



World Meteorological Organization



Global Water Partnership

ASSOCIATED PROGRAMME ON FLOOD MANAGEMENT



**ANNUAL REPORT
(2004-2005)**



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LIST OF ACRONYMS

ADPC	Asian Disaster Preparedness Center
ADRC	Asian Disaster Reduction Center
AIDA	International Association for Water Law
ANEP	National Administration of Public Education
AP	Associated Programmes
APFM	Associated Programme on Flood Management
BOM	Bureau of Meteorology
BUP	Bangladesh Unnayan Parishad
CapNet	Capacity Building for Integrated Water Resources Management
CATAC	Central America Technical Advisory Committee
CEETAC	Central and Eastern Europe Technical Advisory Committee
CFMCs	Community Flood Management Committees
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CMS	Content Management System
CMS	Centers for Medicare & Medicaid Services
CRC	Joint Commission for the Development of the River Cuareim River Basin (Uruguay-Brazil)
CTM	Joint Commission of the Salto Grande Dam
DNH	National Directorate of Hydrography
EPFL	Swiss Federal Institute of Technology of Lausanne
ESCAP	Economic and Social Commission for Asia and the Pacific
FAO	Food and Agriculture Organization
FASRB	Framework Agreement on the Sava River Basin
FHRC	Flood Hazard Research Centre
GFAS	Global Flood Alert System
GWP	Global Water Partnership
HEC-RAS	Hydrologic Engineering Centres River Analysis System
I-CHARM	International Centre for Water Hazard and Risk Management
IdM	Engineers of the World
IFI	International Flood Initiative
IFM	Integrated Flood Management
IFNet	International Flood Network
IFRC	International Federation of Red Cross and Crescent Societies
IMFIA	Institute of Hydromechanics and Environmental Engineering, Faculty of Engineering
IPH	Institute of Hydraulic Research
IPTRID	International Programme for Technology and Research in Irrigation and Drainage
IRMED	Institute for Resource Management and Economic Development
ISDR	International Strategy for Disaster Reduction
IUCN	World Conservation Union
IWLRI	International Water Law Research Institute
IWMI	International Water Management Institute
IWRM	Integrated Water Resources Management
IYRF	International Yellow River Forum
JVS	Jalsrot Vikas Sanstha
JWF	Japan Water Forum
MLIT	Ministry of Land, Infrastructure and Transport
MWI	Ministry for Water and Irrigation
MWRMD	Ministry of Water Resources Management and Development
OSP	Overview Situation Paper



PWRI	Public Works Research Institute
RIZA	Institute for Inland Water Management and Waste Water Treatment
SAMTAC	South America Technical Advisory Committee
SASTAC	South Asia Technical Advisory Committee
TEC	Technical Committee
TSU	Technical Support Unit
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCO-IHE	UNESCO-IHE Institute for Water Education
UNHCR	United Nations Commission on Human Rights
UNITAR	United Nations Institute for Training and Research
WBI	World Bank Institute
WCDR	World Conference on Disaster Reduction
WHO	World Health Organization
WMO	World Meteorological Organization
WWF	World Water Forum



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 IFM concept into practice. IFM conceptualizes integration of land and water resources development activities in a river basin and aims at maximizing the net benefits from flood plains and minimizing loss to life from flooding.

At global, regional and national level there had been a clear need to bring multidisciplinary point of view into flood management. As such, the IFM like IWRM advocates a multidisciplinary approach with participation of all stakeholders. While there have been a number of international initiatives, the social, economic, ecological, 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. 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 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 Government of The Netherlands. The APFM is housed in WMO with a Technical Support Unit that is provided full technical backup by the Hydrology and Water Resources Department of WMO. The present phase of the programme comes to a close in March 2006.

This report is the third report of the implementation phase of APFM, which mainly documents the activities undertaken during the last reporting period - i.e. from 1 April 2004 to 31 March 2005. The final section of the report lists the activities planned for the 4th year of implementation phase from April 2005 to March 2006.

During this reporting period, various activities have been undertaken such as development of advocacy papers, further collecting of case studies, development and implementation of regional pilot projects, capacity building, dissemination of information and advocacy activities. Some of the outputs and summarised documents are shown in “Annex” meanwhile most of the output materials are attached as “Submaterial” in a separate CD-Rom.



2. ACTIVITIES

2.1. Concept paper and other supporting papers on 'Integrated Flood Management (IFM)'

2.1.1 Objective

(IFM Concept paper)

IFM is based on the concept that flood management should be looked at within the wider perspective - Integrated Water Resources Management (IWRM), but at the same time when APFM was launched there was virtually no material available to address these issues. It is perhaps due to the fact that the concept of IWRM has been developed from the perspective of the need to solve water scarcity problem and the need of more efficient and equitable water resources development and management. Since then, importance of building resilience against water related hazards to meet sustainable development goals has increasingly been realised. This has motivated development of the concept of Integrated Flood Management.

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., developed the IFM Concept Paper, which was completed in October 2003. The targeted groups of this paper comprises of a wide range from policymakers, lawmakers, flood managers to other stakeholders related to flood management, both in developed and developing countries. IFM Concept Paper was published in English, French, Spanish and Japanese and disseminated through various channels including APFM website, conferences, seminars, and workshops.

A second reprint of the IFM Concept Paper, with slight modification to further highlight the environmental consideration, based on the suggestions of the Advisory Committee in 2004, was made in October 2004. The concept paper serves a useful purpose and is widely referred.

To further elaborate the concept of IFM, a set of supplementary papers focusing on specific aspects of flood management, such as socio-economic, environmental, legal and institutional issues are now being compiled to facilitate the implementation of IFM principles into the development planning practice of river basins.

These advocacy papers are aimed at initiating the policy makers and flood managers into addressing the multidisciplinary issues other than engineering. These papers also target various other groups involved in the development planning process in river basins and expose the readers to various interdisciplinary perspectives to flood management and their importance in bringing an integrated approach.

Development of these papers involves an intense dialogue between flood managers and specialists from other disciplines necessary to bring a mutual understanding of different facets. No wonder the process is time consuming and requires patience, perseverance and understanding of each other's views.

2.1.2 Legal and institutional aspects of IFM

Legal aspects of flood management are mostly neglected. This situation manifests itself in form of inadequate institutional mechanisms and was clear demarcation of responsibilities and obligations. One of the factors responsible for such a state is lack of open channel of communication between hydrologists/ flood managers on one hand and legal experts on the other. As such, it was decided to address the legal and institutional issues with a view to raise 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 framework. The Advisory Committee 2004 was presented



with the scoping paper that had been formulated to outline the purpose, target audience and issues to be addressed. After establishing collaborative contacts with leading experts in the fields of water law and policy, the initial scoping paper was revised and presented in form of a discussion paper to a wider range of Water Law Experts, Water Managers and Policy Makers in IWLRI/AWRA Conference on “Good Water Governance for People and Nature: What roles for Law, Institutions, Science and Finance?” held in Dundee, Scotland, 29 August - 2 September 2004.

The Secretariat of the UNECE Water Convention has been actively associated in the development of the paper from the outset of the preparation process. TSU has participated in a number of seminars/conferences organised by UNECE related to the subject and has gained from these interactions, in particular at the Seminar on Flood Prevention, Protection and Mitigation (Berlin, June 2004), and the second meeting of its Legal Board (Geneva, September 2004).

Experts from legal and policy fields related to flood management from Canada, Japan, Serbia and Montenegro, and the United Kingdom attended a meeting of the Expert Group (EG) on “the Legal Aspects of Integrated Flood Management” organised by APFM in Geneva, Switzerland, 27-28 September 2004. The International Water Law Research Institute (IWLRI) at the University of Dundee, Scotland, UK, is the key collaborating partner in this endeavour and contracted to provide for the research inputs. During the EG meeting, in depth discussions were held on a wide spectrum of related topics. Participants from Japan and Serbia offered to present specific case studies on the legal aspects of flood management in their respective countries with a view to link the contents of the proposed paper close to the current national practices. These case studies have been subsequently supplemented with additional case studies from India and Switzerland. The expert group recommended that, in view of the proposed contents, the publication would better be called “Legal and Institutional Aspects of IFM”.

In December 2004 the first draft of the paper prepared by the IWLRI with substantial inputs from TSU was circulated for comments to a wider group of legal experts including those that had attended the earlier expert group meeting in Geneva. The paper was presented at the World Conference on Disaster Reduction (WCDR) 18 – 22 January 2005 in Kobe, Hyogo, Japan. The audience consisted of disaster managers, risk management experts and policy makers. The paper was also distributed in hard copy with a call for additional comments. In accordance with the recommendations of the session emphasis was laid on building the capacity of countries and institutional arrangements for flood management. The draft of the paper was also placed on the APFM webpage with request for comments and inputs.

The draft paper emphasizes the need to mainstream integrated flood management perspective (in all the three phases: before, during and after a flood), into a wide range of (sector specific) legal arrangements on various administrative scales. These include laws related to spatial planning and land use regulation, building regulation, environmental conservation, stakeholder participation, forecasting and warning, civil defence etc. Specific emphasis is given to:

- Availability and accessibility of the basic data and information for informed decision-making;
- Coordination and cooperation among various organisations, institutions, users and uses of the river basin with clearly established roles and responsibilities; and
- An enabling environment for all stakeholders to participate and make collective decisions.

Based on a review of related international, selected basin and bi-lateral agreements and the work of the International Law Association key considerations for implementing IFM on the international basin scale are also provided.

After having received various comments and suggestions on the publication, a workshop between representatives of TSU and IWLRI at Dundee University, Scotland, UK on 14 and 15 April 2005 was organized. During this workshop it was agreed to add a chapter to concisely outline the steps of the



reform process to be taken towards a legal and institutional framework for IFM, as a “Rapid Assessment Tool”. The latest version of the paper is attached as sub-material I.

2.1.3 Environmental aspects of IFM

A paper on environmental aspects of IFM has been developed with a view to raising the awareness of policy makers about the links between flood management interventions and the ecology of rivers, floodplains and river deltas and the wider consequences on people’s livelihoods and the long-term productivity of the floodplain. A scoping paper has been prepared, which addresses issues on how to balance environmental issues vis-à-vis development issues in flood management; how environmental considerations need to be factored in the decision making process, and what tools are available and how they should be applied while making flood management decisions. The scoping paper is shown in Sub-material II. In the preparation process competent partners have been identified. Based on first round of discussions, a detailed framework of the paper has been prepared. An expert group consisting of representatives of IUCN, Ramsar Convention, government of Switzerland and Japan will be discussing this paper shortly.

2.1.4 Social aspects of IFM

In recent years, there are certain changes, which have been taking place in the way we make our decisions. There is greater appreciation of the need to involve the society in the process of decision-making and increasing their resilience against the flood hazards. However, flood management has often been dealt with through engineering interventions without wider consultations and without involving communities in the decision-making. The implementation agencies for flood management in the countries essentially remain mono-disciplinary organizations with little interaction with social and environment streams.

It is, therefore, proposed to compile a paper on “Social Aspects of IFM” as one of the supplementary papers focusing on specific aspects of IFM in order to facilitate the implementation of IFM principles. This paper will explain how social and cultural factors can influence the flood management decisions and how society can reduce its vulnerability in the light of community level approach. Social factors that relate to the choice of a particular flood management approach with emphasis on improving resilience of society will be discussed.

Appropriate basin management plans incorporating flood risk management principles and implementing them through active participations from communities is another factor that is essential to make society resilient. The paper also addresses the institutional mechanism, which is the foundation of planning and management, including public participation for decision-making. The paper comprises of two parts, one on community approach and the other on institutional mechanism required to put it in practice. Asian Disaster Preparedness Centre (ADPC), Pathumthani, Thailand is identified as a partner for the preparation of the paper on the community approach. Detailed discussions were held with representatives of ADPC during the WCDR in Kobe, Japan. The paper will include the outcome of the South Asia pilot project. A scoping paper is attached as Submaterial III

2.1.5 Economic Aspects of IFM

TSU has prepared a brief outline of the shortfalls in the input material earlier prepared by Dr Collin Green in consultation with Dr Kamta Prasad, Chairman, Institute for Resource Management and Economic Development (IRMED), New Delhi, India. The material was proposed to be submitted to GWP Technical Committee (TEC) meeting in Stockholm in August 2004. However, due to other pressing agenda the subject could not be included therein for discussion. The paper is now being prepared by IRMED.



2.2 Compilation of good practices in IFM

2.2.1 Objective

In order to assess the current status of flood management practices, the APFM has collected a number of case studies with the aim to obtain information on relevant practices from countries in various regions of the world. Focusing on the evolution of flood management practices in a given location/environment, the overall goal was to help in identifying those tools required to implement the concept of IFM. An overview situation paper, critically analysing each case study, has been prepared. The exercise has helped identify the extent to which flood management has been carried out within the context of IWRM; understand shortcoming in current flood management practices worldwide; catalogue the policy changes required to support IFM and identify the institutional changes required. The Overview Situation Paper (OSP) is attached as submaterial VI.

2.2.2 Current practices around the world

Based on the case studies collected under the programme and those based on existing in literature elsewhere, a brief paper on current practices of flood management around the world is being prepared.

2.2.3 New case studies

With a view to close gaps in the coverage of regional and subject areas, additional case studies have been collected, namely from Germany for the Rhine and Elbe River Basins and from Ukraine for the Tisza River Basin. This brings the total number of APFM case studies to 21. These case studies attached as submaterial IV and submaterial V represent the transboundary aspects of flood management and outline the co-ordination and cooperation mechanism between the concerned countries. A case study for the Swiss approach to flood management has been targeted which is currently under preparation.

Case studies, one each from Japan, India and Serbia and Montenegro have been collected to support the paper on legal and institutional aspects with a view to develop better understanding of national practices (see section 2.1.2 for more details).

2.3 Regional pilot projects

2.3.1 Objective

Several pilot projects have been undertaken for implementation together with GWP's Regional Water Partnerships and WMO's member countries including National Hydrological Services to test and demonstrate the applicability of IFM principles in practice. These pilot projects act as seed activity to initiate the practice of IFM at the ground level. The experience gained are assimilated in developing the supplementary papers and are shared with others through the APFM website and in print form.

2.3.2 South Asia

The objective of this Pilot Project is to reduce flood vulnerability in project areas with a particular emphasis on enhancing people-centred activities on the level of communities and improving their interaction with district-level government authorities. The Pilot Project has been implemented in Bangladesh, India and Nepal with GWP partners from each country namely BUP (*Bangladesh Unnayan Parishad*), IRMED (Institute for Resource Mobilization and Education Development in India), and JVS (*Jalsrot Vikas Sanstha* in Nepal).

The project was kicked-off in November 2002 and went through three phases. Phase-I of the project aimed at preparing a country paper to assess flood management activities and practices with a focus on



community involvement in the process. The outcome of Phase-I study was presented in the Third World Water Forum held in March 2003 in Kyoto, Japan.

Phase-II of the project made in-depth studies, conducted awareness generation and capacity building activities in selected study areas. The outcome of the project was formulation of Flood Management Coordination Committees in the village communities and put their experiences in the form of manuals on “Community Approaches to Flood Management” (country manuals) in each country with strong interaction with community members. These manuals were also translated into local languages and distributed to the local administrative level functionaries.

A synthesis of the three country manuals has also been prepared and translated into local languages of each of the respective countries. Summary of synthesis manual is attached as Annex I and full version of synthesis manual is attached as Sub material VII.

In order to test the applicability of the Manual in actual flood conditions, Phase-III of the project was taken up. Community Flood Management Committees (CFMCs) were established (three in India and two each in Bangladesh and Nepal) during the monsoon season in 2004. The manuals were field-tested in these communities. The activities undertaken in this phase were found to be extremely useful to reduce loss of lives and property in the communities covered by the pilot project. The test also revealed the necessity of continuous effort for capacity building in the community together with the essential support for the community. The reports of field-test by each country are attached as Sub material VIII.

In order to mainstream the outcomes of this pilot project, sensitisation of government functionaries is being taken up both by WMO as well as the GWP partners in the countries. The objective is to link up the community level institution to the government machinery responsible for disaster management so that they build resilience in the communities in fulfilling their objectives.

The outcomes of the Pilot Project were also shared with the participants of World Conference on Disaster Reduction in January 2005 in Kobe during the session in the thematic segment (see section 2.5.3) and 9th GWP Consulting Partners Meeting and Associated Programme (AP) Day (see section 2.5.4)

2.3.3 Africa (Kenya)

WMO in close collaboration with a technical team of Kenyan experts jointly prepared the Strategy for Flood Management for Lake Victoria Basin in Kenya under the APFM. The work involved information gathering and interaction with regional stakeholders and policy makers through the organization of two workshops. The Strategy was finalized in consultation with the Project Steering Committee consisting of experts from different, concerned departments of the Government of Kenya.

Hon Martha Kharoua, Minister, Ministry of Water Resources Management and Development (MWRMD) launched the strategy on 16 February 2005 and recognized APFM’s role in developing such important document for one of the most flood affected regions in the country. She confirmed her government’s commitments to draw up an action plan to identify what, how and when the elements of the strategy could be implemented within the available country resources without any delay or waiting for external support. The Strategy is attached as Submaterial IX.

2.3.4 South America

The general objective of the project is to promote Integrated Flood Management in the Cuareim/Quaraí (Brazil/Uruguay) River Basin, which is a transboundary river basin between Brazil and Uruguay. The National Directorate of Hydrography (DNH) which is the water authority of Uruguay, and the Institute of Hydraulic Research (IPH) of the federal University of Rio Grande do Sul are the key partner organizations in the two countries.



The Implementation of the project is divided into two phases. The objective of the study in the first phase (Phase 1) is to study structural as well as non-structural actions to manage floods adequately. In the second phase these options would be advocated through the intergovernmental institutional setup for implementation. The duration of the first phase was foreseen to last 12 months and has started in the month of April 2004.

Activities undertaken

The activities undertaken during the period include an evaluation of the possible approaches to flood management duly assessing both structural as well as non-structural measures with active involvement of community.

Joint topographic survey, topo-bathymetric surveys and river channel surveys of cross sections were carried out by DNH and IPH. The objective of these surveys was to develop flood hazard maps and to extend flood forecasts in the flood affected areas. First attempt at flood forecasting for the city of Artigas was made with a one-dimensional hydrodynamic model (HEC-RAS 3.1.2).

A water balance study for 11 sub basins under conditions of present demand and projected future demand for the river basin was carried out. The existing private sector stakeholders such as CTM (Joint Commission of the Salto Grande Dam) were also involved and agreed to contribute their scientific knowledge and experience throughout the pilot project. A workshop on the coordinated management of the river basin of the River Quarai/Cuareim was held from 30 of June until 1 of July 2004. In the month of November 2004, another workshop was held for communicating the results of the water balance studies. Existing agreements of CRC (Joint Commission for the Development of the River Cuareim River Basin (Uruguay-Brazil)) and the plan of environmental monitoring (CRC-IMFIA) were also discussed.

ANEP (The National Administration of Public Education, Uruguay) and DNH organised a workshop in April 2004 where the directors and teachers of 11 schools, social members of the Local Emergency Committee, doctors, assistants, heads of police, as well as firemen, army- and technical personnel, participated. A mass awareness campaign involving the educational bodies in the area to inform about measures to be taken during, and following the occurrence of extreme flood events was organised for sensitising mass opinion on the flood issues. A day of cleaning the riverbanks of the River Cuareim/Quarai was organized jointly, involving the CRC on 18 of September 2004.

The summary of the second progress report is attached as Annex II (in English), and the second progress report is attached as Submaterial X (in Spanish).

2.3.5 Central and Eastern Europe

The countries of the Central and Eastern Europe (CEE) are frequently affected by flash floods. Population living in the flood plain is taken by surprise due to short lead-time. There is a pressing need for improving flood risk mitigation utilizing the scientific advances in flood forecasting and knowledge and experience of the communities. The objective of this Pilot Project is to introduce the IFM approach in the flash flood areas of CEE.

Phase I of this project “Study of the Historical Floods from Integrated Flood Management Viewpoint” was started at the end of March 2004 and since then country reports have been collected from 12 River Basins in 7 countries reviewing the recent floods, flood mitigation systems and policies. Summary of country reports is attached as Annex III and the country reports are attached as Submaterials XI.

From the examination of above reports, it is felt that there is scope for improving interactions between various agencies, organizations and community concerned to participate in the comprehensive assessment of flash flood events and existing system, and to develop an integrated flash flood



management strategy by empowering communities. This will be the base of phase II of the pilot project “Forward integration of flood warning in areas prone to flash floods”. The project proposal of 2nd phase of the pilot project is under discussion with regard to the methodology to be used in the implementation of the pilot project.

2.3.6 Central America

An expert meeting on Integrated Flood Management took place in San José, Costa Rica on 1-2 February 2005, to discuss possible Pilot Project(s) between Nicaragua and Honduras; and Costa Rica and Panama. The meeting was attended by the representatives of CATAC and by the WMO representatives in Costa Rica, Honduras and Nicaragua, among others. Two basins, namely river Negro (Honduras and Nicaragua) and river Sixaola (Costa Rica and Panama), were identified. During the Expert Meeting it was agreed that two project proposals would be prepared by the participating countries and submitted to TSU.

2.4 Capacity Development

While there are a number of training courses/modules available or under development for IWRM, there were virtually no contents/modules available for training courses focused on flood management. Therefore it was felt that IFM training courses would need to be prepared by APFM in collaboration with competent partners in the field of education and capacity development as components of wider IWRM training courses.

In view of this, TSU co-organized the “Global Course on Integrated Water Resources Management”, held in Divonne, France, from October 11-15, 2004, in collaboration with World Bank Institute, UNITAR and other partners. The course was well attended by 22 water sector professionals from various national and international organizations. Concept of IFM was introduced during the course. Valuable experience has been gained on how to structure and present training materials on IFM.

UNITAR had been identified as another key partner in capacity building for IFM. A proposal for training workshops on IFM for consideration within its series on Biodiversity, which is one of the seven main programme pillars of UNITAR Hiroshima Office for Asia and the Pacific is under discussion.

Capacity development on the grassroots level for community based flood management has been undertaken in the framework of the APFM Pilot Project in South Asia by field testing the manuals on the community approach to flood management (see section 2.3.2).

2.5 Dissemination of information and advocacy activities

2.5.1 APFM Newsletters

APFM Newsletters have been published since June 2002 to briefly introduce the APFM activities from time to time. The newsletters are sent electronically to APFM contact list by email and distributed at conferences and meetings. During the reporting period three newsletters (no.6, 7 and 8) have been published. A newsletter module has been created in the APFM website which facilitates the administration and issuance of newsletters. The module enables users and visitors to subscribe, or unsubscribe to the newsletters through the APFM website.

2.5.2 Information service

The APFM website provides a variety of flood management information. The website was refurbished with a simple but distinct design and clear structure so that all users can easily reach information



required on IFM and is being regularly updated. During the reporting period the following additional features have been added to the website:

- New pages have been developed for advocacy papers under development where the latest status including the draft versions is presented.
- New separate pages for regional pilot projects in South Asia, Africa and South America have been created. Outcomes of the activities such as community manuals in South Asia, strategy for flood management for lake Victoria basin, Kenya in Africa and progress reports in South America are presented.
- Complete texts, summaries and synopses of all the case studies have been posted.
- A database on Institutions and Agencies involved in Flood Management has been updated to serve as a tool to facilitate communication and cooperation between various agencies and institutions across the world that are involved in flood management. The database also enables institutions and agencies to submit their information to the APFM through the website.

Virtual forum

A forum module has been created, through which a virtual forum on selected topics can be organised through the website. Visitors can register an ongoing forum. Visitors can follow the discussions at the forum even if they do not register. First forum is proposed to be organised on flood management leading to the 4th WWF.

Contents Management System

Content Management System (CMS) is browser-based web content manager and web site builder application with a complete online HTML editor that can be used to create, edit, and update the entire web site through the Internet.

2.5.3 Advocacy

International Conference on Integrated Water Resources Management (IWRM)

The “International conference on Integrated Water Resources Management (IWRM)” was held in Tokyo on 6-8 December 2004, which was organized by Japan Water Forum. The session on “Risk Management in IWRM”, chaired by head of TSU of APFM and Director, WMO, recommended that flood management should be streamlined within the IWRM process. The session made an Urgent Appeal to the international community to adopt an indicator for the assessment of the progress in disaster risk reduction: “*To halve, by 2015, the number of flood-related human loss of life.*” This Urgent Appeal was presented during the plenary session, chaired by ex-Prime Minister of Japan, Mr Hashimoto, who is also the chairperson of the UN Secretary General’s Advisory Board on Water and Sanitation, with the recommendation that it be submitted to the Advisory Board. During the second meeting of the Advisory Board on 9-10th December 2004, the Appeal was endorsed. Secretary General of WMO has also been laying emphasis on setting a similar indicator for monitoring the progress in global activities on disaster risk reduction.

World Conference on Disaster Reduction (WCDR)

The World Conference on Disaster Reduction was held from 18-22 January 2005 in Kobe, Hyogo, Japan. TSU was represented at the conference to advocate for IFM and to liaise with the disaster management community by presenting the activities and output of the programme. APFM had initially planned to organise a separate session on Integrated Flood Management. However, due to lack of time and demand for organising a number of sessions, APFM participated jointly with Australian Bureau of Meteorology (BOM) and Ministry of Land, Infrastructure and Transport (MLIT) Japan, in one of the sessions. Following events at WCDR, which are of relevance to the activities of the APFM, were attended:



Session on Integrated Flood Risk Management

The session on “Integrated Flood Risk Management” was organized by the Government of Japan, the World Meteorological Organization and the Australian Bureau of Meteorology under the Risk Identification, Assessment, Monitoring and Early Warning thematic segment. TSU made a presentation on legal framework to support an integrated approach to flood management and distributed the draft of the advocacy paper, in order to get feedback particularly from the disaster management community. Representative of APFM pilot project in South Asia presented the outcomes of the pilot project on the “Community Approach to Flood Management”. The participants of the session discussed and supported a “Statement on Integrated Flood Risk Management” submitted to the ISDR Secretariat. Recommendations and concrete actions suggested by the session are given in Annex IV.

Launch of the International Flood Initiative (IFI)

During another session of this Thematic Segment at WCDR, Mr K Matsuura, Director General of UNESCO and Mr Michel Jarraud, Secretary General of WMO jointly launched the International Flood Initiative (IFI) to improve and develop flood management measures. An International Centre for Water Hazard and Risk Management (I-CHARM), will be established as a global facility in support of the Initiative under Public Works Research Institute, Tsukuba, Japan. Integrated Flood Management has been accepted by the initiative as its central concept.

Coordination meeting for the preparation of WWF 4

WMO along with Japan Water Forum (JWF) and Co-operative Programme on Water and Climate (CPWC) have been assigned the responsibility to lead the thematic area of “Risk Management” during the 4th WWF. Head of TSU representing WMO held a meeting between TSU representatives and Japan Water Forum (JWF) during the World Conference on Disaster Reduction in Kobe to discuss the preparatory process of the thematic area of “Risk Management”.

WMO Booth at WCDR

APFM outputs materials were widely disseminated through the WMO booth at WCDR.

Integrated Flood Management advocated by UN-Water

UN-Water, an inter-agency mechanism to coordinate various water related issues being handled by different UN agencies has brought out its first UN-Water series paper on “Water Hazard Risks” on the occasion of the World Conference on Disaster Reduction, 18-22 January 2005. The paper deals with the current trends in flood management and other water hazards. The paper recommends adoption of strategies such as Integrated Flood Management (IFM) that go beyond traditional response to the impact of individual events and hazards.

2.5.4 Dissemination through meetings and conferences

UNECE Task Force

Second meeting of the UNECE task force on flood prevention, protection and mitigation and the follow up conference on the Budapest Initiative on strengthening international cooperation on flood management was organised on 26-28 April 2004 in Budapest, Hungary within the framework of sustainable development. TSU participated in these meetings and presented a paper on “Integrated Flood Management and Sustainable Development”. The session addressed the progress of the international cooperation on flood management and was able to align the task force activities with the IFM concept.

GWP Consulting Partners Meeting

TSU participated in the 9th GWP Consulting Partners Meeting (GWP CP) and Associated Programmes (AP) Day, held in Kuala Lumpur, Malaysia from 11 to 13 June 2004. The GWP Consulting Partners Meeting is the annual general meeting/assembly of the GWP Partners and was jointly organized by the Malaysian Water Partnership and GWP. It reviewed the GWP work programme and plans for the



future. The AP Day gave APFM an opportunity to strengthen its links with other Associated Programmes, the GWP central bodies (e.g. TEC) and the GWP regional and country chapters.

Seminar on Flood Prevention Protection and Mitigation

In June 2004 the Economic Commission for Europe organized a seminar on Flood Prevention Protection and Mitigation in Berlin, Germany. The participants reviewed the UNECE Guidelines on sustainable flood prevention in light of the commonalities with the document under preparation by European Union on best practices in this area. It formulated certain recommendation concerning the needs to promote stronger cooperation among countries sharing watercourses, promote capacity building, preparedness and response capacity, flood assessments, and on the role of the media in disseminating information before, during and after the events. TSU participated in the seminar and presented the concept of IFM being advocated by APFM.

Defra Flood and Coastal Management Conference (York)

TSU participated in the 39th Flood and Coastal Management Conference of the Department for Environment, Food and Rural Affairs (Defra), which was held at the University of York, UK, from 29 June to Thursday 1 July 2004. TSU presented the concept of IFM in the Session on “Sustainability”, targeting an audience from across the sectors including representatives from local and central government, flood and coastal defence operating authorities, consultancies and industry.

IWLRI Conference on Good Water Governance for People and Nature (Dundee)

TSU in collaboration with the International Water Law Research Institute (IWLRI) presented a paper on Legal Aspects for Integrated Flood Management to a wide range of Water Law Experts, Water Managers, Policy Makers and experts from various other related fields at the IWLRI Conference on “Good Water Governance for People and Nature: What roles for Law, Institutions, Science and Finance?” held in Dundee, Scotland, 29 August - 2 September 2004.

UNECE Water Convention

The second meeting of the Legal Board under the UNECE Water Convention took place in Geneva on 16-17 September 2004 where TSU was also represented. The board was informed about the activities, which have been undertaken in the APFM on the “Legal and Institutional Aspects of Integrated Flood Management”. The Legal Board appreciated the offer of APFM/WMO to cooperate on this area of activity. The leader of the UNECE task force on flood prevention, protection and mitigation provided valuable inputs to the draft supplementary paper on the subject.

Commission for Hydrology

The Twelfth Session of the Commission for Hydrology was held in Geneva from 20 to 29th October 2004. More than 160 delegates from 55 countries, representing National Hydrological and Meteorological Services along with representatives of International Organizations attended the session. The APFM presented the concept of IFM, on-going pilot projects, compilation of supplementary papers of IFM, linkages with other organisations, APFM reference centre etc., which were enthusiastically received.

The UNECE seminar on the role of ecosystems

TSU participated in the UNECE seminar on the Role of Ecosystems as Water Suppliers and the working group on Integrated Water Resources Management, which were held on 13-15 Dec 2004 at the Palais des Nations, Geneva, Switzerland and was able to obtain important inputs for the environmental paper.

2nd General Meeting of IFNet (on 19 Jan. as Open Forum)

IFNet (International Flood Network) is an open network whose objective is to facilitate international cooperation in flood management. Mr Avinash Tyagi chaired the 2nd General Meeting of IFNet and presented keynote address at the session. Global Flood Alert System (GFAS) is one of the important proposed outputs of the network. 129 organizations are registered as participants of IFNet that



includes 52 government agencies. IFNet proposed to issue “Flood Disaster Reduction Action Report” to raise awareness of flood issues among societies, and to promote actions concerning flood disaster reduction through collaboration with APFM, ESCAP/WMO Typhoon Committee, Ministry of Land Infrastructure and Transport (Japan), Public Works Research Institute (Japan), and RIZA (the Netherlands) in the area of flood risk assessment, flood risk/hazard maps, user-friendly information, education on flood disaster prevention and preparedness, information transmission and evacuation, etc. Ongoing close coordination between activities of the APFM and IFNet is targeted to gain full synergy between the activities of the two organisations.

World Wetlands Day

The World Wetlands Day was held on 2 February 2005 in Gland, Switzerland. The Swiss Federal Office for the Environment, Forests and Landscape, UNEP, UNHCR, WHO, FAO, CMS, CITES, International Association of Hydrologists, IUCN, WWF, BirdLife International, Wetlands International, IWMI, and European Space Agency and the APFM agreed a "declaration of principles" entitled "Beyond the tsunamis: a way forward"

Cap Sud 2005 day of Engineers of the World

TSU participated in the Cap Sud 2005 day of Engineers of the World, which was organized by an association of students, Engineers of the World (IdM) and held at the Swiss Federal Institute of Technology of Lausanne (EPFL) on 13th April 2005. The aim of this event was to alert future engineers and architects to the ethical issues surrounding water and flood management. TSU made a presentation to explain the activities of APFM and disseminate output materials.



3. PROGRAMME PERFORMANCE

3.1 Progress of activities

3.1.1 Compilation of advisory material

The second edition of the Concept Paper was published in English, French, Spanish and Japanese and disseminated at conferences, seminars and workshops.

As proposed in the Advisory Committee in June 2004, supplementary papers of the Concept Paper are being developed. The first supplementary paper is on the “Legal and Institutional Aspect of IFM”. The draft paper was developed in collaboration with the IWLRI. The paper was presented at WCDR and was placed on the APFM webpage. The paper is in the process of finalization. The paper on “Social aspects of IFM” would be composed of two parts. ADPC is a partner in compilation of a paper on community approach. The paper was planned to be completed before the end of 2005. The scoping paper on “Environmental aspects of IFM” was prepared and a competent partner was identified for the compilation of the paper and is expected to be completed during current year as scheduled. TSU has identified IRMED as partner to develop the economic paper, which is also expected to be completed by March 2006.

Progress under this activity is only 60% of the planned. Development of advocacy papers, which involve intense inter-disciplinary discussions and consultations, has proved to be more time consuming than anticipated. TSU has made effort to ensure that these papers do follow the philosophy of IFM.

3.1.2 Compilation of good practices in IFM

The overview situation paper based on the analysis of 19 case studies collected so far has been finalized and is being published on the APFM website. Efforts were made to close gaps in the geographical coverage and subject areas covered by the case studies. Two additional case studies were collected. Case studies for three countries are currently under preparation. Specific case studies on legal and institutional arrangements have been collected and are being used in the preparation of the legal aspect paper. (Progress: 100%)

3.1.3 Implementation of regional pilot projects

In South Asia, field tests to verify the applicability of manual on “Community Approaches to Flood Management” were successfully carried out. These field tests also provided precious lessons for future improvement of community approaches. A synthesis of three country manuals and its translation into three local languages was accomplished and is being published in the APFM website. (Progress: 100%)

In Kenya, the “Integrated Flood Management Strategy on lake Victoria Basin” was finalized and officially launched by the Kenyan government. Government of Kenya is preparing an action plan for implementing the strategy. (Progress: 100%)

In South America, the pilot project was expected to be completed by the end of March 2005 but it still requires 3 to 4 months to finalize some of its activities. Meanwhile, 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. (Progress: 80%)

In Central and Eastern European countries, phase I of the pilot project studies have been carried out in 7 countries, providing the baseline information for consolidating plans and implementing the second phase of activities. However, due to difficulties in the involvement of the other stakeholders, the progress has been far from satisfactory and is assessed at 50%.



In Central America, the pilot project is yet to be developed. Incorporation of the concept of IFM into the pilot project proposal, that too in a transboundary case, identifying the right partners to participate, ensuring the upward linkages, has proved to be a time consuming process. The progress can be assessed at 20% only.

3.1.4 Capacity Development

The liaison with CapNet has been further strengthened towards close cooperation. Other competent partner such as IWLRI and UNITAR have been identified as strategic partners in capacity development. Contacts have also been developed with WBI and ADPC for further co-operation on the subject. (Progress: 80%)

3.1.5 Dissemination of information

Three issues of APFM Newsletter were disseminated. “Information service” facilities have been strengthened through the re-furbishing of APFM website. 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: 70%)

3.2 Financial Performance

During the reporting period, CHF 762,000 was contributed by Japan and The Netherlands to APFM.

1 st instalment from Japan:	CHF 256,000	Aug. 04
2 nd instalment from Japan:	CHF 128,000	Oct. 04
<u>3rd instalment from Japan:</u>	<u>CHF 128,000</u>	<u>Mar. 05</u>
(Total contribution from Japan)	CHF 512,000	

1 st Instalment from The Netherlands:	CHF 125,000	Oct. 04
<u>2nd Instalment from The Netherlands:</u>	<u>CHF 125,000</u>	<u>Dec. 04</u>
(Total contribution from the Netherlands)	CHF 250,000	

In addition, a sum of the CHF 141,874 was carried over from the period 2003/04, and therefore a total of CHF 903,874 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 2005 is given in the Table on page 19.

Against the available funds of CHF 1,368,947 and projected budget of CHF 1,000,000, (January 2004 to March 2005) an expenditure of CHF 769,802 was made. There was a shortfall of CHF 230,198 in the expenditure during the period. This was on two accounts. Firstly, there were shortfalls in physical progress in certain activities as detailed in preceding paragraphs. Slow take-off of two of the pilot projects and compilation of two advocacy materials have largely contributed to shortfall in expenditure. This in turn has also effected development of training material. Participation in conferences for dissemination of the concept has also been limited due to time constraints. Secondly, the expenditures could be economized due to synergy between the activities of TSU and the department. As of end-March 2005, a balance of CHF 599,145 is available and is carried over to the next reporting period.

It might be pointed out that while the APFM activities by itself will come to a close by the end of March 2006, it is expected that some of the printing works may spill over beyond March 2006. In addition, compilation of the final report would require additional inputs up to the end of July and would require some consultative work after the activity period. It would be therefore necessary to keep open the accounts and make provisions for consultant up to the end of July 2006. In the event the



Phase II activities under APFM find support, the period of spill over up to July 2006 could be covered under the transition phase.

Taking the above fact in mind, the proposal is to keep certain minimum fund available at the end of March 2006 to close the activities by July 2006.

APFM TRUST FUND FINANCIAL STATEMENT
(as of 31 March 2005)

Income and Expenditure from January 2004 to March 2005

		CHF
1-1.	Opening balance	55,474
	Adjustments to Surplus/Capital	128,315
	Sub Total	<u>183,789 (a)</u>
1-2.	Income	
	Contributions	1,182,000
	Interest	3,158
	Total Income	<u>1,185,158 (b)</u>
1-3.	Expenditure (including support costs)	
	Actual Expenditure (Liquidated)	694,801
	Unliquidated (Future Obligation)	72,708
	Requisition (Future Obligation)	2,293
	Total Expenditure	<u>769,802 (c)</u>
1-4.	Carry forward from this period	(a) +(b) – (c) <u>599,145 (d)</u>

Certified correct

*Tomiji Mizutani
Chief, Budget Office
WMO*



4. ACTIVITY PLAN (2005-2006)

4.1 Advocacy for Integrated Flood Management

4.1.1 Legal and institutional aspects of IFM

It is planned to finalize and translate the supplementary paper and disseminate them through various channels including but not limited to WMO, GWP and APFM counterparts. The paper would be disseminated to the water law and policy community through publication of a peer-reviewed articles in international journal (through IWLRI), and the APFM/WMO web pages and the GWP ToolBox.

It is planned to increase the coverage of the case studies (related to legal aspects) of different legal systems by adding cases from countries with Islamic and Roman Law tradition. It is proposed to publish legal case studies in a separate volume to give them better visibility.

To test the applicability of the Rapid Assessment Tool developed as part of the above paper and to create a reference case for the tool, possibility of applying the tool, is currently being explored in the Sava River Basin in the Balkans. Under the Framework Agreement on the Sava River Basin (FASRB) the parties agreed to conclude additional protocols, regulating various issues, including the protection against floods. It has been suggested to review the tool in applying it to one of the basin states and report on the conclusions and recommendations of this exercise to the next conference of the International Association for Water Law (AIDA) at International Conference, to be held in Belgrade, Serbia, 28 August – 1 September 2005.

It is proposed to develop a strategic partnership between the IWLRI and WMO, formalized in form of Memorandum of Understanding or similar administrative arrangement to ensure long-term viability and strategic outreach of this activity and to strengthen the capacities of countries to implement a legal and institutional framework based on IFM principles.

4.1.2 Environmental aspects of IFM

To develop the advocacy paper on environmental aspects of IFM, an expert group consisting of members from flood management and environmental community has been set up. Specific case studies related to environmental aspects of IFM are also proposed to be collected. The Paper will be presented at the 2nd International Yellow River Forum (IYRF) in October 2005 in China. The advocacy paper will be finalized by December 2005.

4.1.3 Social aspects of IFM

The paper on “Social Aspects of IFM (Community Approach)” is being prepared by TSU and ADPC. It will be revised and improved through a discussion at an expert group meeting and a wider circulation of draft at major events and webpage. The second part of this paper will include “Institutional mechanism of basin management”.

Individual tools for addressing specific issues may follow this paper. It is proposed to take up such tools as the “Manuals on the Community Approach to Flood Management”, that had been developed in the pilot project in India, Nepal and Bangladesh.

4.1.4 Economic Aspects of IFM

The supplementary paper on Economic Aspects of IFM is being developed in collaboration with IRMED. An expert group consisting of members from both developing and developed economic perspective would guide the development of the paper to be completed by March 2006.



4.1.5 Trans-boundary Aspects of IFM

It is a challenge to ensure an integrated approach to flood management where political or administrative boundaries divide the basin in parts under different administrations. A scoping paper to address this issue is attached as sub material XIII

4.1.6 Gender Aspects of IFM

There is need to outline what role the gender issues play in relation to flood management and how a gender sensitive approach can be developed in IFM. An advocacy paper on the Gender Aspects of IFM is planned with the aim to assist policy makers, flood managers, and disaster management sector professionals in identifying the relation between gender specific roles of the community in all phases, before, during and after floods, and their relation to different impacts of floods on men and women. The paper will set out how a gender sensitive approach to flood management, particularly on the local level, could be adopted. A scoping paper is attached as sub material XIV.

4.1.7 Health Aspects of IFM

Floods often have dominating impacts on public health. In turn public health concerns can have considerable influence on flood management strategies. These concerns can result in the adoption of certain strategies such as structural interventions providing for higher standards of flood defence, evacuation of floodplains etc. It is proposed to develop an advocacy paper on health aspects with the aim to raise awareness about how implementing IFM could assist in improving the health condition of the inhabitants in the affected areas. A scoping paper is attached as sub material XV.

4.2 Implementation and Outreach of Regional Pilot Projects

4.2.1 South Asia

First attempt of field testing the country manuals was successfully carried out during the last monsoon. The first test revealed certain existing gaps between the field exercise and recommended actions due to lack of capacity building and resources. To fill this gap, further effort need to be made. In this regard, second field testing will be undertaken during 2005 monsoon, addressing the following issues.

- 1) Improvement of community level activity through familiarization with the manual.
- 2) Methodologies of sustaining this activity without project support.
- 3) Identification of minimum essential support required from government and NGO's.
- 4) Transfer positive experience to a large number of other communities within and outside the countries.

4.2.2 Africa (Kenya)

APFM will assist the MWRMD in implementing the strategy and also in investigating the possibility of securing funds from donors for the full implementation of the strategy. APFM will also support public awareness activities and publishing publicity materials. Development of flood management strategy within overall IWRM plans in another African country will be attempted.

4.2.3 South America

It is proposed to address the following points in the further implementation of the Pilot Project.

In order to achieve the objective of establishing a joint and agreed upon criterion for granting user rights for water, it is proposed that the existing criterion should be compared and a suggested joint criterion be proposed as an out put of the Pilot Project. It is proposed to carry out a study regarding the



sufficiency of the hydrometric network addressing the needs of flood management. This would serve the purpose of upgrading the system that is developed within the Pilot Project to next level of operational efficiency as and when the resources for the purpose are available. It is proposed to develop a linkage with the civil defence authorities to make the flood forecasts and alerts more effective. Guidelines should be prepared as to how such linkages could be developed. A proposal for floodplain zoning would be prepared and presented to the municipal authorities. With the objective of gathering secondary information on social, economic and environmental impacts on urban and rural areas, it is proposed to involve all relevant agencies.

It is proposed to share the positive and negative experiences of working in a transboundary basin. A final workshop with the local authorities is proposed to make the results of the Pilot Project known widely.

4.2.4 Central and Eastern Europe

There is need for improving interaction between various agencies, organizations and community concerned. For this purpose, a workshop on “Disaster Mitigation in Flash Flood Prone Areas” will be organized to review the lesson learned from case studies and extract guidance for improved practices. This will also help in bringing various stakeholders on a common platform. On the basis of outcomes of this workshop, phase II of the pilot project “Forward integration of flood warning in areas prone to flash floods” will be undertaken in the selected area(s).

4.2.5 Central America

It is expected that two pilot project proposals will be sent to WMO soon by the participating countries as discussed at the expert meeting on Integrated Flood Management took place in San José, Costa Rica (see section 2.3.6 for more details). One proposal would be for the pilot project in the river Negro (Honduras and Nicaragua) and the other for river Sixaola (Costa Rica and Panama). One of the pilot projects is proposed to be taken up during the year.

4.3 Capacity Development for adopting Integrated Flood Management approach

Ensuring that future project proposals by CapNet and APFM, on flood management issues, are formulated in close cooperation has further strengthened the liaison on capacity development for IFM with CapNet. The Draft CapNet proposal on “Building Capacity to Cope - Supporting vulnerable communities to deal with effects of climate variability on water resources” and the APFM Phase II proposal are complementing each other fully. In collaboration with UNESCO-IHE, Wageningen University and Research Centre, the Cooperative Programme on Climate and Water and other partners, a capacity development project in the Nile Basin and East Africa will be supported under WMO umbrella, titled “Strengthening the resilience of people at risk - Adaptation to Changing Water Management Conditions for East Africa”. This project is also intended to serve as a future platform for training courses on IFM.

APFM, Cap-Net, UNITAR, IWLRI together with other competent partners, would develop IFM training modules. Some of the outputs of APFM are expected to be adapted into IFM training materials. This has already been taken up in the activity on the advocacy paper on the legal and institutional aspects of IFM. IWLRI will be developing one such training module. Various tools such as manuals on “flood hazard risk mapping” and “flood forecasting and warning” are being developed by WMO, which will form part of the capacity development tools available with APFM.

4.4 Information services

The TSU will continue to update information and outcomes obtained from the APFM activities. The following items are planned to be developed for the next reporting period.



APFM reference centre

The APFM reference centre is a set of planned interactive databases accessible through the APFM web site. Through the reference centre, APFM endeavours to provide guidance and assistance, based on the principles of IFM, to flood prone countries and communities as well as the research institutions and donor communities. Databases on “Flood Prone Areas”, “Flood Management Policy and Legislation” and “Literature on Flood Management” will be developed in addition to “Institutions and Agencies involved in Flood Management” which is regularly being updated.

4.5 Establishment of linkages and cooperation with other initiatives

IFM concept is based on a multi-disciplinary approach to the overall development issues and the influence the flood hazards have on the process. It is proposed to develop partnerships among groups dealing with various aspects of floods to communicate, coordinate, and collaborate with an aim to accomplish the common purpose of achieving sustainable development.

One of the important purposes is to enlarge the support base for the cause. The APFM enjoys the partnership of WMO and GWP. WMO represents a well-established strategically important link into the UN-System and national Governments, in particular through its network of Members and their National Meteorological and Hydrological Services (NMHSs). The Programme also continues to draw from the wide scientific communities connected to WMO on Weather, Climate and Water issues.

The GWP since its establishment in 1996 has built a multidisciplinary network of partners, and not confined to Governments but reaching into civil society. It is proposed to draw upon the large participation base of the GWP Regional and National Water Partnerships to take the message down to the community levels. Other similar organisations like the International Federation of Red Cross and Red Crescent Societies, Rainwater Harvesters’ Organization, ISDR country focal points and other non-governmental organisation would be identified and engaged for the outreach process.

A number of initiatives and programmes on flood management and related issues already exist. Some of these international and regional initiatives are: WMO Flood Forecasting Initiative, UNESCO IHP, International Flood Initiative (IFI), IFNet, I-CHARM and other UN-Water partners programmes. All these programmes and initiatives address special aspects of flood management and as such form the natural associate partners.

APFM will continue to strengthen its partnership with above mentioned organizations, and other potential partners and initiatives for the development and strategic outreach of the programme.

Summary of the synthesis of manuals on Community Flood Management in Bangladesh, India and Nepal - Building Resilience through Community Participation -

Introduction

The pilot project of “Community Approaches to Flood Management” was launched to introduce the community level approach of Integrated Flood Management (IFM) as part of the activity “Associated Programme on Flood Management (APFM)” that is jointly carried out by the World Meteorological Organization (WMO) and the Global Water Partnership (GWP). This pilot project has been carried out by Bangladesh Unnayan Parishad (BUP), Bangladesh; Institute for Resource Management and Economic Development (IRMED), India; and Jalsrot Vikas Sanstha (JVS), Nepal. Community-based flood management manuals have been prepared by above mentioned institutions - for the respective countries, viz. Bangladesh, India, Nepal. The manuals have been prepared on the basis of information provided by and in consultation with selected flood-prone communities in the three countries (two communities in Bangladesh, three in India, and two in Nepal). The study areas given below and Figure 1.

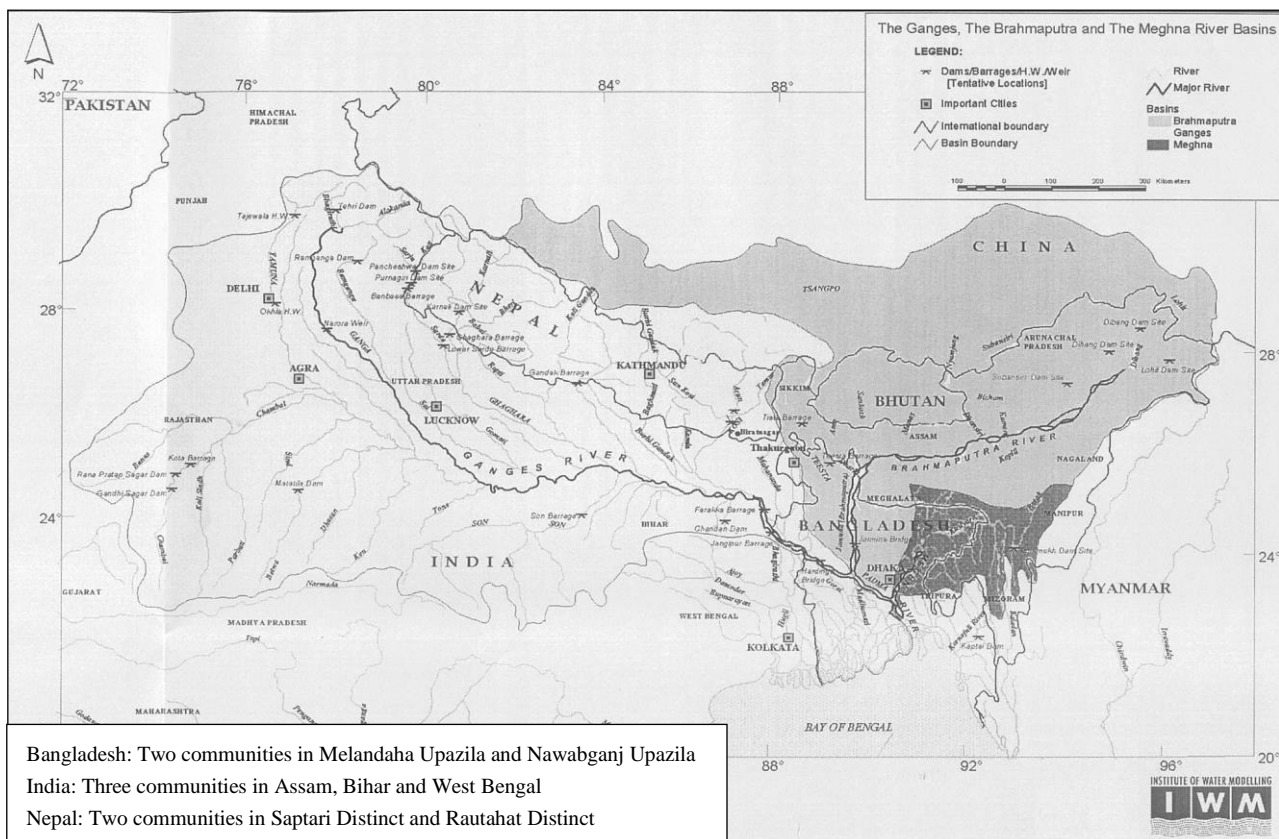


Figure 1: Ganges-Brahmaputra-Meghna (GBM) Basin

The purpose of the pilot project has been to find out how people cope with floods, what are the risks involved, how can they move their lives forward after the floods, and to devise ways of improving their capacity to do the things they have been doing more effectively and to identify additional critical tasks that they may undertake to improve their flood management capacity and preparedness.

Economic and social infrastructure and industrial and other business units are affected by floods, particularly by devastating floods. It is the flood-affected people whose lives and living are devastated by major floods. As a result of devastating floods, the poor become destitute and a large number of



non-poor are forced to join the ranks of the poor. If equipped with an organizational structure and improved capability (through proper training), individually and collectively, the local people can manage floods better, with damages and losses substantially reduced even during major floods. Collectively, within the framework of a local organization titled Community Flood Management Committee (CFMC)/ Flood Management Committee (FMC), the local people not only can mobilize efforts within the flood-affected areas but can also liaise with and secure assistance from different possible outside sources in a coordinated manner.

The manuals, if implemented in various flood-prone areas, are helpful to improve the flood management capacity of the communities concerned and reduce their flood vulnerability. The synthesis is based on the three country-manuals. It should, however, be mentioned that the synthesis provides generalizations. Specific conditions in a country may require specific measures, which cannot possibly be generalized. This synthesis, in fact, highlights a set of key common responses, which provide a broad framework, with reference to which specific measures for particular situations in different countries will need to be worked out taking into account the particular situational contexts.

Proposed Frame Work for Community Approaches to Flood Management

Flood management activities may be of three broad types: (i) advance preparation (ii) real-time responses and (iii) post-flood rehabilitation. Preparation relates to such activities as are conceived for execution during a flood and where preparations are made in advance. The purpose is to reduce flood-related vulnerability of households and communities. Real-time responses to reduce damages and losses as a flood is understood to be imminent and, then, as it sets in. As flood recedes, rehabilitation phase begins.

Preparedness (Advance Preparation)

In order to begin the preparedness process, people need to understand that a flood is coming and how intense it might be in terms of areas that will be affected as well as the depth of inundation and the estimated duration of the flood event. People have been traditionally doing their own flood forecast by looking at the behavior of the rainfall, water levels in rivers, or the behavior of snakes, frogs, ducks and other animals. . These methods are empirically weak but quite often effective in areas where no technically sound flood forecasting and warning activities are in place. But, even though such activities are in place in many places now, quite often flood forecasting messages do not reach the affected population in time and in technical terms and language they understand. Therefore, they still have to combine their traditional knowledge with the information they receive from the bulletins aired by media, radio in particular, from time to time during flood seasons. Such bulletins are often in technical-speak and cannot be fully grasped by the ordinary rural people. People often seek information from the chairmen or the members of the local elected bodies, local knowledgeable persons and officials but do not often receive satisfactory information. In the light of these circumstances a considerable degree of uncertainty remains. People are, therefore, constrained to rely more on empirical methods as indicated above. The conclusions have sometimes been right; but not so at other times regarding both timing and intensity of floods. Lack of timely and effective flood forecasting and warning, disseminated in local languages, remains a major problem.

Community action starts with the community mobilization to strengthen the organizational bases for local flood mitigation initiatives. In the past, most of the activities were carried out by people themselves during a flood and were based on individual initiatives. People were hastily organized, if at all, and that too primarily for the construction of physical facilities or often unplanned evacuation and rescue activities. If these activities are carried out in a community-based organized manner at community level, vulnerability and risks due to flood can be substantially reduced. For that to happen, community institutions are needed for collective action-planning, implementation, monitoring and evaluation. Based on the pilot study carried out in the GBM basin described above, the basic institutional structure in the form of CFMC has been identified to be the essential building unit. Under the proposed community approach, the focus is community involvement in all phases including awareness-raising, individual and community capacity building, planning, and implementation.



In the community approach, flood preparedness includes the following activities:

Formation of a community level organization named Community Flood Management Committee (CFMC) to manage floods

- Assessment of various requirements to reduce flood vulnerability and to enhance capability of the community to reduce damages, losses, and sufferings of the people
- Training for capacity building at community and individual levels, as appropriate
- Planning for rescue and evacuation, flood proofing and flood moderation
- Organizing drills to facilitate effective evacuation
- Making provisions for addressing unforeseen eventualities
- Monitoring of the proceedings with respect to various activities undertaken and reporting
- Managing information for future reference
- Resource Mobilization

An example of the constitution of the CMFC and the formulation and the functions of the CFMC are shown in Figure 2 and Figure 3 respectively.

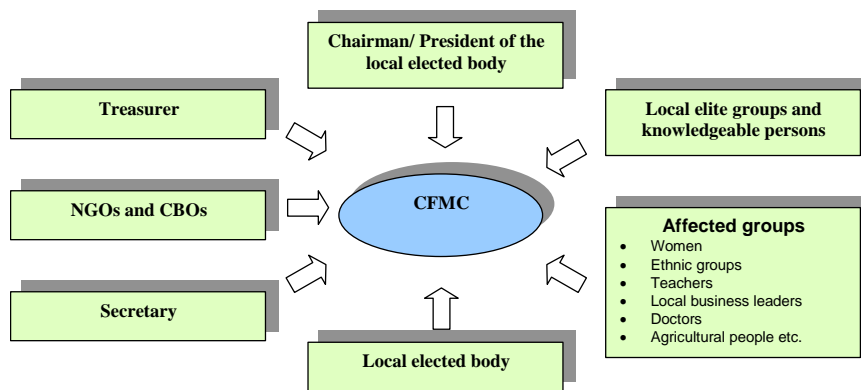


Figure 2: An example of the Constitution of the Community Flood Management Committee (CFMC)

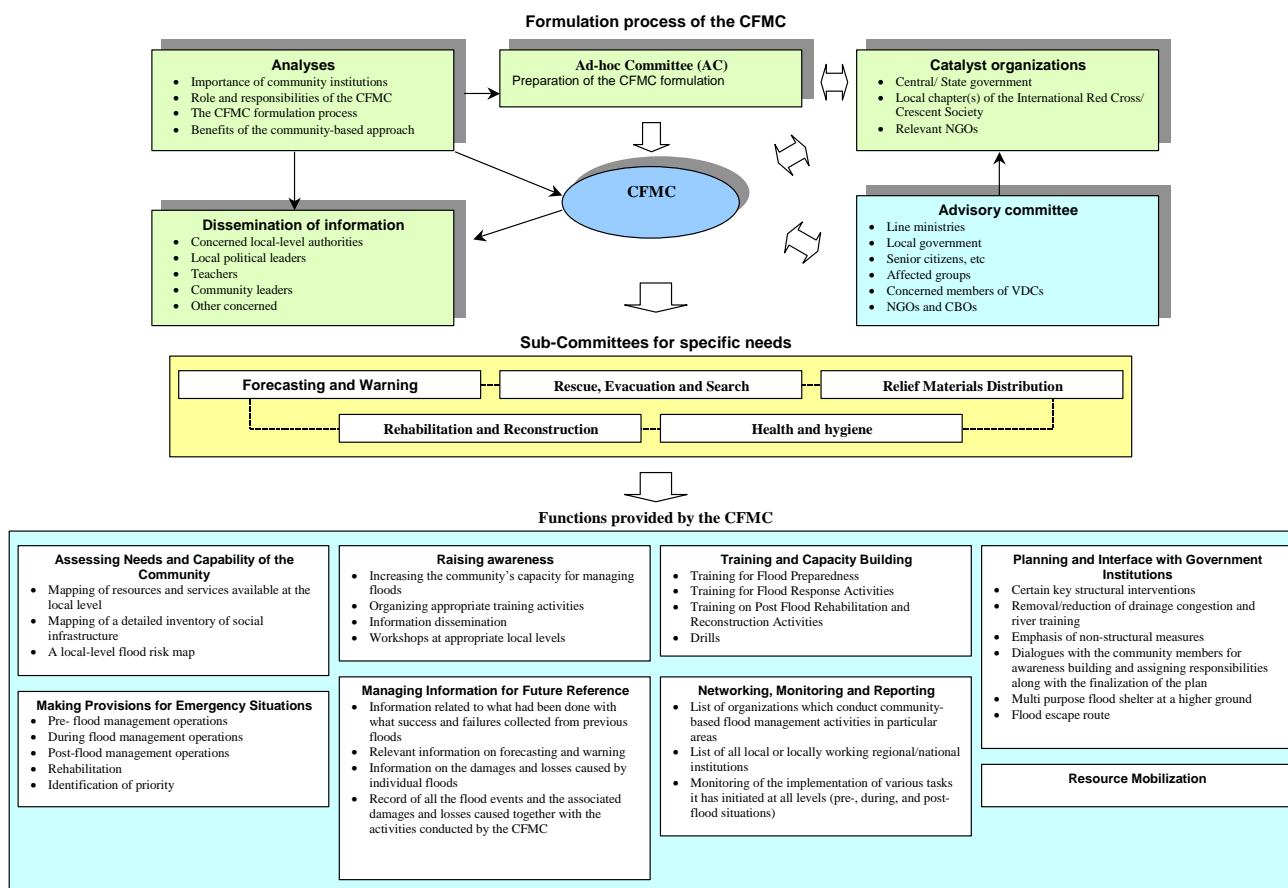


Figure 3: An example of the formulation and the functions of the CFMC

Real-Time Responses (Pre-Flood Responses and During-Flood Responses)

Timely responses, as planned, should be implemented prior to, during, and after a flood event. People of flood-prone areas of the countries of the region have been responding to floods during all the three stages on their own, which may be considered household-level coping mechanisms against floods. However, prior to the pilot-project intervention, lack of organizational guidance and of coordination has not allowed pooling of limited capabilities of the people, leaving the outcome at random. It is envisaged that these individual actions - if coordinated at the community level and if the community capacity is strengthened through such activities as awareness building, training, and networking - can generate an effective grassroot-based flood management approach. Key elements of this approach are outlined below.

Pre-Flood Responses

When the flood is imminent, the CFMC may organize constant Flood Vigilance Task Activities (FVTA) to check on how an impending flood is developing (i.e. to assemble and review available information on flood forecasting and issue warning to the people in the language they can understand). The CFMC should keep record of indicators (for example, water level relating to landmarks, say, on electricity poles or old trees) observed, the corresponding warnings issued, the actual effect that took shape in terms of the extent of flooding and the mobilization of people and resources in response to the evolving situation. The data bank created thereby overtime can be a very useful background material in dealing with future floods.

According to the forecast degree of severity of the flood, warning should be issued, giving the likely severity level to different parts of the area. Warning concerning different levels of severity should be given out along with actions that residents in relevant parts of the area may need to undertake. The



likely actions may include staying alert, keeping one's belongings and valuables at higher elevations, preparing for evacuation, evacuation as deemed necessary, and relocation to a safe refuge.

The CFMC may allocate specific responsibilities such as assemblage of information and issuance of warning to particular members responsible for FVTA. There are several modalities of issuing warning to choose from by showing flags (hoisting different colour-coded flags) on bamboo poles or hanging flags over tall trees at open spaces so that these can be seen from all sides of the area. During the phase of preparation and drill programmes, people should be informed of the consequences of these flood signals, i.e. what colour of the flag means what is the likely extent of flooding and what actions are expected of them.

During-Flood Responses

During a flood, one may choose from the following two options (a) enduring flood by staying inside the house or compound, or (b) leaving the house and taking shelter either in non-flooded areas or in nearby flood shelters, if available.

Enduring flood is indeed difficult. Many poor families tend to stay back in their marooned dwellings, often in raised platforms inside the dwelling or on roof-tops to avoid moving out and risk the theft of valuables. In doing so, they sometimes fall victim to snake-bites, even drowning. Escaping flood waters and taking shelter elsewhere also depend on the availability of flood shelter or high places to move to, which are expected to be arranged by the CFMC.

Living within the marooned homestead or opting to relocate to a neighbour's or a kin's house during a flood is a family-level response while opting for relocating temporarily in a flood shelter is largely a community response. However, whatever the case, it is advisable to shift, with help from the CFMC, children (below 10 years of age), old (above 60), adolescent girls, pregnant women, and lactating mothers to safer places (flood shelters, flood-free kin's house) on a priority basis.

In the context of the emerging circumstances, the CFMC would need to work out procedural details regarding undertaking various tasks including the management of the proposed flood shelter (s). If a CFMC is not in place, one may be quickly established; and if that is not feasible at the present, individuals will have to use their best judgment about what to do and how. But, it would be advisable to coordinate activities with neighbours and others as much as possible.

Recovery and Rehabilitation (Post-Flood rehabilitation)

Flood affected people are keen to get back to normal life. After suffering losses in terms of crops, livestock, and property, they often find themselves in extremely difficult situations and cannot rehabilitate themselves without assistance from the government, rich benefactors, or NGOs/CBOs. Sometimes, neighbours help one another towards getting back to 'normal life'. Interpersonal relationship and kinship also play vital roles in helping some flood affected people to find their feet again. Community effort can be useful in repairing partially damaged houses, often by means of collective free labour supporting one another. Well-to-do people sometimes employ poor neighbours in restoration activities, thereby offering temporary employment. In the case of large scale flood devastation, government's role in relief and rehabilitation becomes crucial. Once the evacuees have left, the CFMC should arrange the cleaning up of the vacated flood shelters/camps to make them usable for their usual purposes.



Summary of the progress of the pilot project in South America

The River Cuareim/Quarai (Brazil/Uruguay)

The river basin of the River Cuareim has a drainage area of approximately 14,800 km², of which 6,600 km² (44,6%) are located in Brazilian territory and 8,200 km² (55,4%) in the extreme northwest of Uruguay. As a result, it is a transboundary river basin, sharing its water resources between the countries Brazil and Uruguay and with the border between the two countries being marked by the main river course of the River Cuareim. The Pilot Project is coordinated in Brazil by the "Instituto de Pesquisas Hidraulicas" (IPH) and in Uruguay by the "Dirreccion Nacional de Hidrografia" (DNH).

The general objective of the project is to manage floods in the River Cuareim/Quarai river basin (Brazil/Uruguay) within the framework of Integrated Water Resources Management. At the same time, the quality of life of the population that is affected by floods is to be improved, maximizing the net benefits, and taking advantage of the increase in water availability during flood periods.

Different structural and non-structural measures are going to be considered. Amongst these are: the design and implementation of a flood forecast system, the planning and design of an emergency plan, and territorial ordering as well as measures that can be effective for flood management.

The Implementation stage is divided into two phases, the objective of the study in the first phase (Phase 1) is to develop non-structural actions to adequately manage floods, and eventually to plan structural measures with the same intention. The duration of the first phase was foreseen to last 12 months, starting in the month of April 2004. Those activities carried out during the period April 2004 to March 2005 are listed below:

The results of the Pilot Project will contribute to the "Framework Program for the Sustainable Management of Water Resources in the Plata river basin" project, to be financed by the Global Environment Fund (GEF) and to be carried out in the next years. DNH (Uruguay) will provide information on the Pilot Project that will be given to the Committee of the Countries of the Plata river basin (CIC).

Also the incorporation of the Pilot Project into the TwinLatin Project is foreseen, which forms part of the 6th Framework Programme for RTD (2002-2006), Activity Area "Sustainable development, global change and ecosystems", 3rd Call for Proposals (FP6-2004-Global-3), Work Programme Sub-Priority 1.1.6.3 "Global Change and Ecosystems". The Quarai/Cuareim river basin (DNH-IPH) will participate, together with other river basins from Europe and Latin America, in the project: Twinning European and Latin-American river basins for research enabling sustainable water resources management, coordinated by IVL, the Swedish Environmental Research Institute. Furthermore, the project has been selected for being financed by the European Commission and the corresponding contracts are in the stage of being negotiated.

1. Topobathymetric information

With the objective to obtain a single topographic map of the cities of Artigas and Quarai for the purpose of zoning urban areas a joint topographic survey was carried out during the month of June 2004 by personnel of DNH and IPH during which, amongst other things, points of the National Geodesic Networks of Uruguay and Brazil in both cities, and the relative topographic positions of existing hydrometric stations were ratified. In order to be adequately able to plan the topobathymetric survey of the lower section of the River Cuareim/Quarai an aerial survey was carried out for the river, complemented by field measurements on the ground.

In addition, 2 cross section profile campaigns were carried out for the River: firstly, during the month of August of 2004 in a first campaign that was completed, and during which 17 profiles between



Artigas and Paso de the Leon were carried out, with the distance between sections being approximately 5 km. This was done by DNH. In addition profiles of the river mouths of the A° Tres Cruces and Cuaró were studied. On the other hand, the second stage of the study in charge of IPH was carried out and profiles of the river and the floodplain from Paso de Leon to the inflow of the Cuareim/Quarai river into the River Uruguay were obtained.

2. Quality analysis of hydrometric information

A quality and consistency analysis of the precipitation information (daily and hourly) and level data (daily and hourly averages), was made, using the available hydrometeorological stations available: CTM, DNM, DNH. It was concluded in the general terms that as according to the aims of the project all information was consistent, without finding any significant discrepancies between the stations.

3. Database of the Project

Updating of the database of the project was carried out, including the incorporation of all new information from field studies and the information generated for the project.

4. Flood mapping of rural areas

A first flood map for the lower river basin of the Cuareim/Quarai river was produced as corresponding to the flood event of the 1 to 7 of June 2001. Water level information from the stations 'Paso de la Cruz' (CTM) and the River Uruguay at 'Monte Caseros' (CTM) were used to project the corresponding flood path on top of satellite imagery.

5. Study and processing of existing information on the inventory of users and hydraulic works in the river basin for the benefit of water resources

During the days of 30 of June and 1 of July a workshop was held in the facilities of IPH that was dealing with aspects of coordinated management of the river basin of the River Quarai/Cuareim. Various aspects were analysed and it was especially referred to the inventory of water use and water users in the river basin, and to hydrologic monitoring and dealing with flood events in the river basin. From this, activities to be carried out were agreed on which are in the process of being put into action.

6. Flood Prediction

As part of the agreements established with CTM, those activities were carried out that were necessary to make it possible for information from the stations to be received in real-time at the meteorological station of Artigas and to be sent to Salto Grande via a repeater located in Cuaró. It was agreed that CTM would provide the knowledge and experience that its personnel possesses in the assembly (ie. construction), management and maintenance of the system, and contributing in quality for one year a borrowed antenna and a decoder; CRC in turn would contribute one microprocessor and DNH, a colour monitor, a matrix point printer and a modem in order to be able to remotely operate the database.

7. Availability-Demand Balance Study and Hydrologic Diagnosis

In this period the Water Balance Study for the river basin was carried out, during which the hydrological characterization of the river basin was made and a water availability-demand balance was established for 11 sub basins under conditions of present demand and conditions of potential future demand for the river basin. The main results of the study are as follows:

- Because the river basin has a very low storage capacity, most of the available surface water is flood water. For example, it is sufficient to say that 90 % of the water in the river basin is generated during only 30 % of the time.



- In most of the river basins rice cultivation is limited by water availability. In river basins at higher elevation an inverse situation predominates since in these cases suitable ground for cultivating crops is short of demand, and therefore this becomes the limiting factor;
- During the last 20 years water availability was in the order of 20% greater than during the first half of the last century (30 % greater at the time of rice cultivation). If, as is well possible, a sequence of dry years reoccurs, the present reservoir storage capacity of the existing dams would not be sufficient to water the presently cultivated lands;
- When irrigated areas and reservoir capacities increase their impacts on river discharge volumes increase. Under such conditions maximum demand also becomes a very significant factor. In order to adequately quantify this process more detailed modelling is necessary at the daily timescale. This is due to the unusually fast response of the river basin.

8. Dissemination of information to the public

In the month of April 2004 a work agreement between ANEP and DNH was signed. A workshop was held in which the directors and teachers of 11 schools, social members of the Local Emergency Committee, doctors, assistants, heads of police, as well as firemen, army and technical personnel participated, and during which the project was presented. In the month of July, doctors and social assistants informed the relatives of involved schoolchildren on the subject of floods. Furthermore, the educational body worked out a survey that was carried out amongst all involved children, with the purpose of compiling a flyer containing measures to take during and following the occurrence of extreme events.

During the period August to December 2004 those activities agreed on were carried out. Accordingly, based on the successfully collected information, the inundation flyer, printed in 5000 units and distributed to all involved actors in the city, was finalized by the directors, the educational body and the students. Also, several guided visits of school groups were made to the meteorological station, the symbolic painting of a wall was made on the subject, and the project theme was selected by a number of schools to form part of the closing acts for school courses.

In the month of November 2004, a workshop held for communicating the results of the Water Balance agreements of CRC-DNH-IMFIA and the plan of environmental monitoring (CRC-IMFIA). In addition to this point, proposals for future studies in the river basin, based on the obtained results, were made.

On the day of 18 of September 2004 a new day of cleaning the banks of the River Cuareim/Quarai was organized jointly with the CRC (The Commission of the River Cuareim/Quarai). Around 800 people participated directly in this day of raising awareness, organized by the civil society of the city of Artigas. The activity also included previous propaganda and information dissemination methods, such as the distribution of stickers, T-shirts with slogans, symbolics and posters. Photos and a video of the day are expected.

9. Constructing a webpage for the project

The construction of a webpage of the project is underway which includes the objectives, the participating actors and all the activities that have recently been carried out.

10. Cooperation with the foundation Ipanema-branch of GWA

With the objective to develop the social component in the Brazilian part of the river basin, IPH teamed up with the Ipanema Foundation, a branch of the GWA. Within the framework of the collaboration, the Ipanema Foundation is left in charge to prepare a workshop on flood generation, to be held in the cities of Artigas and Quarai. The project has been presented to the GWA.

11. Modelling of the river basin



An analysis of a first flood forecasting approximation for the city of Artigas was carried out, which was based exclusively on statistical tools in hydrology, without considering modelling of the rainfall-runoff process nor of the floodwave propagation at this pilot stage.

A version of the Sacramento model (used by CTM) has been used for the river basin, for waters upstream of Artigas/Quarai to the effect of using the hydrological modelling as the basis for the flood alert system. The calibration stage of the model is currently well underway.

12. Hydrodynamic Modelling

A one-dimensional hydrodynamic model (HEC-RAS 3.1.2) has been implemented for the Cuareim/Quarai river in order to establish a rural flood zone from inundation curves and for different return periods. The boundary conditions have been determined for upstream and downstream waters and the relevant river geometry has been incorporated. At the moment a first calibration of parameters for the section is being carried out, and it is hoped that the model is complemented with those cross section profiles that are being carried out for the river outflow sections at the river mouth.



Summary of the country reports of the pilot project in Central and Eastern Europe

Country Reports of Flash Flood in CEE (Part 1)									
Country name	Area of Basin	Geographical Character	Climatic Character(Annual precipitation)	Hydrological Character of river	Land use change	Rain and Water Gauging Station	Authorities concerned	Existing warning and rescue system	Flood forecasting model
BULGARIA (Varbitsa River Basin- sub basin of Arda River)	1203.9Km ²	Mountainous area with poor forest coverage and gravely affected by erosion (slope of the basin 26%)	Torrent rainfalls from mediterranean cyclones. Lots of rain occurs during winter time. (800mm)	During the winter (Jan. to Apr.) 60% of the annual runoff occurs. High torrent floods in summer are rare(except June-July 2002).	deforestation, wrong agrotechnical activities and creation of solid coverings (roads, roofs)	Hydrological gauge stations are available	①National Institute of Meteorology and Hydrology ②Executive Agency of Civil Defense in Bulgaria(EACD) ③Ministry of Environment and Water		
BULGARIA (Yantra River)									
CZECH REPUBLIC (Svatka and Svitava Catchment)	66.78Km ² (Svatka) 32.1Km ² (Svitava)	Highland with undulating figure	(669mm)			Rain gauge stations are available. Field survey for water gauging was done immediately after the flood	①Czech Hydrometeorological Institute ②Fire Brigade ③Civil defence unit ④Flood commission meeting	meteorological warning	Numerical weather forecast models(the Aladin model and the model of the German weather service), which is hard to predict storm precipitation in small area.
LITHUANIA (Nemunas River)	930Km ² (The whole basin including Russia)	Hilly uplands with glacial drift. The delta of Nemunas river is shared by Lithuania and Russia(Kaliningrad) and in case of extreme flood both area will be inundated.	In the western area floods occurs in winter and early spring. Flood breaks river ice and push it downstream (540-930mm 75% in the form of rain)	35%-60% of the river discharge occurs in spring. Extreme flood is caused by the combination of heavy rainfall, saturated soils and intense snowmelt. Such events occur every 7-8 years.		Meteorological stations and river stations are available in the area. All hydrological observations are manual. Air survey is done to get the information on development of ice before it is broken.	①Lithuanian Hydrometeorological Service (LHMS)(first notification and warning, call of the Extreme situation management centre) ②Civil Defence and Rescue Department(CDRD)(emergency correspondence) ③Headquarter and municipal extreme management centre etc.	LHMS informs and issues warning to the organizations	LHMS does not operate any numerical model and has started preliminary work on HBV.
POLAND (GDANSK)		The area is located near the river mouth.	Precipitation in Gdansk is highly non-uniform in space and time. Maximum daily precipitation occurs in July. (600mm)		In recent years expansion of the city of Gdansk with new house building decreases in natural retention capacity.	3 precipitation stations	①National Meteorological Service(MGW) ②Institute of Hydro-engineering		1-D MIKE 11 HD for mathematical model of unsteady flow analysis
POLAND (KŁODZKO)	1689Km ² (Catchment of the upper Nysa Kłodzka which is the sub-basin of Odra river)	Average catchment land slopes are from 2.1% to 13.4%. Longitudinal stream slopes are from 10% to 46%.	The main source of the flood threat is torrential rainfall which occurs in the summer half of the year.	Steep slopes and large longitudinal slopes of river beds cause rapid water discharge. Flood water arrival times in particular places vary from 1 to 9 hours.		(Kłodzko district) 19 water level gauges, 20 precipitation gauges, flood management command center in the district office, Municipality level flood command offices (whole system was implemented in march 2002)	①Institute of Meteorology and Water Management ②Provincial Flood Committees ③Regional Water Management Offices(RZGW) ④Provincial Land Management and Water Management Boards(WZMIUW) ⑤State Fire Brigades etc.	Local flood warning systems are being built with composing of precipitation and water levels monitoring gauges, as well as of some decision support system for warning and advice being addressed directly to inhabitants (which are supported by European OSIRIS project with involvement of IMWM)	Standard X25 (Additional information from Czech which using the French ALADIN model, as well as the model study by German Hydro-Meteorological Service.)
ROMANIA (Slanic river)	44Km ²	Medium slope 30%		Small basin area, high slope, rather impermeable soil and high intensity of the rain cause many flash floods	In these last years the upper basin was highly deforested so the flood produced a big volume of dragging and suspension.	1 water level gauging station	①The Central Commission for the defence against flooding, dangerous meteorological phenomena and hydrotechnical and hydroelectrical accidents ②District Commissions ③Local Commissions	During the flood all the activities were coordinated by a headquarters and all the authorities were subordinate to this headquarters.	
ROMANIA (Vișeu river)	1581Km ²	Medium slope 15%	(High area 1000 - 1400mm, hills area 1000mm)		Forests were replaced by agriculture in the hill area.	4 gauging stations	④National Authority of Water ⑤The Basin Agencies(12) ⑥The Civil Protection Headquarters ⑦National Meteorological Agency ⑧National Institute of Hydrology and Water Management etc.	National Institute of Hydrology and Water Management issues hydrometeorological warning	
ROMANIA (Crisul Alb river)	4240Km ²	Medium slope (upper course 9 - 25%, medium course 1.2%, inferior course 0.3 - 0.7%)	Climate is characterized by a mixture of a lot of influences from mediterranean, baltic, continental.	During the winter, sudden raise of the temperature cause snowmelt combined with a large amount of precipitation, which cause severe flooding.	The low degree of forestation (30%) is the main cause of the flooding.			National Institute of Hydrology and Water Management issues hydrometeorological warning	
SLOVAK REPUBLIC (Malá Svínka(MS) and Dubovický Creek(DC))	MS(62.21Km ²) DC(15.24Km ²)	Flyshoid structure and high slopes (cause land slide during the flood)	(600-650mm)		Not significant change(Forest MS(40%) DC(30%))	No rain gauge recorders nor water gauging stations.	①Operational Center of fire brigade ②Municipal, Regional, District and Central Flood Commissions ③Slovak Hydrometeorological Institute	Weather forecast for local thunderstorm was done for small catchment area. The more precise localisation was not done.	
SLOVAK REPUBLIC (Štrbský Creek)	12.23Km ²	More solid soil and hydro-geological ground compare to Malá Svínka.	(750mm)		Stable for long time (Forest 10%)	There are some rain gauge stations near the area.	①Operational Center of fire brigade ②Municipal, Regional, District and Central Flood Commissions ③Slovak Hydrometeorological Institute	Weather forecast for local thunderstorm was done for small catchment area. The more precise localisation was not done.	
SLOVENIA (Savinja River)	1847.7Km ²	High mountains, glacially valleys, hills and gravel layered plain	(1100-2000mm)	High discharge occurs in April, and second high in November / The rates between the low, middle and high discharge are high	Increase building of houses after WW2nd	(Water level)20 operating gauging stations and 4 automatic gauging stations Meteorological data including radar pictures are available	①The Environmental Agency (Monitoring Hydrological Conditions, Forecasts and Flood warnings) ②Notification center of R. of Slovenia ③Regional Notification centers	The Environmental Agency dispatch the information to Notification centers of R. of Slovenia, which send a notification to Regional Notification center. Information is also distributed to Hungary and Croatia	Hydrological forecast(simple regression models) with using the data from automatic hydrological and meteorological stations, and precipitation forecast. Rainfall-runoff models,WMS,HBV are in test use. Lead time of forecast is 36 hours with accuracy of 85%.



Country Reports of Flash Flood in CEE (Part 2)

Country name	Frequency and magnitude of precipitation and flash flood in the report	Character of flood	What is the main cause of casualties by flood	Flood damages	Activities taken	Structural and non-structural measures. Proposed measures for the future	Others
BULGARIA (Varbitsa River Basin- sub basin of Arda River)	12 Dec. 1990 Precipitation was 39 - 73 mm in total	Floods accompany the pollution with heavy metals from the mines in the area.		①Ten soldiers died		The area contains social problem(ethnic, unemployment, poor, pollution by industry) There isn't enough reliable data for flash floods nor enough number of gauge stations for forecasts and alarming. Poor maintenance of river bed, lack of skill and training of population, lack of equipment of local authorities are pointed out. A large scientific based study of flash floods is necessary (Hydrometeorological measurements and field survey, educational program, impact of the floods on the river ecosystem etc. Cost of study is about 65,000 - 68,000 EURO for	
BULGARIA (Yantra River)	6 July 1991 precipitations was 52-104 mm for 12 h after the previous grave rainfall.		The flood had been aggravated by the bridges, river training works, construction of buildings on the river terraces, lack of care to clean the river bed.				
CZECH REPUBLIC (Svratka and Svitava Catchment)	July 15, 2002 daily precipitation was 171.7 mm (higher than 200 years return period), substantial rainfall began around 17:00 and flood wave was created between 17:30 and 19:00		①Sudden occurrence of torrential rainfalls	①Two women died ②many public facilities and private properties were destroyed or damaged	On the 13th July, notice of torrential precipitation was given out for the days of 13th to 17th July but no caution. Mayor made caution at 19:30 on 15th July		
LITHUANIA (Nemunas River)	①Apr. 1958 100 years return period flood (Result of heavy snow in Feb, low temperature in March, sudden melting in Apr.) ②1994 (Heavy precipitation and sudden rise of temperature in March)	①a dam made by river ice jams causes flooding upstream and also causes flash flood by breaking of dams ② Backwater effect by the winds rise water level ③Flood last long time ④frozen ground prohibit infiltration	① It is difficult to predict flash floods resulted from ice broke.	①(1958) 74000ha in Kaliningrad and 57000ha in Lithuania side was flooded ②(1994) 77,000USD		Area has long been protected by polder system but recently become ineffective. Realtime information, accurate flood forecast and early warning are needed.	
POLAND (GDANSK)	9 July 2001 precipitation was 120 mm (once in 200 - 300 years)	Combination of storm surges at sea and increased river discharge may lead to flooding		50 million USD (embankment was breached in 5 places, roads were damaged, railway stations and numerous houses were flooded)	After flood, 5000 people received special calamity status, which affords social assistance.	(plan decided) construct several small reservoirs upstream and several control outflows from the channel together with creating a flood warning system by installing precipitation and water level gauges.	Increasing the conveyance of channel is difficult because it is a historical construction, and on the other hand there are numerous ecological organizations which are against cutting down trees on the embankment.
POLAND (KLODZKO)	6 July 1997 maximum flows of Nysa Kłodzka and its tributaries are from 0.01%(10000 years return period) to 0.06%	Accompanied with greatest land slide, debris mud flow	①Sudden character of flooding phenomena, which in mountains last couple of hours only	①13 people were killed ②Flood protection structures like dams and dikes, arable land, roads, bridges, buildings were damaged	First warning was issued 33 hours lead time(12:30 p.m. July 4) to all Provincial Flood Commissions about predicted locally intense precipitation and increase of water levels.	There was two small dry reservoirs for flood, which were destroyed during flood. The only proper solution for such mountainous regions are to build flood storage reservoirs as structural measures, to educate people about flood emergency situation, and to build early warning systems.	The population demonstrated very high rescue capability. Generally, people respected directives issued by the Flood Protection Authorities.
ROMANIA (Slanic river)	7-8 August 2002 The peak discharge (113m ³ /s) exceeding probability of 1% (Precipitation 42mm in 30 min.)	Short duration (2 hours)		292500 EURO	Population responds promptly to the warnings of evacuation issued by local authorities District and Local Defence Commissions work together to remove flood damages.	(Post flood measures adopted) (Structural measures) bank works, afforestation, retaining the water in urban areas, dams and concrete walls (Non-structural measures) Hydrological warnings, Planning and management of the territory, risk maps, building regulation etc.	
ROMANIA (Vişeu river)	3-7 March 2001 exceeding probability of the maximum discharge (Bistra gauging station) was 3%	Rapid snow cover melting and the augmentation of runoff coefficients because of the frozen soil made the rapid and highly culminating discharge.		①All the people in danger were evacuated so no human lost were recorded. ②Total material damages 1,045,000 EURO	The siren warned the flood and immediately people began to prepare for flooding and Local Commissions for Defence Against Flooding issued the evacuation order.		"Defense State" took place in accordance to "Defense Plans Against Flood, Dangerous Meteorological Phenomena and Hydrotechnical Accident"
ROMANIA (Crisul Alb river)	6 - 11 April 2000, maximum discharge had the exceeding probability of 2%			①3 persons died ②Total damages was 5,500,000 EURO	Local Commissions and District Commissions made plans for evacuate the endanger people.	Ministry of environment decided in the action plan on flood defence to improve the flood forecasting systems. (main measures proposed after flood) Adequate maintenance of the river beds, Better systematize of towns and villages to avoid build-up the houses in the flooding area.	(Conclusions) It is very important to make the population understand that they can protect their self against flooding and they can diminish the damages by: not placing the houses in the flooded area, following the directions issued by the authorities, etc.
SLOVAK REPUBLIC (Malá Svinka and Dubovický Creek)	July 28, 1998 Precipitation reached 100 - 130 mm during 150 min (mostly occurred in 10 to 30 min.), while 80 - 90 mm is the 100 year return period for 24 hours /Flood volume was 1000 year return period	①Sudden arising of the flood wave by high intensity of rainfall (ground was already saturated by previous precipitation) ②Series of break waves was made by artificial barriers and sedimentation, which temporarily pool the water	①The flash flood started immediately after the thunderstorm ②Roma part of the village located in the inundation area ③Confusion and panic by young Roman population (while older family members of Roma community already escaped from their experience in the past)	①47 people died ②850 million SKK (23.5 thous. EURO) ③3,600 people were evacuated	④ (after flood) Drinking water were closed two months for testing	No flood protection object was situated. After the event, Slovak Government has accepted strategy document the Programme of Flood Protection till 2010 in year 2000 (long, mid, short-term structural and non structural measures. Flood warning and forecasting system of Slovak Republic (POVAPSYS))	For the comprehensive view on flood phenomena (suggestion by author) ①Prevention(evaluation of actual state and potential risk, education of inhabitants, enforcement of Water Act) ②Early warning ③Rescue system ④Removing of flood damages ⑤Evaluation of environment ⑥Impacts of social sphere
SLOVAK REPUBLIC (Štrbský Creek)	July 24, 2001 Precipitation (Štrba village 73.6mm. 95% of precipitation fell out during 30 min.) Peak Flow(120m ³ /s (at 11.2m)) was higher than 1000 years return period	④In July 2004, the intensive continuous precipitation was combined torrential rains		④No people died ⑤1,085 million SKK (30 thous. EURO) mainly local communications, sewer system, sewage water treatment	④ (after flood) Citizens and Operational centre of fire brigade created a good basis for elimination of impacts.	No flood protection object was situated.	
SLOVENIA (Savinja River)	(Precipitation) ①Nov 1, 1990 100 years return period (upper part of valley) ②Nov 5 1998 50-100 years return period (lower part of valley)	①Induce landslides ②Landslides blocked the river as a dam and caused inundation ③Broke of dam of landslides caused 2 meter high flood wave ④Outflow of waste water from canalisation aggravated the condition	①Inadequate design of public facilities against flood (foundation of bridge etc) ②Gravel material transported by the extreme high waters	①(1990) 2 person died, 449 27 USD (some communities in the area) ②(1998) 750.60 USD (all communities)	①Hydrological Forecast Service issued 13 warning messages in 1998 ②(after flood) The Institute for Social Medicine and Hygiene immediately took the necessary action to prevent the epidemic.	After Nov 1998 Construction of the hydrotechnic structure(reservoir, levee, etc.), reforestation against landslide were planned. On June 2003, round table on hydrological forecasts and warnings was held with inviting end-users, local authorities and media. Many suggestions and recommendations were made (see report).	Comprehensive management is needed. Service and organizations should be well organized with clear goals and tasks with appropriate legislation and permanent financial sources.



Statement on the Integrated Flood Risk Management

WCDR Thematic Session 2.1

The session “Integrated Flood Risk Management through appropriate knowledge sharing and capacity building systems” was organized by the Government of Japan, the World Meteorological Organization and the Australian Bureau of Meteorology on January 20, 2005 during the World Conference on Disaster Reduction held in Kobe through January 18 to 22. The participants of the session discussed and supported the following statement on Integrated Flood Risk Management.

Background

Water-related hazards are a major component of natural disasters worldwide. Between 1991 and 2000 over 665,000 people died in 2,557 natural disasters of which 90% were water-related events (WMO, 2004). Of these water-related disasters, floods represented about 50 percent. Floods constitute a risk for societies and communities and can turn into disasters when these risks are unmanaged. Weather, climate and water-related hazards have continued to increase, and some scientific assessments suggest that climate change could result in more severe and more frequent natural hazards in the future. While, natural hazards can not be avoided, early warnings, together with timely prevention and mitigation measures, can prevent them from becoming disasters. The terrible Tsunami disaster in the Indian Ocean last year, with an unprecedented death toll, has shown the danger to millions of lives such disasters pose in the absence of early warning systems and public awareness.

In the context of flood management, an integrated approach based on risk management principles should be followed. This will ensure that development activities do not result in an increase in the hazard; structural and non-structural measures reduce exposure to these hazards; and vulnerability of the society is reduced through preparedness and timely and reliable early warning systems. These measures are key components in reducing the loss of life and other adverse impacts of flood hazards and must be supported with legal and institutional frameworks.

Recommendations

To realize sustainable development as well as poverty reduction, it is essential to appropriately mitigate against, prepare for, respond to and recover from water-related disasters. In relation to flood management an integrated approach is essential. Floodplains have been and will continue to provide livelihood and resources for the economic activities and development of many communities. As such their use has to be based on the principles of risk management with due weight to the benefits and the risks posed by making use of floodplains. In particular, the followings key elements of such an approach are:

- *Flood Management*
 - A river basin should be the basic unit of planning flood management strategies based on Risk Management principles and should be carried out within the overall context of integrated water resources management.
 - Flood Management being inter-disciplinary, interactive dialogue among various stakeholders should be facilitated, including the scientific community (such as meteorology and hydrology), engineering community, sociological community (such as disaster prevention), environmental community and development community).
 - To enable all sections of stakeholders, including the less able sections, to participate in the process effectively, legal and institutional framework should be established and streamlined.
- *Monitoring and awareness building*



- Monitoring of floods over long periods of time and sharing this knowledge with all stakeholders to support planning, design and execution of policies and options for flood management is essential.
- Raising awareness of the extent and magnitude of the hazard through, for example, flood hazard maps, vulnerability assessment before undertaking development activities in flood prone areas as well as enhancing early-warning systems to ensure that they work effectively in case of extreme events is fundamental for the successful flood responses.
- Issuing of timely warnings with clear messages, including accurate flood and debris flow forecasts, is essential.
- *Training for capacity building*
 - It is necessary to build resilience in the society to withstand the hazard with minimal disruption to the economic activities and by minimizing the economic losses and loss of human life.
 - Strengthening community participation in preparedness and disaster response right from the planning stage is crucial for its success.
 - Evacuation drills should be carried out repeatedly including the testing of communicating forecasts and warnings, and guiding evacuees to shelters.
 - Community leaders at all levels who may lead the emergency activities should be included in capacity-building activities.
- *Promotion of international, regional, interagency and multidisciplinary cooperation*
 - It is important to share the experiences around the world through technology transfer.
 - Cooperative programs or initiatives among organizations working on water-related disasters such as the IFI (International Flood Initiative) should be encouraged.

The session supported the proposal made by Mr. Ryutaro Hashimoto and Secretary General of WMO to set a new MDG goal as follows – to halve the number of human loss of life as a result of water related disasters by 2015. The session suggested that this should be expressed in terms of the average number of human life losses over specified periods to set measurable goals.

Concrete actions

The following concrete actions (undertaken in an integrated manner with other initiatives) should be implemented to support the activities mentioned above.

- Countries should be supported at the international level through Interdisciplinary approaches to Integrated Flood Risk Management through programs such as the Associated Programme on Flood Management (APFM).
- Knowledge sharing should be promoted through network systems for information exchange supported by organizations such as, *inter alia*, the IFNet (International Flood Network) or the Portfolio of Disaster Reduction Actions, a monitoring mechanism, being newly proposed by Japan.
- Methods and technology for compiling hazard maps, providing flood forecasts, issuing warnings, communicating information and building structural measures should be continuously transferred from developed countries and international organizations to developing countries through an international research center such as, *inter alia*, the International Centre on Water Hazard and Risk Management under the auspices of UNESCO (CHARM).
- Training programs for capacity-building to realize the above should be effectively carried out through an international cooperation framework involving groups such as IHE Delft, CHARM and WMO.