numerical model; optic fibre or microwave radio internet links; access to satellite information;

- Infrastructure: fulfilment of the Ship of Opportunity project; a digital link in microwave range; agreements with Institutions that have information collected by remote sensors;

URUGUAY

The Permanent Representative of Uruguay communicated that the Direccion Nacional De Meteorologia De Uruguay does not have a Marine Meteorology Department and that the Institution's needs on oceanography and marine meteorology extend to all aspects of these two sciences.

VENEZUELA identified the following general needs for the Servicio Meteorologico De La Fuerza Aerea De Venezuela:

- Training: workshops, seminars, courses, etc. on marine meteorology, sea waves, tropical cyclones and marine climatology (CLICOM);

- Technical Assistance: information on new technologies, automated systems, etc.;

- Hardware and Maintenance;

- Data and Information: Internet services and technology; access to products obtained by remote sensors;

- Infrastructure: the need to identify and satisfy user requirements.

Conclusions

In order to fulfil the requirements of this survey, the Permanent Representatives established a liaison involving the national Institutions and Organizations involved in the survey, which resulted in a surprisingly high rate of response (63.6%).

The information, available in its undiluted form for JCOMM, shows strong variations, confirming the original expectations on the heterogeneous nature of the Region and reflecting the different resources, possibilities, targets and potential of each RA III Member.

According to the survey results, Chile has shown an advantageous position in terms of capacity building while Uruguay occupies the most unprivileged situation. Argentina has shown a great potentiality but a serious funding problem to fulfil its expectations, while Venezuela stated very few specific needs. Their respective situation widely differs from that expressed by Brazil, Colombia and Ecuador, which all presented an extensive and varied list of priority requirements.

The disparity amongst the regional countries may point to a future need for more regional interaction and to recommend the encouragement for, and assistance towards, a regional Internet network for the exchange of data, products, procedures, software, publications, etc. as a supportive system to the GTS. It would also be extremely important to promote and encourage the transfer of knowledge and technology within the Region, from countries with the appropriate capacity and expertise in a given field towards the most unprivileged.

Despite the mentioned differences, it was possible to identify the basic needs of RA III in the Capacity building and it was also possible to portray the present financial

constraints faced by the great majority of the maritime countries of RA III. The funding question constitutes the main obstacle to the full implementation, development and accomplishment of the many programmes on marine meteorology and oceanography undertaken by WMO/IOC. Appropriate funding is essential to establish the basis of future projects of JCOMM in RA III. The lack of funding, however, does not undermine the strong willingness shown by the countries to meet, to the maximum extent of their possibilities, the requirements of the programmes they have now underway, or their desire to participate in new ones.

It is our responsibility to assist decision makers to find sound solutions to their requirements for capacity building and to ensure that all countries can equally participate in and benefit from the work, programmes and projects of JCOMM.

These and other conclusions demonstrate the potential usefulness of identifying and examining national and regional capacity building requirements to make the most effective use of existing and potential resources.