World Meteorological Organization

ASSOCIATED PROGRAMME ON FLOOD MANAGEMENT

ANNUAL REPORT

(2005-2006)

April 2006

APFM Report No. 13

The Associated Programme on Flood Management (APFM) is a joint initiative of the World Meteorological Organization (WMO) and the Global Water Partnership (GWP). It promotes the concept of Integrated Flood Management (IFM) as a new approach to flood management. The programme is financially supported by the governments of Japan and the Netherlands.

The World Meteorological Organization is a Specialized Agency of the United Nations and represents the UN-System's authoritative voice on weather, climate and water. It co-ordinates the meteorological and hydrological services of 187 countries and territories.

The Global Water Partnership is an international network open to all organizations involved in water resources management. It was created in 1996 to foster Integrated Water Resources Management (IWRM).

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1. INTRODUCTION

The Associated Programme on Flood Management (APFM), a joint initiative of the World Meteorological Organization (WMO) and the Global Water Partnership (GWP), was established in order to promote the concept of Integrated Flood Management (IFM) and to show the practical steps for putting the concept into practice. IFM recognizes the benefits of the annual floods (i.e. smaller and more frequent floods), the importance of floodplains and the increasing demands of development they are facing, while at the same time recognizing the disruptive nature of floods. An IFM approach aims at maximizing the net benefits from flood plains and reducing loss of life due to flooding, flood vulnerability and risks, and at the same time preserving ecosystems and their associated biodiversity within the overall framework of Integrated Water Resources Management (IWRM). It conceptualizes integration of land and water resources development activities in a river basin. The concept

The aim of IFM can be realized through river basin flood management plans. There are a number of key elements that should be considered while preparing such plans. These are:

- Adopt a best mix of strategies: both structural as well as non-structural;
- Manage the water cycle as a whole: considering all floods, including both extremes;
- Integrate land and water management: as both have impacts on flood magnitudes and flood risks;
- Adopt integrated hazard management approaches: considering risks due to all related hazards such as landslides, mudflows, avalanches, storm surges, and tsunamis and creating synergies.
- Ensure a participatory approach: to develop a sense of ownership and reduce vulnerability.

Therefore, IFM, like IWRM, advocates a multidisciplinary approach with participation of all stakeholders. The social, economic, ecological, and legal and institutional aspects of flood management have been dealt with sporadically and in a limited manner. As a result, these aspects are hardly accounted for in the flood management planning and decision-making in a balanced manner. There is a need to facilitate, both technically as well as financially, particularly the developing countries, in realizing the IFM so as to:

- Prevent flood hazards turning into disasters;
- Incorporate risk management principles in water management;
- Alleviate poverty through preventive and response strategies for vulnerable sections;
- Increase multidisciplinary approaches in flood management;
- Factor environmental considerations in flood management; and
- Enhance community participation.

The APFM through the concept of IFM is therefore an attempt to streamline the multi-facets of flood management issues into the decision-making of policy makers, flood managers, and various other groups involved in the development planning process in river basins. The objectives of APFM are to:

- Establish the principles of Integrated Flood Management;
- Help assimilate principles of Integrated Flood Management within the overall Integrated Water Resources Management;
- Develop capacities in the countries to integrate flood management into sustainable development processes; and
- Provide a platform for a common strategic vision on integrated flood management issues, and to promote the implementation of effective policies and strategies worldwide.

The programme was launched in August 2001. After inception phase of 8 months, it entered the implementation phase in April 2002 (duration 4 years). The programme is being supported by the Government of Japan and the Government of the Netherlands. The APFM Technical Support Unit (TSU), housed in Hydrology and Water Resources Department of WMO provides full technical backup to the programme.

The present phase (Phase I) of the programme comes to a close in July 2006. A major achievement of the Phase I has been development of the concept of the Integrated Flood Management approach through an analysis of existing flood control practices around the world and building of an atmosphere of cooperation among various disciplines and by providing platform for exchange of information and expertise in the areas of environmental, legal, social, and economic disciplines. Outcomes of these interactions are presented in the form of advocacy papers on “Environmental Aspects of IFM”, “Legal and Institutional Aspects of IFM”, “Social Aspects and Stakeholder Involvement in IFM”, and “Economic aspects of IFM”. Another major achievement has been adoption of the concept of IFM by the UN-Water as a main plank within its Water Hazard Risk Policy. A number of aspects of IFM have been field tested through 5 pilot projects in South Asia, South America, Africa, and Central Eastern Europe in ten countries.

The concepts developed under the Phase I of the programme will now be put into practice through field demonstration under the Phase II, focussing mainly on implementation of the IFM concept on the ground, thereby moving from Concept to Field Demonstration. It will focus on developing capacities in the countries by supporting local and regional actions that advocate, support or demonstrate the IFM principles. The primary focus will be on activities at the ground levels through field demonstration projects (pilot projects) to put the concept of IFM in its multidisciplinary approach into practice. This will be achieved in four definitive and mutually interactive steps running concurrently viz.;

- Advocacy for IFM;
- Capacity development for adopting IFM approach;
- Field demonstration projects; and
- Provision of information and HelpDesk services.

This report is the fourth Annual Report of the implementation phase of APFM, which documents the activities undertaken during the last reporting period - i.e. from 1 April 2004 to 31 March 2005 and, at the same time, briefly reviews the activities undertaken during the four year period of the Phase I. Some of the outputs and summarised documents are given in Annex, meanwhile most of the output materials are attached as Sun-material in a separate CD-Rom.

2. ACTIVITIES

2.1 Flood management policy series

The '*Flood Management Policy Series'* has been established within the framework of the APFM. The series comprises of publications on various aspects of flood management policy, including economic, environmental, legal and institutional, as well as social aspects (earlier the working title of the series was simply "supplementary papers") to facilitate the implementation of IFM principles into the development planning practice of river basins. The series is based on wide consultation process among expert from various disciplinary groups constituted for each publication, to guide and advise the preparation process. The preparation itself consisted of a wide review and consultation within the framework of conferences and direct correspondence with leading sector professionals in the area of natural resource management and development policy. Such quality assurance mechanism was a prerequisite to include a publication under this series. The series is published with a distinct design with the view to create a brand.

2.1.1 Concept paper

The initial source and inspiration of the 'Flood Management Policy Series' has been the 'Integrated Flood Management Concept Paper', presents IFM as a viable development policy option within the overall context of IWRM. Based on inputs of leading experts in the field of flood hazard research, it was first published in 2003 after a thorough consultation and review process, among others during the Third World Water Forum. The concept paper has been published in English, French, Spanish and Japanese. The popularity of the paper required a reprint in 2004. The occasion was utilized to introduce a few modifications and was put out as the second edition. The IFM concept paper continues to play a central role in the outreach to flood managers, policy makers and development planners. In light of most recent catastrophic floods, the concept paper remains a valid and balanced source of inspiration for all target groups.

2.1.2 Legal and Institutional Aspects of IFM

The paper on 'Legal and Institutional Aspects of IFM' has been the first publication under the 'Flood Management Policy Series". The paper aims at raising the awareness of policy makers about the need for an appropriate legal framework for IFM, thereby providing guidance to legal experts on how to incorporate IFM principles into legal instruments. Additionally, it intends to motivate and enable flood practitioners, stakeholder groups, including actors of the civil society involved in public opinion building such as NGOs and the media, to engage in dialogue with policy makers about the legal requirements for integrated flood management strategies and the best approach to a balanced legal framework for its implementation.

In working towards implementing IFM, it has become apparent, both in theory and in practice, that a broad range of interdisciplinary and multi-sectoral inputs are required, across many areas of expertise. In this context there is a real need for an effective coordinating mechanism – some vehicle or medium that could identify, gather and utilize the inputs from all actors and concerned stakeholders. At the heart of this publication is the notion that "law" can provide a framework for ensuring that this task is achieved.

The paper has been prepared and published in collaboration with the International Water Law Research Institute at the University of Dundee, Scotland. An international expert group constituted for this purpose guided the preparation process and the drafts were consulted with a wider group of experts in law and natural resources management. For reference a list of comments and suggestions from this group during the preparation and review process is presented in Annex I together with indications how these comments have been taken into account. The preparation of this publication has presented many challenges – how to approach floods and law in one coherent publication? The

challenges, however, have been most welcome, and provided a platform for innovation. This is the first work to examine the role of law in the context of Integrated Flood Management. The final product has been primarily developed for, and is aimed at, the frontline, that is, those responsible for implementing IFM policies – policymakers, flood managers and legal experts. The publication is written from practical perspective and is not an academic exercise. Therefore efforts have been made to present existing examples, among others through linking four country case studies into this effort.

Equally important is the development of a Rapid Legal Assessment Tool (RLAT), which has been conceived to strengthen the guidance aspect of the paper. This guidance may be particularly useful for countries who decide to adopt an integrated flood management approach in their overall development policies and wish to reflect this in their legal and institutional arrangements. The RLAT is conceived to be applied by a group of experts in legal matters, hydrological sciences and development economy with a view to assess the compatibility of the existing legal and institutional arrangements with the principles of IFM. The ultimate aim in using the RLAT would be to identify the areas where reform to the legal and institutional system would be required and to create a basis for a substantiated consultation among decision makers and stakeholders about a possible reform process. The RLAT was reviewed in depth by Dr Slavko Bogdanovic, a legal expert from Serbia, by applying the tool in the Serbian context. The review showed that the application of the RLAT can be instrumental in initiating legal and institutional reform processes by broadly identifying gaps in the existing legal and institutional frameworks. A first full scale application of the RLAT has been taken up in India as one of the most flood affected countries by Mr Videh Upadhyay, Advocate at the Supreme Court of India, and supported by the APFM.

The experience gained during this process also indicates that one of the most important issues in advocating for IFM, is to find a common language between different professional groups, to facilitate each groups inputs towards the aims of IFM, in this case flood managers and legal experts. In this respect it is believed that the paper on the “Legal and Institutional Aspects of IFM” is instrumental in bridging disciplinary boundaries, to enable a multidisciplinary approach to flood management. Copies of the final publication were distributed during the 4th World Water Forum in Mexico.

2.1.3 Environmental Aspects of IFM

It is widely recognized that there is a greater need for addressing environmental concerns for sustainable development. Flood management is no exception. Some of the underlying causes that make it difficult for flood managers to address the environmental issues could be traced to the communication constraints in mutually understanding the requirements of sustainable development from differing disciplinary perspectives, to different terminology being used by different disciplines, to differences in paradigms, and to a lack of appreciation for the issues raised by others.

The publication on Environmental Aspects of IFM provides a rational and balanced way of addressing environmental issues in flood management. It is primarily directed to flood managers, to enable them to understand the range of environmental issues involved in flood management. At the same time, the publication provides useful information for policy makers, environmental groups, NGOs and communities, to enable them to understand flood risks in relation to environmental concerns and sustainable development. It is aimed at improving communication and understanding among different disciplines, various stakeholders, and experts. It therefore, refrains from going into highly technical detail and uses language readily understandable by all the target groups.

An expert group meeting was organized on 6-7 October 2005 at WMO secretariat in Geneva to discuss issues such as balancing development imperatives, risk of flooding vis-à-vis preservation of ecosystems, how environmental considerations can be positively addressed by flood managers, etc. The experts came from various regions of the world and discussed these issues from various disciplinary perspectives, ranging form Ecology, Hydrology, Sociology, Economy and legal affairs. These preliminary outputs were presented and discussed at a special session on IFM, during the

Second International Yellow River Forum on 20 October 2005 in Zhengzhou, China (see section 2.4.3).

Based on the discussion at the expert meeting and outcomes of the special session, the draft publication was developed and widely circulated not only to the expert group, but also to various experts and organizations (e.g. IUCN, members of IAHR, sociologists, environmental and development authorities, etc.) for wider inputs from different perspectives. The final draft of this publication was prepared based on comments about the draft publication and is currently being peer reviewed and will go to the press shortly. There were real difficulties in mutually understanding the requirements of sustainable development from different disciplinary perspectives in the beginning, although it was soon apparent that ultimate goal being pursued was always similar. These experiences have enriched the publication. It has provided us a platform, which would strengthen the future activities addressing such issues during the second phase of APFM.

In such a multidisciplinary pursuit, consensus building guided by a balanced approach is one of the key elements of success. In the endeavor to incorporate various perspectives into this publication, however, some of the views representing extreme positions could not be incorporated. Some of these comments are briefly presented in Annex I.

2.1.4 Social Aspects of IFM

Flood management measures in the past have played an important role in protecting people and socio-economic development in the flood plains. However, they have largely been successful in only shifting the flood risks, thereby causing negative impacts on certain sections of society and have in some cases distorted the protected population's perception of flood issues. Particularly, structural flood protection works in the past have provided a false sense of security without factoring residual risks and have stunted community initiatives into passivity. Such a situation is largely attributed to the non-involvement of beneficiaries and other affected groups in the decision-making process. There is a growing concern about the sustainability of this approach and a need for the active participation of communities in flood management. The publication "Social Aspects and Stakeholder Involvement in Integrated Flood Management" addresses these issues.

This publication highlights the importance of factoring social aspects and the need for stakeholder involvement in formulation of flood management policies and in planning and implementation of the plans and measures. It also provides a closer look at various vulnerabilities of the society that have an impact on flood management issues. The vulnerability of society against flood hazards is a combination of a complex and interrelated set of dynamic factors. The paper addresses vulnerability and risk assessments, undertaken as a first step in the flood management process, which have to be based on the recognition of diverse socio-economic and cultural backgrounds and the needs of the population at risk and identified through long-term engagement of the community at various levels of decision making.

Flood emergency management calls for the active participation of community in pre, during and post flood stage since the community is the first to be affected, react and cope with the situation. The paper explains the requirement of flood emergency management at all stages with respect to the role of various stakeholders including Government institutions at all levels and NGOs.

For stakeholder participation, it is crucial to realize that diverse stakeholder groups have different needs and capacities to contribute. This calls for different types of participation mechanisms and inputs. The publication highlights multi-stakeholder engagement in the process to ensure the strong support of stakeholders and change their passive attitude towards flood issues through proactive engagement. The capacity building of stakeholders and an enabling framework through appropriate laws and institutions set-up required for their effective participation are also described.

The paper on "Social Aspects and Stakeholder Involvement in Integrated Flood Management" has been developed in collaboration with Asian Disaster Preparedness Center (ADPC). An expert Group Meeting was organized to discuss the content of the paper from 25 to 26, November 2005 in Geneva, which was followed by extensive consultative process. The paper is presently under editing process.

2.1.5 Economic Aspects of IFM

The benefits and costs from any intervention for the mitigation of flood risks stem from a large number of primary, secondary, and tertiary sources. Unfortunately, these benefits and costs are not always direct and are thus sometimes beyond assessment. Direct and indirect methods are now available or used for estimating the environmental services, such as the benefits of replenishing wetlands, recharging groundwater and supporting agriculture and fisheries systems, improved river water quality or the costs of losing an area of wilderness to development.

The publication on Economic Aspects of IFM provides a broad overview of the economic analysis required in making choices on the policy as well as project levels of flood management. Economic analysis helps to select not only the optimum level of adjustment to floods on the basis of risk safety trade-off decisions, but also an optimum combination of measures for a wide range of flood management strategies comprising both structural and non-structural measures, including the option to live with floods. This publication highlights the economic aspects relevant to IFM.

This publication has been developed in collaboration with the IRMED, New Delhi, India. The draft has been prepared, which will be circulated to the GWP TEC for comments and contribution from their experts.

2.2 Compilation of good practices in IFM

In order to assess the current status of flood management practices, APFM has collected a number of good practices in flood management with the aim to obtain information on relevant practices from countries in various regions of the world, during the first phase of APFM. These are made available on the APFM website to disseminate these good practices and practical tools.

Good practices in IFM have been compiled in the form of the full text, the summary, and the synopsis analyzing IFM elements: from Africa - Cameroon, Ethiopia, Mali, Mauritania, and Zimbabwe; from Asia - Bangladesh, China, India, Japan, and Pakistan (2); from North and Central America - Canada, USA (2); from South West Pacific – Fiji; and from Europe - Italy, Turkey, UK.

During the year, voluntary case studies were received from Germany and Ukraine, which have strengthened the database for good practices. Four additional legal case studies from India, Japan, Serbia, and Switzerland have straightened the practical aspects of the publication on Legal and Institutional Aspects of IFM described in section 2.1.2.

The Overview Situation Paper (OSP) has been prepared based on the good practices collected. The OSP provides: an overall synopsis of floods, their nature, type and magnitude of damages caused; an overview of existing trends and approaches to flood management such as national policies, instruments, and organizational response for flood management; and the lessons learned from current flood management practices. The paper also contains findings on the identified drawbacks and gaps in existing practices with respect to IFM, and recommendations for the approaches required for putting into practice the IFM concept. These outcomes would form part of the helpdesk and information services to be developed during the second phase of APFM.

2.3 Regional pilot projects and capacity building

A series of pilot projects have been implemented together with Regional GWP partners and WMO counterparts to test and demonstrate the applicability of IFM principles. The approach taken has build on the philosophy that all dimensions and institutional structures cannot be integrated at the field level in the pilot projects. Therefore, each pilot project has a specific flavour depending on which aspects of IFM are particularly addressed, i.e. which dimensions are being particularly addressed. Some focussed on participatory approaches by formulating flood management strategies through stakeholder consultation processes, others addressed the flood management issues of transboundary basins. A couple of others looked at the community approaches to flood management to use and develop local capacities to contribute to the aims of IFM. One of them focussed on the cooperation between communities at risk, civil defence authorities, hydrologists and meteorologists to provide more effective flood warnings in areas prone to flash floods.

The experiences and lessons learned from the pilot projects are being used to formulate project proposals to replicate the experiences on a larger scale to benefit entire countries or to have a regional impact. The APFM in such situations serves as a facilitator between country needs and the financial partners.

2.3.1 South Asia

Flood management practices at community level is an important component of IFM, as these communities represent the ultimate beneficiaries of flood management practices and improving resilience of communities against negative aspects of floods that enables them to maximize net benefits from regularly occurring smaller floods. While emergency preparedness aspects of flood management are recognized and dealt with at community level, there is hardly any up-link of community-based activities to national flood emergency activities and to other communities in river basins.

The principal objective of the pilot project in South Asia was to enable flood-prone communities to develop and strengthen self-help capacity and community-based institutions to improve flood preparedness and management on community level. Under the general guidance and oversight of the project by WMO/APFM, the project had been implemented by three nationally respected NGO's in Bangladesh, India, and Nepal. The regional driver organization for the project had been the BUP in Bangladesh, cooperating with JVS in Nepal and IRMED in India. These NGO's were fully responsible to organize and implement all local activity necessary to achieve the project objectives.

Stakeholders were at the centre of all activities and had been involved in virtually all activities from the Participatory Rapid Assessment of local capacities, the establishment of the Community Flood Management Committees (CFMCs), planning and implementing of all activities at local level in the project, links to Local Government authorities, and the representation of their views and results ("Voice of the Communities") during the national workshops.

Main focus of the project had been on community level covering all relevant aspects of hazard- and risk awareness and recognition, pre-flood preparedness, response during flood events and post-flood recovery, documentation of lessons learnt and building resilient community organizations to implement flood management activities related to all aspects and sectors of community life in a holistic manner. CFMCs were established in selected communities in three countries where the project had been jointly implemented and these CFMCs had been registered at the Local Government level. Self-help capacity to mange floods on community levels has been improved. The main output of the pilot project had been the development of Flood Management Manuals based on the active interaction with the participating communities as well as the production of a Synthesis Manual. In the reporting period, based on the lessons learnt from the monsoon period 2004, extension officers were sent to all

participating communities to assist them implementing flood management activities in the monsoon 2005 season.

The uplink to overall national IFM and disaster management activities has been undertaken through the organization of National Workshops on Community-Based Flood Management in Bangladesh, India and Nepal, including also the National Meteorological and Hydrological Services that provide crucial flood forecasting information. As a result of the national workshops, country representatives at the Secretary and Ministry level pledged to internalize the project approach and results into the overall national planning process and programmes for disaster reduction and flood management.

The uplink to a wider regional perspective has been achieved through the organization of a regional workshop on the subject on 3-5 April 2006 in Bangladesh. A regional workshop was held in Bangladesh with the objective to promote the successful approach and results of the project to other countries, in the region, including Myanmar, China and Pakistan and to foster interest for the project subject with regionally active organizations and bilateral donors. The Synthesis Manual is used as reference manual to promote the outreach of the pilot project approach and results to other communities in different countries. As a result of the regional workshop, there has been an interest to implement the project regionally and two countries, namely Pakistan and China will develop an approach to implement the project nationally.

Hon. Abdul Moyeen Khan Minister for Science and Information and Communication Technology, Bangladesh, (second from left) inaugurating the Regional Workshop in Dacca.

The success of the pilot project lies in the political will demonstrated to implement the project approach nation wide and also in other countries in the region that were not covered by the project. There have been no major obstacles in the implementation of the project in the three countries. The single most important lesson learnt is that the approach can be adapted to a wide variety of environmental and socio-economic settings and replicated in a large number of communities. The linkage between community-based approaches and a close uplink to national activities related to flood management and disaster reduction is important to ensure the sustainability of the project results. APFM will provide further advisory services but any funding in a view to extend the number of communities participating needs to be acquired from third-party funds outside the APFM core fund.

Sustainability of the outcomes of the project depends largely on the ability of governments to further provide minimum seed funding and to support a larger number of communities. All countries have pledged to multiply the number of communities that will benefit from the project in the coming years. Main outreach of the project at this point is the nationwide implementation of the project, introducing the project approach in other countries, create a regional network and further promote the project approach globally in cooperation with relevant organizations.

2.3.2 Africa (Kenya)

Kenya has been experiencing some of its worst flood events during recent years. During the last couple of decades, Kenya has experienced serious incidents of flood disasters, in different parts of the country. Recurring floods are experienced in the Kano plains of western Kenya in the lower reaches of river Nyando. Flood management has acquired importance in certain basins of the country. The Government of Kenya has recently taken certain concrete steps toward sustainable water resources development by adopting "The Water Act 2002". This formulated a "national water resources management strategy" to protect, develop, use and mange the water resources of the country. In response to the request from the Kenyan Minister of Water Resources Development and Management, WMO assisted the Ministry of Water Resources to develop a Flood Management Strategy in the Lake Victoria basin as a pilot project under the WMO/APFM. The Strategy was developed based on the IFM approach.

The starting point in an IFM strategy is a reorientation of approach to floods and development. The strategy for flood management in Lake Victoria basin, therefore, simultaneously addressed the present problems of the poor flood plain dwellers and the imperative future development of the entire fertile land that is prone to frequent flooding. The project aimed at assessing the flood impact in the Lake Victoria Basin (within Kenyan territory) and to draw up an Integrated Flood Management Strategy for the basin in Kenya through a wide stakeholder consultation process. It also designed a Flood Forecasting System for the basin. The long-term view of the project is to strengthen national capabilities, so that eventually national experts can develop a flood management strategy for the entire country by using the developed Strategy as a model.

Stakeholders representing all interest groups, disciplines, professions, vocations, including women groups in the basin, were identified and consulted in the Stakeholders' Workshops. They were given the opportunity to express their views on the proposed strategy and at the same time provide ownership in developing the strategy. The present status of development, the immediate plans under progress and the long-term needs and planning were addressed during interactions.

During the pilot project, it was realized that greater efforts are required for better coordination and cooperation among various stakeholders to ensure successful implementation of the Strategy and that the community participation at the policy formulation level is essential.

The Kenya Government through Ministry of Water and Irrigation has started the implementation of the Strategy for Flood Management in Lake Victoria Basin. A National Committee has been established to start the process and lay a firm foundation for implementation. The Ministry requested WMO to assist them in implementing the strategy within the available national resources and also to investigate the possibility of securing funds from the Development Partners for the full implementation of the strategy. A workshop is proposed for decision-makers from all Ministries concerned and potential Development Partners including JICA, World Bank, African Water Facility (AWF) and others to be organized in collaboration with WMO and UNEP. WMO approached JIAC and World Bank to envisage their interest to join WMO in such an activity, who have expressed interest in participating in the workshop.

The main objective of the workshop is to discuss with the policy makers and high-level technical experts their needs and requirements from WMO, JICA, and World Bank and others UN agencies to assist and support the country in the implementation of the strategy.

Hon. Martha Karua, Minister of Water Resources Management and Development of Kenya, being presented the Kenyan Strategy

2.3.3 Africa (Zambia)

Kafue Basin is the most sensitive basin in Zambia. It cuts the country into two: the Upper Zambezi in the west and the Luapula/Chambeshi and Luangwa basins in the east. The basin is the most urbanized in the country with all the major towns and industries located therein. Floods continue to be amongst the most damaging natural disasters. Flood devastation ranges from loss of lives to widespread destruction of crops and other economic activities, the most affected being the Kafue Flats in the basin.

The project is aimed at assessing the flood impact in the Kafue Basin and drawing up an Integrated Flood Management Strategy for the basin. It will also design a Flood Forecasting System for the basin. The Water Resources Action Programme (WRAP), formulated by the Ministry of Energy and Water Development (MEWD) sets out to develop and implement strategies for integrated water resources management (WRM). As floods and droughts play an important part in determining sustainable development, there is need to be integrated within water resources management. Thus, a Flood Management Strategy has to be put in place and implemented to prevent flood disasters hampering the development process in the basin.

The project is being implemented through national experts who will carry out the activities according to specific terms of reference (TOR) under the overall guidance of Steering Committee established by MEWD, consisting of different stakeholders and the TSU of APFM. They will also contact appropriate stakeholders and interact with different government authorities and facilitate the implementation of the project within the MEWD. Many other Ministries and government institutions are involved in the process to ensure the availability of all required data and information and to contribute to the development of the strategy. The implementation of the project involves the following activities:

- Raising public awareness on the initiative for flood management in Kafue basin;
- Collecting and analyzing all available technical, economical and social data related to Integrated Flood Management (IFM); and
- Interaction with different local, national and regional development agencies, departments and ministries working in water related fields and other stakeholders through workshops at various level.

2.3.5 South America

The basic objective of the project is to manage floods in the river Quarai/Cuareim basin, a transboundary basin shared between Brazil and Uruguay, within a framework of integrated water resources management. At he same time, the project seeks to improve the capacity of the local population affected by flooding.

The first phase of the pilot project was focused on the development of non-structural actions for managing floods. The first priority was to define the mechanism for coordinated bi-national management and joint flood risk assessment in the basin. The future phase would include the other aspects related to IFM. The following activities were carried out during this phase:

- Identification of public policies, legislation, and proposal for new management mechanism;
- Socio-economic characterization of the population affected by flooding in the cities of Artigas and Quarai;
- Analysis and diagnostic of the hydrometeorological network and of the floods and implementation of a shared database;
- Assessment of the flood plains in the rural areas and flood plain mapping of urban areas;
- Design and implementation of preliminary warning systems; and
- Awareness building and education and training.

The two coordinators one from the Institute of Hydraulic Research of the Federal University of Rio Grande do Sul (Brazil) and one from the National Directorate of Hydrography (Uruguay) had the responsibility of coordinating with other institution of their own countries. The stakeholders' involvement was quite satisfactory with the exception of the Water Authorities of Brazil. It is suggested to assess to convenience of continuing the pilot project with other institutions as coordinators that the ones that were involved in the first phase.

The Project has had its final Workshop of the First Phase of the Implementation Stage on the 13th of December 2005. The flood forecasting capabilities improvement, the worth of some of the structural measures, namely dredging and other topics related to the activities that were carried out show improvements in flood management in the basin. As mentioned before, more efforts will have to be dedicated to water management itself. The most difficult issue during the first phase was the lack of participation of stakeholders from real water resources management in one of the countries, Brazil, of the basin. This situation was aggravated because of the fact that the institute responsible for the coordination in Brazil is a research institute and in spite of having made many efforts to coordinate and to involve the institutions that should manage water resources, no much success was obtained. It would be useful to involve the water authorities of Brazil in the second phase.

The project has had an important impact as an exemplary project within the La Plata Basin. The Committee that is coordinating Water Resources in the following five countries has made references to the project: Argentina, Bolivia, Brazil, Paraguay and Uruguay. The experiences and outcomes from the river Cuareim/Quarai pilot project may provide important input to flood management practices in these five countries.

The involvement of the Water Authorities of the two countries is seen as the way to assure sustainability of the project. In the case of Uruguay, one of the water authorities was the coordinator. In the case of Brazil, before starting the first phase, it was requested that one of the federal water authorities of Brazil, namely ANA (the National Water Agency) signs a letter stating that ANA was going to follow the recommendations of the pilot project. The letter was signed and sent to WMO, but due to change of authorities in ANA this understanding will need to be renewed before starting the second phase.

2.3.5 Central and Eastern Europe

In collaboration with the GWP Central and Eastern Europe (GWP CEE) hosted by the Slovak Hydrometeorological Institute (SHMI), the pilot project in the Central and Eastern Europe has focused on reducing vulnerability to flash floods. The project was divided in two phases: Phase I - Study of Historical Floods in Central and Eastern Europe from an Integrated Flood Management Viewpoint; and Phase II - Forward Integration of Flood Warning in Areas prone to Flash Floods.

Phase I

The phase I was coordinated by Ms Katarina Hajtasova of the Slovak Hydrometeorological Institute (SHMI) under the guidance of the TSU. SHMI also served as contract partner as the host of GWPCEE. Twelve flood events from seven countries in Central Eastern Europe were studied in the first phase and published in form of a summary report. The following countries participated in the first phase and thus contributed to a better understanding of the nature of the events as well as the available coping mechanisms: Bulgaria, Czech Republic, Lithuania, Poland, Romania, Slovak Republic, and Slovenia.

The collaboration between the constituency of WMO, namely the National Meteorological and Hydrological Services (NMHSs) of the seven involved countries and of GWP, i.e. the regional and country water partnerships has proven to be an effective vehicle to implement the project. This particularly applies to the combination of strengths of both constituencies, e.g. by making use of the technical expertise of the NMHSs in flood forecasting and warning with the experiences in stakeholder involvement and public outreach of the GWP partners. Active involvement of the municipalities and associated civil defence bodies, as well as other local stakeholders has been ensured throughout the project, among others by incorporating their knowledge into the flood studies, review of existing flood warning systems, by organizing participatory flood hazard mapping exercises and by providing a public awareness raising campaign about flood hazards and preparedness measures in the pilot areas.

The project has first and foremost offered an opportunity for the involved institutions (NMHSs, GWP country water partnerships, civil defence authorities, regional authorities, municipalities) to draw closer to the potentially affected communities, i.e. users of their products. This has led, on pilot scales an insight into the information and preparedness requirements of local communities and the development of technical solutions adapted to the social realities. In some of the pilot areas this was required not least because trust in public authorities in particular about flood warnings had decreased after flood events of the past years.

Secondly, it has led to a closer cooperation and coordination for flood forecasting and warning services of institutions driven by user needs. One example has been that under the umbrella of the pilot project new institutional arrangements could be agreed between different levels of government to increase the effectiveness of the current warning system.

Thirdly, based on the flood events studies, and including the consultations with affected communities and other recipients of flood warnings, improved technical means of detecting the areas at imminent risk and warn more effectively, have been developed. The effectiveness of those can finally only be judged once the next flash flood has hit that area, yet efforts have been undertaken to urge participating communities to run regular emergency drills to keep up the preparedness levels of the respective authorities and the risk awareness of the population.

A general lesson about the promotion of IFM has been that flood management responsibilities are scattered under a multitude of institutions. Each of these institutions has a mandate to fulfill and is supposed to spend its budget on it. If gaps are to be addressed or an institution wants to move closer to the community needs, this requires initially extra budgetary funds. Once success stories can be developed on pilot scales, required institutional changes (laws, policies and administrative arrangements) can be implemented.

Phase II

In the second phase of the project immediate objectives and subsequent activities were formulated according to individual country needs. The overall objective is to increase the preparedness and response capacity of the local authorities and population in flash flood prone pilot communities to forecasts and warnings issued by respective authorities in order to reduce the vulnerability of the

affected population. Three countries, Poland, Romania, and Slovakia, are participating in the second phase. The overall coordination of all three pilot project components has been provided by the TSU.

During a kick-off meeting in November 2005 the results of the study were discussed and the project proposals drafted and subsequently formalized. A coordination meeting with the three countries participating in this phase was held in April 2006 to review progress and lead the activities undertaken to their intended purpose within the APFM phase I.

After implementing the project in three selected basins, it is intended to consolidate the outcomes and reach out along two lines of action:

- Present the outcomes back to the region in form of a regional workshop or similar format.
- The results of the pilot project should be promoted on the national level, i.e. made accessible to all branches of the NMHSs, regional crisis centers and municipalities.

In the broadest possible terms, the pilot project results and momentum should be used to urge national governments to address the issue of flash floods in an integral manner for the continued safety of potentially affected communities. One line should concern the upgrade of technical means of detecting imminent flash flood hazards and the other should concern the improvement of communication and response mechanisms, including the preparation of hazard and risk maps and based on that the preparation of management plans for high risk areas with active participation of the local authorities.

2.3.6 Central America

In Central America efforts have been made to start up a pilot projects for last three years. To begin with efforts were made to setup a joint project team to work towards a pilot project in the transboundary river Negro between Honduras and Nicaragua with the help of local GWP partners. However, despite interest shown by the two country representatives, no agreement could be reached for a joint working arrangement. In order to generate further interest and facilitate the decision making APFM organised a workshop in Costa Rica where representatives from Costa Rica, Honduras, Nicaragua and Panama were present. As a result of the workshop some understanding was reached between Costa Rica and Panama to start a pilot project on the transboundary River Sixaola. However, it has taken a long time in reaching a decision regarding the area of activities that the two countries would take in the basin jointly to work towards a transboundary flood forecasting system which would not only involve cooperation on technical aspects of flood forecasting but also address the issues related to flood management and interaction with the communities to make the forecast more effective and useful. However, cooperation agreement has taken more time than expected and the pilot project could not be started on schedule. The agreement on the scope of activities and the mode of implementation has finally been reached in March 2006 and the pilot project would be taken up in the next phase after July 2006. The experiences in the Central America have shown the need for patience, persistence and understanding to work in transboundary rivers.

Guatemala has been subjected to large-scale landslides and flooding in the river basins flowing to the Caribbean Sea during the past. Last year Hurricane Stan hit this country and caused severe floods in the pacific coast accompanied with mudflows and landslides in the west highlands with catastrophic consequences to lives and livelihood, infrastructure, crops, cattle and other livestock. Government of Guatemala feels the need to develop a strategy for dealing with these disasters as part of their Poverty Reduction Strategy through development and integrated multi-hazard approach.

APFM responded to the request of Guatemala and organized a workshop on Integrated Flood Management on 7th December with the officials of INSIVUMEH (the National Forecasting and Warning Service), SEGEPLAN (Secretariat of Planning) and Ministry of Agriculture. The IFM concept was presented to the participants. A Japanese mudflow and debris flow expert from the Ministry of Land and Infrastructure also participated.

The objectives set forth by the Guatemalan authorities in relation to rural development in face of the flood risks matches with the objectives of IFM. The discussions narrowed down to the need for setting up a legal and institutional framework for enabling a coordinated and integrated approach to deal with various disasters within a multi-hazard framework. The possibility of developing a pilot project was briefly discussed. A formal request on the next possible steps is yet to be received from the Guatemala authorities.

2.4 Dissemination of information and advocacy activities

2.4.1 APFM newsletters

APFM Newsletters have been published since June 2002 to disseminate APFM activities. The newsletter is disseminated in three formats: the PDF version, HTML version, and one-page hard copy version. The HTML version is sent electronically to subscribers of APFM newsletters via email for a quick look. The subscribers can also download the PDF version in a printable format, if they wish to go through and know about APFM activities in detail. The hard copy version is distributed at conferences and meetings. Generally, information about events and conferences, "outcomes" of the conferences, which APFM participates or organizes, can be obtained at the event page of the APFM web site. It can also be visited through a direct link from the event page to the topic articulated in the HTML version of the newsletters, so that visitors can easily get timely-information. During the reporting period three newsletters (no.9, 10 and 11) have been published.

2.4.2 Information services

The APFM website serves as the central access point for various programme activities and its information services, including the reference centre on integrated flood management. During the first phase of APFM, the following features have been developed and have become operational: renewal of the APFM website with downloadable material on APFM activities and publication; establishment of the Contents Management System (CMS) that can be used to create, edit, and update the web site through the Internet; installation of the newsletter module that can create a subscription system of the newsletters; establishment and operations of databases on flood management and organization of a virtual forum. Based on templates and contents revised during the last reporting period, this website is continuously updated and maintained.

During this reporting period set of databases on flood management policy and legislation, literature on flood management, and flood-prone area have been particularly added to and developed on the website. Database on institutions and agencies involved in flood management has been online since last year. These databases are being enriched further for flood managers, policy makers, communities affected by floods to obtain flood management information in a country. This would also form part of helpdesk services.

A virtual workshop was organized in November and December 2005, using the utilities provided on the website of the 4th World Water Forum (WWF). On this virtual platform, the baseline document on the framework theme of Risk Management was opened for discussion for incorporating a wide spectrum of views from a geographical, professional disciplines and geopolitical point of view. The virtual workshop had 55 participants generating comments during the 8 weeks of opening and even further and proved to be successful. Outcomes of the virtual forum were used not only for the session on Risk Management during the 4th WWF, but will also be useful for future activities of APFM.

2.4.3 Dissemination of information through meetings and conferences

World Water Week

A workshop on "Coping with Climate Variability, Climate Change and Water-Related Hazards" was organised on August 23 during the World Water Week, held in Stockholm from 21 to 27 August 2005. The workshop recognized that climate change is a matter of great concern. However, it was realized that the projection of impacts of the potential changes on the water resources availability and particularly flood magnitudes were not yet within the acceptable confidence limit. However, it was emphasised that the science should make continuous efforts to provide credible information on climate variability and climate change while the society should improve its coping capacity to the water-related hazard.

A seminar on UN-Water, which is an inter-agency mechanism to coordinate various activities related to all water related issues being handled by different UN agencies, was held on August 24 during the week, aiming to outline UN-Water's work and call for the involvement of non-UN partners. The UN-Water policy series paper on "Water Hazard Risks", in which the concept of IFM has been accepted as the strategy to deal with flood related hazards, was introduced during the meeting.

The Second Southeast Asia Water Forum

APFM participated in the Second Southeast Asia Water Forum, which was held from 29 August to 3 September 2005 in Bali, Indonesia. APFM made presentation on Integrated Flood Management (IFM) at the session of "Reducing vulnerability from floods, droughts and other water-related natural disasters", which was co-organized by Mekong River Commission (MRC), Japan Bank for International Cooperation (JBIC) and the International Flood Network (IFNet). The presentation was followed by a panel discussion where the importance of public participation and flood forecasting for reducing vulnerability against water related hazards was recognized.

The Second International Yellow River Forum

In order to enhance awareness about the need for a paradigm shift from flood control to flood management through IFM, WMO organized a special session on IFM at the 2nd International Yellow River Forum (IYRF) on 20 October 2005 in Zhengzhou, China. Experts from various disciplines and from different backgrounds presented and discussed various issues that need to be make this paradigm shift with special reference to the South and South East Asian region. The Panel Discussions on " IFM and Sustainable Development", that followed, highlighted the issues related to flood management in the region. The report of the special session is given in Annex II.

International Workshop on Flood Risk Management in Tsukuba

The international workshop on Flood Risk Management was held in Tsukuba, Japan on 24-25th January 2006, which was co-organized by Public Works Research Institute (PWRI), UNESCO and WMO. Various aspects of Flood Risk Management were addressed. Discussions were focussed on identification of the proposed activities of upcoming International Centre for Water Hazard and Risk Management (ICHARM). Participants emphasised the need to adopt IFM approach in the planning of the activities. TSU made a presentation on "Reducing Social Vulnerability to Flood Risks; Stakeholder involvement in flood management for the best use of early warning".

4th World Water Forum

The 4th World Water Forum, which was held from 16 to 22 March 2006 in Mexico City, focussed on the subject, "Local actions for a global challenge. This was addressed through five framework themes. WMO assumed the role of a "co-beacon" during the preparation process of Risk Management framework theme. WMO and TSU were deeply involved in the preparation of the Baseline and Thematic Documents on Risk Management. This involved an ample consultative process, including holding a virtual forum on the issue. This provided an opportunity to emphasize the importance of IFM within the overall IWRM strategies to a wider water management community at the WWF4 which was attended by more than 15,000 participants representing governments, UN agencies, intergovernmental organizations, non-governmental organizations (NGOs), academia, business and industry, indigenous groups, youth and the media.

The APFM/WMO Booth at the Fourth World Water Forum in Mexico

Mr. Michel Jarraud, The Secretary-General of WMO, sharing APFM publication with Gen. Carl Strock, Commander of the US Army Corps of Engineers (USACE); and Ms Melanie Schultz van Haegen, The Netherlands Vice-Minister of Transport, Public Works and Water Management

The APFM was active at the Forum, among others, by co-organizing a thematic session titled "Adopting Integrated Flood Management within the Integrated Water Resources Management" under the framework theme of "Implementing Integrated Water Resources Management". This was

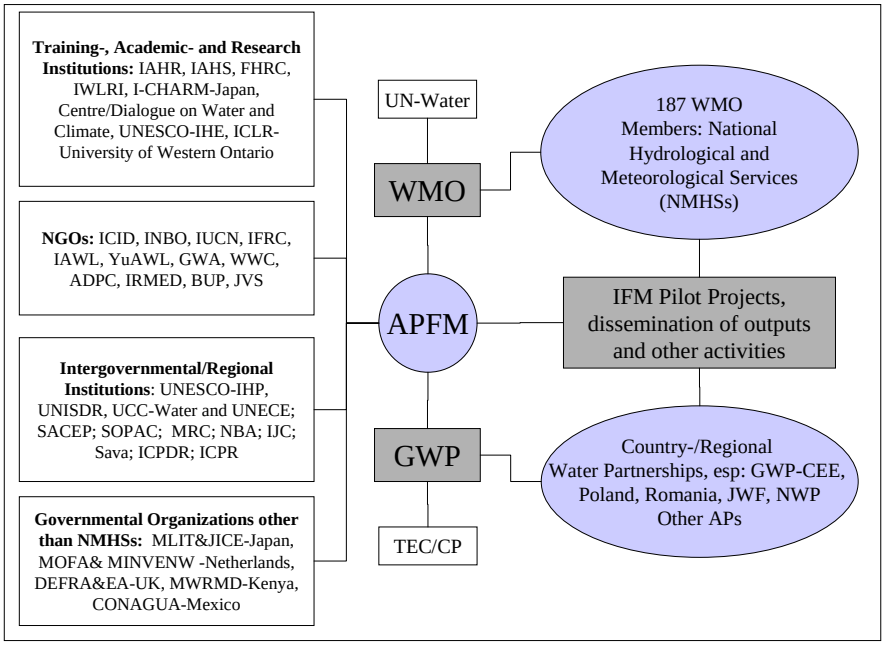
organised in partnership with the Governments of Japan, the Netherlands and France, who were represented by high-ranking ministerial representatives. The level of participation at the session was encouraging, which emphasised the interest and concern the water community has in general with the subject of flood management, not least due to the large-scale flood events of 2004 and 2005 with huge media coverage. The session report is attached as Annex III.

The APFM was also present at the "World Water Fair" sharing the WMO stand, which was visited by an estimated 3000 participants, including Ministers and Heads of Organizations. There was a high demand for APFM publications and this opportunity could be utilized for targeted and large scale distribution of APFM materials to water sector professionals and policy makers from various countries. In particular, the IFM Concept Paper, the paper on "Legal and Institutional Aspects of IFM", an IFM information folder, the "Manual on Community Approaches on Flood Management in India" and the "Strategy for IFM in the Lake Victoria Basin" were in great demand. About 200 additional requests for literature and publications were registered for delivery after the Forum. In addition, APFM publications were distributed through the GWP Stand and the Stand of the "International Flood Network (IFNet)" at the water fair.

The APFM also participated at the session of the International Flood Initiative (IFI), established in 2005 during the World Conference on Disaster Reduction, to present the concept of IFM, which forms the foundation of the initiative. WMO, UNESCO, I-CHARM, UNU, IAHS, and ISDR jointly organized the session.

2.2.4 Network

APFM's network remains the strength and backbone of the programme's activities and especially its outreach. After 4 years of implementation, it can be said that the APFM TSU forms the centre of an extensive global network of institutions and individuals that contribute to the implementation of the programme. The figure below indicates the widespread setup of the programme in governmental, non-governmental, intergovernmental and scientific communities. The indicated institutions have either



directly contributed to the activities of the APFM or have been part of the outreach process. It is important to note that the unique setup of APFM as a joint WMO/GWP initiative has capitalized for APFM's activities, for example in the pilot projects in Central and Eastern Europe. It has been

perceived that the strength of both networks and wider community of NGOs has contributed to the success of activities, where both technical expertise in areas related to flood management and expertise in stakeholder participation as well and public outreach is required. This combination and the direct links into the scientific community continue to strengthened APFM's role as an independent think-tank for flood management policy related to various regions of the globe. From a policy perspective, the outputs prepared under the APFM continue to provide a balanced picture in a policy field with opposing or sometimes extreme positions in the related community. The experience with combining these strengths forms the basis for future activities of the programme.

Next to GWP, a number of institutions, among others under the International Flood Initiative (IFI), play a crucial role as natural associates of the APFM as well as strategic partners for the future. This particularly concerns I-CHARM under the auspices of UNESCO, UNU-EHS and IFNet. Continued close coordination and collaboration is intended to maximize the benefits and synergetic action of those initiatives under IFI. Please see for more details Chapter 5 of the Activity Plan of the Implementation Phase II (2006-2010), APFM report no.14.

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3. PROGRAMME PERFORMANCE

3.1 Progress of activities

3.1.1 Compilation of advisory material

The supplementary papers on "Legal and Institutional Aspects of IFM", "Environmental Aspects of IFM", "Social aspects of IFM" have been completed. These papers are under various stages of printing and will be available before the close of Phase I in July. With IRMED as partner, the economic paper has also been developed and will be reviewed through GWP chairman by the end of the project period. The final printing might spillover to Phase II. However, monetary provisions have already been committed. Development of advocacy papers, which involves intense inter-disciplinary discussions and consultations, has proved to be more time consuming than anticipated. TSU has made efforts to ensure that these papers do follow the basic philosophy of IFM. Progress under this activity is 90% of the planned.

3.1.2 Regional pilot projects and capacity development

In South Asia, field tests to verify the applicability of manual on "Community Approaches to Flood Management" were successfully carried out. The outreach strategy by organising the country workshop of various stakeholders particularly involving national disaster management agencies and the ministerial level involvement in these workshops has attracted the attention of the decision makers. The regional workshop has also generated interest of other countries such as Pakistan and China to take up similar activities. (Progress: 100%)

In Kenya, the "Integrated Flood Management Strategy on lake Victoria Basin" is being advocated as the focal point of the World Bank and JICA support programmes in the country. (Progress: 100%)

In South America, the pilot project was completed in December 2005. A number of outcomes have been produced, which contribute to the implementation of IFM and some of which have been taken up in the outreach process. The outcomes of the project were disseminated through WMO regional meetings and have generated interest in the region in IFM. (Progress: 100%)

In Central and Eastern European countries, after successful completion of the phase I of this pilot project in seven countries, the phase II has been carried out in 3 countries: Poland, Slovakia and Romania through the WMO counterpart agencies as well as the GWP country water partnerships. The desired outcomes of the project are expected to be available by the end of the Phase I of APFM. The progress, after an initial slow start, has been satisfactory and is assessed at 90%.

In Central America, development of the pilot project has taken more time than anticipated. Acceptance of IFM as the concept for implementation in the pilot project proposal, particularly in a transboundary case, and identifying the right partners to participate to ensure the upward linkages have proved to be a time consuming process. One of the reasons is that these pilot projects require joint activities by the countries, as most of the rivers are transboundary in nature. Despite persistent efforts through WMO as well as GWP channels, no agreement could be reached in the case of River Negro, shared between Nicaragua and Honduras. Agreement on the joint activity plans for River Saxola has finally been reached in March 2006, and as such it is not possible to undertake the activity within the Phase I. In Guatemala, despite the quick response from the APFM in organising the workshop to explain the concept of IFM, no concrete request has come from the country. The progress can be assessed at 20% only.

3.1.3 Capacity Development

In Phase I, several advocacy materials such as concept paper and supporting papers were developed. These materials have been printed and widely disseminated to enhance the capacity of various stakeholders to

engage in multidisciplinary dialogue and promote IFM. It is already envisaged that these materials will be taken up in JICA training course to train flood practitioners from developing countries. Further a training module will be developed to be used in the lectures and for self-learning for gaining knowledge of IFM. This training will be undertaken in Phase II of APFM. The liaison with CapNet has been further strengthened towards close cooperation. UNESCO-IHE has been identified as partners in capacity development. Talks are underway for incorporating the IFM concepts in the courses being conducted by JICA. Contacts have also been developed with WBI and ADPC for further co-operation on the subject.

Pilot projects have been successfully undertaken and, for example in South Asia, the outreach process of multiplying the success of pilot projects in capacity development has been already initiated through national and regional efforts. In Phase II, APFM will continuously support these efforts through Information Service such as Help Desk service. (Progress: 80%)

3.1.4 Dissemination of Information

Three issues of APFM Newsletter were disseminated. “Information service” facilities have been strengthened through the re-furbishing of APFM website which is being visited by 300 visitors per month. Currently website offers information of all published documents and reports. Databases, forum module and content management system have been developed. During the reporting period, TSU of APFM and WMO staff participated in various conference, meetings and workshops for advocacy of IFM and interchange of knowledge and experience. (Progress: 90%)

3.2 Financial performance

During the reporting period, CHF 512,000 was contributed by Japan and The Netherlands to APFM.

1st instalment from Japan:	CHF 193,500	Dec. 05
2nd instalment from Japan:	CHF 96,750	Feb. 06
3rd instalment from Japan:	CHF 96,750	Mar. 06
(Total contribution from Japan)	CHF 387,000	
1st Instalment from The Netherlands:	CHF 125,000	Nov. 05
(2nd Instalment from The Netherlands:	CHF 75,000	#1)
(Total contribution from the Netherlands)	CHF 200,000	

#1 This amount will be transferred upon the acceptance of the final report and the financial accounts

In addition, a sum of the CHF 599,145 was carried over from the period 2004/05, and therefore a total of CHF 1,186,145 plus interest was available during the period. The financial statement of the APFM Trust Fund with income and expenditure from January 2004 (because of the financial system of WMO which counts the balance in two years term) to 31st March 2006 is given in the Table on the following page.

APFM TRUST FUND FINANCIAL STATEMENT
(as of 31 March 2006)

1. Income and Expenditure from January 2004 to December 2005

1-1.	Opening balance		55,474	
	Adjustment to Surplus / Capital		128,315	
		Sub-total	**183,789**	**(e)**
1-2.	**Income**			
	Contributions		1,500,500	
	Interest		9,279	
		Total Income	**1,509,779**	**(f)**
1-3.	**Actual Expenditure (including support costs)**		**1,157,411**	**(g)**
1-4.	**Closing balance carried forward to the 2006-2007 biennium**	**(e)+(f) - (g)**	**536,157**	**(a)**

Certified correct

Luckson Ngwira
Chief, Finance Division
WMO

2. Income and Expenditure from January 2006 to March 2006

			CHF	
2-1.	**Opening balance**		**536,157**	**(a)**
2-2.	**Income**			
	Contributions		193,500	
	Interest			
		Total Income	**193,500**	**(b)**
2-3.	**Expenditure (including support costs)**			
	Actual Expenditure (Liquidated)		110,781	
	Unliquidated (Future Obligation)		177,244	
	Requisition (Future Obligation)		263,317	
	Prior years income/expenditure		0	
		Total Expenditure	**551,342**	**(c)**
2-4.	**Carry forward from this period**	**(a) +(b) – (c)**	**178,315**	**(d)**

Certified correct

Tomiji Mizutani
Chief, Budget Office
WMO

Table: Detail of Contributions for APFM Trust fund

January 2004 to December 2005			
Date	Country	Amount in CHF	Budget year
Jan. 04	Japan	120,000	03-04
Feb.04	The Netherlands	180,000	03-04
Mar.04	Japan	120,000	03-04
Aug.04	Japan	256,000	04-05
Oct.04	The Netherlands	125,000	04-05
Oct.04	Japan	128,000	04-05
Dec.04	The Netherlands	125,000	04-05
Mar.05	Japan	128,000	04-05
Nov.05	The Netherlands	125,000	05-06
Dec.05	Japan	193,500	05-06
Total		1,500,500	

January 2006 to March 2006			
Date	Country	Amount in CHF	Budget year
Feb.05	Japan	96,750	05-06
Mar.05	Japan	96,750	05-06
# 1	The Netherlands	(75,000)	05-06
Total		193,500	

1 This contribution will be transferred upon the acceptance of the final report and the financial accounts

4. OVERVIEW OF ACTIVITIES OF APFM PHASE I

4.1 Objectives of APFM

APFM was established in August 2001 after a series of discussion in the Technical Advisory Committee (TAC) of GWP, which recognized the necessity of undertaking flood issue in relation to IWRM. The goals of the APFM were contemplated as:

- To promote the inclusion of floods in all aspects of IWRM so as to safeguard and increase the quality of life of those threatened by floods, protect the environment, and maximize the use of flood waters for the benefit of society and the environment. In this context, consideration of floods should be seen as one component of overall risk management.
- To provide national governments, agencies and bi-lateral and multi-lateral donors with a sound system of methods, tools and policy options within which to respond to the flood problem in an integrated manner so as to save lives and protect infrastructure and property while contributing to sustainable development within river basin.

Given the above goals, the stipulated objectives were:

- to develop and apply an approach to flood management which incorporates it as a component of integrated water resources management;
- to make available the tools that are necessary for the above;
- to provide a mechanism for coordinating regional activities on flood management; and
- to assist in the preparation of relevant projects at regional and national level.

As the implementation of the above activities progressed and the current practices around the world were reviewed, it was realized that there was necessity to fine tune the objectives and the proposed activities to put the concept of integrated flood management into the policy as well as at implementation levels. The objectives and activities of APFM have been revised based on discussions at the steering committee and advisory committee meetings.

Revised objectives

- Establish the principles of Integrated Flood Management;
- Help assimilate principles of Integrated Flood Management within the overall Integrated Water Resources Management;
- Develop capacities in the countries to integrate flood management into sustainable development processes; and
- Provide a platform for a common strategic vision on integrated flood management issues, and to promote the implementation of effective policies and strategies worldwide.

Accordingly, to begin with the following activities were identified.

- Identify gaps in present flood management practices and IFM approach to stimulate partners to meet critical needs within their available human and financial resources;
- Support actions at local, national, regional or river basin level that follow principles of Integrated Flood Management;
- Provide advice and relevant information to institutions and decision-makers on flood management issues; and
- Advocate and promote awareness about flood management issues, build political commitment and trigger action at all levels.

4.2 Activities

Activities taken up by APFM in Phase I are:

1. Development of Flood management policy series;
2. Compilation of flood management practices through case studies;
3. Implementation of regional pilot projects;
4. Establishment of linkages with APFM partners and contacts; and
5. Dissemination of information, knowledge accumulation and opinion making.

4.2.1 Flood management policy series

IFM is based on the concept that flood management should be looked at within the wider perspective - Integrated Water Resources Management (IWRM), but when APFM was launched there was virtually no material available in this context. Therefore the need to develop the IFM concept paper was realized.

In early 2002, the Technical Support Unit (TSU) of the APFM liaised with Dr. Colin Green of the Flood Hazard Research Centre (FHRC), University of Middlesex, U.K., who provided a draft material for the IFM concept paper. This draft was then worked on by the TSU to address to a wider range of readers from policymakers, lawmakers, and flood managers to different stakeholders related to flood management, both in developed and developing countries. The draft was discussed at the WWF3 and other groups of WMO and reviewed by the Steering Committee. The Concept Paper was completed in October 2003. IFM concept paper was then translated into French, Spanish and Japanese and disseminated through various channels including APFM website. (http://www.apfm.info)

While the IFM Concept Paper being the core to conceptualize the approach of IFM, a set of supplementary papers focusing on specific aspects of IFM, such as socio-economic, environmental and legal issues have been compiled to facilitate the implementation of IFM principles into the development planning practice of river basins.

The paper on '**Legal and Institutional Aspects of IFM**' has been the first publication under the 'Flood Management Policy Series". It has been prepared and published in collaboration with the International Water Law Research Institute at the University of Dundee, Scotland. An international expert group constituted for this particular purpose guided the preparation process and the drafts were consulted with a wider group of experts in law and natural resources management. The paper aims at raising the awareness of policy makers about the need for an appropriate legal framework for IFM, and providing guidance to legal experts on how to incorporate IFM principles into legal practice. Additionally it intends to motivate and enable flood practitioners, stakeholder groups, including actors of the civil society involved in public opinion building such as NGOs and the media, to engage in dialogue with policy makers about the requirements and the best approach to a balanced legal framework for IFM. Efforts have been made to present existing examples, among others through linking four country case studies (India, Japan, Serbia and Switzerland) into this effort, and equally important, the development of a Rapid Legal Assessment Tool (RLAT). This Tool has been conceived to strengthen the guidance aspect of the paper and is provided therein as the final chapter. This guidance may be particularly useful for countries, which take up Integrated Flood Management into their overall development policies and wish to reflect this in their legal and institutional arrangements. The publication was distributed during the 4th World Water Forum in Mexico.

Vulnerability of society against flood hazard is represented by the inability of a community or a group to anticipate, cope with, resist and/or recover from the impact of flooding. It is a combination of complex and interrelated set of mutually reinforcing and dynamic factors. The paper on "**Social Aspects and Stakeholder Involvement in IFM**" explores the relationship between people and floods in respect of both their positive and negative impacts from social and economical development perspectives. This paper also explains various mechanisms of reducing flood risks and how participatory process can contribute in flood risk reduction. Multi stakeholder involvement in the process is a key to success of IFM and this paper explains about the

stakeholder involvement at different levels of planning and how to make this process sustainable. The individual tools such as a manual of community involvement in disaster preparedness and response strengthen this paper.

The publication on the "**Environmental Aspects of IFM**" addresses issues on how environmental considerations can be appropriately incorporated in flood management practices. Some of the underlying causes that make it difficult to integrate environmental considerations into flood management practices revolve around communication gap: understanding differing perspectives to sustainable development. This publication is an attempt to narrow this gap. While it does not attempt to be a guideline or manual prescribing procedures or steps, it provides a rational and balanced way of addressing environmental issues in flood management. This publication is primarily directed to flood managers, to enable them to understand the range of environmental issues involved in flood management. At the same time, it provides useful information for policy makers, environmental groups, NGOs, and communities, to enable them to understand flood risks in relation to environmental concerns and sustainable development. This publication has been developed based on inputs provided by experts of different regions of the world from various disciplines, e.g. ecology, eco-hydrology/eco-hydraulics, hydrology/hydraulics, multi-criteria analyses, legal affairs, etc.

The publication on "**Economic Aspects of IFM**" provides a broad overview of the economic analysis required in making choices on the policy as well as project levels of flood management. Economic analysis helps to select not only the optimum level of adjustment to floods on the basis of risk safety trade-off decisions, but also an optimum combination of measures for a wide range of flood management strategies comprising both structural and non-structural measures. In addition, direct and indirect methods are now available or used for estimating the environmental value, such as the benefits of replenishing wetlands, recharging groundwater and supporting agriculture and fisheries systems, improved river water quality or the costs of losing an area of wilderness to development. This publication highlights the economic aspects relevant to IFM including positive and negative aspects. This publication has been developed in collaboration with the IRMED, New Delhi, India. The draft has been prepared and will be reviewed through the GWP channels.

During the development process of various supplementary papers (policy series), a number of tools have been identified that need to be developed to put these principles into practice. Some of the tools are:

- Basin Flood Management Planning;
- Flood Management Policies and Strategic Environmental Assessment;
- Environmental Impact Assessment of structural flood management measures;
- Adaptive Management Techniques for IFM;
- Flood Reservoir Operations and Managed Flows;
- Flood Forecasting: reaching out to Municipal level functionaries;
- Integrating Flood related hazards;
- Involving Flood Stakeholders in River Basin Organisations;
- Reducing Vulnerability of Buildings in Flood Prone areas.

4.2.2 Compilation of flood management case studies and overview situation paper

APFM has undertaken the collection of a number of case studies of flood management to obtain information on relevant practices from countries in various regions of the world considering regional and socio-economic distribution. An **Overview Situation Paper (OSP**) was compiled based on 19 case studies.

The OSP provides an overview of existing trends and approaches to flood management practices and the lessons learnt – in the case study countries – from current flood management practices. Based on these case studies, the OSP identifies drawbacks and gaps in existing systems with respect to IFM implementation; and the approaches required or recommended to be followed to adopt the IFM approach. These formed important inputs to the IFM concept Paper.

Figure: Location of the Case Studies and Pilot Projects

4.2.3 Implementation of regional pilot projects

Five pilot projects have been executed in **South Asia, Africa, South America, Central and Eastern Europe and Central America** through GWP and WMO regional networks to develop and implement various components of the IFM concept and its application through demonstration. In all 10 counties, Bangladesh, Brazil, India, Kenya, Nepal, Poland, Romania, Slovakia, Uruguay and Zambia have been supported through the project to implement the concepts of IFM in the countries at the pilot scale. In addition, 10 more countries Hungary, Costa Rica, Guatemala, Honduras, Nicaragua, Panama, Bulgaria, Czech Republic, Lithuania, and Slovenia were involved in the consultative process of developing the pilot projects or in the initial phases of the pilot projects.

In South Asia, the pilot project on "**Community Approaches to Flood Management**" was started in November 2002 in collaboration with the South Asia Technical Advisory Committee of GWP, with the objective to reduce vulnerability of communities to floods through suitable community-based approaches. By the end of the pilot project, Community Flood Management Committees (CFMCs) have been established in selected communities (three in India and two each in Bangladesh and Nepal) and manuals describing specific activities for community based flood management have been developed in a participatory mode for each of the communities. During the monsoon season of 2004 and 2005, the manuals were field-tested, and found to be extremely useful to reduce loss of lives and property in the communities covered by the pilot project. With a view to uplink the results from the pilot project, national workshops have been held in Bangladesh, India and Nepal to integrate the Pilot Project in the national flood management and disaster prevention programmes and activities. Country representatives at the Secretary and Ministry level pledged to internalize the approach and results from the pilot project into the overall national planning process and programmes for disaster reduction and flood management. A regional workshop in Bangladesh was organized with the objective to promote the successful approach and results of the project to other countries in the region. As a result of the regional workshop, there has been an interest to implement the project regionally and two countries, namely Pakistan and China will develop an approach to implement the project nationally.

In Africa, "**Flood Management Strategy for the Lake Victoria Basin in Kenya**" has been developed to serve as a model for developing the country's national strategy on flood management. The Ministry of Water Resources Development and Management of Kenya responsible for flood management in the country has

decided to implement the strategy both through its internal resources as well as in collaboration with the financial partners. In Zambia also, where floods continue to be amongst the most damaging natural disasters, a pilot project has been started for Kafue Basin for developing an Integrated Flood Management Strategy.

In South America, "**Integrated Flood Management in the river Cuareim/Quarai basin**" was carried out in collaboration with the South America Technical Advisory Committee of GWP and is being implemented by the National Directorate of Hydrography (DNH) of Uruguay and the Institute of Hydraulic Research (IPH) of the Federal University of Rio Grande do Sul of Brazil. The targeted basin is the sub-basin of the La Plata River Basin and is shared between Brazil and Uruguay. The objective of this project is to establish a flood management plan in this river basin in order to better manage flooding within a framework of IFM. The first phase of the implementation of the project ended in 13 December 2005. The first phase of the project has limited itself on assessment of the flood risks and development of a flood forecasting system with participation of different stakeholders. The second phase is expected to focus on development of a flood management plan for the basin. The Brazilian partner in the pilot project, a research organisation with little operational responsibility, has limited scope to present a viable stakeholder perspective and as such the second phase would depend on the involvement of the ANA authorities in the region.

Central and Eastern Europe (CEE) is effected almost every year by flooding by both large-scaled slow rising floods and flash floods. There is a great source of knowledge in this region on good practices to be exploited for flood management, from both scientific and practical viewpoints. The "**Study on historical floods from IFM viewpoint**" was initialized through collaboration with the Central European Technical Advisory Committee of GWP to collect, analyze and synthesize this knowledge and present a clear picture on the situation regarding the flood management in CEE region with special reference to flash floods. This study has been concluded through contributions from 7 countries. Based on the experiences from the first phase, the second phase has focused itself on "**Forward integration of flood warning in areas prone to flash floods**", implemented in pilot areas in Poland, Slovakia and Romania. Overall objective of this implementation phase of the pilot projects is to increase the awareness, preparedness and response capacity of the local authorities and population in flash flood prone pilot communities to forecasts and warnings issued by respective authorities. The aim is to reduce the vulnerability of the affected population. The project is expected to provide useful experiences on the ways to use the capacities in the local administrative authorities and increase their self help capabilities.

In Central America two projects are in the early stage of development. In Guatemala, after Hurricane Stan a Workshop on Integrated Flood Management (IFM) was held in December 2005 in Guatemala City. Participants from various institutes attended the workshop. In Costa Rica and Panama the final stage of the development of a project document for jointly implementing the project in the Saxola basin, after long discussions has been completed in March 2006. The experience in Central America hallmarks the difficulties in dealing with transboundary rivers. Perhaps bringing the countries together to work jointly on a transboundary river itself is kind of an achievement. The Guatemala case highlights the need for greater coordination and cooperation among different institutions within the country.

4.2.4 Establishment of linkages with APFM partners and contacts

APFM has been developing ties with various partners to develop cooperative activities. Some of them are listed below:

- With FHRC to compile IFM concept paper and the paper on Social Aspects and Stakeholder Involvement in IFM
- With DFO to compile a flood inundation map in Kenya, utilizing satellite imagery
- With IWLRI to compile supplementary paper on legal and institutional aspects of IFM
- With UNECE to promote the issue of legal and institutional aspects of IFM
- With ADPC to compile supplementary paper on Social Aspects and Stakeholder Involvement in IFM
- With CapNet to develop IFM training module
- UNESCO-IHE in the field of training and capacity building

- With WMO Member Countries through APFM contact points for advocacy with national flood management institutions
- With ICID in developing flood risk management strategies with flood management institutions in the countries
- With the Swiss Federal Office for the Environment on the supplementary papers on environmental and legal aspects of IFM
- With the United Nations University - Institute for Environment and Human Security (UNU-EHS) in developing the paper on Environmental Aspects of IFM
- With UNEP Collaborating Centre on Water and Environment (UCC-Water) in developing the paper on Environmental Aspects of IFM
- International Association of Hydraulic Engineering and Research (IAHR) in developing the paper on Environmental Aspects of IFM
- The World Conservation Union (IUCN) in developing the paper on Environmental Aspects of IFM
- Ramsar Convention on Wetlands in developing the paper on Environmental Aspects of IFM
- Close collaboration planned with ICHARM in training and capacity development
- Collaboration with Niger Basin Authority to develop flood management strategies in Niger basin
- Proposed collaboration with the Danube River Commission
- South Asia Cooperative Environment Programme to develop pilot project in South Asia in Phase II
- Collaboration with Commision Nacional Agua, Mexico to implement flood management strategy in Mexico

4.2.5 Dissemination of information, knowledge accumulation and opinion making

The APFM has been disseminating its information and products like the IFM Concept Paper and the APFM Newsletters, through various mechanisms and channels to different users. TSU and WMO staff participated in various conferences, workshops, and seminars to promote the concept of IFM and APFM activities, such as:

- the 3rd World Water Forum (WWW3) in March 2003, Japan
- the annual meeting of the Association of State Floodplain Managers (ASFPM) in May 2003
- the Pan African Implementation and Partnership Conference on Water in December 2003
- the Second Meeting of the UNECE Task Force on Flood Protection and Mitigation in April 2004
- the Follow-up Conference on the Budapest Initiative on Strengthening International Cooperation on Flood Management in the Framework of Sustainable Development in April 2004
- the 9th GWP Consulting Partners Meeting and Associated Programmes Day in June 2004
- the 39th Flood and Coastal Zone Management Conference of the Department for Environment, Flood and Rural Affairs (Defra) in June to July 2004
- the Third South Asia Water Forum in July 2004, World Water Week in Stockholm in August 2004
- the Conference on “Good Water Governance for People & Nature” in August 2004
- the Commission for Hydrology of WMO - Twelfth Session in October 2004
- the International Conference on Integrated Water Resources Management in December 2004, Japan
- the World Conference on Disaster Reduction in January 2005 in Kobe, Japan,
- the World Water Week in August 2005 Stockholm in Stockholm, Sweden,
- the Second Southeast Asia Water Forum in August 2005 in Bali, Indonesia,
- the 2nd International Yellow River Forum (IYRF) on Keeping the Healthy Life of the River and Modern River Basin Management in October 2005 in Zhengzhou, China and
- the 4th World Water Forum (WWF4) in March 2006, Mexico
- the Flash Flood Forecasting Workshop in March 2006 in San Jose, Costa Rica.

APFM is also utilizing its web site to provide APFM outputs: IFM policy series, APFM Newsletter, Case studies, and information on the on-going pilot projects. Currently, on an average 142 visits take place every day to the APFM website with an average data transfer (download) of 42 mb per day, which can be considered to be fairly satisfactory, considering that a number of products are still under development and are yet to be put on the web. APFM Reference Centre will be established in the web site to provide strategic

advice for IFM (HelpDesk) with the information of institutions in flood management, flood policy and legislation, literature etc as databases for reference. Forum module to facilitate online discussion within flood management community ahs also been commissioned.

4.2.6 Integrated Flood Management adopted as a major component of Water Hazard Risks policy by UN-Water

Advocacy of the IFM Concept to be adopted at various levels starting with the UN System down to the country level is very important for achieving the ultimate objectives of the programme. UN-Water, an inter-agency mechanism to coordinate various activities related to all water related issues being handled by different UN agencies, in its first UN-Water policy series paper on "Water Hazard Risks" has recognized Integrated Flood Management (IFM) to be one of the comprehensive processes within " Disaster Risk reduction and related strategies", which go beyond traditional response to the impact of individual events and hazards. The paper deals with the current trends in flood management and other water hazards and traces the underlying causes of the growing concerns towards the impact, which the water related disasters have, on the sustainable development process. It recognizes that flood management strategies need to be multi-sectoral and inter-disciplinary in nature and comprise a wide range of interrelated activities at the local, national, regional and international levels. The APFM considers UN-Water as its partner in advocating the IFM approach at various levels.

The International Flood Initiative, launched by UNESCO, WMO and other international non-governmental organisations has also formed IFM as its major thrust area. With the involvement of the governmental agencies in the pilot projects, the concepts forms important inroads as a policy concept.

4.3 Review of the performance

Under phase-I the Advisory Committee took an annual review during its annual meeting, which consisted of the representatives of the donors along with the ones from the two parent partner organisations, GWP and

WMO. Some of the excerpts from the proceedings of the Advisory Committee Meetings of June 2005 are reproduced below:

"… The Committee appreciated the philosophy adopted in the implementation of the pilot projects and the field demonstration achieved so far and recommended to upscale these activities by involving the agencies such as GEF or JICA. The Committee commended the crucial role being played by APFM in initiating the activities on the ground to test and demonstrate the usefulness of IFM concepts."

"…The Committee expressed its satisfaction at the importance being given to capacity development for IFM and stressed the need to put in more efforts to achieve tangible results. The Committee also approved of the logical connection and collaboration with other institutions related to flood management such as IWLRI, ADPC and IRMED."

"… The Committee discussed in details the importance of advocacy but was of the view that the good outputs from pilot projects and their upscaling combined with development of tools for the implementation would go a long way in advocating adoption of IFM approach. In this context the necessity to ensure close collaboration between relevant global flood related programmes, e.g. IFI, I-CHARM, IFNet etc. to avoid overlap in the activities were stressed."

ANNEXES

Annex I Comments and suggestions on Flood Management Policy Series – how those can be reflected

A set of the "*Flood Management Policy Series"* is published within the framework of the WMO/GWP Associated Programme on Flood Management. The series comprises of publications on various aspects of flood management policy, including economic, environmental, legal and institutional, as well as social aspects. The series has been developed in consultation with expert groups convened for each publication, to guide and advise the preparation process, and on a wide review and consultation process in the framework of conferences and direct correspondence with leading sector professionals in the area of natural resource management and development policy.

Comments and suggestions provided by experts have been appropriately incorporated into the series to enrich the contents, and cover various issues on respective aspects of IFM. However, in our endeavor to reconcile these comments, some of them could not be reflected in the series. The following tables show a number of essential comments and our view on them, i.e. how they have been - or why they could not be accommodated.

Legal and Institutional Aspects of Integrated Flood Management

	Some of comments and suggestions provided by experts	**How these could be reflected?**
1.	Along the preparation process of this paper and the development process of the IFM concept, comments relating to the term "Integrated flood management" came up such as: "It is rightly noted that society is becoming increasingly vulnerable to flood events and that damage has therefore increased. Paragraph 3 again refers to this, stating that traditional flood control has failed and that a paradigm shift towards risk management is therefore necessary. The new concept is called "Integrated Flood Management". I advise against this designation. Rather, both here and in the title of the paper, the word "Risk" should be consistently used as well, in order to highlight the paradigm shift.	A decision on this discussion had been taken earlier to be IFM. The inclusion of the term "risk" has been perceived to collide with some elements of the overall IFM approach, especially in the negative connotation that it includes towards floods and the focus on extreme floods that it implies.
2.	Videh Upadyay, Supreme Court Advocate, India commented: The section on ' RIGHTS, POWERS AND OBLIGATIONS' needs to be strengthened substantially and perhaps could even be rewritten. While the section has important points they don't reflect the entire gamut of issues that needs do seen from the perspective of rights, powers and obligations.	Mr Upadhyay has been given the opportunity to alter the section so that after deliberate discussion the section could be published with substantially strengthened content.
3.	Otto Malek, Germany Federal Ministry of the Environment wrote on the first draft: The possible pollution of water bodies in the case of flooding is not mentioned at all. This risk must be	The legal paper has in consequence allocated a discussion on this issue in subchapter 1.2, including how land use regulation can contribute in minimizing pollution from land-based contaminants during flood events.

	Some of comments and suggestions provided by experts	How these could be reflected?
	taken into account through precautionary measures in particular in the floodplains. Furthermore, deposition in flooded areas can give rise to risks if these sediments are heavily contaminated. These days therefore, the comment in the first paragraph that floods increase the fertility of flood plains must be qualified considerably.	
4.	Akihiko Nunomura, Ministry of Land, Infrastructure and Transport, Government of Japan, noted that it is essential to enhance the laws and regulations on dam constructions and operations and to secure the functions to check the implementation of them, in order to prevent dam breaks.	The Rapid Legal Assessment Tool has in Table 3 included a number of legal measures related to dam safety.
5.	Otto Malek, German Federal Ministry of the Environment noted on the first draft that areas allegedly protected by technical measures (e.g. by dykes) are also at risk of flooding (flood-prone zones).	The Rapid Legal Assessment Tool has in Table 3 included provision about responsibilities of authorities in the area of public awareness raising on flood hazard areas. A note of caution concerning the risk of re-adoption of flood control policies after large floods with a sole focus on structural measures has been included in Chapter 8.4.
6.	Cecilia Tortajada, Third World Centre for Water Management, noted about the statement of the draft paper that analyses with respect to the principles followed in international conventions would help put in place a conductive framework of national legislation that would be of utmost importance and relevance for a better understanding between the neighbouring countries. “It does not seem to me that the previous statement is accurate. In most of the countries, if not all, decisions (water and flood management included), are taken based on the internal needs and interests of the countries, and not necessarily according to international conventions, even when they have been signatories to them. It is somewhat impractical to expect that international conventions will dictate formulation of national legislations on flood control.	Definitely the international conventions should not be understood to “dictate” as it is too vague to be directly applicable in a national context. As a consequence it has been more clearly spelled out that principles of international law can be an “aid” in formulating national legislative frameworks, in particular where national experience with the subject of flood or water law is lacking.

Environmental Aspects of Integrated Flood Management

	Some of comments and suggestions provided by experts	How these could be reflected?
1.	From Ger Bergkamp, IUCN Real world examples are useful to illustrate a point made.	It is realized that there is no single method, approach, or framework to determine environment-friendly flood management. In order to balance the description of the issues and to avoid impression that one case study can be applied to all, such practical examples are minimized or not reflected. Different socio-economic background, geo-morphological, and hydrological characteristic should be taken into account. Instead, this paper shows a rational and balanced way of addressing

	Some of comments and suggestions provided by experts	How these could be reflected?
		environmental issues in flood management.
2.	From Ger Bergkamp, IUCN The target audience is narrowly defined primarily to flood managers. This kind of "Advocacy Paper" would require a target audience that includes e.g. lawmakers, insurance company, tourism developers. Targeting those groups would require a different format. Thus either the advocacy nature o the paper needs to be modified or the target audience need to be redefined to ensure the paper will have an impact.	This publication preliminary addresses flood management practitioners, who are directly involved in flood management. The description contains a scientific view, so that flood managers can understand basin ecological and morphological concepts of rivers and how they are largely influenced by flow regimes. However this publication also provides useful information for policy makers, environmental groups, NGOs and communities to enable them to understand flood risks in relation to environmental concerns and sustainable development. This would help improve communication and understanding among different disciplines, various stakeholders and experts.
3.	*About a box describing the trends in river and ecological concepts* From Ger Bergkamp, IUCN Use of a table summarizing the top 5 ecological concepts (e.g. river continuum concepts (RCC), flood-pulse concept, etc.) can be considered. From Claudio Meier I strongly question the inclusion of this highly theoretical material and references in this paper. Not even river ecologists agree among themselves about the value of the RCC, why should we be trying to sell it to river managers.	We realize the importance of main ecological concepts, in order to understand more details about the concepts. But, as the description is highly theoretical and arguable even among ecologists, we described only the basic concepts of river corridor ecologies and morphologies without discussing too much details. For those who are interested in knowing the details, certain references are provided at the end of this publication.
4.	From Ger Bergkamp, IUCN The range of policy and planning instruments that governments and other actors have at their disposal. The current overview is insufficient	List of the policy and planning instruments relating to environment and flood management has been provided in another publication on Legal and Institutional Aspects of IFM (LIAIFM). Instead of listing them in this publication, this refers to the LIAIFM.
5.	From Soontak Lee, Yeungnam Univ. and IHES Although this draft is focused on cases of European and American rivers, it should contain case of Asian rivers, which are characterized by the monsoon season. In Korea, such as management of a large flood plain in channel, operation of an underground water tank in urban area, and utility of a storage zone along channels are essential to IFM.	This publication addresses rivers not only in Europe and America, but also in Asia and other regions (where are affected by monsoons and population density is high in flood plains) in a balanced manner. But this does not focus on structural underground drainage systems. Even though the importance is recognized in flood management, this publication only focus on some of main structural flood management measures (e.g. dams, embankments, detention basins, bypass channels, etc.), so that a general approach to understanding environmental impacts is attempted and possible mitigation measures can be explored. The purpose is not to cover all the structural flood management measures.
6.	From Soontak Lee, Yeungnam Univ. and IHES This report should focuses mainly on the impacts of	IFM is a process promoting an integrated approach to flood management. Impacts and adaptability of IFM differs from one to another. The emphasis has

	Some of comments and suggestions provided by experts	How these could be reflected?
	IFM practices on the river environment, not the impact of individual measure on the river environment, which has already been widely known. In this sense, we need to define what IFM is and explain in detail what are main ingredients of IFM and impacts of IFM on the river environment. For example, one may want to know the coupled impacts of a dam and embankments on downstream river environment.	been therefore put on what are the general approaches to addressing the environmental issues in flood management and how these approaches can be attempted. This publication is not an attempt to be a guide line providing technical solutions for reducing impacts of flood management works. Instead of assessing technical issues such as coupled impacts of several structural measures, this provides an integrated approach that can be attempted in flood management, with special reference to environmental aspects.
7.	From Soontak Lee, Yeungnam Univ. and IHES It is necessary to contain the operational techniques of the monitoring and the procedure of the feedback for the results of the monitoring in the revised draft.	It has been realized that it is important to address operational techniques of monitoring and of a procedure of feedback for mid-course corrections in flood management. However, in order to maintain a level of the description in all the chapters, this publication discusses only a basic adaptive management approach to deal with scientific uncertainty.
8.	From Fabrice Renaud, UNU Section 4.6 on diffusion of pollutants does not fit to Chapter 4 ecosystem services and flood processes. This should be out of place.	Chapter 4 ecosystem services and flood processes: inter-relationships, addresses how ecosystems are influenced by flood processes. Diffusion of pollutants during floods can also be regarded as the inter-relationships. The section 4.6 therefore addresses only such an issue without going too much detail.
9.	From Keigo Nakamura, PWRI The interaction between terrestrial and aquatic ecosystems is one of hot issues in stream ecology. Therefore you should mention the importance of forests for the aquatic ecosystem.	We have realized the importance of the interaction between terrestrial and aquatic ecosystems. In order to maintain a level of details in all the issues addressed in the publication, mention about the importance has been minimized without discussing the details.
10.	From Keigo Nakamura, PWRI Please define the “flood plain”, because two types of definitions used by hydrologists and ecologists are introduced.	The definition of the “flood plain” cannot be sorely decided. This publication briefs organization of flood plains components and processes as a spatiotemporal hierarchy. The extent of “flood plain” gets defined by the specific geomorphic and vegetation characteristics and the objectives of flood plain management.
11.	From J Ganoulis (IAHR) A definition of components of the risk of flooding (i.e. magnitude, exposure, and vulnerability) stated in the paper is not in line with the widely accepted one. The risk of flooding is a function of two elements: frequency of occurrence and consequences. Vulnerability is rather a performance index of the system, indicating the degree of its possible damage under risk.	We understand that the definition of the risk of flooding provided by an expert, i.e. the frequency of occurrence and consequences, are more widely accepted in a situation where insurance-relating matters are addressed. Our definition of the risk of flooding, i.e. a combination of the hazard, the exposure, and the vulnerability, is also widely accepted when discussing disaster reduction including social and environmental components.
12.	From JICE About a phrase regarding a positive aspect of woods in the channel: Wood entrapped in the channel bed absorbs flow energy, reduces stream velocities and creates secondary currents.	The impact of the wood entrapped in the channel is different according to the morphological characteristics: a situation whether embankments are confined narrowly or embankments are set farther back from the channel.

	Some of comments and suggestions provided by experts	How these could be reflected?
	Wood entrapped in the channel has negative effect and aspects as well. For instance, driftwoods become the obstacles of flood flow in the river channel and would cause the levee-breach; and subsequently the severe inundation in the residential areas.	This difference has been taken care of in the publication.
13.	From Claudio Meier About a phrase regarding a negative effect of forest during flooding: Causes of logjams, leading to reduced floodwater storage. The effect is the other way around. Presence of dead or standing vegetation increases depth; this effect has got to be larger than the simple volume of vegetation; think that even a very thick forest will use only a small portion of the available space, but its hydraulic effect will be very relevant.	Same as above from a different viewpoint.
14.	From Claudio Meier About a description of a dilemma between occupation of flood plains due to their development potentials and causing less potentials due to disaster mitigation by restricting of people away from the plains. Are we saying that moving people out of flood plains is a bad idea?	No, this is a good idea and an important issue to be addressed. However, the question raised by the expert can be regarded as a perspective, where there are relatively low land constrains and other development potentials without living in flood plains. But we also recognize that land use regulation by restricting people away from areas that have risks of flooding is very important. This publication discusses importance of land use regulation by understanding balancing development imperatives vis-à-vis environmental conservation. Therefore this phrase is important but has been rephrased.
15.	From Claudio Meier About a description of an effect of absence of forest cover on hydrological regime: Absence of forest cover contributes to “shallow” landslides and gully erosion, resulting in land degradation and higher sediment discharges from chatchment The absence of forest cover contributes to “all kinds” of erosion, not only sheet or laminar.	This suggestion can be regarded as an ecological viewpoint. The effect depends on size, location, soil structure, antecedent condition of soil, etc. But, in general, it can be said that the effect is limited to “shallow” landslides, not always all of landslides, as many scientists have been discussing on this issue. This publication attempts to describe relevant impacts on ecosystems due to human interventions, which are not scientifically wrong.
16.	About a description of effectiveness of ecosystems on flood reduction (or impacts of structural measures on the environment): The effectiveness (or the impact of measures depends on magnitude of flooding, size, location, antecedent condition (or design). From Claudio Meier The description is too general.	This is one of biggest challenges in this publication to narrow the communication gap from different disciplines. Different disciplinary groups such as; environmental scientists, ecologists, flood managers, and hydrologists, among others, approach sustainable development from different perspectives. A comment no 12, 13, and 16 shows the same issue with this no 18. This publication is an attempt to understand various perspectives involved in flood

	Some of comments and suggestions provided by experts	How these could be reflected?
	From MLIT Impacts on the environment depend on the climates and conditions of natural surroundings in the local area. The paper introduces one concept as compilation of various environmental aspects. Therefore we would suggest stating in the paper that each area needs to respond in accordance with their environmental characteristics.	management and to narrow this gap. This understanding is a prerequisite for a multidisciplinary approach to flood management. Those comments from different perspectives have been taken into account in the final draft.

Social Aspects and Stakeholder Involvement in Integrated Flood Management

The first draft of the paper was prepared in consultation with Asian Disaster Preparedness Center (ADPC) based on the outline paper prepared by TSU, which suggest the structure of the paper. The expert group meeting was organized to discuss the first draft paper from 25 to 26 November 2006 in Geneva. In the expert group meeting, the content was well appreciated with some suggestions and comments to refine it. The importance of featuring stakeholder involvement in the paper was confirmed there, and the title of the paper was specified as “Social Aspects and Stakeholder Involvement in Integrated Flood Management” to make conspicuous the feature of the paper.

Based on the discussion in the expert group meeting and comments from Ministry of Land Infrastructure and Transport, Japan, second draft of the paper was developed on 23 February 2006 and posted at the website and sent to the wider circle of experts for the comments to finalize it. This paper was also introduced at the several meetings and workshops. Overall structure and the content were well acknowledged with useful suggestions and the paper was finalized in April 2006.

Annex II Session report on Adopting Integrated Flood Management within the Integrated Water Resources Management at the Fourth World Water Forum

Title of the session

Adopting Integrated Flood Management within the Integrated Water Resources Management

Session conveners

- River Bureau, Ministry of Land, Infrastructure and Transport; Japan
- Ministry of Transport, Public Works and Water Management of the Netherlands
- Ministry of Ecology and Sustainable Development of France and French Water Academy
- WMO/GWP Associated Programme on Flood Management

Keynote speakers

- Masato Seiji — Vice-Minister for Technical Affairs, Ministry of Land, Infrastructure and Transport, Japan
- Pascal Bertaud — Director General, Water Bureau, Ministry of Ecology and Sustainable Development of France

Conveners general remarks about the session

To build flood resilient communities, it is essential to take an integrated approach –linking land and water uses, flood risks, socio-economic development and the protection of natural ecosystems through appropriate institutional framework and public participation.

Damage due to flooding is increasing over the years and more rapidly during the last few years: recently the extreme floods are turning more often into disasters.
To build flood resilient communities, it is essential to take an integrated approach: factoring flood risks in water resources management, land uses, socio-economic development and the protection of natural ecosystems through appropriate institutional framework and public participation.

Japan, the Netherlands and France have joined together for tackling Integrated Flood Management in each of the country by exchanging the information and knowledge. WMO is supporting the advocacy and implementation of IFM by sharing the accumulated knowledge and conducting the pilot projects to demonstrate the applicability of the Integrated Flood Management concept in the field through the Associated Programme on Flood Management.

Synopsis

In this session, through the presentations and discussion, various practical experiences, good practices and lessons learned including difficulties and problems, with their consequences and their optional remediation and solution were analyzed and shared, in order to facilitate the countries in adopting an Integrated Flood Management approach.

Local actions presented during the session

Through the presentations of Local Actions and panel discussion, some of the practical experiences, good practices and lessons learned including difficulties and problems, with their consequences and possible solution were analyzed and shared.

Community Approach to Flood Management in South Asia (LA1258)

The presentation deals with experience and lessons of a local action on involvement of village community in flood management in Bangladesh, India and Nepal, the three major flood prone countries of South Asia. An entirely new approach having far reaching implications for the people of flood prone areas has been developed during the last three years under the auspices of Associated Program on Flood Management (APFM) of GWP & WMO. The implementing organizations were Bangladesh, Unnyan, Parishad, (BUP) (contact person Dr. Q.K.Ahmad) for Bangladesh; Institute for Resource Management and Economic Development (IRMED), Delli (contact person Professor Kamta Prasad) for India; and Jalsrot Vikas Sanstha (JVS) (contact person; Pradeep Mathema) for Nepal.

Local level communities in the frequently flooded areas of the three countries have been involved in aspects of flood management for which they are better equipped. Local communities were empowered through capacity building and creation of an appropriate institutional framework. A Manual on Community Approach to Flood Management has been developed in each country. The said Manual was tested twice in all the three countries during actual flood situations in 2004 and 2005. A process of multiplying the experiments has started. National level workshops in each country participated by policy makers have been held with positive outcome. A Regional Workshop is scheduled in first week of April. Favourable response from a government agency to multiplication of the Local Action to a limited extent has already been received in India. Much more support needed from donors.

Plan Loire Grandeur Nature (PLGN) (LA0803)

The “Plan Loire grandeur nature” (PLGN) is a project concerning the river Loire, in France. It involves various actors for developing a new approach of the flood risk management.

For that purpose, the plan addresses three priority topics: security against flood risk; improvement of water resources management in the landscape; reinforcement of the natural assets wealth. It aims at fulfilling these three topics in parallel.

The PLGN is a global land planning plan for the river Loire which was initiated during the third part of the 20th century by the French government. Given the valuable first outcomes, the French government offered to the local partners to enlarge the project to the whole catchment. That proposal led to setting the current inter-regional program “Loire Grandeur Nature” planned for the period 2000-2006.

Tama River Improvement Plan (LA1472)

“Tama River Improvement Plan” is a crown of many people’s labors, and was almost a large-scale pilot program by itself. During the formulation of the plan, concerned residents jointly with the basin and government administrators thoroughly observed the river status and discussed all critical related issues. In the plan, the perspectives of “flood control”, “water use” and “environment” as well as “operation and maintenance” are integrated in holistic manner.

River widening project: the Overdiepse Polder (river Meuse, the Netherlands) (LA1739)

This local action, the Overdiepse Polder, is located in the downstream part of the River Meuse. The water level rises 0,3 meter in this part of the River Meuse because of higher river discharges. Widening this section of the river prevents this water level rise. The dikes in this river section need no raising or adaptation because of this measure. River widening in this section is realized by repositioning the dike some 500 meters in the inland direction. The existing agricultural area of approx. 550 hectares is positioned outside of the dike through this measure. The existing farmhouses (17 dairy farms) will be pulled down and rebuilt on flood protected mounds d along the new dike. The river will utilize the new area outside of the dike once in 25 years on estimate. This allows the continued agricultural use of the area. In case of floods, the farms with their houses and cattle are high and dry on the mounds. After a few weeks maximum, the land is usable again.

The concept for this arrangement of the area came from the inhabitants and enterprises themselves. They took the initiative to make sure that they were involved in the planning from the very beginning. The authorities because of this broad social basis chose, among others, this measure.

Lessons learned

- Collaboration between public and government agencies with involvement of government representatives has to be based on local concerns and sensitivities.
- Transparent processes and timelines make public participation easier.
- Regional authorities should be involved to develop local plans.

Lessons learned from the Local Action from Bangladesh, India and Nepal

- Sustained effort is needed to workout the modality for operationalising optimal level of community involvement in flood management.
- This would require efforts to seek the support of the local bureaucracy and empower the local community.
- Community participation is the best method for implementing Integrated Flood Management.
- It also helps build resilience among the community and reduces vulnerability. Research oriented NGOs are best suited to handle this task.
- It needs to be recognized that community participation in flood management as elsewhere comes at a cost and is a timeconsuming process that needs a longterm perspective and ongoing commitment to ensure the sustainability of the approach.
- Empowerment of local communities to play a role in flood management in their own capacity is required.

Lessons learned from the French Local Action

- Integrated Flood Management needs to integrate the different policy sectors in order to reconcile the objectives of flood control and the natural environment,
- Water resources development and management needs to federate all the stakeholders (State, local authorities, riparian, NGOs) toward the same objective, to reconcile the different interests, in order to convince the stakeholders on the need for carrying some actions and the positive feedback foreseen.

Lessons learned from the Japanese Local Action

- Preventive measures are often more efficient than reactive measures
- Involvement of various stakeholders in the planning process, consequently, saves costs in the long run
- Excessive events (larger than the design standard for flood defences) should be taken into account for minimizing losses
- Hydrological impact of basin development should be assessed and appropriate measures be taken for preventing or mitigating the negative impacts

Lessons learned from the Dutch Local Action

- Collaboration between residents and government benefits both parties
- Communication on basis of equality is essential
- Government has to be sensitive to local concerns
- Deal with uncertainties
- Transparant processes and timelines make public participation easier
- The involvement of government representatives is essential to achieve results
- Regional governments are the best level to develop plans within local perspective
- There is a need to clearly identify the respective roles and responsibilities of various levels of governement in flood management reaching from local to regional to national.

Key messages

- Following key messages, giving conclusions in general terms, are important in factoring flood risks within Integrated Water Resources Management:
- Integrated Flood Management should aim at minimizing the losses of life from flooding and maximizing the net benefits from flood plains.
- In these efforts it should be recognized that floods have positive as well as negative aspects that need to be taken into account in flood management.
- Integrated Flood Management requires a clear identification and assignment of respective roles and responsibilities of various levels of government reaching from the local to the international levels.
- Recognizing the importance of land and water management and to balance the structural and non-structural measures while giving due consideration to preservation and restoration of natural environment and community participation, mechanisms for implementation should be strengthened.
- Striking a good balance of different measures, based on comparative advantages, is crucial in achieving the objectives of IFM.
- IFM requires a multi-disciplinary approach for which a continuous dialogue between professionals from different disciplines and the general public is needed.
- It is important to engage with public participation processes on a long-term basis
- Create a basis for developing and strengthening capacities in the countries by supporting local and regional actions that advocate, support or demonstrate the IFM principles, e.g., by: establishing a platform for the various stakeholders to discuss issues; and taking into consideration social and cultural aspects for promoting education, information sharing and public participation.
- Provide international support to the efforts of the countries and other agencies in this direction at adequate scale.
- Awareness on flood risk and water issues in general can be increased and strengthened through non traditional channels and means such as games, theatre etc.
- Regional cooperation in flood management is of particular importance for international river basins. There is a variety of areas of cooperation in flood management, including but not limited to flood risk assessment and flood risk management plans.

Orientations for action

Funding agencies should support Integrated Flood Management approaches at national and international levels.

Annex III Session report on Integrated Flood Management at the Second International Yellow River Forum

Messages to be taken to the Fourth World Water Forum from a
Special Session on Integrated Flood Management

Special session on Integrated Flood Management (IFM), 20 October 2005 in Zhengzhou, China

Asia, particularly South Asia and the South East Asia suffer heavily at the hands of natural disasters from riverine floods, flash floods or mudflows initiated by tropical cyclones or typhoons; or those caused by seismological activities such as earthquakes or tsunamis. With population stress on the natural resources people are forced to take higher risks and occupy hitherto unoccupied areas exposed to these natural hazards. Special session on Integrated Flood Management at the Second International Yellow River Forum (IYRF) provided the opportunity to review the flood risks in the region and the flood management practices adopted. The outcomes provide input for the Risk Management theme at the Fourth World Water Forum (WWF) at Mexico from 16-22 March 2006.

World Meteorological Organization (WMO) organized this special session with an objective to enhance awareness about the need for a paradigm shift from flood control to flood management through Integrated Flood Management. Experts from various disciplines and from different backgrounds presented and discussed issues, which need to be addressed to achieve this paradigm shift with special reference to the South and South East Asian region.

The magnitude and characteristics of floods in the South Asia and China vis-à-vis those around the world were presented by Prof. Wang Guoan, Yellow River Engineering Consulting Co., Ltd, YRCC, Zhengzhou in his paper "Comparison of Yellow River Floods to the other Floods in China, Asia and the World". It was pointed out that the magnitudes and extent of floods which are mostly caused by the monsoon rains are accompanied by other related hazards such as landslides and mudflows due to peculiar natural geophysical conditions as well as anthropogenic effects of large deforestations. As a result these floods also carry large amount of sediments and provide morphological instability to rivers in the region.
Download: Comparison of Yellow River Floods to the other Floods in China, Asia and the World (PDF)

Mr Avinash Tyagi, director of Hydrology and Water Resources of WMO, head of the WMO/GWP Associated Programme on Flood Management (APFM) and chair of the session, presented "A paradigm shift from flood control to flood management through an integrated approach" as a new approach to flood management, which refer to the integration of land and water management in a river basin within the contexts of Integrated Water Resources Management (IWRM) with a view to maximising benefits from floodplains while minimising loss of life towards sustainable development. He also presented importance and requirements of roles played by law at national and international level at all stages of pre-, during and post-flood situation in order to achieve Integrated Flood Management (IFM).

Dr. Ania Grobicki, a WMO consultant from South Africa, made a presentation about importance of "Integrating the ecosystem approach with flood management". She pointed out that increasingly this approach is being realised to be crucial for maintaining the services being provided by ecosystems and associated livelihoods to the benefit of those who depend on these services. The present approach of YRCC towards a healthy river is a welcome step in that direction. She pointed out, however, that there are no clear guidelines or material that could help flood managers implement this approach in practice. She presented the work being undertaken by her for the WMO in this direction and solicited inputs.

Prof Kamta Prasad, Institute for Resource Management and Economic Development (IRMED) in New Delhi presented importance of "Building resilience in flood prone communities through participation". He presented the results of a pilot project, which has been implemented on the ground level under APFM. The project had organised the community members to develop self-help capacity in pre, during and post disaster

response mechanisms. However he pointed out that the Community Flood Management Committees established for the purpose could not function effectively unless linked to and supported by the government agencies. He informed the participants of the efforts being made in this direction to uplink the community approach with the regional and national disaster management authority.

Finally, Prof Weimin Zhao, YRCC, Ministry of Water Resources in China presented "Flood Disaster Response Mechanisms in China", and addressed the legal and institutional mechanisms for disaster response in China.

Panel Discussion

In the Panel Discussions that followed on the " IFM and Sustainable Development", the authors were joined by Prof Jian-yun Zhang, from the Bureau of Hydrology, Ministry of Water Resources in Beijing, responsible for the Flood Forecasting in the country. The panel discussed various issues raised in the presentations as well as other related issues that are relevant to flood management in Asia, particularly in South Asia and South East Asia. It was felt that the outputs from the panel discussion should be submitted as input to the Fourth World Water Forum (WWF) to be organized on 16-22 March 2006 in Mexico.

Special Drivers of Flood Risks in the Region

In China, Southeast Asia and South Asia floods are largely influenced by the Asian monsoon and the typhoons in the region. Widespread rains associated with such systems where the intensity could be extremely high cause both flash floods as well as widespread riverine floods. These floods are accompanied by large mudflows such as in Philippines, Malaysia and Indonesia. The overall risks due to natural hazards are further accentuated by the active volcanic and seismological activities in the region. Mud-flows and landslides, which are induced by floods, also need to be taken into account. The extreme variability of rains, both in time as well as in space, cause both floods as well as droughts sometimes at the same time in different parts of a country. Rapid population growth in the region and the need to meet the increasing demand for food and energy, provide livelihood, infrastructure and economic development, force people to move from rural to urban areas thereby taking greater risks puts more and more people and economic activities at risks due to natural hazards particularly flooding. A special characteristic of the region is that people have been living with the floods for decades. However, exposure to flooding year after year has hampered their economic and social development. Harmonious living with the floods calls for improvement in various aspects of living conditions: health, communication and livelihood. As such, flood management requires to be addressed in an integrated manner rather than with a knee-jerk approach.

How these special conditions are addressed through Integrated Flood Management?

The risk management principles envisaged under IFM call for comprehensive assessment of risks due to all natural hazards and adopting an approach where various options of flood management are viewed from both development perspective as well as risks. It is emphasised that all the three components that contribute to risks, i.e.; the magnitude and frequency of the hazard; the exposure of the population and the economic activities to the hazard; and the vulnerability of these activities and communities to such an exposure, need to be addressed in preventing and managing risks. Assessment of risks need to be addressed at all stages of flood, i.e. preparedness, response and post-flood rehabilitation. Eventuality of the risks to which people are exposed and how they will affect people in the event of failure of flood protection measures should also be factored in disaster response strategies.

The fact that the region is at the same time effected by too much as well as too little water, drought issues and the corresponding ground water recharge during floods have to be integrated, considering water cycle as a whole.

Improving the resilience of the society and the economic activity to flood risks is considered to be an essential element of such an approach. With the large river systems where it is difficult for the government

machinery to be present and respond at all places at a time; or to respond to a flash flood event that does not provide enough warning for the government machinery to respond, it becomes essential that the communities are ready to help themselves to begin with. For such expectations from the community to be fulfilled, the community needs to get organised in order to respond to the emergency situations. Capacity development of communities for such a role is essential.

With high climate variability in the region, the uncertainty caused by changes in the past variability is likely to impact the risk situation. This uncertainty should be accounted for appropriately as far as possible. The emergency situation when a structural flood management intervention fail because of exceedence of the design flood or uncertainty of climate change, need to be addressed as far as possible. The climate change impacts on the risks should be factored on the 'no regret' principle.

With rapid economic growth and need for poverty alleviation, all natural resources including the ecosystems should be harnessed in a sustainable manner. There is need for addressing the issue of deforestation, an effect of population pressure and the need for energy sources, in order to prevent occurrence of landslides and mudflows. There is also the need to have land use regulations in respect to the location of hazardous industries in the flood plains to avoid exposure of the population to spread of toxic chemicals due to flood water and protecting the wetlands that provide livelihood to people.

Current socio-economic situation in the region, as apparent from the experience in China and India, does not bide well for successful flood insurance. In order to implement effectively the mechanisms of flood insurance, support of the government to insurance companies is essential. However, the basic characteristics of floods do not encourage the insurance companies to venture into this field. Difficulty in assessment of losses due to floods in a transparent manner also plays an inhibiting factor. The mechanism of compensation and post flood rehabilitation support provided by the governments appears to be the most viable economic instrument under the given situation in the region.

What Lessons can be learned from the Region?

Living with the floods has long tradition in the region. Special houses build on stilts and certain agricultural practices that withstand the ill-effect of long inundation periods are a couple such adaptation measures and others. However, with the overall socio-economic changes taking place in these countries, these far from ideal conditions of living cannot be tolerated and force people to migrate to urban areas. Science and technology should address the special needs such as the communication needs and the health concerns of the people who are forced to live in houses surrounded by floodwaters. Special agricultural practices that can take advantage of long inundations, need to be researched. Building technology should address the need for cheaper flood resistant houses. The communities have to be enabled and provided with legal and financial self-sufficiency to organise themselves and handle the flood situations.