REFLECTIONS OF DIALOGUE ON WATER & CLIMATE AFTER THE 3RD WORLD WATER FORUM IN KYOTO

DIALOGUE ON WATER & CLIMATE

COLOPHON

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DATE : **AUGUST 2004**

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1 Introduction

1.1 The Dialogue on Water and Climate

The objective of the Dialogue on Water and Climate (DWC) was to bring the water resources management community and the climate science community closer together. This objective was pursued at three levels:

- At the knowledge level: the DWC prepared an overview of what we know about climate and its impacts on water.
- For practitioners: the DWC facilitated multi-stakeholder dialogues at the local, national, basin and regional level;
- For a wider audience: the DWC developed a web site about water and climate, published and widely distributed a brochure "Dark Skies, Stormy Waters" and produced a film "The Heat is On, Better be Prepared" which was world-widely acclaimed and shown including on national television in West Africa and the Netherlands. .

The results of these activities were written up in the document " Climate Changes the Water Rules" and the accompanying "Policy Makers Document", which were both successfully presented in March 2003 at the 3rd World Water Forum in Japan.

The Dialogue on Water and Climate aimed to stimulate co-operation between the climate and water community. Both communities consist of numerous stakeholders including policy makers, scientists, practitioners such as farmers and water managers, and the public. Bringing these communities together requires building bridges between the stakeholders to raise:

- Legitimacy at the policy level
- Credibility at the knowledge level
- Public support for action at the practitioners level

The Dialogue on Water and Climate has contributed on all the above counts.

1.2 Legitimacy

The Dialogue on Water and Climate stimulated the initiation of multi-stakeholder policy debates (i.e., *dialogues*) to develop coping actions in the water sector. Of the eighteen dialogues initiated at the local, national and regional levels throughout the world, at least sixteen dialogues are scheduled to continue. This strong commitment from DWC partners at the national, basin and regional level confirms the political legitimacy and support for continuation.

The 3rd World Water Forum in Kyoto (WWF3) has formalised the legitimacy in the Declaration of the Ministerial Conference, which calls for the following actions:

- *"The growing severity of the impacts of floods and droughts highlights the need for a comprehensive approach that includes strengthened structural measures such as reservoirs and dikes and also non-structural measures such as land-use regulation and guidance, disaster forecasting and warning systems and national risk management systems in harmony with the environment and different water uses"*
- *"We will co-operate to minimise damage caused by disasters through enhancing the sharing and exchange, where appropriate, of data, information, knowledge and experiences at international level. We encourage the continuation of collaboration between scientists, water managers and relevant stakeholders to reduce vulnerability and make the best prediction and forecasting tools available to water managers."*

Further weight to the importance of addressing water and climate issues is provided by the 30 commitments, mainly by international organisations, to continue addressing issues related to Water and Climate. Issues which include the Interagency Initiative (WB, UNDP, IUCN, EU, GEF, bilateral and multilateral external support agencies, Red Cross, IISD, DWC) which addresses mainstreaming poverty into the Climate Change and increasing Climate Variability debate. This debate calls for mainstreaming adaptation into national inter-ministerial sustainable development plans and the development of appropriate financing mechanisms for adaptation which are not strictly limited to incremental costs only. Other programmes, such as WANI of IUCN, the disaster preparedness programme of the Red Cross, and numerous research activities acknowledge the need for better policy instruments and practical coping measures.

1.3 Scientific credibility

To influence policy, the DWC's main report "Climate Changes the Water Rules" uncovers the established scientific evidence about climate variability and change, and it's expected impacts upon hydrological regimes change. The report confirms that - depending on the location - dry spells are on the increase and wet spells more intense. These scientific observations provide a strong case to act.

Research challenges include specific thematic impact studies on for example coastal zones, lakes, small islands, ecosystems and human health, assessments for different coping options, and social and cultural implications including gender aspects and economic impacts.

The report "Climate Changes the Water Rules" provides an agenda for follow up activities in the field of research and knowledge/capacity development. The agenda calls in particular for better operational assessment tools for applications at the local level by water managers. Such tools include training packages for capacity development, an interactive bibliography, methodologies for hot spot identification, guidelines for conducting multi-stakeholder dialogues and a compendium of coping strategies.

1.4 Public awareness

The objective of the awareness raising activities under the DWC was to build public commitment at the national, regional and basin level. This was pursued through different media, including the DWC's web site[1], a series of publications such as brochures and fact sheets, and through the television documentary "The Heat is On, Better be Prepared". The film is a powerful tool to reach out to a wide audience. It shows actions to cope with storms, floods and droughts in each of the continents. Renowned water and climate experts present a comprehensive overview of the state of knowledge on climate and water and the technological means, in particular satellite observations. The film ends with a plea for action. Hundreds of copies of the film have been distributed all over the world and presently the film is translated into local languages for screening on local television networks. The film got a very good reception at the third World Water Forum in Kyoto and was nominated for the film festival in Cannes (2003) and New York (2004).

1.5 Reflection on the Dialogues

The Dialogue on Water and Climate has contributed to the legitimacy, credibility and public support in bringing together the water and climate communities. Of equal importance is that the DWC succeeded to start 18 multi-stakeholder dialogues at the national, basin and regional level. Dialogues that set out to prepare for action to cope better with the imponderables of climate on the water sector.

Most dialogues will continue and develop into partnerships for action. These partnerships are local initiatives by water managers in collaboration with the climate community and often also the disaster preparedness community. These partnerships will benefit from exchange of knowledge and experiences between – and amongst – the North and South. In a nutshell, planning for and the introduction of coping action is the focus of follow up programme to the Dialogue on Water and Climate (see Chapter 5).

1.6 This report

This report analyses the outcomes of the WWF3 and the Dialogue on Water & Climate and looks at the road ahead. Its purpose is two-fold:

1. to present a status report on Water and Climate at Kyoto
2. to analyse the main components of the road ahead, both thematically and institutionally

Chapter 2 reviews the actions called for and commitments made at the WWF3 in the context of climate variability and change. Chapter 3 summarises proposed follow-up activities of the national, basin and regional Dialogues initiated under the Dialogue on Water & Climate. Chapter 4 compares the results from the WWF3 and the Dialogues, identifying areas where further action is required. Finally Chapter 5 describes the follow-up to the Dialogue on Water & Climate.

[1] www.waterandclimate.org

2 Water and Climate at Kyoto

2.1 Introduction

At the 3rd World Water Forum (WWF3) participants met in 351 sessions organised around 33 themes and five Regional Days. Themes included a range of topics such as: water and climate; water supply, sanitation, hygiene and water pollution; water and cultural diversity; water, nature and environment; water and cities; water governance; floods; integrated water resources management and basin management; water and peace; water and agriculture and food; water and poverty; financing water infrastructure; and dams, and water and sustainable development. The five Regional Days focused on Africa, Asia and Pacific, the Americas, the Middle East and Mediterranean, and Europe. The Forum concluded on 23 March with the release of a preliminary Summary Forum Statement, drafted by the 3rd World Water Forum's Secretariat. The Ministerial Conference officially opened on 22 March, and closed on Sunday, 23 March. Its primary outcomes were a Ministerial Declaration and a Portfolio of Water Actions.

This chapter describes the outcomes of the WWF3. It aims to identify the actions called for and commitments made at the WWF3 in the context of climate variability and change. The analysis is based on the reports from the sessions at the Forum, the theme statements, regional statements and the results of the Ministerial Conference. A full report on the Kyoto World Water Forum, and the reports of most of the 351 sessions are available from the website of the world water forum www.world.water-forum3.com. Readers interested in a complete account of the many references to water and climate that emanated from WWF3 are invited to refer to Appendices B (Summary Report of Sessions in the WWF3 'Water and Climate' Theme), C (Other Themes), D (the five Regional Days), and E (the Senior Expert Group meetings). Outcomes of the Ministerial Conference are provided in section (2.4) below.

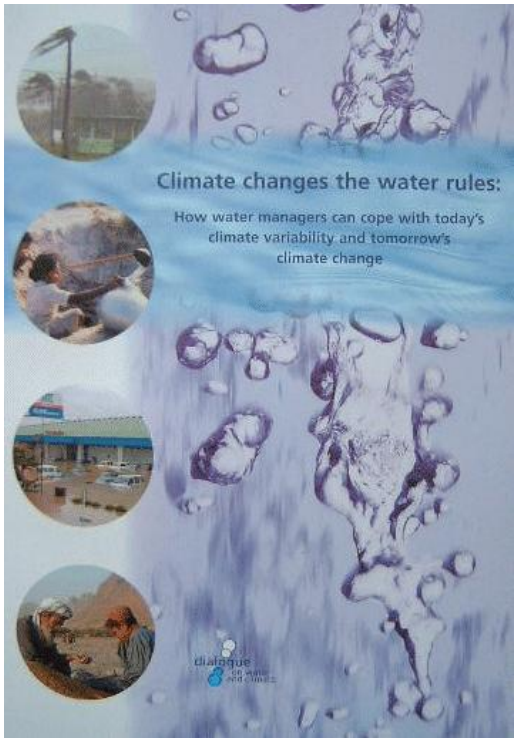
2.2 Theme Water & Climate

This theme was convened by the International Secretariat of the Dialogue on Water and Climate (DWC) from 16-17 March, with participants meeting in opening and closing plenaries and 11 sessions (Box 1). The sessions discussed, *inter alia*: what science can offer; water in small island States; risk, insurance and finance; building capacity to cope; integrated monitoring of the world's freshwater to address the impacts of global warming; water cycle research and observational activities for understanding climate and water resources management and sustainable development; and adapting water management to climate change.

During the sessions, participants discussed the results of the DWC, highlighting the importance of enhancing collaboration between the climate and water communities and building on alliances created through the dialogue. Several participants drew attention to the water-related vulnerabilities of developing countries and the impact of climate change on the hydrological cycle. Participants also highlighted the need for, *inter alia*: site-specific water management practices; better precipitation models; the integration of disaster preparedness into sustainable development

programmes; the identification and enhancement of local coping capacities; international co-operation; and creative mechanisms for funding adaptation strategies.

Box 1 lists the individual sessions under the Water & Climate Theme. A summary of the sessions is given in Appendix . Reports of the sessions and the overall theme report are available from www.world.water-forum3.com.



Theme statement to the Ministerial Conference

A Water & Climate theme statement (

Appendix A) was agreed upon by more than 200 participants of the wrap-up session at the WWF3 and submitted to the Ministerial Conference (see Section 2.4). The Statement acknowledges that the consequences of increasing climate variability and climate change affect livelihoods in many ways including health and sanitation, food security, energy and nature. It notes that everyone is affected, but the greatest impacts are on the poor and remote, and that climate variability and weather extremes will derail achievement of the MDGs. The statement stresses the need to increase greenhouse gas abatement efforts and initiate actions for coping with climate variability. It also states that a greater appreciation of climate issues among water policymakers, water managers and society is the basis for effective actions.

The statement recommends, *inter alia*: continuing greenhouse gas mitigation efforts and enhancing policies and measures toward climate change adaptation; continuing the multi-stakeholder approach at national, basin and regional levels to prepare adaptation action plans; implementing the water and climate agenda under the Integrated Water Resources Management (IWRM) framework; developing national, basin and regional capacities and securing financial support for preparing and implementing national water sector adaptation plans; creating a "Water and Climate Alliance"; mainstreaming climate change and variability considerations into national water and land management policies and practices; and reversing the trend of deteriorating *in-situ* data collection and observational networks. It also recommends enhancing efforts to integrate and mainstream "Water and Climate Associated Programme" initiatives with related processes, including the Intergovernmental Panel on Climate Change's fourth assessment report and national communications by Parties to the UN Framework Convention on Climate Change (UNFCCC), and disaster preparedness and management strategies.

The statement also contains a listing the water and climate-related commitments of various States, IGOs, NGOs, research institutions and businesses.

Box 1: Overview of session titles and session convenors under the Theme Water & Climate

- CLIM-OP Opening Plenary: Water and Climate - *International Secretariat of the Dialogue on Water and Climate*
- CLIM-02 What can science offer? - *International Secretariat Dialogue on Water and Climate*
- CLIM-03 Water in Small Island Countries - *Asian Development Bank*
- CLIM-04 It pays to be prepared: Better protection of the most vulnerable against vagaries of climate - *Netherlands Red Cross, Centre on Climate Change and Disaster Preparedness*
- CLIM-05 It pays to be prepared: Risks, Insurance and Finance - *Dialogue on Water and Climate, Delft, The Netherlands*
- CLIM-06 Climate Convention: Does it matter for water? - *International Secretariat of the Dialogue on Water and Climate*
- CLIM-07 Integrated Monitoring of the World's Freshwaters to Address Impacts of Global Warming - *Lake Biwa Research Institute and NGO*
- CLIM-08 Building capacity to cope - *IHE Delft*
- CLIM-09 Climate change influence on flood and drought in East Asia; Effects and Response - *Committee for climate change influence on flood and drought*
- CLIM-10 Climate is everybody's business, too - *Dialogue on Water and Climate*
- CLIM-11 Change! Adapting Water Management to Climate Change - *IUCN The World Conservation Union*
- CLIM-12 Water Cycle Research and Observational Activities for Water Management and Sustainable Development - *NOAA/Global Water Cycle Programme, International Secretariat Dialogue on Water and Climate (DWC)*
- CLIM-WP Wrap up Plenary : Water and Climate - *International Secretariat of the Dialogue on Water and Climate*

2.3 Water & Climate content in Thematic Sessions

This section analyses the outcomes of the WWF3 discussion themes and the theme statements. It is based on the reports from the sessions. The analysis aims to identify the main actions participants of the Forum call for to be taken in the context of water & climate. These actions are for consideration in the follow-up of the Dialogue on Water & Climate. The analysis is structured by WWF3 discussion themes. For a number of themes the Final Theme Statements were not

available. In these cases, draft Theme Statements were analysed instead. Appendix gives an overview of the Water & Climate content of the WWF3 themes.

Climate, global change and its effects were mentioned as an important issue for water management in over 30% of the sessions, as more than 100 session reports explicitly refer to climate and vulnerability issues.

Most calls for actions in the context of climate change came from:
1. African region
2. The nature & environment community
3. The science and information management society

Most calls for action were directed towards practitioners in:
1. Disaster and flood management
2. IWRM
3. Science and information management
4. Climate research

From the discussions at the WWF3 it may be concluded that many themes have recognised climate change as a challenge, and wish to proceed to a phase of consolidation and concrete focussed actions. The calls for action are treated in more detail below.

A number of themes did not call for action in the context of climate, nor were commitments made. For some of these themes, e.g. cultural diversity, the link with climate change may indeed be less obvious. For others though, the relation is crucial, since a large impact of climate change is expected. Here the Dialogue on Water & Climate commits to building awareness next to strengthening the capacity to cope with the impacts of increasing variability of the world's climate. The themes that require special attention most urgently are the link between climate, water and poverty, the links between climate, water and disasters, the impacs of climate upon groundwater and financing mechanisms for adaptation.

2.4 Water & Climate content of the Ministerial Declaration

On 23 March the Conference closed with the adoption of a Ministerial Declaration and a Portfolio of Water Actions. This Section summarises the results of the Ministerial Conference related to water & climate. In view of Water & Climate three paragraphs out of the 29 articles of the Ministerial Declaration are of particular importance.

Regarding water resources management and benefit sharing, the Ministerial Declaration encourages scientific research on the global water cycle:

> *Paragraph 12.* We will further encourage scientific research on predicting and monitoring the global water cycle, including the effect of climate change, and develop information systems that will enable the sharing of such valuable data world-wide.

On disaster mitigation and risk management, the Declaration notes the need for a comprehensive approach to mitigate the growing severity of floods and droughts, and supports enhancing where appropriate the sharing and exchange of data, information, knowledge and experiences at the international level:

> *Paragraph 27.* The growing severity of the impacts of floods and droughts highlights the need for a comprehensive approach that includes strengthened structural measures such as reservoirs and dikes and also non-structural measures such as land-use regulation and guidance, disaster forecasting and warning systems and national risk management systems, in harmony with the environment and different water uses, including inland waterway navigation.
> *Paragraph 28.* We will co-operate to minimise damage caused by disasters through enhancing the sharing and exchange, where appropriate, of data, information, knowledge and experiences at the international level. We encourage the continuation of collaboration between scientists, water managers, and relevant stakeholders to reduce vulnerability and make the best prediction and forecasting tools available to water managers.

2.5 Overall outcomes from the 3rd World Water Forum

The brief analysis given above provides only a glimpse of the interest given to water and climate in Kyoto. The summaries found in the Appendices clearly show that climate variability and change is a major concern for an ever-growing number of water sector professionals and organisations that attended WWF3. It should also be noted that this concern is not limited to a few stakeholder groups. It is widely spread across the water sector, from technicians to social scientists and from local community activists to international policy makers.

The Water and Climate Thematic Sessions were very well attended and produced lively discussions. But the topic was also raised in several other thematic and regional sessions, as well as in the meeting of the Senior Experts Group and the Ministerial Conference. It is now clear that water and climate has become an important focus point on the international water agenda. The high level of visibility now being given to the issue and that the momentum created by the Dialogue on Water and Climate on local (national, basin and regional level actions) provides an important impetus for further informed decision making and local action.

Specifically, the participants of the 3rd World Water Forum agreed on the importance of mainstream the climate variability and change into national water and land management policies and management practices. It was recommended that the DWC continue the informed multi-stakeholder approach (i.e. dialogues) at national, basin and regional level to prepare action plans for adaptation and to support local stakeholders in building the capacity required to successfully implement local coping activities.

3 Dialogues

3.1 Proposed Follow-up of the Regional, National and Basin level Dialogues

Informed, multi-stakeholder dialogues provide a means through which a wide range of stakeholders can participate in identifying and in promoting policies and coping strategies to reduce the impacts of climate variability and change from the regional through to the community level.

The eighteen dialogues (Figure 3-1) initiated under DWC are seeking to continue and expand. In terms of process, the directions that will be taken by the different dialogues are somewhat similar because:

- most dialogues of the DWC have started preparing adaptation plans to be implemented and participants are highly motivated to begin implementing their plans
- it has been widely accepted that informed multi-stakeholder dialogues provide a tool befitting the development objectives as agreed upon in the MDGs of UN, the WSSD and the COPs under UNFCCC and the WWF-3

Figure 3-1: Regional (green), National (red) and Basin (blue) initiated under DWC.

As described in the following section, the orientation and scope of the proposed follow-up activities may vary from one dialogue to another. This is partly a function of the different geophysical and hydro-meteorological characteristics that define the main climate-related challenges faced in each region, country and basin. But is it also, and arguably most importantly, a reflection the levels institutional capacity (including hydrological and meteorological science), social awareness and political involvement which dictate the ease with which proposed adaptation plans can become implemented.

Yellow River Basin (China), Nagoya Basin (Japan), Southeast Asia have not decided upon follow-up and are therefore not described in this Chapter.

3.2 Basin dialogues

Under the DWC framework, basin-level dialogues proved to be the most participatory and transparent, involving several different categories of local stakeholder groups including farmer associations, NGOs, municipal authorities, trade unions, and schoolteachers. Also involved were representatives of state/provincial and national governments, academics, people for the regional and/or national meteorological offices.

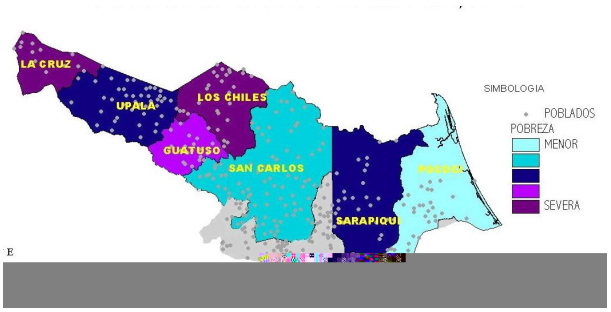
In smaller basins such as the San Juan, the Thukela and the San Pedro, proposed dialogues activities focus mainly on education, users needs and local adaptation strategies. This is also true for the many basins that make up the network participating in the “Small Valleys” dialogue in Central America. Larger and/or more populated basins such as the Yellow River, Murray-Darling,

Aral Sea, Lena and Nagoya benefit from greater political visibility and have thus been successful in involving national and state representatives in their consultations.

The structure of basin-level dialogues allows for flexibility and can lead to considerable penetration of the issues into the general community. At least two basin dialogues, the San Juan and San Pedro, conducted surveys within the community. These served in raising awareness of the issues, as well as assessing stakeholder concerns and opinions.

3.2.1 San Juan Basin (Costa Rica and Nicaragua)

Background: The San Juan is a boundary river between Costa Rica and Nicaragua. The 38,500 km^2 basin, rich in biodiversity, has one million inhabitants, most of whom live in poverty and lack access to safe drinking water, adequate sanitation, and schools.



Climate variability has long been manifest through a succession of floods, droughts and intense rainfall, mainly the result of hurricanes and tropical storms. Reducing vulnerability to climate impacts is crucial to the inhabitants' aspirations for social and economic development. The mechanism through which local stakeholders have begun channelling their actions to cope is the PROCUENCA-SAN JUAN; a participatory basin association authorised and executed through the technical units of the two national governments.

The final report of the San Juan dialogue identified five requirements to the successful implementation of appropriate coping strategies:

1. Strategic plan for disaster prevention and mitigation
2. Better territorial planning
3. Risk management becoming a cross-cutting issue in development planning (particularly in tourism)
4. Active Basin Committees that conserve and manage the water resources endangered by climate variability
5. Enforced legislation on disaster prevention and mitigation based on local realities

Planned Activities and Expected Outcomes:
Concerning the Improvement of Knowledge Base

- *Basin-wide Hydro-meteorological Study*. As part of the PROCUENCA-SAN JUAN activities for the formulation of the Strategic Action Program (SAP,) the Nicaraguan Institute is undertaking a basin-wide hydro-meteorological study for Territorial Studies (INETER), through its Water Resources General Directorate.
- *Vulnerability Reduction Study and Design of a Flood Early Warning Basin-wide System*. A comprehensive vulnerability study will be carried out for the preparation of a vulnerability to natural hazards zoning. Based upon the findings of the San Juan DWC, the vulnerability zoning will stress those phenomena or hydro-meteorological origin, and more specifically droughts and floods. An early warning system for floods will also be designed for implementation during the next phase of the PROCUENCA-SAN JUAN.
- *Transboundary Migration Study*. A study on human transboundary migratory patterns is being carried out by the Latin American Faculty for Social Science (FLACSO). Based on the strong correlation between transboundary human migrations from Nicaragua to Costa Rica, gender, and climate variability, found during the DWC, the study is focusing on better characterising this issue, as to include specific measures within the SAP.
- *Gender Diagnostic and Analysis*. A gender analysis for the Basin is being undertaken with the support of an expert in the subject. As part of the activities of the analysis, a Seminar/workshop on Gender, Inequities, and Integrated Water Resources Management (IWRM) has been scheduled for the second quarter of 2003. Given the findings of the DWC, emphasis will be given to climate variability.

3.2.4 Small Valleys Flood Alert & Vulnerability Reduction Programme (Central America)

Background: This programme develops locally managed low-technology early warning systems for floods. With the support from the International Secretariat of the Dialogue on Water and Climate, the OAS/USDE in consultation with representatives from the region have drafted the terms of reference to enable an NGO consortium to establish the Regional Platform of the Small Valley Alert and Flood Vulnerability Reduction Program (SVP). Through this Regional Platform, the NGO consortium will provide technical advisory services and training, outreach, follow-up and maintenance (when necessary) to local, national and regional participants. The community-based approach of the SVP has three components: (1) flood hazard assessment and monitoring of flood conditions, (2) flood alert and emergency preparedness and response, and (3) vulnerability reduction of local infrastructure to floods.

Planned Activities and Expected Outcomes:
Support to, among others, the NGO Co-operative Housing Foundation (CHF) submission of a project proposal to the United States Agency for International Development for a project on institutional strengthening of local non-governmental organisations (NGOs) in three Central America countries – Guatemala, Honduras, and Nicaragua.

As part of the contribution of the OAS/USDE to CHF for the project, the OAS/USDE will endeavour to provide CHF with technical advisory services in order to maximise the knowledge, experience and expertise gained in the implementation of the SVP over the past eight years. These advisory services will focus on the preparation of technical manuals for local use in the three subject areas, and the selection and programming of technical advisory services and training with existing and new local SVP groups.

Partners and Funding:
For the implementation of the Regional Platform of the SVP through CHF's proposed NGO strengthening program, the OAS/USDE expects to provide CHF with up to US$75,000 in each of the first two years of the proposed five-year project. Nonetheless, the source of these funds will be outside of the OAS Regular Budget and thus must be solicited from external sources, a process that has already begun. OAS/USDE will endeavour to access directly external funds for the remaining contribution of an equal amount during each of the final three years. However, should OAS/USDE not be successful in obtaining sufficient funds to cover all five years, the OAS/USDE will assist CHF and OAS member states benefiting from the project to access financial support.

The OAS/USDE expects CHF to match any OAS/USDE cash contribution to the project with a cash contribution to the project for direct services to local community groups on a 2:1 basis. The CHF matching contribution can only include direct expenditures on participating staff, materials and arrangements for goods and services for local activities (such as through a voucher system), and cannot include overhead, in kind services or senior or regional CHF staff related expenditures. The total value of these OAS/USDE technical advisory services is expected to be valued at up to US$37,500 per year for the first two years.

3.2.5 Lena Basin (Russia)

Background: The Lena River, located in eastern Siberia, is amongst the top ten largest rivers in the world. Subjected to very high climate variability the river's flow is extremely variable. Up to 35% of the annual discharge is formed during a few weeks of spring flooding. In recent years, the floods have been more extreme and have occurred earlier in the season. Despite strong knowledge (based on extensive research) of the likely impacts of climate change the basin's water resources, climate change and variability are not yet fully considered within decision making, due to a lack of communication between the hydrologic and meteorological science communities, water managers and politicians. Inadequate water management and emergency protection measures have led to significant economic and social losses in recent years.

The final report of the Lena dialogue recognised the two main obstacles to adaptation as:
1. Insufficient co-ordination of the relevant executive authorities at the federal level.
2. Insufficient financing of the Lena basin water management actions from the federal budget.

Furthermore, the dialogue identified five requirements for successful follow-up:
1. improved information dissemination

2. inventory of water management facilities
3. strategy on water resources management and flood preparedness under climate change, aligned with national interest
4. Operational preventative measures
5. Targeted, integrated science programme on water regime formation of Yakutian rivers

Planned Activities and Expected Outcomes:
The main objective of the follow-up activities is to find and implements integrated solution of the most urgent water management issues for the Lena basin, which are directly linked to climate change adaptation.

Main planned activities:
1. Development of the Basin Co-ordination Plan, which would compile all relevant activities under implementation within the frameworks of the action plans of the executive authorities of administrative territories located at the Lena basin, and the research institutions.
2. Selection of pilot areas and rivers of the Lena basin, where the climate change adaptation measures should be taken, and practical implementation of the climate change adaptation strategy.
3. Development of the distributed system of data bases using the meta-data base developed under Phase 1 of the Lena Basin Dialogue.
4. Preparation of the assessment reports and corresponding recommendations on specific issues of climate change adaptation strategy, including possible variations of hydrologic and corresponding water management characteristics due to climate change.
5. Workshops on development of climate change adaptation strategy for selected pilot areas.
6. Development of the chart for integrated use and protection of water resources at the Lena basin.

Expected outcomes:
1. Co-ordination Plan for adaptation to climate change in water management and flood preparedness at the Lena basin.
2. Distributed system of databases co-ordinated via meta-data base developed under Phase 1 of the Dialogue.
3. A set of scientific assessment report and recommendations on specific issues of climate change adaptation strategy for the pilot areas of the Lena basin.
4. Chart for integrated use and protection of water resources at the Lena basin.

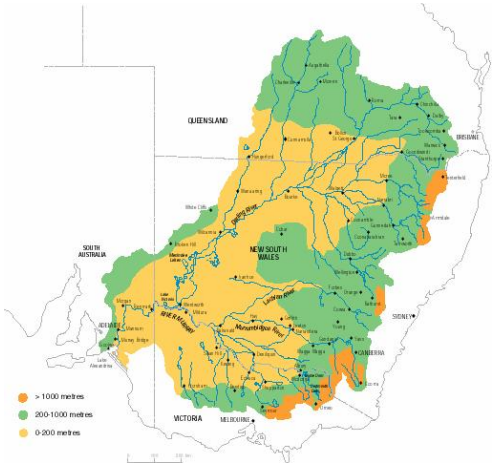
Partners and Funding:
Partners:
- Government of the Republic Sakha (Yakutia)
- Lena Basin Water Management Authority
- Ministry of Civil Defence and Emergency Situations of the Republic Sakha (Yakutia)
- Yakutian Regional Hydro-meteorological Agency
- State Hydrological Institute (St. Petersburg)
- Russian Academy of Sciences (Institute of Geography)
- Academy of Sciences of the Republic Sakha (Yakutia)
- Yakutian research institutes subordinated to the Siberian Branch of RASci.
- Polar Foundation
- Secretariat of the Arctic Monitoring and Assessment Programme (AMAP)

The programme is planned for 2003 – 2005 with a total cost of 800,000 USD. It is envisaged that 450,000 USD will be allocated from the federal budget of the Russian federation and the budget of the Republic Sakha (Yakutia), and 350,000 – from the sources of international assistance, as the DWC follow-up. At present, the Government of the Republic Sakha (Yakutia) confirmed allocation of 125,000 USD (in Rouble equivalent).

These funds do not include direct investments to operational activities being implemented under the components of the Basin Co-ordination Plan that is proposed for development (see Activity 1).

3.2.6 Murray-Darling Basin (Australia)

Background: The Murray-Darling basin covers an area of 1 million km^2, the majority of which is characterised as arid or semi-arid. Indeed, nearly nine-tenths of the basin contributes no runoff to the system, except during floods. This is a remarkable statistic considering that the basin contributes 70% of Australia's irrigated agriculture. Although variability in precipitation has always been high (as in most arid basins), there is concern that yet higher variability will lead to more frequent droughts that would greatly affect both agriculture and the basin's ecology.



Through follow-up activities to the DWC, the Murray-Darling Basin Commission and several other dialogues participants are seeking to:

- Develop better knowledge of climate variability and potential climate change (including better forecasting) to assist farmers make management decisions for increased profitability and reduced risk and uncertainty.
- Improve water use efficiency at a range of levels to cope with lesser availability of water due to climate change (including seasonal allocations).
- Formulate nation-wide drought management strategies.
- Protect the natural environment, including wetlands, through the better management of environmental flows
- Develop strategies for enhanced aquifer recharge and storage through reuse of water.

Planned Activities and Expected Outcomes:
Integrated management of the MDB water resources, taking into account water requirements for agriculture, municipal use, environment, recreation and others, through multilevel stakeholder engagement has to prepare for increasing climate variability and possibly trends of decreasing water availability.

The Murray-Darling Basin Dialogue will be continued within future activities, including the development a national imitative on climate research in Australia, the new Co-operative Research Centre on Irrigation Futures or the CSIRO Flagship Program "Healthy Country", which has a regional focus on irrigation in the Murray Darling basin. These initiatives span over next seven years.

In addition, two new integrated science initiatives were recently started, which are partially based on the results of the DWC:

a) Adaptive Irrigation Management for Climate Variability and Climate Change funded by CSIRO and Land and Water Australia

b) Use of Climate Forecasts to Cope with Seasonal Variability funded by the Land and Water Australia and the Co-operative Research Centre for Sustainable Rice Production

Partners and Funding:
Although no funds has been allocated for the dialogue *per se*, the leading partners of the Murray-Darling Dialogue – CSIRO, Murray Darling Basin Commission, Co-operative Research Centre for Irrigation Futures, Co-operative Research Centre for Sustainable Rice Production, Land and Water Australia and Irrigation Companies – are all committed to pursuing the further integration of relevant climate information with the water management framework.

3.2.7 Aral Sea Basin (Central Asia)

During the last 25 years many components of the Aral Sea basin's environment have been greatly impacted by anthropogenic activity, with catastrophic impacts on the sustainability of ecological and economic sectors. The situation is compounded by global climate changes (global warming).

With land area used for irrigated and rain fed agricultural decreasing due to desertification and population growth, it necessary finding ways to increase volume and assortment of agriculture crops and therefore increasing agriculture productivity. The final report of the Aral Sea dialogue identified five actions needed to the remedy the situation:

1. Implementation of the Aral Sea Basin Management Model to demonstrate regional sustainable development
2. Assessment of the influence of climate change on available water resources
3. Investigation of rational water use in irrigated agriculture
4. Strengthening of inter-state co-operation
5. Developing appropriate legal and financial mechanism

Planned Activities and Expected Outcomes:
Dialogue partners (see below) have been seeking funding to computer based tools that estimate the consequences of climate change influences on the dynamics of socio-economic development in the Aral Sea basin states in order to formulate recommendation on adaptation of the region's states development in such conditions.

Partners and Funding:
Different organisations that could be involved in Dialogue on Water and Climate include:

- Scientific-Information Center of Interstate Coordination Water Commission of the Aral Sea basin (SIC ICWC)
- National Hydrometerological Services of all five states of the Aral Sea basin region
- The Engineering Centre of SANIIRI and Uzbek –Israel joint venture (SANIIPIAST)
- Ministry of Water Economy of five states of the Aral Sea basin
- Two Basin Water Organization – BWO "Syr Darya" and BWO "Amu Darya"
- Farmers and other user groups, outstanding scientists, professionals and NGOs related to the water problems of the Aral Sea

Funding for the follow-up activities of the Aral Sea basin has yet to be secured.

3.3 National dialogues

National dialogues focus primarily on legal issues and national policy and institutions. Participants tended to come from government, academic institutions, and a few of the larger and more prominent NGOs (those with an interest in government policy).

In general, these dialogues begin by producing a country level study on issues related to water (vulnerability) and climate (variability and change) and a policy review of water management and other related sectors such as agriculture and disaster management. The study serves as a discussion document for dialogue participants as they develop a national adaptation framework. One advantage of national dialogues is that outcomes and recommendations are geared specifically to national policy development and national adaptation plan development. These include the formulation of national IWRM policies and strategies (as agreed upon at WWSD to be ready by 2005) and the preparation of integrated National Adaptation Plans of Action under the UNFCCC which links potentially to global Adaptation Funds.

Any group of stakeholders interested in influencing the formulation of national and development policy can initiate national dialogues, provided they can obtain the necessary funding. However, to be successful, participation of national ministries is crucial. In Bangladesh for example, the dialogue was organised by the national IUCN office in co-operation with three Bangladeshi Ministries (Water, Environment and Forests, and Disaster Management), with financial support from the Dutch Embassy. Involvement of research institutions and the climate forecasting community is also critical.

3.3.1 The Netherlands

Background: Situated in the low-lying, densely populated delta of the rivers Rhine and Meuse, The Netherlands is relatively vulnerable to especially floods and water pollution. To deal with this, the country has built up a high level of technical knowledge and skills and has applied this to create a sophisticated water system that fulfils different requirements such as public safety, drinking water, agriculture, navigation and recreation. The development of the Dutch system for water management is, with hindsight, largely driven by incidents.

The public and political awareness of increasing flood risk was drastically increased by the occurrence of two near-flood situations along the river Rhine in the 1990's, one requiring the precautionary evacuation of 100.000 people. Adaptation to the effects of climate change on the Dutch water system is now an important aspect in national and regional policy plans on spatial planning, public safety and nature development. In contrary to the past not only technical measures (dikes, levees) are implemented to ensure safety to floods: An important aspect of the new policy is that it is safer to 'give room to water' by restriction of human activities within the watershed, rather than to try to control the water system under all circumstances.

Planned Activities and Expected Outcomes:
A continuation of a Dutch Dialogue is felt not needed: this process is ongoing as many research and feasibility studies aiming at climate adaptation are already underway. Examples are the 'Droogtestudie', the 'National study Climate Change and Water Quality', several projects looking into the future of flood risk management along the coast and the main rivers, and studies into the future of regional water management. The most important outcomes of the Dutch Dialogue were that:

(A) Climate Adaptation is more or less the same as Integrated Water Resources Management rather than an isolated process
(B) Not knowledge but true implementation in spatial planning, is the limiting factor in improving water management in the Netherlands.

There are, however, several aspects that deserve further attention – especially in a river basin (Rhine, Meuse) and European context:
1. Techniques for long-term weather forecasting (periods up to a year) are slowly developing. The same is true for systems that use real-time weather data to continuously improve flood forecasts. These developments could be expedited within a European framework by stimulating several ongoing initiatives.
2. Testing and implementation of plans for truly innovative and large-scale adaptive spatial planning could be stimulated further.

A thorough study into the possibilities and impossibilities of insurance as a risk reduction mechanism may be useful.

3.3.2 Bangladesh

Background: Bangladesh is one of the poorest and most densely populated countries in the world. The poor are particularly dependent upon safe & reliable water resources for their health and livelihoods. There are considerable regional and seasonal variations in water-livelihoods relationships: Monsoon rainfall, river discharge fluctuations, groundwater availability, saline intrusion, fish availability and others (differing by region). As a result, rural communities, and especially the poor, in all parts of Bangladesh are severely affected by climate variability. Floods are among the most costly natural disasters in terms of human suffering and economic losses in Bangladesh, and flood damage has been particularly extreme the last 15 years (i.e. in 1992 and 1998). Approximately 20 percent of the country experiences normal annual flooding and all the previous major flooding events have inundated more than fifty percent of the country's total area. Conversely, low rainfall years, such as 1997 and 2001, also have very serious implications for agricultural productivity, fish availability and other aspects of rural livelihoods.

The overall objective of the Dialogue was to develop a **National Strategy** for Water & Climate, based on consensus of key stakeholders and the specification of policy options and specific coping, adaptation & mitigation strategies. The dialogue identified three steps where rapid progress could be achieved:
1) Climate accommodation within the National Water Management Plan

2) Coping mechanisms specifically related to water to be included in the national NAPA
3) Improved co-operation with upstream countries

Planned Activities and Expected Outcomes:
The next phase aims at development of a Plan of Action for adaptation to climate change and climate variability. Planned activities include:
i) Five to seven local level dialogues will be conducted as follow up of Phase-I
ii) A national workshop to review the Strategy Paper developed in Phase-I
iii) An institutional framework for enhancing institutional capabilities will be recommended
iv) Priority issues / areas of action will be set up
v) Local coping and adaptation strategies will be assessed
vi) Identification of vulnerable areas, hot spots and most vulnerable communities will be developed
vii) Indicators will be defined and benchmarks of change will be set up
vii) Integration of climate variability into water policies, the ICZM process and other policies and programs will be recommended
(ix) Further in depth study of some sectoral issues

Expected output will be:
- Local people sensitised
- Local knowledge tapped
- Strategy paper reviewed
- Priority issues identified
- Action Plan developed

Partners and Funding:
Institutional partners include IUCN Bangladesh (Leading organisation), Centre for Adv. Studies, Bangladesh Unnayan Parishad, WARPO, Centre for Water Policy & Development, Int. Inst. for Env. & Development, and several national ministries.

Funding for the follow-up has yet to be explored.

3.4 Regional Dialogues

Regional dialogues provide an opportunity for people and institutions from neighbouring countries or with similar geographic features to discuss the outcomes of long-term regional outlook studies and set up regional information systems, find common solutions, and develop regional strategies. Many international organisations involved in water and climate, such as IUCN, GWP, and several United Nations programmes, have offices around the world. They also have a proven their ability to bring together a broad range of stakeholders to participate in dialogue activities, and this was mobilised to establish several regional dialogues.

The regional scale also proved to be of interest to the climate and meteorological community. Seasonal forecasts are issued at the regional level, and most areas have regional meteorological offices tasked to pass climate forecasts to national governments. The participation of regional meteorological centres and regional development organisations like SADC (Southern Africa) and CRRH (Central America) bring insight and expertise crucial to successful dialogue. Other key participants included national ministries for water, environment, land use planning, development and disaster management, international disaster relief agencies such as the Red Cross/Red Crescent, United Nations agencies and NGOs.

Regional dialogues also include representatives from national government, and can thus play a strong role in stimulating national dialogues on water and climate.

3.4.1 Central America

Background: The increase on water demand and the potential reduction in supply due to climate change, combined with the impacts of extreme climate events and the poor quality of the resource in Central America, lead the region to a very vulnerable stage. It is necessary to develop mechanisms and options to improve actual conditions, but it is also necessary to reduce future stresses on water resources. This will not only require policies and good practices, but also investments and flows of new capital for the development of infrastructure. The availability of

funding for adaptation measures is scarce, and is of little interest to banks and investors. Reducing vulnerabilities due to climate change and in particularly to extremes are going to need a combination of approaches including mitigation options by means of energy and forest and aquatic ecosystems options.

Planned Activities and Expected Outcomes:

1) Development, implementation and systematisation of common methods for quantification water capital and water uses en Central America, including all users of the resources. This will contribute to develop a water balance (supply and demand) which orients water policies for uses planning and assignation of responsibilities.
2) Implementation of framework for adaptation, studying the better options by using recommended (UN-IPCC) methodologies and enhancing the adaptation capacity for: application of specific methods and the implementation of options.

Partners and Funding:

Some initiatives are already in place, working on developing water balances in Central America and studying the impacts of extreme events induced by climate change on the water resources of Central America. There are also other initiatives which are being developed by dialogue partners CRRH-SICA, IUCN and GWP and other regional actors which were involved in the regional dialogue, OAS, CATHALAC, between others.

There has been also some discussions between partners to include DWC-CA results for the IPCC IV-AR, it means there would be necessary to publish peer reviewed, articles. With UICN, the discussion leads toward the development of Adaptation Water coalitions, from the global to the municipal and local, giving a lot of emphasis to risk management and sustainable development.

3.4.2 Small Islands: Caribbean and Pacific

Background: The participating small island countries of the Caribbean and the Pacific represent 28 nations, with a wide range of cultural heritages, languages, economic activities, and political systems. The populations vary in size from 2,000 (Niue) to 8,500,000 (Dominican Republic). The two regions are home to a plethora of fragile ecosystems and vulnerable hotspots, such as coral reefs, mangroves, and tropical forests. The small island countries in the two regions vary from low-lying atoll islands to raised coral atolls and high volcanic islands. These countries are at great risk from the impact of increased climate variability, especially evident in relation to water resources. Increased extreme weather events due to global climate change are already resulting in coral reef bleaching, droughts, floods, and stress on the water supply for all sectors of the population and economy.

The final report of the Caribbean dialogue identified three areas where follow-up activities were sorely needed:

1. Execution of the key objectives of the ACCC – Adapting to Climate Change in the Caribbean, and of related programmes
2. More systematic identification of health impacts
3. Exploration of the feasibility of establishing an insurance pool

The Final report of the Pacific dialogue signal that priority and support were needed for five strategic responses:

1. use of seasonal and inter-annual forecasts
2. hazard and risk management programmes
3. vulnerability and adaptation assessments
4. a Pacific climate information and prediction system
5. drought assessment and response

Originally planned as two separate regional dialogues, the Caribbean and Pacific dialogues co-ordinated their efforts, which resulted in a joint action plan for Small Island States.

Planned Activities and Expected Outcomes

Caribbean:

- Establish effective collaboration with the Caribbean Community Climate Change Centre (CCCCC) in activities related to climate and water evolving out of the CDWC process. The

CCCCC participated in the 3rd WWF as a member of the Caribbean delegation and has been designated a reviewer of documents produced by the CDWC from a climate perspective.

- Continued public awareness campaign throughout the region on water, climate change, and other sectoral issues (e.g. tourism, health, food security).
- Proposed participation (subject to the availability of funding) of Caribbean persons in the upcoming training programme in hydrogeology organised by SOPAC for 2003.

Pacific:

- The Pacific region hosting the UNESCO International Hydrological Programme Regional Steering Committee meeting for Southeast Asia and the Pacific to be held in October 2003 in Fiji, in collaboration with SOPAC.
- UNESCO/SOPAC will organise an associated two-day symposium on “Managing Water Resources under Climatic Extremes and Natural Disasters".
- Exchange of climate information and capacity building through the Island Climate Update and a Hydrology Training programme for the Pacific by partnership arrangement between WMO, UNESCO, SOPAC and NIWA with a financial contribution from NZAID.

Small Islands (joint activities)

- Increasing collaboration between SOPAC and CEHI and work to implement the Joint Programme of Action for Water between Caribbean and Pacific SIDS. The Joint Programme of Action received the endorsement of the Ministerial Forum at the 3rd World Water Forum, held in Kyoto, Japan, 2003. Both organisations will invite each other for relevant meetings and share information on water and climate as agreed upon by Memorandum of Understanding signed at the 3rd World Water Forum.
- CEHI and SOPAC to jointly submit the Joint Programme of Action for Water to the SIDS+10 Conference to be held in Mauritius in 2004 for endorsement and support.
- Submission of the Joint Programme of Action by Caribbean and Pacific SIDS to the General Assembly of the World Meteorological Organisation, May 2004 for funding support for aspects of the Programme.

The general outcomes of the Small Islands follow-up activities are:

- Capacity generated in water resources assessment and management
- Climate information exchanged and made available for the management of water resources

Partners and Funding:
Lead partner for the Pacific Dialogue on Water and Climate is the South Pacific Applied Geoscience Commission (SOPAC). Other parties actively involved in the PDWC follow-up include: NIWA, UNESCO, WMO, NZAID, CEHI, OAS, ADB.

The total budget for activities in the Pacific is 90,000 USD, of which 40,000 has already been committed by partners as in kind support. External funding for the remaining 50,000 is currently being sought.

3.4.3 Mediterranean

Background: The Mediterranean dialogue provided a benchmark and critical mass of awareness for the development of climate change adaptation frameworks for action and helped to build synergies to improve integration of water resource and wetlands management.

The Athens Roundtable identified challenges on different fronts to be addressed at the local, national and region levels; including:

- Awareness raising as many countries have yet to respond in detail on this issue
- Building networks, as expertise and good science on which to base decisions is lacking
- Case studies of what & who has been successful, and unsuccessful in adaptation.
- A regional-level adaptation framework for mutual exchange and support in the process

Enabling institutional arrangements and collaborative processes were required. Three strategic technical dimensions were identified: (1) reducing risk to hydrological variability and extremes (2) closing the demand-supply gap in water resources, and (3) balancing human and nature needs.

Planned Activities and Expected Outcomes
The IUCN Centre for Mediterranean Co-operation will address the awareness and network building challenges through dissemination of the products produced under the dialogue to key stakeholders in the region. One tool is an information package containing a CD of all outputs, conclusions on adaptation frameworks for action, and the IUCN global publication Change, incorporating results of all 5 IUCN-lead regional dialogues in three languages.

The Center will focus on balancing human and nature needs, through a series of projects under the Water and Wetlands theme, one of the Center's five theme areas. Initial projects will focus on integrated catchment management and mainstreaming environmental consideration in integrated basin management.

Partners and Funding:
Leading partners in the proposed follow-up activities include:

- IUCN Member Countries in the Mediterranean
  - GWP Mediterranean
  - Ramsar and UNFCC Country Focal Points
  - IUCN Water and Nature Initiative

Core funding support for the Centre comes from Ministry of Environment, Spain, Junta of Andalucia, and project level support for the water co-ordinator also includes funds from IUCN-WANI and Ministry of Foreign affairs, Italy.

3.4.4 West Africa

Background: The dialogue process conducted in West Africa was facilitated by IUCN-West Africa, the West Africa Water Partnership (GWP-WAWP) and the Inter-States Committee for Drought Control in the Sahel (CILSS). It involved representatives of government institutions (especially climate change focal points) and of river basin authorities (OMVS, ABN), members of the civil society, researchers and teachers. All West Africa countries, with the exception of Cape Vert, Liberia and Sierra Leone, were represented in one or more of the consultation meetings organised as part of the Dialogue. A Regional Adaptation Strategy Document being drafted.

One of the key findings of the Dialogue is that West Africa's level of preparedness to climate variability and change is low. To respond to this situation a number of remedial measures are considered in national communication developed by individual countries in the region. It should however be noted that the effective implementation of many of these proposed actions require a regional approach, either because they relate to internationally shared water courses, or because they require human and financial means that are beyond the capacities of the countries taken individually, or finally because it is more logical that some of the proposed climate change response options be envisaged at the regional level in order to achieve economies of scale.

The final report of the West Africa dialogue identified seven "inter-related axes of intervention" that needed to be pursued:

1. to benefit from an improved understanding of regional climate change impacts and patterns
2. improve awareness of the predictable impacts and relate these to major development challenges
3. greater involvement by regional institutions in the International Conventions on Climate Change and the Environment
4. IWRM approaches
5. Strengthened capacity of the river basin organisations to absorb and implement the coping agenda
6. Strengthening of existing early warning systems
7. Implementation through the piloting of adaptation interventions, within an up-scaling framework

Planned Activities and Expected Outcomes
The Regional Adaptation Strategy currently being finalised will be the main tangible outcome of the dialogue. This Strategy will complement and support efforts being made at the national level. The Strategy will assist the States of the region in the development and implementation of their national adaptation plans of action (NAPA). The general objective of the West Africa Regional Adaptation is to strengthen the region's capacity to cope with climate variability and change affecting water resources and aquatic ecosystems. The Regional Adaptation Strategy is supported by the following specific objectives: (1) Improving and sharing relevant decision-support scientific knowledge and information base; (2) Promoting integrated and sustainable water resource and ecosystem management (IWRM, wetlands and coastal zones); (3) Putting in place a regional consultation mechanism on water and climate change ; (4) Identifying, promoting and disseminating relevant adaptation technologies, techniques and policies.

As reflected by the 3rd Strategic Objective, stakeholders in West Africa called for the continuation of the Dialogue in one way or the other, for example by setting up a regional mechanism for consultation. Among the arguments given to justify this recommendation are the following: (a) many national Climate change focal points feel the need for support from scientists before and during the negotiations; (b) there is a real need for consultation among States, at least among Climate Change National Focal Points, for a co-ordinated West African approach at international negotiations more particularly; (c) in West Africa, it was felt that no effective adaptation strategy can ignore the regional dimension (especially because of the high water inter-dependency of countries).

In response to this recommendation, it was suggested to consider the establishment of a regional consultation platform (or dialogue continuation) as one of the components of the regional Strategy being developed. Some felt that in the event that the Regional Strategy is delayed or jeopardised, we should consider the establishment of the regional consultation platform a stand-alone initiative.

Some benchmark dates:
- End June: Regional Adaptation Strategy developed along with communication brief
- Fundraising activities: From June to September 2003
- Start implementation of Strategy: October 2003

Partners and Funding:
Partners have been listed above.

Modest CIDA funding is available to support part of June-September activities, but funding sources to implement the Strategy have not yet been identified.

3.4.5 Southern Africa

Background: Four issues emanating from a discussion paper were discussed at the dialogue. First, was the question of the availability of necessary skills among stakeholders to enable them apply the ecosystem-based and community-based natural resources management approaches in order to assist freshwater ecosystems to adapt to changes in climate. Several propositions were made, e.g. that different stakeholders and the type of information they need should be, first of all, identified and addressed. Secondly, there was a need for capacity building, specifically technical training in Integrated Water Resources Management, an awareness programme that provides concrete evidence of changes in climate, and measures on how to deal with the impacts.

The second issue was the feasibility of using demonstration projects to test preparedness and adaptation strategies before scaling up the efforts. Participants recommended demonstration projects to test resilience of structures against disasters. The third point was on integration of national policies and laws into ratified or signed international agreements. Panelists observed that countries that have not yet revised their policies or laws are deficient in these instruments because the extant ones are outdated since they were put in place by the 1960s. This being the case, they fail to capture new ideologies on environmental issues. For instance, such laws or policies do not address climate change variability. There was an opinion, therefore, that laws will need to be strengthened since the private providers are entering the water market.

The fourth issue considered was on the feasibility of insuring capital equipment, goods, and services and the need for concerted efforts when implementing mitigation or adaptation measures. A number of options to minimise risk were presented, ranging from improved infrastructure designs, building-in costs of recovery when pricing water and other wetland goods and services, e.g., charging levies.

Key messages from the dialogue were directed at regional decision makers, stakeholders, and NEPAD, then international conventions (UNFCCC , Ramsar, CCD, CBD) and donors. Essentially, the messages acknowledge that Southern Africa is under threat from climate variability and change impacts, which are threatening the region's water and wetlands resources, and other sectors, including human life. The cost of coping with these impacts is much less than that for responding to the effects after the disasters have occurred.

Planned Activities and Expected Outcomes
IUCN-ROSA has initiated a dialogue that aims at developing a regional adaptation framework for the water and wetlands sectors. Most important of all, there is solid commitment from stakeholders, thereby enhancing its regional network on integrated management of climate change, water and wetlands. Lastly, the region has formulated a fund-raising strategy to enhance the level of awareness and preparedness. However, the region needed the support of international conventions (UNFCCC, Ramsar, CCD, CBD) and donors for it to cope and implement the adaptation framework.

Partners and Funding:
There a number of initiatives focused and climate change in the region. These include the Drought and Flood Management strategy developed by the SADC Water Sectors, SADC Strategy to combat Desertification, as well as numerous national efforts. The dialogue facilitated by IUCN ROSA strongly recommended that IUCN ROSA should play a leading role in facilitating co-ordination and fundraising for the implementation of the adaptation framework. In this endeavour, IUCN ROSA plans to work with GWP Southern Africa, the Southern Africa Millennium Ecosystems Assessment and the newly created SADC Infrastructure and Services-Water Division, to facilitate the implementation of a regional adaptation framework.

3.5 ADAPT Dialogues

Background
The ADAPT dialogues focused specifically on developing adaptation strategies to alleviate the negative impacts of climate change and climate variability on food production and the environment. The project studied seven major river basins across the globe: Syr Darya (Central Asia), Volta (Ghana, Burkina Faso), Walawe (Sri Lanka), Zayandeh Rud (Iran), Mekong (South-East Asia), Rhine (North-Western Europe), Sacramento (U.S.A.).

Specific outputs relevant to this project include a field tested method for downscaling regional and global climate scenarios to the sub-river basin scale, spatially resolved hydrological scenarios for all participating river basins, and estimates of present and future major crop production under these scenarios. After showing the impacts of climate change on food and environment, the ADAPT team concludes that innovative management and adaptation strategies are required. These will have to be developed in targeted discussions between stakeholders from research, water management and policy making. (Further information on the ADAPT project are available at: www.geo.vu.nl/~ivmadapt)

The outputs from the ADAPT project contributed knowledge and understanding to both the Dialogue on Water and Climate as well as the Dialogue on Water, Food and the Environment.

Planned Activities and Expected Outcomes
The overall hypothesis of the follow-up project (ADAPT II) is that solutions to alleviate impacts of CC are found by increasing resilience of communities, accomplished through stakeholder dialogues. These dialogues will deliver management strategies in terms of water related engineering options as well as policy and adaptation measures. Different assessment and presentation scales have to be considered to involve farmers and other stakeholders at the village level as well as water and food managers at the basin level.

The concept that underlies this project is that of bringing together

- assessment of food security and river basin vulnerability under different climate scenarios, and
- analysis of alternative adaptation strategies in the context of water and food policies, sustainable development and poverty reduction

The main activities and outputs include:

- Scenario analysis, including the impacts of *climate variability*
- 'Hotspots' mapping and vulnerability assessments
- Adaptation strategies for food production
- Institutional capacity building and networking

Partners and Funding

Major partners include IWMI (HQ and regional offices), WRI Ghana/ZEF, TMU, WRC, IVM/VU, IHE, FAO, SEI and ITC. Two thirds of the estimated 3M (USD) budget required for the ADAPT II project (4 years) has already been obtained.

3.6 Call for action

The synthesis report of the Dialogue on Water and Climate, "*Climate Changes the Water Rules*", identified six main areas where further work was required in order to create an "enabling environment" for the water sector to better cope with the impacts of present climate variability and long-term climate change. Taking stock of the planned follow-up activities describes above, this section assesses how the various partner activities meet the needs identified by the recommendations and identifies areas where further efforts are required.

NAPA's

In addition to the process of developing national Integrated Water Resources Management (IWRM) plans at national level also National Adaptation Plans of Action (NAPA's) provide a useful mechanism for mainstreaming coping strategies into national adaptation plans. Only two dialogues, the Bangladesh National Dialogue and the West African Regional Dialogues, have recognised the importance of the NAPA mechanism and have made plans to pursue this approach to support adaptation efforts at the national level.

There is a need for the regional dialogues to incorporate the NAPA framework into their regional action plans and to provide assistance and guidance to participating countries as they formulate their national adaptation plans. This can be accomplished through informed participation in the regional activities or through the creation of new national-level dialogues similar to the one organised in Bangladesh.

Vulnerability Assessment

Although top-down scenario-based model studies for vulnerability assessments at the national level are fairly well developed, easily accessible and frequently used, they often fail to capture vulnerability at the local or basin scale. This poses a problem because 1) vulnerability can vary greatly with a given country and is primarily manifested at the community or basin scale, and 2) water managers mainly operate it is at this scale.

Grassroots-level tools are currently being developed to assess the vulnerability of particular communities, cities, ecosystems, and agricultural sub-regions among others. But this does not seem to pose a problem to the majority of basin dialogues, the majority of which have included a vulnerability assessment study as a key activity of their plans. Similarly, at least three regional dialogues (Central America, Caribbean and Pacific) will conduct vulnerability assessments, as will Bangladesh.

There remains a need to continue developing tools to identify the water-related social, economic and environmental vulnerabilities to climate change and extremes through both the scenario-based model studies and the best available grassroots vulnerability assessments. Although local action can (and should) be taken without waiting for priority comparisons between different assessment scales, adaptation strategies at the local level must be taken into account in formulating integrated national coping and adaptation plans.

Prediction and Preparedness
Present predictions can provide water managers with reasonably accurate short-term weather information (days up to weeks), and predictions for the longer term (seasons) are improving in reliability.

Although this fact has been recognised by all dialogues (at all scales), predictive capacity has yet to be fully translated into increased preparedness. There remains a need to better disseminate climate prediction information to weather managers, decision-makers and user groups, especially farmers. Nearly all dialogues have identified the better use of available predictions as part of their proposed work plan.

Research, Monitoring and Knowledge Sharing
It is widely recognised that research and information sharing will accelerate understanding of how to build resilience and moderated the impacts of extreme weather and climate. Unfortunately, the links between climate, meteorology and hydrology are only partially understood.

Reliable and accessible information is required to assess vulnerability, manage risk, and inform decision-makers, and all but two of the dialogues have identified the need for more research monitoring and knowledge sharing in their proposed action plans. The dialogues provide a means not only to promote required research, but also to disseminate results.

Capacity Development
To cope with increasing hydrological variations and weather extremes, water managers need new skills. Climatologists too have to work in different ways to provide the appropriate help to their water colleagues. But the "self-help" potential of local agencies is often limited by available resources – technical, institutional and financial. Many governments too require significant outside support to implement adaptation strategies for coping with changes in climate.

All of the regional dialogues recognised the importance of capacity building in their proposed action plans, as did three basin dialogues (San Juan, San Pedro, Small Valleys) and the Bangladesh National Dialogue. Several dialogues reported that institutional capacity was one of the main obstacles to better preparedness and adaptation. There is a need to identify major shortcomings within the relevant institutions framework (at the local, national and regional levels) in order to implement the adaptation plans.

Public Awareness
Public awareness is essential to building the political will to address the challenges of climate variability and change. Dialogue partners have used a wide variety of approaches, using different types of media. Examples include videos (Lena, San Juan, educational materials for schools and youth groups (San Pedro, Central America), fact sheets (all dialogues), press releases (Caribbean, Pacific), magazine articles (Murray-Darling, San Pedro) and web sites (Caribbean, San Juan).

In the proposed work plans, nearly all dialogues have recognised the importance of awareness-raising materials and have been learning from each other's experiences.

4 Meeting needs with commitments

This chapter aims to match commitments made at the WWF3 with the needs expressed by the DWC's local, national and regional dialogues and by practitioners at the WWF3. Opportunities for co-operation are identified as well as the possible mismatch of commitments and needs. In addition, we identify communities highly susceptible to climate impacts but that did not express needs or commitments in the context of water & climate, nor participated in the Dialogues. Here building awareness will be crucial next to strengthening the capacity to cope with the impacts of increasing variability of the world's climate. With its conclusions this chapter aims to contribute to and inspire future co-operation on water & climate issues.

An analysis of the WWF3 and the Dialogue on Water & Climate identifies four main areas around which the action and commitments can be grouped. The sections in this chapter address these four areas:

- **Community level actions for adaptation**
- **Advocacy for political and social mobilisation**
- **Partnership development and information sharing**
- **Capacity development focused on technical assistance, training and research**

Although these needs are treated here separately, a successful strategy to cope with climate change and variability will require a combination of all four.

In general, the analysis shows that most of the commitments focussed mainly on IWRM and climate research. The largest gap between 'actions called for' and 'commitments gained in return' exists for Africa and in the Nature and Environment theme. Disaster management and IWRM have made the least commitments relative to the number of calls for action. Communities that – based on the WWF3 reports – have a weak link with water & climate issues and will require special attention include those related on poverty alleviation, disaster preparedness, groundwater and financing.

This chapter is supported by the opinion that agenda setting at the global, continental, and even national scale misses many of the most important needs. Relatively 'local' dialogues can help to reveal meaningful priorities, but implementation most often requires support from national governments. The transcendent challenge, therefore, is not only to help put in place the local support systems, but also to mainstreaming coping and adaptation into national priorities and the international development agenda.

4.1 Community level actions for adaptation

Local, national and regional dialogues served to build knowledge and exchange experiences in coping and adaptation strategies at the practical level. Furthermore, these locally driven, multi-stakeholder partnerships have been developing problem analyses and action priorities for coping and adaptation in order to enhance water safety and security. It should also be noted that many dialogue participants were informed as much (if not more) by the process as they were by the results themselves.

However, to successfully implement specific actions and measures at the practitioner level, the dialogues will require support through advocacy, networking and capacity building. And for most dialogues, this will require some external expertise. One potentially interesting strategy would be to develop an open and inclusive platform for contributing to – and benefiting from – the knowledge gained in addressing similar challenges elsewhere.

The needs of local partners are varied, but much of the commitments by several groups at WWF3 focused on applied research and data analysis (see Appendix G). Although these are highly important and should be pursued through partnership building and cross-fertilisation, further efforts will need to be initiated to meet the dialogues' other needs for advocacy, networking and capacity building.

It should also be noted that the dialogues asked for more specific and practical instruments and tools than the research institutes and (inter)national research programs committed to. In addition, more emphasis was placed on the use and exchange of information generated than is on building new tools.

Matching Dialogues and WWF3 commitments
There was only one WWF3 commitment aimed directly at promoting local level action:

- The Red Cross Climate Centre in the Netherlands, committed to support Red Cross and Red Crescent National Societies to become better prepared for climate change and extreme weather events.

4.2 Advocacy for political and social mobilisation

Participants of the WWF3 and the Dialogues stressed that governments, multilateral agencies, civil society organisations and the private sector should engage in a concerted effort to strengthen disaster preparedness and risk management policies and programmes. Many have recommended these issues be included as an element of national/regional IWRM strategies. This highlights the important change from disaster response to hazard assessment & risk management in the context of IWRM. However, few concrete commitments were made to this end, although a number of other non-climatic policies were identified to strengthen disaster management, including forest management and inland waterway transport.

From the perspective of the Dialogues, advocacy in water and climate has three main strands:

- Raising the profile of the Dialogues at the national level, so as to streamline the implementation of adaptation action plans and integrate them into national development planning.
- Converting more stakeholders in developing countries to the water-and-climate cause, so as to foster establishment of more Dialogues to develop water related adaptation and coping plans as part of Integrated Water Resources Management plans and/or National Adaptation Programmes of Action (NAPAs).
- Mainstreaming of water-and-climate issues in the global development agenda.

In calling for the design and implementation of strategies to respond and adapt to the impacts of climate change and variability, it was noted that informed multi-stakeholder approaches (e.g. dialogues) at national, basin and regional level should be strengthened to prepare action plans for adaptation (such as NAPAs). Flexibility in the planning, innovative policies and new initiatives are key. A number of institutes commit to support the development and demonstration of new integrative management approaches to adaptation. The WWF-3 calls upon them to be innovative, engage political leaders and to prioritise people, taking into consideration differences from gender, age, race, ethnicity, and economic status. In addition an adaptation framework should be regional specific. Securing financial support for the preparation and implementation of national water sector adaptation plans requires special attention, since few commitments have been made in this direction.

An important challenge is to recognise and make full use of new and progressive management options, like non-conventional water resources, desalination and inland waterway transport as well as socio economic options such as income diversification, temporary migration, improved information etc. As was mentioned above it is advised to implement adaptation policies through piloting of adaptation interventions, within an up-scaling framework.

The WWF3 strongly called for Integrated Water Resources Management as the inter-sectoral framework within which als adaptation to and coping with changing climate should be addressed. Implementation of such National water management plans and inter-state and cross-border co-operation requires commitment from government. Though few commitments have been made by governments the *Ministerial declaration Paragraph 28* offers an entry for discussions at the governmental level (see also 2.4).

The priority to cope with changing climate at regional and international basin level is not prominent yet, although the importance of climate variability was noted in the sessions of the Southeast Asia Network on Capacity Building for IWRM (SEACapNet) and NEPAD

Matching Dialogues and WWF3 commitments
Opportunities for matching partners from the Dialogues and WWF3 participants include:

- The Netherlands Red Cross, committed to advocate the need to include & mainstream Disaster Preparedness and Risk Reduction in sustainable development programmes, to work with:
  - San Juan Dialogue on a Strategic Plan for disaster prevention and mitigation; Risk management; active Basin Committees; Enforced legislation on disaster prevention and mitigation based on local realities
  - Small Islands Dialogue on hazard and risk management programmes
- UNDP, -committed to work in three countries-, assisting the West African Region, Murray-Darling and Bangladesh to develop national adaptation plans & support capacity building
- Co-operation between GEF, -committed to develop an action plan on adaptation to Climate Change-, the Dialogue Secretariat and the countries that develop national adaptation plans, supported by UNDP
- Focussing and harmonising support for the Small Islands Dialogue of ADB, SOPAC and other donors who consider broadening their support base for coping facilities for small island states
- The EU to support case studies under its 6th Framework Programme and programme for Water Governance in the Dialogue areas, in particular in West Africa, the Mediterranean, the Aral Sea and San Pedro.
- The World Water Forum of Journalists to produce articles on water and climate in Asia and Africa.

4.3 Partnership development and information sharing

A great deal of research and development has gone on in recent years to improve forecasting, assess vulnerability, and produce tools and guidelines to facilitate adaptation planning. The information database and the pool of experts are both growing rapidly. There are also plenty of individual coping actions being implemented by local communities, farmers' groups, etc, that make interesting case studies as potential models for others. The snag is that awareness of available information tends to be confined to an inner circle of conference-goers, academics and committed professionals. Many of the agencies and individuals that will be a vital part of efforts to adapt to climate variability do not have the time or resources to be proactive in keeping up to date with all that is happening in the water-and-climate field.

Several commitments to develop information sharing networks were made at WWF3 (see appendix G) by regional groups like SOPAC, NARBO and REDICA. Likewise, international organisations such as GWP (toolbox), CAPNet and IFNet have been involved in similar efforts. Participants at WWF3 and in the Dialogues felt that it was sometimes difficult to access specific information, stating that it was often scattered and fragmented. It was recommended that some kind of catalogue or database should be produced to assist users in locating knowledge to meet their specific needs.

Furthermore, it was suggested that the feasibility of different adaptation measures ought to be shown in demonstration projects prior to up scaling. No commitments have been made to carry out site specific demonstration projects for adaptation. If appropriately supported by donors and the research community, there appears to be interest in the follow up of the Dialogues on Water & Climate to fill this gap.

Matching Dialogues and WWF3 commitments
Opportunities for implementing the priorities of the dialogues and the WWF3 through the WWF3 commitments include:

- Five countries (Argentina, China, Bangladesh, The Netherlands, Vietnam) committed to learn from each others experiences in flood management concepts & strategies, preparation of integrated flood management plans, structural & non-structural measures, raising public awareness and participation, and strengthening the implementation "powers" of central government top level.
- The Mediterranean, West Africa and/or Southern Africa Dialogues co-hosting one of the research meetings of the International Geographical Union Commission for Water

Sustainability that promotes the exchange of best practices in different climatic and socio-economic environments in different parts of the world. Focus may be on Water harvesting techniques

- Partners from Australia, US [Department of Agriculture], and China to collaborate with the Murray-Darling and the Aral Sea Dialogue on knowledge of climate variability & change to support agricultural management.
- SOPAC, CAPNET, UNESCO-IHE, REDICA to expand their work in capacity building and support of regional networks on Water & Climate.
- The Network of Asian River Basin Organizations (NARBO) [WARDEC, Asian Development Bank (ADB) and Asian Development Bank Institute (ADBI)] to work with any of the Asian dialogues in achieving IWRM in river basins by strengthening the capacity and effectiveness of river basin organisations.

4.4 Capacity development focused on technical assistance, training and research

Participants at WWF3 recognised that capacity building and the exchange of best practices are required to stimulate action and develop the necessary skills among stakeholders to pursue adaptation to changes in climate. WWF3 called for information systems and services, integrating the observational, model and social water / land use data and products, and for international distribution of scientific data for actual social applications. Water harvesting techniques are identified as particularly promising, warranting the establishment of a water-harvesting network, although no specific commitment has been made in this direction.

Specific areas that require capacity building according to the WWF3 and the dialogues include public awareness in Africa and the energy sector. And based upon the theme reports, communities working on poverty alleviation, groundwater and financing should also be attended to.

Although the commitments specify topics to attend to in capacity building, little is said about the parties to be involved. The West African Dialogue addresses this in calling for strengthening the capacity of river basin organisations in particular. Capacity building and information exchange should be framed in the larger context of implementing a coping agenda and achieving major development goals.

Participants expressed special concern to halt the further deterioration of hydrological & meteorological data collecting networks, essential for water & climate sectors. This call seems to be met by many commitments from the global science community. Following up its commitment the degradation of site specific in-situ data networks should be given special attention.

An important research question remains the development of integral adaptation strategies that e.g. reduce and mitigate water-related disasters on one hand and ensuring adequate environmental flows on the other. The identification of regional vulnerabilities asks for special attention too.

Data requirements for planning, design and development of water resources systems (water supply, irrigation, hydropower production, navigation, recreation etc) and operational management are stressed. An example is hydrological data for (re)designing reservoir capacity as an adaptation to climate variability and change. Experience from the dialogues underlines that the data collection and exchange requirements for operational day-to-day adaptive management are significantly different and less well documented than those required for long-term forecasting and planning.

Matching Dialogues and WWF3 commitments

Opportunities for matching the capacity building needs of the dialogues through the WWF3 commitments include:

- Research institutions in Europe (UK [MetOffice], Netherlands [KNMI], Germany, WMO), US [Columbia university], Japan, Australia & South America that committed to work on high resolution climate forecasting tools for water managers to work with
  - Small Islands Dialogue on a Pacific Climate Information and Prediction System, including the use of seasonal and inter-annual forecasts
  - Thukela Dialogue on a hydrological modelling system for applications in risk management

- Applied research initiatives (Red Cross, Wallingford, IUCN, SEI, Wageningen UR) that committed to develop tools for disaster risk reduction to work with:
  - Small Valleys Dialogue on a Flood alert mechanism
  - West Africa Dialogue on strengthening early warning systems
- IFNET that committed to develop flood runoff models and facilitate international co-operation in flood management to work with:
  - Small Valleys Dialogue on Flood hazard assessment and the Monitoring of flood conditions
- A consortium of private partners, including Munich-Re, that committed to continue developing risk management and risk spreading financial mechanism and instruments to work with:
  - Small Islands Dialogue on establishing an insurance pool
  - Netherlands Dialogue on evaluation of insurance as a risk reduction mechanism
- The River Bureau, Ministry of Land, Infrastructure and Transport, Japan, committed to include inland waterway transport (IWT) as an option in disaster management, to work with:
  - Lena Dialogue on a strategy on flood preparedness, aligned with national interest
- Co-operation between applied research initiatives (Red Cross, Wallingford, IUCN, SEI, Wageningen UR), -committed to develop tools for adaptation-, and the dialogues, possibly starting with Southern Africa, Small islands and the Mediterranean. Special attention could be given to the Feasibility of different adaptation measures and demonstration projects to test adaptation strategies prior to up-scaling
- Collaboration between IUCN/IISD and SEI, -committed to support development, formulation and demonstration of new integrative approaches to adaptation-, and river basin organisations in West Africa, Mediterranean Dialogue, Central America and the ADAPT Basins
- The Global Environmental Change Programmes (IABP, IHDP, WCRP, Diversitas), the NOAA / US Water Cycle Program, the International Association of Hydrological Sciences (IAHS) as well as NASDA and ESA (Europe), -through CEOS and IGOS-P-, have committed to international co-operation on water cycle research. One of these programs could focus on the development of tools and management systems, possibly running a case study with the Yellow River and/or Lena Dialogue.
- Applied research initiatives (Red Cross, Wallingford, IUCN, SEI, Wageningen UR) to work with the Aral Sea, Lena and/or Murray Darling Dialogue to develop and implement tools for adaptation, disaster risk reduction, ecosystem management and sustainable livelihoods.
- The IGOS-P water cycle theme and the WHO to examine the status of insitu water cycle measurements, halt the deterioration of existing networks and further the development and dissemination of new (hydrological) measurements required for enhancing river basin management.
- The International Association of Hydrological Sciences (IAHS) to work with the Southern African Dialogue on capacity building for local water resources management.

5 Recommendations and Outlook

5.1 Introduction

Chapter 5 aims to give an outlook on the issues ahead and outlines a proposed Co-operative Programme on Water and Climate (CPWC). Chapter 5 builds on the previous chapters in which the results of the WWF-3 were presented (Chapter 2), the outcomes and future of the national, regional and basin dialogues were presented (Chapter 3) and the comparative analysis of these results (Chapter 4).

5.2 Outlook

5.2.1 Objectives

Developmental Objective

Contribute to the achievement of sustainable development, in particular the MDGs, through the development and promotion of co-operative partnerships on coping and adaptation policies, strategies and measures at national, basin and regional level. These partnerships will help reduce the vulnerability of the poor against the detrimental effects of climate variability and climate change.

Intermediate Objectives

Support partnerships at national, regional and basin level to develop policies, mechanisms, activities and tools that enable water sector practitioners to adapt to, and more effectively cope with weather and climate impacts at the regional, national and community levels.

Specific Objectives

The specific objectives of the CPWC are:

- To assist national, regional and basin level partnership initiatives (demand driven) to develop and implement coping and adaptation plans for climate variability and change, preferably as part of national and/or river basin IWRM Plans.
- To improve coping capacities through demand-driven tool development, knowledge generation and exchange.
- To improve North and South and inter-regional collaboration between governmental and non-governmental organisations including the private sector and the knowledge sector on coping with water and climate.
- To create linkages between international and regional water and climate communities and their initiatives in the realms of policy development and the scientific research agenda.

5.2.2 National and Basin level Adaptation Plan Development

Towards the future the primary concern remains to develop or improve upon practical adaptation plans to climate imponderables.

Factoring climate-related hydrological variability into water management practises including policies, planning, designs and implementation activities is quite a challenge for the water resources community – and not only the government agencies responsible for water management. The disaster management community, lead mainly by NGO's, has begun to recognise the increasingly structural nature of the changes and is moving its focus from relief efforts towards a more preventive approach oriented on preparedness. The quickly increasing claims on water related damages have driven the largely private insurance world to consider new instruments and approaches for spread risks.

Thus, the DWC has learned that addressing changes in hydrological regimes is best pursued by a multi-pronged and multi-stakeholder approach. Coping with the effects of climate changes requires addressing physical/structural, economic, social, environment and institutional domains and requires collaboration of government, NGO's, private sector and the science community. In other words, coping with climate variability and climate change need to be addressed within the context of integrated water resources management. Integrated water resources management is primarily a local responsibility, and therefore requires local action planning. It is fitting that the WSSD (September 2002) called for the preparation of national IWRM plans by 2005. Participants at the WWF3 stressed climate concerns and adaptation policies and activities should be included in these plans.

Adaptation Plans should typically follow the following process:

- Start with a thorough, multistakeholder assessment of the impacts and vulnerabilities/risks on the water systems of increasing climate variability and climate change;
- Having assessed the impacts and vulnerabilities of climate on the water sector, the potential coping options (including policies and strategies) should be worked out and their feasibility (including implementation capacities and costs);
- Policy decision makers decide on the way to take and the means to be made available;
- Implementation of policies (including capacity development) and monitoring of impacts

A challenge for national and river basin adaptation plans is to establish clear links between poverty alleviation and sustainability with climate variability/change. A second challenge is to show clearly that the adaptation plans are cost effective especially when factored into non-climate policy and ongoing projects. There is a widely shared hesitation among financiers to support very costly, mostly structural adaptation works. The DWC and discussions during WWF-3 have shown that pre-emptive activities such as awareness raising, shelters and warning systems can be relatively cheap and yet very cost effective.

5.2.3 Water and Climate and the "Global Commons" debate

The call for national IWRM plans is paralleled by the call of the UNFCCC and the COPs to prepare National Action Plans for Adaptation.

Being involved in the NAPA preparations is important because of the link to the global climate and sustainability debate under UNFCCC and its funding mechanisms. The Marrakech Accords in 2001 contributed the Special Climate Change Fund, the Least Developed Country Fund and the Adaptation Fund. Each of these funds is operated by GEF. Presently, the guidelines for these funds are being developed and several countries are in the process of preparing National Adaptation Programmes of Action (NAPAs). These plans are developed under the National Ministries of Environment and particular the National Focal Points. For the water sector it is important to ensure that the sector adaptation plans are incorporated into the NAPAs.

An important challenge for the policy debate about adaptation is how adaptation in the water sector is linked to the 'global commons' principles underlying the conventions for climate, biodiversity and wetlands, and the poverty agenda. This question was addressed by an interagency group of EU, GEF, UNDP, WB, DGIS, DFID, SIDA, UNEP, IUCN and IISD in a document "Poverty and Climate" (mid 2003). The paper discusses mainstreaming poverty into climate discussions and the need to mainstream climate considerations and its impacts into national development planning. It acknowledges the importance of institutional co-ordination between the Ministries of Environment (including the National Focal Point) and sector Ministries including Water at the national levels. The paper also recognises the importance that this mainstreaming at the national level (the demand side) is to be matched by mainstreaming in international support programmes including of GEF, EU and other international and bilateral agencies.

One particular challenge for adaptation plans is to keep them within reasonable budgets. To date, there has been a tendency to include large and very costly construction activities under adaptation plans. This tendency has shifted with the realisation that much less costly awareness raising and preparedness activities are also very effective for adaptation, and including increasing the actual use of sometimes disregarded traditional coping mechanisms such as rainwater harvesting and cropping patterns, among others. Adaptation plans do not necessarily have to be very costly.

5.2.4 Tools

The IWRM and NAPA plan development requires external support in terms of capacity development and tools for planners. Operational tools which have been identified during the DWC. Tools such as:

- guidelines to conduct a multi-stakeholder Dialogue
- a compendium of coping options
- a bibliography
- climate impact assessment tools for national/basin level
- assessment tools for hot spotting

- weather forecasting tools

These tools need developing and dissemination to develop capacities of water managers at the national and river basin level to cope as soon as possible.

5.2.5 Research needs

Further, the WWF3 supports the need for more fundamental research to develop better knowledge base and to develop operational tools. The research agenda includes among others (see also Chapter 4):

- Improved understanding of the links between climate, meteorology and hydrology and the impacts on local water availability, sustainability and livelihoods of people and ecosystems
- Recognition and improved knowledge about traditional coping and resilience capacities, and linking these to national coping and adaptation strategies and practises.
- Community level vulnerability assessment tools for mega cities, coastal zones, small islands, wetlands etc.
- Better knowledge about resilience and coping ability of ecosystems and their impacts upon transitions affecting human health and ecosystems health
- Increased number of instruments for risk management and risk spreading also for the poor in developing countries.
- Training programmes in adaptation and coping for water managers

5.2.6 External Support

Some of the multilateral and bilateral agencies presented their positions concerning the importance given to Water and Climate in Kyoto, notably GEF, DGIS and SIDA. The positions of the bilateral External Support Agencies Sida and DGIS as they were presented to WWF-3 are provided in annexes to this Chapter.

Multilateral and bilateral support to IWRM plans

The first line for external support to adaptation plans for the water sector is through the normal multilateral and bilateral external support mechanisms for sector support. And this support is linked to the availability of national IWRM plans.

Global Environment Facility

GEF has funded so called Stage 1 (planning and research) activities and is presently starting up funding of preparation activities (NAPAs) including vulnerability assessments. The LDC Fund has presently US $ 10 million for preparing NAPAs, The Special Climate Change Fund will have US $ 410 million from 2005 onwards, but the disbursement rules still have to be finalised.

Though there are a number of funds for ADAPTATION the commitments and contributions are on a voluntary basis. Funds for capacity development (non-structural adaptation) are limited and for hard, structural adaptation measures such as dikes are yet not available. In addition, GEF policy is to limit financial support to incremental costs only. This policy will make funding of adaptation complicated.

5.3 Towards a Co-operative Programme on Water and Climate (CPWC)

The activities described under Chapter 3 provide a wide scoped agenda for follow up. An agenda which will be addressed by a large number of initiatives and activities at the local, national, river basin, regional and global level. Activities directly aiming at the development of adaptation plans by directly involved beneficiaries. Other activities fall in the category of support e.g. for capacity development of local beneficiaries. In this category fall activities such as information provision, training, tools dissemination etc. And a third category is research further a field to improve the understanding of the impacts or relations of climate on water and the impacts of coping on water system service performance.

All parties in one way or another, directly or indirectly working on the above issues are considered to be member of a very open and global CPWC. An open and inclusive programme, where members have essentially no obligations, but can rather benefit through their effort from publicly available information or tools etc. The criterion for membership is the actual effort of the partner to improve his knowledge and/or management of the water system in the face of climate impacts.

The encouraging results of WWF-3 support the recommendation of the International Steering Committee of the DWC to continue pursuing the objectives of the DWC by creating a Co-operative Programme on Water and Climate (CPWC).

The CPWC will continue to stimulate the water managers in particular at the national and basin level to develop adaptation plans to cope with the impacts of increasing climate variability and climate change on their water systems. And a second major objective of the CPWC is to provide the external financial support and technical know how to the local managers for their plan preparation. .

Activities
The activities of the CPWC include:
a. regional, basin and national Water and Climate partnership development activities;
b. thematic development, tools development (forecasting, assessments, guidelines, manuals etc) , capacity development;
c. networking and knowledge exchange including awareness raising through the virtual www network, dissemination of tools, support for relevant workshops/seminars
d. awareness raising through publications and publicity
e. contributions to key processes and events e.g. WWF, WSSD, IPCC, COPs,
f. co-operation between partnerships and (international) research programs and policy fora
g. follow up to calls and commitments made at the WWF3

Institutional aspects
The CPWC is to be a network of partners at the international, regional down to national and even local level. It expects to include:
- international organisations such UNESCO, WMO, WWC, IUCN, UNDP, Red Cross, UNISDR, GEF, IISD, WWF-J, WWF-4 etc.
- regional GWP-TACs, basin organisations and national Water Partnerships
- national Water and Climate programmes and institutions
- national down to local NGOs and private sector parties
- external support organisations

The CPWC will be managed by an International Secretariat, which will be governed by an International Steering Committee.

Short-term work plan to establish the CPWC
The intention is to start the CPWC in January 2004. The preparations for the CPWC include:

- Preparations of national, basin and regional Water and Climate partnerships.
- Seeking commitment of the Water and Climate partnerships, the International Organisations such as WMO, UNESCO, IUCN, Red Cross, UNDP, WWC, UNISDR and financiers to become a CPWC partner
- Finalisation of the CPWC Proposal and discussions with external support agencies for financial support.
- Launch of the CPWC implementation phase on January 1, 2005.

Box 2:SIDA

Sweden has been active in supporting the Framework Convention on Climate agreed on in Rio 1992. Sweden has also recently replenished the Global Environment Facility with approximately 83 million Euro, where part of the contribution is geared towards the Framework Convention on Climate.

The Swedish International Development Cooperation Agency, Sida, is responsible for the Swedish bilateral development cooperation. Sida has recently drafted an in-house Paper on climate and development with a plan of action. The Draft Paper concludes that poor and marginalized people are most prone to the negative impact of increased climate variability and potential climate change. It is therefore important to integrate climatic considerations at a strategic level in all development

interventions. Other important characteristics are that prevention is better than cure, the approach applied should be holistic and seen as long-term cooperation.

A number of methods are identified:

- Future country and regional strategies for Sida's bilateral development cooperation should include a strategic analyses of the impact of increased climate variability and potential climate change.
- Consideration of impact of increased climate variability and potential climate change should where appropriate be integrated into all projects and programmes supported by Sida in different sectors.
- Generally all Sida's climate related intervention related should aim at knowledge development and building capacity to improve the coping capacity at local, national and regional level.

In relation to Sida's support in climate and the water sector some specific actions have been identified:

- An analysis of how poor people might be affected by increased climate variability and potential climate change should be included in the assessment of support to different projects and programmes.
- Sida is supporting the development of institutional arrangement and strategies for the joint management of transboundary water. In Southern Africa the cooperation on the Zambezi River, the Pungue River and the Okavango River receives such support. Also the river feeding into the Lake Victoria, namely Kagera, Mara and Malaba/Sio/Malakisi are supported in this respect. Similar support is also considered in West Africa and in other parts of the world. Additional fund might be allocated to further increase the capacity to cope with climate variability and potential climate change in these projects.
- Minor fund might be allocated for strategic input into method development or the Dialogue on Water and Climate. Sida has approved a two-year support through UNDP to Water and Climate Change Adaptation Framework.

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Box 3: DGIS

The Netherlands is an active supporter of international cooperation and coordination in the field of Climate Change and Development. NL is an active partner of the UN Framework Convention on Climate Change and is committed to implementing the instruments of the Kyoto Protocol. These commitments are translated in financial contributions to programmes and organisations through bilateral and multilateral channels.

The Dutch government announced in its Climate Policy Implementation Document that the Directorate General for Development Cooperation (DGIS) will set up a structural climate programme with support for developing countries. Elements of this programme are:

- Capacity building and institutional development for climate policy, and for participation in CDM;
- Efforts, in the long term, to restrict global emissions of greenhouse gases (mitigation);
- Adapting to the effects of climate change (adaptation).

This programme is now being implemented by the Environment and Development Department (DML) of DGIS.

Water is also a priority theme for The Netherlands and many of the water stakeholders present here in Kyoto are in one way or another involved in Dutch sponsored water programmes. The Dutch commitment to water is again reinforced by the NL government's action plan to implement the outcome of the WSSD: Sustainable Action.

NL warmly welcomed the initiative to link the two themes of Water and Climate through the actions of the International Dialogue on Water and Climate and offered to host the Secretariat and fund part of its operations. All in all, The Netherlands already invested about 5.4 million Euro in the Dialogue. First of all I would like to compliment the impressive work of the Secretariat and all its partners in organising this Dialogue with its formidable results. By and large these results point at the great challenge to address water and climate issues at national, basin and regional level.

Financing options in bilateral cooperation

The development of capacity, as well as the implementation of specific measures, to cope with the adverse effects of current and future climate change, will in many cases require substantial external resources to reduce the vulnerability and increase the resilience of those most at risk, often the poor in developing countries. Demands for external financial support should result from national planning processes in developing countries, there are currently basically two ways that external support can be channelled in this context:

1. through regular development assistance channels; this could be bilateral, multilateral and/or non-governmental development assistance.
2. through the channel of the GEF, using GEF climate change funding earmarked for adaptation.

At present a typical case often involves external financial support provided as a co-financing package: regular development assistance funding topped up with GEF funding. Such co-financing mechanisms should be encouraged in the future, as they guarantee a good donor coordination.

A third way to mobilize funding resources is still new and need to be explored further: the availability of private funding, through for example public-private partnerships. The Netherlands will actively explore the potential of such partnerships and calls on others to strive at matching public-with private funds. Public-private partnerships are important to mobilize new funding sources with an added value. ODA funds can then be used as leverage to make private means available for investments in the water sector. It is good to note that international insurance companies, for example, have already taken an interest in the work of the Dialogue.

For financing water management measures to counter adverse effects of climate change we advocate the optimal use of existing channels, organisations and processes, rather than developing totally new mechanisms and new organisations. The challenge will be to use existing mechanisms and the routine processes of international development cooperation.

National planning processes, and regular development assistance supporting those processes, focus as a rule on sustainable poverty reduction. And rightly so! However, there are strong arguments that effective poverty reduction programmes in many countries need to include adaptation and coping processes from the perspective of climate change and water management. At the same time certain measures need to address the longer term and preventative nature of adaptation, as opposed to more immediate benefits. This, in a nutshell, is the raison d'etre for GEF funding, over and above regular development assistance funding.

To qualify for external financial support from bilateral or multilateral sources a request has to pass through the normal national planning procedures to ensure ownership of the recipient country. This implies that activities have to meet certain nationally-defined criteria, such as

- considered a political/policy priority;
- based on a national development strategy (e.g. the National Sustainable Development Strategy or the Poverty Reduction Strategies)
- based upon a sound knowledge base
- including capacity development
- specifying implementation mechanisms and capabilities.

We recommend to follow the same support channels and processes for water and climate issues: to look for synergy with existing strategies, planning procedures, and to include water and climate issues as essential components in broader processes of policy and planning at national level.

There are powerful arguments as to why adaptation and coping matter for effective poverty reduction, and safeguards progress towards achieving wider development goals. Considerable work is still needed though, in terms of awareness raising, before both governments of developing countries and donor governments will consider, as a matter of routine, the integration of climate change concerns into their decisions. In particular, adaptation usually falls under the mandate of a number of institutions, leading to problems of coordination of donor funds, making it difficult to identify is as part of the national priorities.

Finally it is to be noted that at COP-7 in Marrakech (UNFCCC - November 2001) the majority of the donors (the 15 EU member states, including the NL, and the EC, Canada, New Zealand, Norway and Switzerland) have made a joint political commitment to increase their climate change funding in support of developing countries substantially, up to an extra annual amount of US$ 410 million by 2005. "

Institutional setting in recipient countries generally does not favour cross-sectoral links: there will be a challenge of coordination between different ministries (for ex. of Environment, Planning, Water) at policy and planning level. To make assistance on water and climate issues effective, there will be a need for institutional development to forge synergy and coordination.
Here lies a great challenge and opportunity where bilateral cooperation can play a major role.

Future of DWC:
NL is in favour of a follow-up to maintain the high levels of international awareness about the linkages between water and climate issues. These high levels are the merit of the Dialogue activities so far and need to be expanded in scope and time. Based on a broad commitment from developing countries, donors and international organisations from the water and climate communities, NL might consider future support to a follow-up in partnership with other donors/countries.

Drafted by Fred Smiet of DML/MI

Appendix A: Theme Statement of Water & Climate Theme at WWF3

STATEMENT ON WATER AND CLIMATE TO THE MINISTERIAL CONFERENCE

Key issues

Over the past decades, increasing climate variability and extreme weather have affected hundreds of millions of people worldwide and disrupted national economies. Climate change is inevitable and through water it has serious consequences for many sectors, including health and sanitation, food security, energy and nature. Everyone is affected, but the poor and remote are hit first and hardest. It is imperative to increase our efforts towards abatement of greenhouse gases emissions and to initiate actions to better cope with today's climate variability, which is a first step towards coping with climate change. A greater appreciation of climate issues amongst water policy makers and planners, water managers and society is the basis for effective actions in a sector that is essential to all facets of sustainable development. Even though climate is driven by global processes, most adaptation actions will need to be taken at the community, basin, national and regional level. Climate variability and weather extremes will derail achieving the 2015 Millennium Development Goals. Development activities without considering climate change will further increase vulnerability.

Actions

Categories of action include infrastructure development, timely warning and forecasting systems, risk reduction, risk sharing and data management, spatial planning and institutional capacity development and reform, based upon community level decision making. To support these actions data are needed from extended observational systems and networks.

The Dialogue on Water and Climate (DWC) was launched in 2001 to develop and promote adaptation strategies that help reduce the vulnerability of the poor against the detrimental effects of climate variability and climate change. In many countries and regions the multi-stakeholder dialogue process has been put in place at the regional, national and basin levels. Through these dialogues a wide range of stakeholders can examine which information is required for awareness raising, what measures can be taken to cope with the effects of climate change, and how climate can best be factored into water resources management policies.

Recommendations

- Enhance policies and measures towards adaptation to the impacts of climate variability and change, along with continuing efforts on further reduction of greenhouse gas emissions.
- Continue the informed multi-stakeholder approach (i.e. dialogues) at national, basin and regional level to prepare action plans for adaptation (such as NAPAs).
- Integrated Water Resources Management should become the inter-sectoral framework under which the water and climate agenda needs to be implemented.
- Develop national, basin and regional capacities (policies, strategies, research and implementation) and secure financial support for preparation and implementation of national water sector adaptation plans.
- Create a "Water and Climate Alliance" as an international umbrella to continue building bridges between the climate and water sector, encourage capacity development to better cope with climate impacts, and facilitate obtaining financial support for national, basin and regional level adaptation plans.
- Establish Water and Climate Associated Program under the GWP.
- Enhance efforts to integrate and mainstream the initiatives developed under the Water and Climate Associated Program with related processes like the IPCC's 4th Assessment Report, national communications for UNFCCC, and disaster preparedness and management strategies.
- Mainstream the climate variability and change into national water and land management policies and management practices.
- Reverse the trend of further deteriorating in-situ data collecting and observational networks.

ANNEX: Commitments

- In addition to continuation of many ongoing activities in Water and Climate at global and local level by e.g. WMO, UNESCO, NGOs, River Basin Authorities, national meteorological services, water ministries and water management bodies, the following recent commitments need mentioning:
- The national (e.g. Bangladesh), regional (Central America, West Africa, Mediterranean, Southern Africa, South East Asia), basin (e.g. Thukela, Lena, Small Valleys, San Pedro, Murray-Darling) and small island states (e.g. Pacific and Caribbean) dialogues are committed to continue towards preparing an Action Plan/Strategy/Policy for coping with climate variability and climate change in the water sector.
- ADB, SOPAC and other donors will consider broadening the support base for a coping facility for small island states.
- The Organization of American States is committed to working with the smaller states of the Caribbean and Central America in support of their climate change / sea level rise mandates and to assist them in locating sufficient financial resources to carry out such programs.
- The Red Cross Climate Centre in the Netherlands is committed to support an increasing number of Red Cross and Red Crescent National Societies to be prepared better for climate change and extreme weather events.
- IUCN is committed to catalyse and support the creation of National Adaptation Coalitions that bring together water professionals and interested stakeholders for societal innovations that adapt water management to the uncertainties of climate change.
- UNDP is committed to assist initially 3 countries to develop national adaptation plans in water and climate.
- Several research institutions in Europe (UK, Netherlands, Germany), US, Japan, Australia and South America (Brazil) are committed to work on high resolution climate forecasting tools for water managers.
- Several applied research initiatives (Red Cross, Wallingford, IUCN, SEI, Wageningen) are committed to work with local partners to develop and demonstrate “grassroots” approaches for vulnerability assessment, develop tools for adaptation, disaster risk reduction, ecosystem management and sustainable livelihoods.
- A consortium of private partners, including Munich-Re, commits to continue developing risk management and risk spreading financial mechanism and instruments including those for Less Developed Countries.
- UNESCO-IHE is determined to disseminate and expand the training package for water and climate with and through regional and national institutes, and in collaboration with CAPNET
- The Pacific Institute (USA) will continue updating the on-line bibliography on water and climate.
- IUCN/IISD and SEI are committed to help local partners in the development, formulation and demonstration of new integrative approaches to adaptation
- The Global Water Partnership is favourably considering establishing an Associate Programme on Water and Climate as a part of the continuation of the activities of the Dialogue on Water and Climate.
- In Japan, in addition to ongoing activities relevant to water issues, a new Water Cycle Initiative with a focus on near future water problems will start in April, 2003, under the Council for Science and Technology Policy, Cabinet Office, Government of Japan.
- The IGOS-P water cycle theme agrees to examine the status of in-situ water cycle measurements as part of its exercise in developing the Global Water Cycle theme report.
- MoU between Caribbean and Pacific organizations (CEHI and SOPAC) has been signed to implement the Joint Programme for Action (37 member states), providing for cooperation on matters including the freshwater environment, capacity-building, data and information management, applied research, sharing of expertise, implementation of the recommendations relevant to small island countries from this meeting, preparations for Barbados +10 and other matters of mutual interest
- Thirteen countries have endorsed the Pacific Regional Action Plan (PRAP) on Sustainable Water Management, providing a basis for development of national policies, institutions and plans, and for strengthening regional and interregional cooperation on water management.
- Several organisations and groups involved in monitoring and research of the world’s freshwater resources, commit to establish a World Water and Climate Network, hosted by Japan.
- The World Water Forum of Journalists is committed to producing at least 100 articles on water and climate per year. These will appear in local, national and international newspapers around the world in order to raise awareness about water and climate-related issues
- NASDA (Japan), and ESA (Europe), partly through CEOS and IGOS-P, will make great efforts to contribute to the WSSD Plan of Implementation of a joint observation and research agenda for water cycle
- WMO is committed to improving the dialogue between national climate services and water managers on the use of climate forecasts in water management decisions.
- European Commission (EU): for the 6th Framework Programme (2003-2006), 700 M€ will be invested in the programme “Global Change and Ecosystems”, about 90 M€ in the INCO programme on water-related aspects and other resources in the Aeronautic and Space programme on GMES: all these research programmes contribute substantially to Water and Climate and will be fully open to international co-operation, providing funding to all “non-OECD” third countries
- US Water Cycle Program will establish the water cycle as a major cross-cutting theme with linkages to all the components of the climate system and will contribute to international cooperation on research in climate and water
- The Global Environmental Change Programmes (IABP, IHDP, WCRP, Diversitas) have committed to a joint Global Water System Project to integrate the knowledge necessary to understand the role of water in the Earth’s system, as conditioned by human and natural factors.

Appendix B: Summary Report of Sessions in the WWF3 Water & Climate Theme

Session CLIM-OP Opening Plenary: Water and Climate

Convenor: *International Secretariat of the Dialogue on Water and Climate(DWC*
Chair: Rajendra Pachauri, Intergovernmental Panel on Climate Change (IPCC)

William Cosgrove, DWC, presented the DWC's results. He stressed the need to: develop tools for assessing vulnerability; enhance collaboration between climate and water communities; finance countries and communities to adapt to changes in weather patterns; and build on alliances created through the DWC. Lionel Hurst, Ambassador of Antigua and Barbuda, spoke on the moral dimensions of global climate change. He drew a parallel between economic systems based on slavery and those based on the burning of fossil fuels, noting their moral depravity. G.O.P. Obasi, World Meteorological Organization, stressed the need to address, at the global level, the impact of climate change on the hydrological cycle and freshwater resources.
L. K. Siddiqi, Minister of Water, Bangladesh, drew attention to the water-related vulnerabilities of developing countries. Roberto Costley-White, Minister of Public Works and Housing, Mozambique, underscored Mozambique's vulnerability to climate change impacts, including flooding and drought. Melanie Schultz van Haegen-Maas Geesteranus, Minister of Transport, Public Works and Water Management, the Netherlands, explained that climate change predictions are influencing national policies in the Netherlands, including those relating to spatial planning and water management.
Motoyuki Suzuki, United Nations University, stressed the increase in pressure on the planet's limited freshwater resources. He highlighted the need for international cooperation, but noted the importance of site-specific water management practices. Toshiharu Kojiri, Kyoto University, stressed improving meteorological information and monitoring networks.
Key points of the 'Climate changes the water rules' report from Water and Climate Dialogue are that:

a) Droughts floods and storms on a scale never seen before
b) Almost all countries are vulnerable
c) Adaptation in hand with mitigation

The main threats of climate change and climate variability are:
Climate variability makes Millennium Development Goals attainment harder.
Natural disasters will cause loss of life, livelihoods and of investment in water infrastructure.
Climate change threatens long-term sustainability of "out-of-poverty" outcomes.

Session CLIM-02 What can science offer?

Convenor: *International Secretariat of the Dialogue on Water and Climate(DWC)*
Chair: Pavel Kabat (DWC)

By means of several keynote presentations the session investigated the main scientific challenges which remains to be addressed in the area of water and climate. Speakers included Prof. Ch. Vorösmarty, University of New Hampshire; Prof. Joseph Alcamo, University of Kassel, Dr. C. Sullivan, Wallingford UK, Dr. Bryson Bates, International Research Institute for Climate Prediction and Mr Minoru Kobayashi, Ministry of Land, Infrastructure and Transport. Next a panel discussed "How to use Climate Change Scenarios for Water Resources Planning and Water Management".
Main conclusions are:

- the "wet" physics processes need to be better represented in climate models, supporting calibration with better (precipitation) measurements
- The capability to assess the implications of climate change along with stresses in water use allows for an evaluation of the areas of extreme risk. These analyses need to be supported by better downscaling capabilities
- Actions to reduce the exposure to the anticipated shortages and risks should be developed by, or in collaboration with, the affected communities and individuals.
- Issues needing additional attention are in a) climate change and water quality, and b) implications of exploitation of groundwater reserves

Call for Action:

- There is a need to strengthen observations of all aspects of the water cycle including the many variables such as evaporation and soil moisture that can only be monitored by surface networks at the present time. The depletion on in situ networks must be addressed and reversed. The IGOS-P water cycle theme should address these issues.
- An umbrella framework for addressing water and climate issues is needed.

- Observations of all components of the water cycle need to be enhanced. The degradation of in-situ data networks is a special concern. It should be brought to the attention of ministers on a priority basis.
- More outreach is needed to advise water managers of the reliability and value of seasonal forecasts.

Commitments:

- Several research institutions in Europe (UK, Netherlands, Germany), US, Japan, Australia and South America (Brazil) are committed to work on high resolution climate forecasting tools for water managers.
- The IGOS-P water cycle theme agrees to examine the status of insitu water cycle measurements as part of its exercise in developing the Global Water Cycle theme report.
- The World Meteorological Organization is committed to improving the dialogue between national climate services and water managers on the use of climate forecasts in water management decisions.
- The Dialogue commits itself to advancing the Dialogue between users and providers of information, particularly in the area of climate change projections and their consequences for water resources.

Session CLIM-03 Water in Small Island Countries

Convenor: *Asian Development Bank*

During preparation for the 3rd World Water Forum, small island developing states in the Pacific and the Caribbean joined forces, resulting in the signing of a memorandum of understanding in Kyoto between the South Pacific Applied Geoscience Commission and the Caribbean Environmental Health Institute, the two organizations that represent their water management interests. Together they have formulated a joint action plan, for which they will be asking sup-port from donor countries and international aid organizations. The Joint Caribbean – Pacific Programme of Action on Water and Climate includes 22 Common Actions on a) Research, b) advocacy & awareness, c) capacity building, d) governance, all in the areas of water resources management, water governance, IWRM, water demand management and water quality. Features adding to the high vulnerability to climate change include: Small size, Remoteness, Cyclone hazards (wind, floods, storm surge), El Nino / La Nina droughts & floods, Limited human and financial resources.

Calls for action:

- Strengthen water resources assessment & monitoring capacity
- Support enhancement of the application of climate information to cope with climate variability & change
- Change from disaster response to hazard assessment & risk management (IWRM)
- Hydrological capacity building using HYCOS
- Strengthen regional and inter-regional partnership
- Establish water demand management programmes

Commitments:

- Caribbean and Pacific organizations (CEHI and SOPAC) have signed a Memorandum of Understanding providing for cooperation on matters including the freshwater environment, capacity-building, data and information management, applied research, sharing of expertise, implementation of the recommendations relevant to small island countries from this meeting, preparations for Barbados +10 and other matters of mutual interest;
- Thirteen countries have endorsed the Pacific Regional Action Plan (PRAP) on Sustainable Water Management, providing a basis for development of national policies, institutions and plans, and for strengthening regional and interregional cooperation on water management; and
- Participants at WWF3 are expected to consider on 19 March a Session Statement and a Portfolio of Water Actions for the Pacific.
- ADB, SOPAC and other donors will consider broadening the support base for a coping facility for small island states.
- The Organization of American States is committed to working with the smaller states of the Caribbean and Central America in support of their climate change / sea level rise mandates and to assist them in locating sufficient financial resources to carry out such programs.
- The Global Environmental Change Programmes (IABP, IHDP, WCRP, Diversitas) have committed to a joint Global Water System Project to integrate the knowledge necessary to understand the role of water in the Earth's system, as conditioned by human and natural factors.

Session CLIM-04 It pays to be prepared: Better protection of the most vulnerable against vagaries of climate

Convenor: *Netherlands Red Cross, Centre on Climate Change and Disaster Preparedness*
Chair: Bert Diphoorn, Netherlands Ministry of Foreign Affairs

Speakers from the International Federation of Red Cross and Red Crescent Societies held key note presentations. Robert Fraser explained that responding to climate vulnerability requires effective partnerships between every sector of society. Dang Van Tao introduced a video on community involvement in disaster preparedness in Vietnam and Bangladesh. Lionel Hurst, Ambassador of Antigua and Barbuda, explained that many of the poorest people lack the capacity to adapt and said that new technologies must be developed to mitigate greenhouse gas emissions. Thanh Le presented a case study on the Red Cross' response to extreme flooding of the Mekong Basin in 2000. Lessons learned include the need to give more consideration to community priorities, and to form effective partnerships. Madeleen Helmer explained that the newly formed Red Cross Climate Centre focuses on disaster preparedness. She noted that the number of people affected by extreme weather events tripled over the last thirty years.
The Red Cross/Red Crescent centre on Climate Change and Disaster Preparedness aims to

- raise awareness about climate change and extreme weather events and impacts on vulnerable people.
- support the development of concrete climate adaptation activities within the existing context of disaster preparedness programmes
- advocate for the concerns about the impacts of climate change and the good experiences with adaptation programmes to the places of policy development.
- Participants explored disaster preparedness as a link between relief and development, and discussed issues relating to capacity building, early warning systems, and weather data availability and usefulness.

Calls for Action:

- Recognition that climate change and extreme weather events are indeed a serious new stress to society. It makes every sense in the world to prepare for the impacts of climate change, in coherence with and topped up on existing coping strategies.
- Disaster Preparedness and Risk reduction are relatively new areas of policy development. Governments, multilateral agencies, civil society organizations and the private sector should in a concerted effort strengthen DP policies and programmes.

Commitments:

- To continue advocating for the need to include and mainstream Disaster Preparedness and Risk Reduction in sustainable development programmes
- Wrap up: The Red Cross Climate Centre in the Netherlands is committed to support an increasing number of Red Cross and Red Crescent National Societies to be prepared better for climate change and extreme weather events.

Session CLIM-05 It pays to be prepared: Risks, Insurance and Finance

Convenor: *International Secretariat of the Dialogue on Water and Climate (DWC)*
Chair: Laurens Bouwer, Free University Amsterdam and Holger Hoff, (DWC)

The session focused on how the financial services industry can contribute to water-related disaster management. Wolfgang Kron, Munich Reinsurance Company, explained that insured losses due to "great" disasters increased from US$6.1 billion in the 1960s to US$124 billion in the 1990s. He outlined several causes for this increase, including increases in population, population density, and the frequency of severe weather events. Ian Fox, Asian Development Bank (ADB), explained that instead of flood control, the ADB encourages flood management as a way to reduce the economic and social costs associated with extreme flooding. In particular, he said the ADB is promoting flood insurance to protect the livelihoods of those living in flood prone areas and to discourage unreasonable development in such areas. Mihir Bhatt, Disaster Mitigation Institute, focused on local lessons from disaster risk management. He noted that existing financial services do not adequately provide for water-related disaster risk, particularly in poor communities.
Discussion: Panelists discussed the potential for long-term partnerships between private and public sector entities to further risk management and information exchange among stakeholders. They further remarked on integrating risk assessments into development plans, noting the need for risk assessment tools and capacity building.

Calls for action:
Offer financial services that provide for water-related disaster risk, particularly in poor communities.
Commitments:
A consortium of private partners, including Munich-Re, commits to continue developing risk management and risk spreading financial mechanism and instruments including those for Less Developed Countries.

Session CLIM-06 Climate Convention: Does it matter for water?
Convenor: *International Secretariat of the Dialogue on Water and Climate (DWC)*
Chair: Ainun Nishat (IUCN-Bangladesh)

Henk van Schaik, DWC, discussed national, basin and regional coping plans and stressed the need to match local action with adequate national-level and external financial support. Explaining that climate change is likely to cause significant changes in rainfall in the Mekong Basin, Hans Frederick, IUCN, noted the need for: integrated management; agricultural diversification; inter-sector collaboration; and local community involvement. Max Campos, Regional Committee for Hydrological Resources (CRRH), highlighted Central America's vulnerability to extreme weather events, including drought and flooding, and called for increased investment in adaptation.
Maria Lamin, European Commission (EC) Directorate General for Development Cooperation, discussed the consultation draft "Poverty and Climate Change: Reducing the Vulnerability of the Poor," submitted to the Eighth Conference of the Parties (COP-8) of the United Nations Framework Convention on Climate Change (UNFCCC). Stressing that climate change is a serious threat to poverty eradication, she underscored that climate change adaptation requires capacity building, awareness raising, and dedicated financial resources.
Pablo Gonzales, Organization of American States, described a community-based approach to integrated floodplain management in small valleys in Central America. The approach aims to incorporate early warning and vulnerability reduction components into integrated floodplain management plans, and to support national and local groups through training and technology transfer.
Addressing the development of a national strategy and action plan for adapting to climate variability in Bangladesh, Ainun Nishat identified the need to build on existing coping strategies, and the need for strategic investments in infrastructure and disaster management. Andrea Marla, GEF, explained that the GEF supports projects that address adaptation planning and capacity building in particularly vulnerable areas, and outlined the GEF Trust Fund, Least Developed Countries (LDCs) Fund, Special Climate Change Fund and the Adaptation Fund.
Bengt Johansson, Swedish International Development Agency, noted the importance of considering climate change impacts within all development work, and of taking a holistic view and a long-term perspective. Henk van Schaik, on behalf of the Netherlands Directorate General for International Cooperation, recommended a follow-up to the DWC to maintain high levels of international awareness regarding the linkages between water and climate.
David Grey, World Bank, explained the influence of climate variability on economic growth, noting the high costs climate variability imposes on African economies without major investments in water security. Maria Lamin highlighted the recent adoption of the Commission Communication on Climate Change in the Context of Development Cooperation, which aims to assist EU partner countries in meeting the challenges posed by climate change, in part by supporting their implementation of the UNFCCC and the Kyoto Protocol.
The session recognised that climate variability is already impacting developed, developing and transitional economies. Adaptation measures will require local, national, regional, as well basin level planning.
Calls for action:
- Use of funds from expatriates abroad (i.e. migrant remittances) can be used towards the funding of the development and implementation of adaptation strategies in their home countries. I.e. Mexico has developed a matching fund program – whereby remittances from expatriates can be used towards a particular development project (and the government will match these funds).
- creative solutions need to be found towards the funding of the development and implementation of adaptation strategies.
- Integrate adaptation strategies into *existing* policies and institutions
- GEFs "special climate change fund" should be operational by 2005.

Commitments:

- Launch of the Interagency paper: Poverty and Climate Change: Reducing the vulnerability of the poor, in June 2003.
- EU proposed to develop an action plan to raise the profile, assist in adaptation, and support for mitigation to climate change.

Session CLIM-07 Integrated Monitoring of the World's Freshwaters to Address Impacts of Global Warming

Convenor: *Lake Biwa Research Institute and NGO*
Chair: Charles Goldman

The world is facing a crisis in terms of the quantity and quality of inland water in the 21st century. Increased country participation, increased geographical and site coverage and diversification of the types of water quality data are to be acquired and shared. A resolution was submitted by the participants of the session.

Calls for action:

Existing organisations should promote and support the extensive university research network, research institutions, non-governmental organisations, researchers and water managers who are actively working to save lakes, rivers, and oceans from environmental degradation throughout the world.

Commitments:

Several organisations and groups involved in monitoring and research of the world's freshwater resources, commit to establish a World Water and Climate Network, hosted by Japan and chaired by Prof. Charles Goldman.

Session CLIM-08 Building capacity to cope

Convenor: *UNESCO-IHE Delft*
Chair: Han Klein (UNESCO –IHE Delft)

Participants and keynote speakers discussed the background of Climate Change and increasing climate variability in relation to growth of populations and economies. Hot spots were identified as those areas with large effects but low capacity to cope. It was concluded that the lack in capacity will have disastrous effects in these hot spots. Bridging the gap requires different target groups addressed, translation of knowledge to coping/adaptation strategies.

Calls for action:

- Build in 5 years a minimum base for capacity to cope, focusing on the hot spots, through formulation and funding for Building Capacity-to-Cope Programme.
- Train about 500 professionals from various organizations at the hotspots over a period of five years, partly web-based (eg e-learning, use of internet resources such as the Bibliography)
- Further outreach through regional stakeholder dialogues.

Commitments:

- UNESCO-IHE is determined to disseminate and expand the training package for water and climate with and through regional and national institutes provided the financial support is available.
- The Pacific Institute will continue updating the on-line bibliography as funds permit.
- UNDP is committed to assist initially 3 countries to develop national adaptation plans and support required capacity building.
- CAPNET will support mobilization of the regional networks for implementation of the capacity building activities.

Session CLIM-09 Climate change influence on flood and drought in East Asia; Effects and Response

Convenor: *Committee for climate change influence on flood and drought*
Chair: Kaoru Takara, Kyoto University

Kenji Nakamura, Nagoya University, recalled a pre-Forum conference initiating work on this issue. Hidehiko Isobe, Japan Meteorological Agency, spoke on weather conditions associated with climate change and stressed the increase in spatial and temporal variation of annual rainfall in Japan. Zong-ci Zhao, China Meteorological Administration, said shortages in water resources are a problem for China, and stressed the need for more research on how to narrow uncertainties of

climate and hydrological models on a regional scale. Noting droughts and floods in India are mainly determined by the monsoon rainfall, P. Mujumdar, Indian Institute of Science, said that forecasts help those managing water resources.
Ueda Takeshi, Ministry for Land, Infrastructure and Transport, said planning for floods and droughts in Japan is based on old statistical data and that recent climatic phenomena indicate a greater annual variation of precipitation than previously recorded. Hiroshi Uyeda, Nagoya University, explained some problems and expectations associated with recording and predicting precipitation in East Asia. Satoru Oishi, Yamanashi University, discussed evolving technologies for observing climate, as well as various characteristics of Japanese rainfall patterns. Seirou Shinoda, Gifu University, spoke on the influence of climate change on forest basins, noting increased run-off. Tomoharu Hori, Kyoto University, explained how data on human behavior could be used in statistical analyses for risk management of floods and droughts.

Calls for Actions:

1. International cooperation of meteorological observation
 - Wide range climate monitoring
 - Understanding of phenomenon variability
2. Improvement of forecasting technologies
 - Regional climate model
 - Integration of climate, runoff and water utilization models
3. Promotion of risk management
 - Flood: hazard map and information transmission
 - Drought: reservoirs operation and water saving
4. Dialogs among related persons and stakeholders

Commitments:

In Japan, in addition to ongoing activities relevant to water issues, a new Water Cycle Initiative with a focus on near future water problems will start in April, 2003, under the Council for Science and Technology Policy, Cabinet Office, Government of Japan.

Session CLIM-10 Climate is everybody's business, too

Convenor: *International Secretariat of the Dialogue on Water and Climate (DWC)*
Chair: Richard Connor (DWC)

Awareness about climate change is essential for water managers. There are different ways to raise awareness. This session focused on the use of the written media (journalists) and television (documentary film). The Dialogue on Water and Climate produced a 45min. TV documentary entitled “The Heat is On: Better be prepared”. The film was given its international debut during this session.

Calls for Action:

It is recommended that the Dialogue on Water & Climate lobbies Ted Turner to produce another video on water and climate, that would focus on the need for mitigation as much as on adaptation.

Commitments:

The World Water Forum of Journalists is committed to producing at least 100 articles on water and climate per year. These will appear in local, national and international newspapers around the world in order to raise awareness about water and climate-related issues.

Session CLIM-11 Change! Adapting Water Management to Climate Change

Convenor: *IUCN, The World Conservation Union*
Chair: Ainun Nishat (IUCN Bangladesh)

Ainun Nishat introduced a report on dialogues undertaken by the IUCN in 2002 on climate change and adaptation. Brett Orlando, IUCN, stated that water management practices must evolve to account for uncertainty arising from climate change. He noted that a planned, top-down approach to adaptation requires significant technical and policy-making capacities, while the alternative approach, autonomous adaptation by companies and individuals, is unlikely to be sufficient. He suggested a "middle-way" based on flexibility and building adaptive capacity and highlighted the need for coalitions of water professionals and other stakeholders.
Jean-Etienne Klimpt, Hydro-Quebec, remarked on the difficulty of planning investments in conditions of uncertainty. Wolfgang Kron, Munich Re, noted the importance of educating all partners in risk reduction, particularly States, affected people and the financial sector. Max Campos, Regional Committee for Water Resources, agreed that adaptation begins with education. Shrikant Limaye, Ground Water Institute, explained the intricacies of watershed management.

Peter Spillett, Thames Water, highlighted key water-related issues in the UK, including increased winter run-off and the need to store more water in wetlands and reservoirs. Peter Kerssens, The Netherlands Water Project, indicated the need for a more resilient water system in the Netherlands, but noted that the planning process is complicated by the long time horizons associated with climate change.

Participants discussed the insurance industry's approach to dealing with uncertainty, the role of the private sector in financing adaptation, and the need for public participation. Participants agreed on the need for demand management programmes. Ger Bergkamp, IUCN, then introduced a new panel of regional representatives to deliberate on the role of multistakeholder dialogues in addressing the implications of climate change adaptation for the water sector, and possible future steps including the development of regional adaptation coalitions.

Francis Mkanda, IUCN, outlined the outcome of dialogue discussions in Southern and East Africa and called for the political prioritization of climate change issues. Madiodio Niasse, IUCN, noted the complementary nature of national and regional-level dialogues, particularly when dealing with transboundary issues in West Africa. Ainun Nishat highlighted that modern agricultural practices are typically less resilient to climate variability than traditional agricultural practices in South Asia. Satoru Oishi, Kyoto University, reviewed the outcome of multistakeholder dialogues held in Japan, underscoring the importance of science and education with regard to climate change adaptation.

Hans Friederich, IUCN, reviewed the main conclusions of dialogues held in Southeast Asia, highlighting the need to bring the views of local people onto the political agenda, and drawing attention to problems caused by perverse economic instruments. Rocio Cordoba, IUCN, outlined the recommendations of the Central American dialogue, including the need to: take into account traditional knowledge regarding adaptation to climate change; include climate change in educational programmes; and involve local authorities, communities and NGOs in flood and drought preparedness programmes. Peter Kerssens underscored the need for increased cooperation between water managers and spatial planners in the Netherlands. Bergkamp concluded the meeting by drawing attention to opportunities for businesses, governments and communities presented by climate change adaptation.

Call for action

Three adaptation priorities were identified:

- reduce current vulnerabilities;
- protect and restore ecosystems;
- Close the water supply – demand gap.

Meeting the challenge: National adaptation coalitions can bring together water professionals and interested groups to innovate and lead a society-wide effort for adaptation. Coalitions must: prioritize people, be innovative, engage political leaders.

Commitments:

- IUCN is committed to catalyse and support the creation of National Adaptation Coalitions that bring together water professionals and interested stakeholders for societal innovations that adapt water management to the uncertainties of climate change.

Session CLIM-12 Water Cycle Research and Observational Activities for Water Management and Sustainable Development

Convenor: *NOAA/Global Water Cycle Programme, International Secretariat Dialogue on Water and Climate (DWC*

Chair: Rick Lawford, NASA

The session followed from a joint observation and research agenda for water cycle established during 2002 WSSD. The session reflected on the (Inter)national Research Programmes and their ability to effectively address remaining research and observational challenges. Activities were presented from the US Water Cycle Research Program, the EU 6 Framework Research Program, the German Global Change and Water Cycle Program – GLOWA, IGOS-P, WMO, UNESCO IHP and ESA.

Calls for Action:

- integrate methods from natural and social science disciplines to describe complex webs of interdependencies between man and nature, create alternatives for future regional water resources management
- initiate and support a large data consolidation efforts in the area of water and climate
- halt further deterioration of hydrological and meteorological data collecting networks, which are essential for water and climate sectors

- enhance support of outreach activities and data exchange policies
- establish an international ground-based observational network of the WATER CYCLE by engaging a broad group of participants
- develop comprehensive and continuous satellite to ground observing strategy for the WATER CYCLE, especially for the rainfall.
- establish information systems and services for integration of the observational, model and social water/land use data and products, and for international distribution of data for interpreting scientific outputs for actual social applications.
- establish administrative expertise and governmental cooperation from all countries to apply the newly integrated WATER CYCLE information for maximum societal benefit.

Commitments:

- The World Meteorological Organization is committed to improving the dialogue between national climate services and water managers on the use of climate forecasts in water management decisions.
- The IGOS-P water cycle theme agrees to examine the status of insitu water cycle measurements as part of its exercise in developing the Global Water Cycle theme report.
- IGOS –P is interested in supporting a water and climate agenda by developing a water cycle theme that will encourage the development of the necessary data
- NASDA [and ESA (Europe), in statement], through CEOS and IGOS-P, will make great efforts to contribute to the WSSD Plan of Implementation of a joint observation and research agenda for water cycle
- US Water Cycle Program will establish the water cycle as a major cross-cutting theme with linkages to all the components of the climate system and will contribute to international cooperation on research in climate and water
- European Commission (EU): for the 6th Framework Programme (2003-2006), 700 M€ will be invested in the programme "Global Change and Ecosystems", about 90 M€ in the INCO programme on water-related aspects and other resources in the Aeronautic and Space programme on GMES: all these research programmes contribute substantially to Water and Climate and will be fully open to international co-operation, providing funding to all "non-OECD" third countries

CLIM-WP Wrap up Plenary Session: Water and Climate

Convenor: *International Secretariat Dialogue on Water and Climate (DWC*
Chair: William Cosgrove, DWC

Andy Bullock, independent consultant, introduced the session by noting that all possible steps to adapt water systems should be taken, and that developed countries should pay for water development and adaptation in developing countries.
Regarding scientific input, Rick Lawford, NASA, called for an umbrella framework for addressing water and climate issues, and support for the development of better precipitation modeling. On water-cycle research and observational activities, Pavel Kabat, DWC, said participants agreed to develop outreach and data exchange policies, and to encourage collaborative modeling research that includes human and social dimensions.
On adaptation, Madeleen Helmer, International Federation of Red Cross and Red Crescent Societies, said participants agreed on the need to integrate disaster preparedness in sustainable development programmes. Laurens Bouwer, Free University Amsterdam, noted that insurance related financial services could complement other adaptive services, but that the dissemination of financial services in developing countries would be slow. Hans Kleijn, The Netherlands Water Partnership, announced an action plan on funding for capacity building, and a target for achieving a minimum degree of coping capacity in five years. Brett Orlando supported the formation of coalitions that would engage leaders on the need for adaptation. Regarding national action plans, Ainun Nishat noted the need to identify and enhance local coping capacities, and to find creative mechanisms for funding adaptation strategies. On small island countries, Jeffrey Stubbs, Asian Development Bank, said participants identified the need to apply new weather forecasting and hydrology techniques, and create mechanisms for supporting community groups in dialogue with national governments. Regarding floods and droughts, Kenji Nakamura, Nagoya University, said participants highlighted the need for international cooperation on meteorological observation, and additional dialogues between stakeholders.
On outreach, Henk van Schaik, DWC, said that members of the International Federation of Environmental Journalists are committed to writing 100 articles on the subject of climate and water

annually. On integrated monitoring, Cosgrove read a resolution establishing an NGO with the goal of linking people and organizations concerned about water and climate change. On input to the ministerial conference, Henk van Schaik presented a draft statement on water and climate recommending, *inter alia*, the continuation of multi-stakeholder dialogues and the creation of a water and climate alliance that would build bridges between the two sectors. In closing, Margaret Catley-Carlson, Global Water Partnership, highlighted IWRM as the appropriate framework for advancing progress on water and climate issues.

Appendix C: Water & Climate content of Other Themes at WWF3

WATER, NATURE AND ENVIRONMENT: This theme was convened by IUCN-The World Conservation Union (IUCN) and UNEP from 17-18 March with the pre-expressed objective of assessing progress in sustainable management, and demonstrating benefits to nature and society. The sessions discussed, *inter alia*: biodiversity and lakes; wetland and river basin management; mountainous areas; oceans and freshwater; ecosystem approaches to water management; environmental flows; and water and forests.

About half the sessions recognises the link between water, nature and global change issues. Participants discussed the need for recognition of the hydrological cycle as whole, including the freshwater, oceans, climate and society; forest management. During the sessions, participants stressed the importance of research and monitoring in mountainous regions, since glacier retreat has a major impact on seasonal availability of water. Innovative policies need to quickly respond to the uncertain challenges climate change imparts in mountains. Mountain biosphere reserves were identified as a particularly good indicator, control, test and monitoring sites to study the impact of global change. Participants emphasised global climate change poses a threat to the functioning of lake ecosystems from outside their watersheds, particularly in African lakes and reservoirs. Several speakers noted the need for interaction and co-operation between different water-related conventions. In addition they called for scientific research on the water conservation functions of forests and to use forest management as part of disaster management following global warming. *The theme statement does not mention global change issues.*

WATER AND GOVERNANCE: The Global Water Partnership (GWP) convened this theme. Participants met from 18-19 March with the pre-expressed objective of sharing knowledge and experience on global and local governance, and plans for future action. Sessions discussed, inter alia: effective water governance; lessons from multi-stakeholder partnership projects; intergenerational water management; private sector participation; the right to water; best practices in water law; and water pricing.

One session in the Governance theme stresses climate change is a global environmental problem, enforcing the call for a global network of citizens, NGOs, CSOs, and existing networks. *The theme statement does not mention global change issues.*

FLOODS: This theme was convened by the International Flood Network (IFNet) Preparatory Unit from 18-19 March to intensify information exchange and interaction on flood management and mitigation. The sessions discussed, *inter alia*: integrated flood management; urban flood risk mitigation; poverty and floods; flood warning dissemination; and people, floods and vulnerability in South Asia.

During the sessions, participants discussed integrating flood management options in IWRM & support within the overall scheme of disaster mitigation and risk management plans. Few speakers explicitly addressed the link between disaster mitigation, vulnerability to water-related hazards and global change. In this context flood forecasts were called for improved for easy interpretation. Speakers emphasised the importance of information sharing and co-operation from a global viewpoint. Governments, multilateral agencies, civil society organisations and the private sector are encouraged to strengthen Disaster Preparedness and Risk reduction policies and programmes. *The draft theme statement calls for investigating and conducting research into the impacts of climate change on future flooding in rivers, estuaries and coastal areas.*

WATER, FOOD AND ENVIRONMENT and AGRICULTURE, FOOD AND WATER: These themes were organised by the Secretariat of the Dialogue on Water, Food and Environment and by the UN Food and Agriculture Organisation (FAO), International Commission on Irrigation and Drainage (ICID) and Japan's National Committee of ICID respectively. The former had the pre-expressed objective to report on the ongoing Dialogue and the building of coalitions to initiate action on-the-ground, the latter to create a specific action plan on water for food sufficiency and security The sessions discussed *inter alia*: water as a source of food security; diversity and multifunctional roles of irrigation; agricultural water productivity and externalities of irrigation; water for food, agriculture and rural development; agriculture, food and water in semi-arid areas; management of water

resources and biological production in coastal environments; and local visions on water, food and environment.

Very few sessions discussed impacts of climate change and variability on food production. Delegates of Arab countries highlighted the challenge of food production under climatic changes. Climate change impacts on water resources was identified as a key issue in the Mediterranean. *The (draft) theme statements mention that public and private investment in agriculture has resulted in much needed productivity gains, and has closed food security gaps, particularly in areas otherwise vulnerable to climatic variability.*

INTEGRATED WATER RESOURCES MANAGEMENT AND BASIN MANAGEMENT: This theme convened from 20-21 March in Shiga and was organised by GWP, International Network of Basin Organisations, UNEP, International Lake Environment Committee, Foundation Masahisa Nakamura, Japan Water Partnership Initiative and the Shiga Prefectural Government. The session has the pre-expressed objective of contributing to the operationalisation of IWRM through sharing of experience on key issues Sessions divided into three sub-themes relating to lake management, river management and IWRM.

Five session reports identify climate change as a key issue. Participants drew attention to the use of large lakes as good indicators of climate change. Making reference to the WSSD Plan of Implementation *the draft theme statement recommends to include programmes for mitigating the effects of extreme water related events into the development and implementation of national/regional strategies, plans and programmes with regard to integrated river basin, watershed and groundwater management*. It was noted that social system and climate are drastically changing so that fixed water management is dangerous and causes opportunity for conflict. Thus water management plans should be flexible and dynamic and responsive to changes in society and climate in time and space.

WATER AND ENERGY (Theme): the International Hydropower Association convened this theme. Participants met from 16-17 March, with the pre-expressed objective to explore links and optimal use of both energy and water, proposing policies, partnerships and actions, to inaugurate the first international summit on the sustainable use of water for energy and to address hydropower and the environment and large hydropower infrastructure.

Session reports stress the demand for knowledge and research on climate change, e.g. by IHA, WMO and IPCC. Participants recommended to re-assess hydrological data and increase reservoir capacity. *The theme statement does not mention global change issues.*

WATER AND TRANSPORT (Theme): This theme was convened by Japan's River Bureau and Ports and Harbours Bureau, the Netherlands' Ministry of Transport, Public Works and Water Management, and the International Navigation Association. The pre-expressed objective was to reflect on current activities and discuss future possibilities for Inland Waterway Transport. Participants met from 17-18 March to discuss: the intergenerational transmission of inland waterway transport technology; waterways, transport and IWRM; regional development and water transport; inland water transport and intermodal transport systems; and the knowledge gap in the field of inland waterway transportation.

Participants of the sessions called for recognition of the potential contribution of IWT to the solution of a broad range of economic, environmental, and social issues, including disaster management. Speakers called for incorporation of IWT into IWRM and comprehensive transport systems. It was recommended to promote a "modal-shift" with water transport as an essential element of a sustainable transportation system. *The theme statement does not mention global change issues,* though it stresses IWT has gained recognition as an effective form of disaster relief transport

WATER, EDUCATION AND CAPACITY BUILDING (Theme): UNESCO, UNESCO-IHE Partnership for Water Education and Research, and Cap-Net convened this theme with the pre-expressed objective of launching a Global Coalition for Capacity Building and reporting results of ongoing activities. Participants met from 20-21 March to discuss, *inter alia*: perspectives for new management strategies, partnerships for capacity building, water and environmental education, knowledge sharing and learning systems. Climate change was identified in one session as a driver for capacity building. *The theme statement does not mention global change issues.*

WATER AND INFORMATION: The American Water Resources Association, the Japanese Foundation of River and Basin Communication, and the National Space Development Agency of Japan convened this theme. The session had the pre-expressed objective of information exchange towards new knowledge partnerships and collaborations. Participants met from 18-19 March to discuss, *inter alia*, the Water Resources e-Atlas, Water Information Day, hydrological information systems, information and indigenous disaster prevention technologies, and translating awareness into action. Neither the session reports nor *the theme statement mention global change issues.* However in the context of climate change, information and data management is called for in many other sessions. E.g. participants called for support of scientific investigations on global change and the global hydrological cycle, and for a contribution to relevant programmes and projects of WMO, other United Nations agencies, ICSU and other organisations of equivalent status.

WATER AND SCIENCE: This theme was convened by the International Water Association Liasion from 19-20 March. Participants discussed *inter alia* space technology and water assessment, contributions of the IHP Program, solutions for community sanitation, hydrology for society, and obstacles to the adoption of technology. It was stated that hydrological uncertainty is increasing due to the increase of complexity and heterogeneity of hydrological processes by water resource development, environmental degradation, urbanisation, industrialisation, land-use change, climate change, etc. The IAHS called for all the water-related organisations to collaborate with the PUB initiative to provide necessary hydrological information. The degradation of in-situ data networks is a special concern. *The theme statement does not mention global change issues.*

WATER AND GENDER: This theme was convened by the Gender and Water Alliance on 17 March. *The theme statement stresses that strategies designed to respond and mitigate the impacts of climate change must take into consideration differences based on gender, age, race, ethnicity, and economic status.* In the Africa sessions, participants called on planners to give priority to the active involvement of beneficiaries, in particular women, at all stages of the project including decision making.

WATER, LIFE & MEDICINE: This theme was convened by the World Medical Association and Japan Medical Association, with the pre-expressed objective of furthering the inclusion of proposals from the medical profession in water management. *The draft theme statement recommends preventive countermeasures should be implemented against potential diseases that stem from ecological changes due to global warming, climatic and natural environmental changes caused by lowered sewage disposal capabilities, and transitions in the water environment and their impact on human health and health care. Participants called upon physicians, medical associations, and health care institutions to consider (a.o.) Climatic fluctuations & Medical Care.*

WATER AND CITIES: This theme was convened by UN-HABITAT with the pre-expressed objective of identifying priorities, a framework for issue resolution and commitment to concrete action. It met from 18-19 March in Osaka. Sessions addressed, *inter alia*: water in Asian cities; technologies for water supply and sanitation; urban water governance; urban poverty and water; water supply and sanitation in cities as key to achieving the water-related MDG, flood control in urban areas; and financing urban water infrastructure.

Few sessions recognise the link between global change issues and the theme water & cities. During sessions, speakers called for improving the knowledge on climate hazards. In addition it was concluded that urban floods caused by storm water – particularly severe in large cities – call for a coherent set of measures including prevention, weather forecast, early warning. *The theme statement mentions the threat of* extreme water events like floods and droughts*, but makes no explicit reference to global change issues.*

The following themes do not mention global change issues in either the individual session reports or theme statement. A short description of these themes is included for comprehensiveness.

WATER AND POVERTY: This theme was convened by the Asian Development Bank (ADB) and met from 19-20 March with the pre-expressed objective of a clear understanding of mechanisms of water and poverty that would influence action programs. Session topics addressed: ethical dilemmas in water management; capacity building; wastewater agriculture; hunger eradication;

disaster prevention and risk management; MDGs and poverty reduction strategy papers (PRSPs); water supply, sanitation and PPPs; vulnerability reduction; and policies for improving governance for water security for the poor.

Neither the session reports nor *the theme statement mention global change issues,* though it is recognised that water management plays a critical role in conserving and sustaining the natural resource base and is pivotal in reducing the vulnerability to hazards such as floods and droughts that impoverish so many. Furthermore the WWF3 did not call upon the poverty reduction community to consider climate change impacts. This in spite of the fact that the theme statement of the Water & Climate sessions affirm that the poor will be amongst those worst hit by climate change, and that climate variability and weather extremes will derail achievement of the MDGs.

FINANCING WATER INFRASTRUCTURE (Theme): This theme was convened by the GWP and the WWC from 20-21 March to presentation of results of extensive discussions on financing water infrastructures through the Camdessus Panel. The sessions discussed, *inter alia*: water and finance; finance for local water management; future water needs; public and private sector management; urban investment; environmental financing strategies; and the need to mobilise local capital. Neither the session reports nor *the theme statement mention global change issues.*

GROUNDWATER: This theme was convened by the World Bank, Groundwater Management Advisory Team, International Association of Hydrogeologists, UNESCO, FAO, Marcelino Botín Foundation and the Association of Environmental Hydrologists, from 18-19 March. The theme had the pre-expressed objective to identify strategic actions and investment needs for sustaining groundwater. Discussions focused on, *inter alia*: the management of groundwater for socio-economic development; groundwater contamination; the relationship between groundwater resources and rainwater harvesting; submarine springs in coastal areas; groundwater and related disasters; and property rights over groundwater. Neither the session reports nor *the theme statement mention global change issues.*

WATER SUPPLY, SANITATION, HYGIENE AND WATER POLLUTION: This theme was convened by the Water Supply and Sanitation Collaborative Council (WSSCC), World Health Organisation (WHO), UN Children's Fund (UNICEF), Japan Water Research Center and Japan Sewerage Committee for the Forum. The session had the pre-expressed objective of presenting numerous initiatives from which to lead to a Kyoto statement on future dialogue. Twenty-one sessions met from 16-17 March to discuss *inter alia*: water, sanitation and hygiene; wastewater management, treatment and water pollution; arsenic contamination; ecological sanitation; household security and quality; and sustainable and secure water delivery. *Climate change was not recognised as a major threat or reason to act*.

DAMS AND SUSTAINABLE DEVELOPMENT: This theme was convened by the UNEP Dams and Development Project and the WWC from 20-21 March. The sessions addressed, *inter alia*: promoting dialogue for improved decision making; challenges to financing institutions; the role of large dams in water resources mismanagement and of water harvesting in sustainable and equitable water management; storing water for sustainable development; and whether dam constructions are necessary. Neither the session reports nor *the theme statement mention global change issues.*

WATER AND CULTURAL DIVERSITY: This theme was convened by UNESCO, the French Water Academy and the Japanese National Museum of Ethnology from 16-17 March with the pre-expressed objective to sensitise the international community to cultural dimensions of water and its management. Sessions addressed: tools and methods for understanding people's perceptions of, and attitudes toward, water; water management and cultural heritage; indigenous world views and spirituality; community life and water management; and indigenous water rights and water management strategies. *No links with climate change were discussed.*

WATER FOR PEACE (Theme): This theme was convened by UNESCO and Green Cross International from 20-21 March in opening and closing plenaries and 11 sessions, with the pre-expressed objective to propose practical measures to share benefits of transboundary water management. The sessions discussed, *inter alia*: the transition from potential conflict to co-operation; successes in preventing and resolving transboundary water disputes; transboundary

water management; twinning of river commissions; and the Palestinian-Israeli water conflict. Neither the session reports nor *the theme statement mention global change issues.*

Appendix D: Water & Climate content of Regional Days at WWF3

The basis of this appendix is a review of the principal frameworks within which participants at Kyoto reported that water action is being taken in five regions of the world, and –if- how Climate and Water issues are framed within these active or planned programmes of implementation. WWF3 revealed some 40 initiatives on the ground -some continental, some sub-regional, and others local– in which action on Climate and Water is already being taken, or where there are recommendations that such actions should be taken.

Individually, each one of these initiatives presents a real opportunity for an effective future action by the Climate and Water community for support to on-the ground, demand-led action. The demand for Climate and Water knowledge falls into three categories: generic, generic tailored to local circumstances and supporting specific implementations. There are seemingly no new knowledge issues that emerge beyond those raised in the Kyoto synthesis report of the DWC. Instead, there are many examples of a demand for the conversion to action of most of the individual issues of the synthesis report.

Of critical importance is the fact that there are active programmes already in place within which a Climate and Water niche must be nested, and that actions must be in accordance with the demand-led and implementation principles set out by Kyoto participants.

In the following sections, regional frameworks are presented for Africa, Asia and the Pacific, Middle East and the Mediterranean, Europe and the Americas. The analysis draws on the 'Regional Days' at Kyoto.

A Common African Agenda

Progress towards a common African action agenda to meet the MDGs

The emphasis of Africa Day (March 17th) was focused firmly on meeting the Millennium Development Goals. Climate and water issues are prominent in the common African agenda – they are cited among eight key issues within the continental water agenda. But like all other issues, climate and water is not top of the agenda – they all embedded within the higher-order goal of achieving the Millennium Development Goals.

Perhaps more than any other region of the world, a clear framework for action has emerged. After much effort by Africans in recent months, from Accra, through Abuja, Johannesburg and Kyoto, African governments are pursuing the following steps:

- Africa Ministers Council on Water (AMCOW) and the Africa Water Task Force (AWTF) will lead development of sound policies and co-ordinate and chart the impact of various water initiatives in Africa.
- Preparation of the NEPAD water agenda based on the Africa Water Vision and Framework for Action to provide a foundation to address the challenges for meeting the MDGs
- An Africa Water Facility for capacity building and investment support in Africa.

Africa Day carries important implications for future Climate and Water actions on the continent. There are actions underway, and there are further actions that can be taken. An important next step in consolidating the African common agenda will be the Pan-African Implementation and Partnership Conference on Water to be held in Addis Ababa in December 2003. That meeting, and the time leading up to it, presents an opportunity for the commitments at Kyoto to find their place within the African common agenda.

Specific insights were given into the action agenda on Climate and Water in four sub-regions: West Africa, Southern Africa, North Africa and the Lake Chad Basin. These were presented in 'Session A, Climate change and variability impact on water resources in Africa; 16th March 2003; Africa Water Task Force', and are summarised below;

West Africa (Mr Athanase Compaore, Chairman GWP-WAWP):
The Dialogue on Water and Climate in West Africa is a joint initiative between IUCN - International Union for Conservation of Nature, GWP - West Africa and CILSS (Inter-State Committee for

Drought Control in the Sahel), with financial support by DGIS (via DWC) and CIDA. The objective of the Dialogue is to increase awareness in climate change impacts on water resources and develop, through an open consultative process, a regional adaptation action plan. The initial phase of the Dialogue – focusing on synthesis of existing knowledge - shows that climate change and climate variability is having tangible and significant impacts in West Africa, which are a) drastic reduction of rainfall and river discharge since the 1970s, b) sea level rise, and c) extreme events. However, it is still scientifically unresolved to determine how much of changes being experienced are attributable to human induced climate change. A regional adaptation strategy is being finalised that compliments and supports efforts underway at the national level (e.g. as part of NAPAs being developed as part of UNFCCC process) It focuses on transboundary issues, joint efforts in information management, and experience sharing.

Southern African (Mr Jean Boroto, GWP - Southern Africa):
The challenges that climate change poses to water resources planning in Southern Africa as vulnerability increases with the prevailing semi-arid climate. Conventional techniques using stochastic analysis are now inadequate. Further challenges are related to data collection, reservoir operation and coastal dynamics. Actions and possible solutions lie in adoption of strategies of "least regret" such as demand management, conjunctive use of surface and groundwater, reservoir operating rules and reservoirs design. Recommendations were made for (a) Data collection to better understand climate change in order to facilitate water resources planning, (b) Flexibility in the planning of water infrastructure to include "Possible Early Starting Date" and "Possible Late Starting Date", and (c) implementing the above strategies of least regret".

North Africa (Prof. Siddiq Eisa Ahmed, Director of Hydraulic Institute, Khartoum, Sudan):
The Northern Africa Sub-region has witnessed a severe drought. Measures are needed to combat the impact of the drought or, at least, minimise its effect. The presentation dwelt on the results of an extensive study on best practices for drought preparedness and water management in the North Africa sub-region. Countries involved in this initiative are Algeria, Egypt, Libya, Mauritania, Morocco, Sudan and Tunisia. Rainfall data collected for the last two decades has been analysed to show the frequency of drought using frequency analysis techniques. A set of recommendations were made for drought preparedness, including water harvesting, dam construction, appropriate crop selection, introduction of special equipment on large-scale water harvesting projects, and development of non-conventional water sources. Means of implementation were recommended to address priority to the active involvement of beneficiaries, in particular women, at all stages of the project including decision making, evaluation and monitoring to be carried out during and after project implementation by national authorities, and the promotion of community participation and raising public awareness. The establishment of a water harvesting network was recommended for exchange of information, organisation of training programmes and workshops and preparation of guidelines and newsletters.

LAKE CHAD REGION (Chair: H.E. Adamou Namata, Minister of Water Resources, Environment and Desertification Control of the Republic of Niger, current Chairman of Council of Ministers of LCBC):
The session of the Lake Chad Basin Commission (LCBC) was held to showcase the activities and problems of the LCBC, to present the progress and achievements of the Lake Chad Region on the Vision 2025, to invite donors and development partners to provide continuous support for sustainable development efforts in the basin; and to bring to the awareness of the international community that all the development projects and activities within the conventional lake Chad basin are in line with the general principles and guidelines of AMCOW and NEPAD.

Sector sessions Africa

The Sectors session raising Climate and Water issues were limited to food security. The session on Water and Food Security illustrated that tens of millions of people in Sub-Saharan Africa are not food secure. The drought in Southern Africa continues for the second year, while in Ethiopia millions face possible starvation because the rains failed this year. But even in a 'normal' year, millions of the rural poor cannot grow or obtain sufficient food to feed themselves. Insufficient water for productive purposes is one of the key variables causing low and uncertain agricultural production. Despite droughts, there is evidence that in general it is the failure to capture and manage the little rainwater, which leads to food shortages and hunger.

A set of recommendations and actions were presented (for complete details of which the reader is referred to the full session report). Many of these are coping strategies, with emphasis on local-scale adaptation through empowerment for self-action. These approaches and technologies have shown significant results and do not require huge sums of money or high levels of technical skills.

Information exchange and monitoring: President of WMO Commission for Hydrology, Datius G. Rutashobya, highlighted the growing concern over the last few decades for the sustainability and future availability of freshwater on regional and global scales, and the consequences of any change in climate on water resources. In response, there are increasing demands and requirements for the international exchange of hydrological data, information and products. There has also been an increasing need for hydrological data and information in support of large-scale applications such as research into the global hydrological cycle. A number of international scientific programmes have evolved to tackle these and other issues that require water-related data and information, with a due necessity to exchange hydrological data and information. In recognition of this importance, the World Meteorological Organization (WMO), at its Thirteenth Congress in Geneva in May 1999, adopted Resolution 25 (Cg-XIII) - Exchange of hydrological data and products. The WMO Commission for Hydrology has arranged for the production of two documents as a means of disseminating and promoting Resolution 25 (Cg-XIII); a brochure on the policy and practice set out in the Resolution and a technical report on the exchange of hydrological data and products. Other initiatives for the international hydrological data and information exchange include The World Hydrological Cycle Observing System (WHYCOS), The Global Runoff Data Centre (GRDC), The Global Terrestrial Network – Hydrology (GTN-H), The Flow Regimes from International and Experimental Network Data (FRIEND) and The Hydrology for Environment, Life and Policy (HELP). WMO put forward specific benefits to be obtained by different countries that review, strengthen and co-ordinate arrangements for the collection and exchange of hydrological data and information. The reader is referred to the full session report for the complete list, but in the specific field of Climate and water, these include water resources systems, early warning on water related disasters (e.g. floods and droughts), support of various international conventions (the UN Conventions on Biological Diversity, Climate Change, and Desertification) and scientific investigations of world importance such as those on global change and the global hydrological cycle.

Prof. Francois Mutua of the Nairobi-based regional Drought Monitoring Centre reinforced that climate affects directly, or indirectly, water resources processes. Thus, climate variability and change have significant impacts on water resources development. Highlighting the importance of monitoring the impacts of climate variability and change on water resources, the recommendation was made to strengthen all initiatives to improve data collection networks and data exchange policies. In this respect, it is also important to collaborate with WMO in its efforts to improve hydro-climatic data collection and rescue of historic data. Because of the impacts on water resources, there is a very urgent need to encourage research in reducing the existing uncertainties that are inherent in today's climate projection tools. Improved climate projection depends upon co-operation and collaboration between all the national as well as the regional institutions, projects and programmes which are directly or indirectly involved in monitoring not only climate change but also the impacts of climate change on water resources.

Shaping a Common Water Future in Asia and the Pacific
Share knowledge and experience; win active stakeholder co-operation to alleviate poverty

Participants at the Opening Plenary Session on Asia Day heard of a vast continent of great diversity that faces huge numbers of people deficient in the Millennium Development Goals.

The ministerial delegation released a joint statement on shared priorities and points for action, identifying nine water-related problems affecting the peoples and environment of Asia. Climate variability and change do not receive explicit mention. The nine common concerns do, however, make explicit reference to recurring flooding and inundation of lands and settlements.

Asia Day did not reveal a regional Ministerial mechanism equivalent to that in Africa. The Ministers of the ten countries called for priorities for action based on regional co-operation. Amongst others, they expressed their joint belief that their countries would benefit significantly from regional co-operation on sharing information on climate variability and forecasting extreme weather conditions. They further requested international attention about, and action on, a set of matters of special

importance to Asia, including more investment in infrastructure development (for, inter alia, flood mitigation) and the need to find and apply measures to mitigate harm caused by water-related problems, such as flooding, drought, pollution, and diseases. In regard to this regional co-operation in Climate and Water, the Kyoto Forum included the launch of a specific new initiative among the Pacific Island States, on which further detail is given in Section 0.

Kyoto revealed a number of regional, sub-regional and local initiatives that are already in place as frameworks for action. Some of which are pursuing specific Climate and Water outcomes. Others are acting towards the broader agenda of IWRM, of which Climate and Water is but one part. Examples of specific importance to Climate and Water include:

Southeast Asia Network on Capacity Building for IWRM (SEACapNet)
To address the issue of capacity shortfall for effective water governance, a new commitment was made to enhance capacity building through establishment and operations of the Southeast Asia Network on Capacity Building for IWRM (SEACapNet). With the priority given by Asian Ministers to disaster mitigation in particular, there may be scope that this network embraces Climate and Water issues.

Asia Pacific Association of Hydrology and Water Resources
In the Asia and Pacific region, people face the dual problems of "Too little water" and "Too much water". According to the International Red Cross Society, the annual average number of people suffering from flooding between 1973 and 1997 was approximately 66 million. This represents the biggest figure among all the other natural disasters such as earthquakes and droughts. With its extensive alluvial plains, increasing urban populations have suffered constant inundations.

Despite several years of concerted action, no opportunities have yet been taken for the systematic and continual sharing of science and technique in the consideration of problems such as the hydrology and water management in Asian and Pacific area. Several recommendations were made, including a proposal for integrated management of floods, droughts and environmental flows. In addition, for the implementation of a number of proposals, it was seen as fundamental for respective countries and experts in the Asian and Pacific region that they reinforce their activities in each field. The Asia Pacific Association of Hydrology and Water Resources was proposed as a means for alignment and collaboration through information and research sharing on mutual problems.

Area Water Partnerships
The South Asian Regional Committee of the Global Water Partnership highlighted the importance of institutions that interface between communities and higher levels of decision-making. Area Water Partnerships (AWPs) are a key part of GWP's networking activities in Asia to provide opportunity for the local communities to voice their needs. In this regard, it is noted that both the South East Asian and the South Asian Vision presented at The Hague foresaw a desirable future in which the risk of flooding was reduced through the taking of measures to mitigate water-related hazards. In this regard, Asia's active AWP's offer clear potential to achieve local solutions.

Decisive Action Taken on Water & Climate in the Pacific and Caribbean

Among all of the frameworks for action discussed on Asia Day the Pacific Island States, acting in partnership with Caribbean States, demonstrated that they have already taken decisive steps on Climate and Water issues. The global water community has long acknowledged the special vulnerability and particular needs of Small Island Countries, further indicated by the inclusion of Water in Small Islands Countries as a special theme at Kyoto, led by The South Pacific Applied Geoscience Commission (SOPAC) and the Asian Development Bank (ADB). They had previously co-organised the Pacific preparations through planning meetings. A similar process was initiated in the Caribbean during the 11th Caribbean Water and Wastewater Association Conference and 1st Caribbean Environmental Forum & Exhibition held in St Lucia 7-11 October 2002. The Caribbean Environmental Health Institute (CEHI) played a leading role in facilitating both meetings that provided a regional forum for presenting, discussing and planning for the implementation of the outcomes of the WSSD and the input towards the World Water Forum, within a Caribbean context. ADB, SOPAC, CEHI, the Organization of American States (OAS) and the International Secretariat for the Dialogue on Water and Climate (DWC) worked together to establish the final programme for

Water in Small Islands Countries at Kyoto with the aim to promote action within and between small island countries in the Pacific, Caribbean and other small island country regions, including Asia and the Indian Ocean.

The Caribbean-Pacific Joint Programme for Action (JPfA) that resulted from the Dialogue on Water and Climate in both regions was officially launched during this session. The JPfA comprises 22 action elements, common to both the Pacific and Caribbean regional consultation outcomes, covering four collaborative areas: research, advocacy and awareness, capacity building and governance. Immediate priority actions were identified as: water resources assessment, water governance, integrated water resources management, water demand management and water quality. CEHI and SOPAC demonstrated their commitment to inter-regional South-South collaboration through the signing of a Memorandum of Understanding on the implementation of the JPfA and collaboration towards the preparation of the UN Global Conference on Small Island Developing States to be held in Mauritius in 2004 (i.e. Barbados +10 Review).

A draft statement and a Portfolio of Actions on Water in Small Island Countries were presented, each deriving from the Pacific and Caribbean consultations and Dialogue on Water and Climate were presented.

Middle East and the Mediterranean Region

Exchange of experience and best practices

The Day of the Middle East and the Mediterranean focused on potential solutions to the region's aspirations for economic, social and environmental outcomes, specifically economic growth, poverty reduction, reduction of social tensions, food security and environmental sustainability. Solutions discussed at Kyoto were framed within the themes of institutional reform, agriculture, non-conventional water resources, and groundwater management.

Climate and Water issues did not figure prominently within the Regional day, but are implicit in the background to many of the region's problems. Aridity, growing water shortages and salinity provide the backdrop for calls for action in expanded irrigation and water-use efficiency, rain-fed agriculture and the development of non-conventional water resources. On the latter, it is foreseen that non-conventional water resources will play an increasing role in the region, particularly desalination, where costs have declined and which has been identified as a more reliable source in a time of climate change. A number of actors committed themselves to continued exchange of experiences in the field of non-conventional resources among research institutes (ICBA, MEDRC and others), governments of the region, networks (GWP-Med) and donors (in particular World Bank and Islamic Development Bank).

Europe

Share experience of implementing WFD. Report on Asia and Africa partnerships

The Day of Europe at Kyoto reflected two principal dimensions; efforts within the region itself and the support that the region provides to others through the EU Water Initiative. In Europe, the key issues are the relatively high population density, significant industrial activity and intensive agricultural production, subjecting the region's water resources to considerable pressure. Chronic water shortages and water stress characterise many of the regions of southern Europe and these problems will be aggravated in the future as a result of climate change. In recent years, Europe has also suffered increasingly frequent and widespread floods: a phenomenon, which may also be linked to climate change. With regard to water and development, Europe contributes a significant proportion of the global aid budget. A major challenge is to ensure that actions and projects are co-ordinated effectively among donors and between donors and recipient countries.

The principal vehicle for action within its own regional boundaries is the EU Water Framework Directive (EFD), which entered into force at the end of 2000. In 2002, the EU launched its water initiative (EUWI) at the WSSD in Johannesburg. Under the EUWI, the EU has reached two formal, strategic agreements, one with African countries and the other with 12 countries from Eastern Europe, the Caucasus and Central Asia on long-term strategic partnerships. International scientific and technological co-operation on water related issues are being broadened with developing countries and countries in transition in the context of the 6th Research Framework Programme (2002-2006).

Europe Day did not give prominence to Climate and Water issues. However, it gave a clear indication of the two overarching frameworks within which future actions on Climate and Water would need to be embedded – the European Water Framework Directive and the EU Water Initiative. But these do not in anyway preclude the potential for local actions.

Appendix E: Water & Climate content of Senior Expert Groups at WWF3

In preparation for the Ministerial Conference delegates to the Ministerial Conference convened in Kyoto to discuss five themes in sub-groups: safe drinking water and sanitation; water for food and development; water pollution prevention and ecosystem conservation; disaster mitigation and risk management; and water resources management and benefit sharing. The first session of each group was open to Forum participants, while the final two sessions were restricted to Ministerial Conference participants. In all sessions participants drew attention to the effects of climate change and increasing climate variability on water and ecosystems.

SAFE DRINKING WATER AND SANITATION: This meeting was chaired by Ronnie Kasrils, South Africa's Minister of Water Affairs and Forestry. Hans Christian Schmidt, Denmark's Minister of the Environment, presented on the EU Water Initiative and Maria Mutagamba, Uganda's Minister of State for Water, reported on progress of the African Water Facility. Climate change was not discussed at any length in this sub-group. The appendix to *the Chair's summary* recognises climate change as one of the factors that may divert attention and resources from achieving the millennium development goals.

WATER FOR FOOD AND RURAL DEVELOPMENT: This meeting, chaired by Ian Johnson, Vice-President of the World Bank, began with presentations and reports from the Water Journalist and Gender and Water Panels. Presenters, *inter alia*: outlined solutions for addressing the impacts of water-intensive agriculture; noted the need to eradicate malnutrition and respond to changing food demands; highlighted the importance of improving irrigation-system management; called for legislation ensuring transparent decision making, and advocated gender-responsive water management activities. Several countries, including Gambia and Swaziland, noted the effects of climate change on water resources. On food security and poverty alleviation, the *Chair's Summary* stresses the need for increased investments in rural areas that fully recognises hydrological uncertainty and volatility.

WATER POLLUTION PREVENTION AND ECOSYSTEM CONSERVATION: This sub-group meeting, chaired by Philippe Roch, Director of the Swiss Agency for the Environment, Forests and Landscape, discussed the potential for technical innovation to reduce water consumption, the benefits of industrial ecology in reducing pollution, and the crucial role of groundwater in supplying quality freshwater. Finland and Switzerland remarked on the relationship between climate change and ecosystems. The *Chair's Summary* acknowledges that delegates deemed the impact of climate change on ecosystems and the subsequent influence on the water cycle extremely important.

DISASTER MITIGATION AND RISK MANAGEMENT: This sub-group was chaired by H. Soenarno, Indonesia's Minister of Settlement and Regional Infrastructure. He remarked that the frequency of floods and droughts around the world has increased. Participants heard reports from sessions on Water and Climate, Water and Information, and the Youth World Water Forum. Regarding floods, the Netherlands stressed that: disasters and floods are "everyone's business"; innovative "win-win" approaches need to be identified; floods and climate issues are linked; and both positive and negative experiences should be shared. Other issues discussed include the importance of information sharing; the use of forecasting technology to prevent disasters; the ratification of the Kyoto Protocol to the UNFCCC; and the recognition that poverty reduction can only be achieved if a risk management strategy is in place. Many countries, including Tunisia, Russia and Morocco, underscored the link between climate change and the frequency of disasters, and noted that the impact of natural hazards is affecting development and hindering attainment of the MDGs. The Marshall Islands said developed countries must contribute to disaster mitigation and risk management by reducing their greenhouse gas emissions.

The *Chair's summary* notes that the increasing severity of water-related disasters, in particular floods and droughts, is of world-wide concern. Increase in the frequency of floods is an expected impact of climate change and must be monitored and included in future management strategies. Enhanced co-operation between scientists and water managers will be beneficial in this regard. The vulnerability of small island states to any sea level rise should also be considered.

WATER RESOURCES MANAGEMENT AND BENEFIT SHARING: This sub-group was chaired by Arjun Charan Sethi, India's Minister of Water Resources. The key recommendations from the sessions on Water and Energy and IWRM and Basin Management were presented to the group.

Addressing the impacts of climate change, South Africa called for the application of the polluter-pays-principle and highlighted the need for progress reports to be submitted to the Commission on Sustainable Development. The *Chair's summary* recognises climate change as a major challenge to water resources management. It notes dams have become more important in view of climate change. There is a need to develop dams for irrigation, additional water storage, flood control and energy provision. The development should follow environmental and social impact assessments and include resettlement plans.

Appendix F: A Quick Guide to Climate and Water at Kyoto

Kyoto sessions	Primary Objective(s) of Session	Climate and Water content
ISSUES		
Water and Climate	Address consequences of climate change through knowledge and action	Throughout.
Water and Cities	Identification of priorities, framework for issue resolution and commitment to concrete action	No direct reference made
IWRM	Contribute to the operationalisation of IWRM through sharing of experience on key issues	Recommendation to support river & lake basin institutions, including mitigating extreme weather events.
Water supply, Sanitation, Hygiene and Water Pollution	Presentation of numerous initiatives, leading to a Kyoto statement on future dialogue	No direct reference made
Water and Information	Information exchange towards new knowledge partnerships and collaborations	Multi-media strategies needed to raise public awareness and political will in disaster mitigation
Water and Cultural Diversity	Sensitise international community to cultural dimensions of water and its management.	No direct reference made
Groundwater	Identify strategic actions and investment needs for sustaining groundwater	No direct reference made
Water for Peace	Proposal of practical measures to share benefits of transboundary water management	No direct reference made
Water and Energy	Explore links and optimal use of both, proposing policies, partnerships and actions	Concern for GHG emissions of thermal energy generation, and actions to mitigate. Tropical dam GHG emissions.
Agriculture, Food and Water	A specific action plan on water for food sufficiency and security	Decadal productivity gains in areas otherwise vulnerable to CV through public and private investment in agriculture
Water, Food and Environment	Report on ongoing Dialogue, and building of coalitions to initiate action on-the-ground	No direct reference made
Water and Poverty	Clear understanding of mechanisms of water and poverty, to influence action programs	Water management pivotal in reducing vulnerability to hazards (floods and droughts) that impoverish so many
Water, Nature and Environment	Assess progress in sustainable management, demonstrate benefits to nature and society	No direct reference made
Water, Education and Capacity Building	Launch of a Global Coalition for Capacity Building, with results of ongoing activities	No direct reference made
Water and Transport	Reflect on current activities and discuss future possibilities for Inland Waterway Transport	Comparable low emissions of GHGs. Effective in disaster relief. New IWT applications in disaster management.
Financing Water Infrastructure	Presentation of results of extensive discussions on financing water infrastructures	No direct reference made
Water and Governance	Share knowledge and experience on global and local governance; plans for future action	No direct reference made
Floods	Intensify information exchange and interaction on flood management and mitigation	Coping with floods. Recommendations to National Governments, international community and donors.
TOPICS		
Public Private Partnerships	Transparent dialogue among conflicting opinions, for more participatory involvement	No direct reference made
Dams and Sustainable Development	Furtherance of constructive dialogue amongst stakeholders, post WCD report	Flood attenuation services. Overcoming variability to provide sectoral services.
SPECIAL PROGRAMS		
World Water Actions	Database of actions, follow-up on Hague commitments, analysis of Kyoto actions	No direct reference made
Water, Life and Medical Care	To further the inclusion of proposals from the medical profession in water management	Preventative medical countermeasures among health care institutions in response to disasters and climate change
Water and Parliamentarians	Discuss role of legislators in water and evolve an Action Plan as a legislative guideline.	No direct reference made
World Water Assessment Programme	Launch the 1st WWDR and future developments in information exchange	No direct reference made
Ministers Meeting on 'Water, Food and Agriculture'	Recommendations that will influence future food and agriculture policies and actions	Agricultural production and water use depend heavily on climatic conditions, giving diverse regional characteristics
MAJOR GROUPS		
Water Journalist Panel	Demonstration of opportunities for better communication and use of the media	No direct reference made
CEO Panel	Share results of joint projects towards CEO Vision of The Hague	No direct reference made
Children's World Water Forum	Demonstrate effectiveness of involving 12-18 year-old age group as active stakeholders	

Kyoto sessions	Primary Objective(s) of Session	Climate and Water content
Gender and Water Panel	Impact of gender approaches in water policies, institutions and programs	Mainstreaming gender into disaster management. CC strategies to take account of different social groups.
Union Panel	Stronger, more effective public management of water, especially in developing countries	No direct reference made
Water Development Partners Panel	Financial institutions and Ministers, with stakeholders, respond to Forum challenges	No direct reference made
Youth World Water Forum	Present outcomes of projects, and develop new forms of communication	No direct reference made
Science, Technology and Management Panel	Recommendations from professionals that articulate integrated and innovative strategies	Immediate attention required to the challenge of flooding. Prioritised a practical framework for flood-prone regions
REGIONAL DAYS		
Africa	Progress towards a common African action agenda to meet the MDGs	Among nine key water issues in poverty & development agenda. Pursuing specific disaster mitigation initiative
Asia and Pacific	Share knowledge and experience; win active stakeholder co-operation to alleviate poverty	Vulnerability to drought & floods. Recommended focus on natural disasters, priority to investment in mitigation.
Americas	Share good practices and knowledge	Inherent vulnerability with loss of life and sector impacts. Regional commitment to effective risk management.
Middle East and the Mediterranean	Exchange of experience and best practices	No direct reference made
Europe	Share experience of implementing WFD. Report on Asia and Africa partnerships.	Future aggravation by CC of water shortage and stress. Increasingly frequent and widespread floods.
OTHER SESSIONS		
in Kyoto	Miscellaneous Sub-Sessions - independent of established themes	
In Osaka	Miscellaneous Sub-Sessions - independent of established themes	
In Shiga	Miscellaneous Sub-Sessions - independent of established themes	
MINISTERIAL CONFERENCE		
	Issuance of the Declaration of the Ministerial Conference	Declaration includes two clauses under heading of 'Disaster Mitigation and Risk Management'

Appendix G: Meeting scientific needs with commitments

Theme	Commitment	Remark
	Preparedness, disaster management	
	Research, data collection and exchange	
CLIM	Several research institutions in Europe (UK [MetOffice], Netherlands [KNMI], Germany, WMO), US [columbia university], Japan, Australia and South America (Brazil) are committed to work on high resolution climate forecasting tools for water managers.	
CLIM	*Several applied research initiatives (Red Cross, Wallingford, IUCN, SEI, Wageningen UR) are committed to work with local partners to develop tools for disaster risk reduction*	
FLOD	IFNET will develop flood runoff models. Therefore the floods measurements in the world will be vastly improved from reactive to proactive action, and perhaps provide the benefit to 4.8 billion people [*Water in Rivers Secretariat, IF Net Preparatory Unit]*	
	Capacity building, information exchange, networking	
CLIM	*Netherlands Red Cross commits to continue advocating the need to include and mainstream Disaster Preparedness and Risk Reduction in sustainable development programmes*	*on-going*
CLIM	*The Red Cross Climate Centre in the Netherlands is committed to support an increasing number of Red Cross and Red Crescent National Societies to be prepared better for climate change and extreme weather events.*	*on-going*
	Management, governance	
CLIM	*A consortium of private partners, including Munich-Re, commits to continue developing risk management and risk spreading financial mechanism and instruments including those for Less Developed Countries.*	*on-going*
TSPT	River Bureau, Ministry of Land, Infrastructure and Transport, Japan commits to include Inland waterway transport (IWT) as an option in disaster management	
GENP	Asian Development Bank and the Gender and Water Alliance will sign a letter of intent on a "Gender and Water Partnership"., a mechanism for regular dialogue and collaboration between ADB and GWA on mainstreaming gender into water resources and management policies, strategies and programmes, including that of disaster and flood management programmes.	a
	Vulnerability & Adaptation	
	Research, data collection and exchange	
CLIM	*Several applied research initiatives (Red Cross, Wallingford, IUCN, SEI, Wageningen UR) are committed to work with local partners to develop tools for adaptation*	
	Capacity building, information exchange, networking	
NATE	International Geographical Union Commission for Water Sustainability holds regular research meetings around the world (e.g. Portugal, UK, Korea, Spain, South Africa, Armenia, Argentina, Brunei) to promote the exchange of ideas from different parts of the world, especially on best practices appropriate to different climatic and socio-economic environments	
	Management, governance	
CLIM	UNDP is committed to assist initially 3 countries to develop national adaptation plans and support required capacity building.	
CLIM	*IUCN/IISD and SEI commit to help local partners in the development, formulation and demonstration of new integrative approaches to adaptation.*	
CLIM	GEF commits to develop an action plan on adaption to Climate Change	
CLIM	ADB, SOPAC and other donors will consider broadening the support base for a coping facility for small island states.	
	Global Change and integrated management	
	Research, data collection and exchange	
CLIM	The Global Environmental Change Programmes (IABP, IHDP, WCRP, Diversitas) have committed to a joint Global Water System Project to integrate the knowledge necessary to understand the role of water in the Earth's system, as conditioned by human and natural factors.	
CLIM	*IGOS –P is interested in supporting a water and climate agenda by developing a water cycle theme that will encourage the development of the necessary data*	
CLIM	*The IGOS-P water cycle theme agrees to examine the status of insitu water cycle measurements as part of its exercise in developing the Global Water Cycle theme report.*	*ongoing*
CLIM	*NASDA and ESA (Europe), through CEOS and IGOS-P, will make great efforts to contribute to WSSD Plan of Implementation of a joint observation and research agenda for water cycle*	
CLIM	*NOAA / US Water Cycle Program will establish the water cycle as a major cross-cutting theme with linkages to all the components of the climate system and will contribute to international cooperation on research in climate and water*	*ongoing*
INFO	1) Through it's Hydrology and Water Resources Programme, the WMO is committed to supporting National Hydrological and Meteorological Services in their data collection and dissemination activities eg, HOMS and WHYCOS. 2) National Hydrological and Meteorological Services are committed to meeting the needs of the users of their hydrological data and information. 3) Users of hydrological data and information are committed to informing National Hydrological and Meteorological Services of their requirements for data and information.	
AFRI	WMO Commission for Hydrology has arranged for the production of two documents to disseminate and promote Resolution 25 (Cg-XIII). The World Hydrological Cycle Observing System (WHYCOS); Global Runoff Data Centre (GRDC); The Global Terrestrial Network – Hydrology (GTN-H); The Flow Regimes from International and Experimental Network Data (FRIEND); The Hydrology for Environment, Life and Policy (HELP)	
STMP	International Association of Hydrological Sciences (IAHS) commits itself for a decade to reduce the predictive hydrological uncertainty and deliver site specific hydrological information by	

Theme	Commitment	Remark
	collaborating with other water related programs	
IWRM	Partners from Australia, US [*Department of Agriculture*], and China have committed to carrying out a collaborative project between 2003-2006. Partners are planning to host activities including workshops and research exchanges in the next 12-36 months. Others are welcome.	
CLIM	European Commission (EU): for the 6th Framework Programme (2003-2006), 700 M€ will be invested in the programme "Global Change and Ecosystems", about 90 M€ in the INCO programme on water-related aspects and other resources in the Aeronautic and Space programme on GMES: all these research programmes contribute substantially to Water and Climate and will be fully open to international co-operation, providing funding to all "non-OECD" third countries	
	Capacity building, information exchange, networking	
CLIM	SOPAC commits to Water quality monitoring and capacity building programme	
STMP	International Association of Hydrological Sciences (IAHS) commits itself for a decade to contribute to capacity building necessary for local water resources management by collaborating with other water related programs	
CLIM	Several organisations and groups involved in monitoring and research of the world's freshwater resources, commit to establish a World Water and Climate Network, hosted by Japan and chaired by Prof. Charles Goldman [Lake Biwa Research Institute / NGO]	
CLIM	*CAPNET will support mobilization of the regional networks for implementation of the capacity building activities.*	
CLIM	*UNESCO-IHE is determined to disseminate and expand the training package for water and climate with and through regional and national institutes provided the financial support is available.*	*conditional on funding*
CLIM	The World Water Forum of Journalists is committed to producing at least 100 articles on water and climate per year. These will appear in local, national and international newspapers around the world in order to raise awareness about water and climate-related issues.	
CLIM	*The Dialogue commits to advancing Dialogue between users and providers of information, particularly in the area of climate change projections and their consequences for water resources.*	
EDUC	REDICA Network on Climate Change and Water Resources Management	
TSPT	River Bureau, Ministry of Land, Infrastructure and Transport, Japan commits to create knowledge base & international cooperation programs on inland waterway transport (IWT)	
IWRM	Establishment of a Network of Asian River Basin Organizations (NARBO) among WARDEC, Asian Development Bank (ADB) and Asian Development Bank Institute (ADBI). The goal of NARBO will be to help achieve Integrated Water Resources Management (IWRM) in river basins throughout Asia, especially in developing countries. NARBO's objective will be to promote the exchange of information & experience among river basin organizations (RBO) and their associated water sector agencies in Asia and to strengthen their capacity and effectiveness.	
FLOD	Signature of a Declaration of Intent by five countries (Argentina, Bangladesh, China, The Netherlands, Vietnam) to learn from each others experiences regarding flood management concepts and strategies, preparation of integrated flood management plans, knowledge about structural and non-structural measures, raising public awareness and participation, and strengthening the implementation "powers" of the central government top level.	
MEME	Continued exchange of experiences in the field of NCR among research institutes (ICBA, MEDRC and others), governments of the region, networks (GWP-Med) and donors (in particular World Bank and Islamic Development Bank).	
CLIM	*The World Meteorological Organization (WMO) is committed to improving the dialogue between national climate services & water managers on use of climate forecasts in water management decisions*	
CLIM	Caribbean and Pacific organizations (CEHI and South Pacific Applied Geoscience Commission [SOPAC]) have signed a Memorandum of Understanding providing for cooperation on matters including the freshwater environment, capacity-building, data and information management, applied research, sharing of expertise, implementation of the recommendations relevant to small island countries from this meeting, preparations for Barbados +10 and other matters of mutual interest;	
	Management, governance	
CLIM	*Several applied research initiatives (Red Cross, Wallingford, IUCN, SEI, Wageningen UR) are committed to work with local partners to develop and demonstrate "grassroots" approaches for vulnerability assessment, develop tools for adaptation, disaster risk reduction, ecosystem management and sustainable livelihoods.*	
CLIM	The national (e.g. Bangladesh), regional (Central America, West Africa, Mediterranean, Southern Africa, South East Asia), basin (e.g. Thukela, Lena, Small Valleys, San Pedro, Murray-Darling) and small island states (e.g. Pacific and Caribbean) dialogues commit to prepare an Action Plan/Strategy/Policy for coping with climate variability & change in the water sector.	
GENP	Asian Development Bank and the Gender and Water Alliance will sign a letter of intent on a "Gender and Water Partnership"., a mechanism for regular dialogue and collaboration between ADB and GWA on mainstreaming gender into water resources and management policies, strategies and programmes, including that of disaster and flood management programmes.	
CLIM	*Thirteen countries have endorsed the Pacific Regional Action Plan (PRAP) on Sustainable Water Management, providing a basis for development of national policies, institutions and plans, and for strengthening regional and interregional cooperation on water management*	*WSSD Johannes-burg action*
CLIM	Pacific Water Association commits to regional water demand management programmes	
CLIM	EU commits to a programme for Water Governance	
CLIM	GEFs "special climate change fund" should be operational by 2005.	
CLIM	*The Organization of American States is committed to working with the smaller states of the Caribbean and Central America in support of their climate change / sea level rise mandates and to assist them in locating sufficient financial resources to carry out such programs.*	

	Research, data collection & exchange	Capacity building, information exchange, networking	Management, governance
Preparedness, disaster management [call for action]	♦ Integrate hydrodynamic flow models with weather forecasting models and with public water supply system models ♦ Investigate and conduct research into the impacts of climate change on future flooding in rivers, estuaries and coastal areas ♦ Improve forecasting technologies (Regional climate model, Integration of climate, runoff and water utilisation models, climate projection tools) ♦ Flood hazard assessment [Small Valleys] ♦ Monitoring of flood conditions [Small Valleys] ♦ Evaluation of insurance as a risk reduction mechanism [Netherlands] ♦ Exploration of feasibility of establishing an insurance pool [Small Islands] ♦ An installed hydrological modelling system for applications in risk management [Thukela]	♦ Reach out and advise water managers on the reliability and value of seasonal forecasts ♦ Improve knowledge on climate hazards ♦ Emphasise threats lakes face from outside their watersheds from global climate change ♦ Highlight the aggravation by climate change of chronic water shortages and water stress that characterise many of the regions of southern Europe. Show the link between increasingly frequent and widespread floods and climate change. ♦ Acknowledge that natural hazards and climate change events, including hurricanes combined with floods and droughts, cause human casualties and have destructive impacts in a.o. urban areas and water supply in the Americas. ♦ Collection and exchange hydrological data and information for early warning on water related disasters (e.g. floods and droughts) ♦ A Pacific Climate Information and Prediction System [Small Islands] ♦ Flood alert mechanism [Small Valleys] ♦ Use of seasonal and inter-annual forecasts [Small Islands] ♦ Strengthened early warning systems [West Africa]	♦ Governments, multilateral agencies, civil society organisations & private sector should in concerted effort strengthen Disaster Preparedness and Risk reduction policies and programmes. ♦ Develop and implement national/regional strategies, plans and programmes with regard to integrated river basin, watershed and groundwater management", including "programmes for mitigating the effects of extreme water related events". Such plans should be flexible and dynamic and responsive to changes in society and climate ♦ Integrate Flood management options in IWRM & support within the overall scheme of disaster mitigation and risk management plans; improve flood forecasts for easy interpretation ♦ Further participatory and efficient risk management ♦ Consider forest management as part of disaster management following global warming ♦ Include IWT as an option in disaster management ♦ Urban floods caused by storm water – particularly severe in large cities – call for a coherent set of measures including prevention, weather forecast and early warning ♦ Change from disaster response to hazard assessment & risk management, included in IWRM ♦ Hazard and risk management programmes [Small Islands] ♦ Strategic Plan for disaster prevention and mitigation; Risk management a cross-cutting issue in development planning; Active Basin Committees; Enforced legislation on disaster prevention and mitigation based on local realities [San Juan] ♦ Flood emergency preparedness and response; Reduced vulnerability of local infrastructure to floods [Small Valleys] ♦ Strategy on flood preparedness, aligned with national interest [Lena]
[commitments]	• Several research institutions in Europe (UK [MetOffice], Netherlands [KNMI], Germany, WMO), US [Columbia university], Japan, Australia & South America (Brazil) commit to work on high resolution climate forecasting tools for water managers. • *Several applied research initiatives (Red Cross, Wallingford, IUCN, SEI, Wageningen UR) are committed to work with local partners to develop tools for disaster risk reduction* • *A consortium of private partners, including Munich-Re, commits to continue developing risk management and risk spreading financial mechanism and instruments including those for Less Developed Countries*	• IFNET will develop flood runoff models and facilitate international co-operation in flood management. Floods measurements in the world will be improved to move from reactive to proactive action [*Water in Rivers Secretariat, IF Net Preparatory Unit]* • *The Red Cross Climate Centre in the Netherlands is committed to support an increasing number of Red Cross and Red Crescent National Societies to be prepared better for climate change and extreme weather events* • Declaration of Intent by five countries (Argentina, China, Bangladesh, The Netherlands, Vietnam) to learn from each others experiences in flood management concepts & strategies, preparation of integrated flood management plans, structural & non-structural measures, raising public awareness and participation, and strengthening the implementation "powers" of central government top level.	• *Netherlands Red Cross commits to continue advocating for the need to include and mainstream Disaster Preparedness and Risk Reduction in sustainable development programmes* • River Bureau, Ministry of Land, Infrastructure and Transport, Japan commits to include Inland waterway transport (IWT) as an option in disaster management • Asian Development Bank and the Gender and Water Alliance will sign a letter of intent on a "Gender and Water Partnership"., a mechanism for regular dialogue and collaboration between ADB and GWA on mainstreaming gender into water resources and management policies, strategies and programmes, including that of disaster and flood management programmes.

	Research, data collection & exchange	Capacity building, information exchange, networking	Management, governance
Vulnerability & Adaptation [call for action]	♦ Studies of vulnerability and adaptation strategies to minimise the impacts of climate variability and change in context of ensuring adequate environmental flows and reducing and mitigate water-related disasters. ♦ Collect and exchange hydrological data and information for planning, design and development of water resources systems (water supply, irrigation, hydropower production, navigation, recreation etc) ♦ Re-assess hydrological data and increase reservoir capacity ♦ vulnerability and adaptation assessments; drought assessment and response [Small Islands] ♦ Identify regional vulnerabilities [San Pedro] ♦ Inventory of water management facilities [Lena] ♦ Develop mechanisms and options to improve prevailing conditions, and to reduce future stresses on water resources [Central America] ♦ Feasibility of different adaptation measures. Demonstration projects to test preparedness and adaptation strategies prior to up-scaling [Southern Africa] ♦ Case studies of successful and unsuccessful interventions in adaptation [Mediterranean]	♦ Lobby Ted Turner to produce another video on water and climate, that would focus on the need for mitigation as much as on adaptation ♦ Encourage the use of water harvesting techniques and construction of dams for harnessing the flood water ♦ Establishment of a water harvesting network ♦ Awareness raising & network building to stimulate action [Mediterranean] ♦ Benefits from an improved understanding of regional climate change impacts and patterns; Improved awareness of the predictable impacts, related to the major development goals [West Africa] ♦ Strengthened capacity of river basin organisations to absorb and implement coping agenda [West Africa] ♦ Necessary skills among stakeholders to pursue adaptation to changes in climate [Southern Africa]	♦ Develop practises for combating drought ♦ Strategies designed to respond and mitigate the impacts of climate change must take into consideration differences based on gender, age, race, ethnicity, and economic status ♦ Innovative policies and new initiatives need to respond quickly to face the uncertain challenges climate change imparts in mountains ♦ National adaptation coalitions must: prioritise people, be innovative, engage political leaders. ♦ Preventive countermeasures should be implemented against potential diseases from ecological changes due to global warming, lowered water retention by the earth's surface, climatic & natural environmental changes ♦ Flexibility in the planning of water infrastructure, implement strategies of "least regret" such as demand management, conjunctive use of surface and groundwater, improve reservoir operating rules, adapt design of reservoirs, etc. ♦ Couple desalination, whose costs have declined and which is a more reliable source in a time of climate change, with demand management and capacity building. Better integration of use of non-conventional water resources in national water policies. ♦ Balance water supply & use through appropriate crop choice & improved resources management ♦ Recognise the potential contribution of IWT to the solution of a broad range of economic, environmental, and social issues; incorporation of IWT into IWRM and comprehensive transport systems ♦ Coping mechanisms specifically related to water included in national NAPA [Bangladesh] ♦ Regional-level adaptation framework [Mediterranean] ♦ Execution of key objectives of 'Adapting to Climate Change in the Caribbean [Small Islands] ♦ Implementation through piloting of adaptation interventions, within an up-scaling framework [West Africa] ♦ Improve water use efficiency at a range of levels to cope with lesser availability; Strategies for enhanced aquifer recharge and storage through re-use of water [Murray-Darling]
[commitments]	• *Several applied research initiatives (Red Cross, Wallingford, IUCN, SEI, Wageningen UR) are committed to work with local partners to develop tools for adaptation*	▪ International Geographical Union Commission for Water Sustainability holds regular research meetings around the world (e.g. Portugal, UK, Korea, Spain, South Africa, Armenia, Argentina, Brunei) to promote the exchange of ideas from different parts of the world, especially on best practices appropriate to different climatic and socio-economic environments	▪ UNDP is committed to assist initially 3 countries to develop national adaptation plans & support capacity building. ▪ *IUCN/IISD and SEI commit to help local partners in the development, formulation and demonstration of new integrative approaches to adaptation.* ▪ GEF commits to develop an action plan on adaption to Climate Change ▪ ADB, SOPAC and other donors will consider broadening the support base for a coping facility for small island states.

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Global Change and integrated management [call for action]	♦ Greater support for research and monitoring of glaciers/snow in high mountain areas. Mountain biosphere reserves are particularly good indicator, control, test and monitoring sites to study the impact of global change ♦ Palaeo records can be investigated as a baseline for development of change scenarios (IPCC) ♦ Illustrate climate change impacts on water resources (for agriculture) in the Mediterranean ♦ scientific research of water conservation functions of forests ♦ research climate change (IHA, WMO, IPCC and others) ♦ Gather information on the climatic and land conditions, flood control and water use unique to the Asian and Pacific region ♦ Halt deterioration of hydrological & meteorological data collecting networks, essential for water & climate sectors; special concern: degradation in-situ data networks. ♦ Develop comprehensive and continuous satellite to ground observing strategy for the WATER CYCLE, especially for the rainfall; ♦ Global co-operation of meteorological observation ♦ Collaborative research to enhance management of the Yellow River Basin [Yellow River] ♦ Develop better knowledge of climate variability & potential climate change to support agricultural management [Murray-Darling] ♦ Implementation of Basin Management Model to demonstrate regional sustainable development [Aral Sea] ♦ Assessment of influence of climate change on available water resources [Aral Sea] ♦ Investigation of rational water use in irrigated agriculture [Aral Sea] ♦ Techniques for long-term weather forecasting (up to one year) [Netherlands] ♦ Integrated science programme on water regime formation of Yakutian rivers [Lena]	♦ Use large lakes as indicators of climate change ♦ Establish information systems and services for integration of the observational, model and social water/land use data and products, and for international distribution of data for interpreting scientific outputs for actual social applications ♦ IAHS calls for all the water related organisations to collaborate with the PUB initiative to provide necessary hydrological information ♦ Raise public awareness in Africa ♦ Increase knowledge on climate change in energy sector ♦ Facilitate dialogs among stakeholders ♦ Promote networking. A concrete projects suggested was a "Stop Global Warming Project" by using an "environmental housekeeping book". ♦ collect and exchange hydrological data and information for: • development, conservation, management and use of water resources in an integrated and sustainable manner through basin wide co-operation for benefit of all • early warning on water related disasters (e.g. floods and droughts) • planning, design and development of water resources systems (water supply, irrigation, hydropower prod., navigation, recreation etc) • determination of the equitable entitlement of each riparian country to the use of the river water ♦ Strengthen all initiatives to improve data collection networks and data exchange policies. Collect data to better understand climate change in order to facilitate water resources planning ♦ Improved information dissemination (Lena) ♦ More systematic information of health impacts [Small Islands] ♦ Capacity building, specifically training in IWRM, awareness of changes in climate, measures to cope [Southern Africa] ♦ Use seasonal & inter-annual forecasts[Small Islands]	♦ Promote sustainable policies and strategies that encourage co-operation and collaboration between national as well as regional institutions, projects and programmes, directly or indirectly involved in monitoring not only climate change but also the impacts of climate change on water resources ♦ Establish administrative expertise and governmental co-operation from all countries to apply newly integrated WATER CYCLE information for maximum societal benefit. ♦ Discuss the relation between conflicts, emergencies, natural disasters - floods, droughts, wars, civil unrest and climatic changes in the Middle East ♦ Consider the hydrological cycle as a whole, including freshwater, oceans, climate and society ♦ Promote water and climate management strategies; Increase binational cooperation [San Pedro] ♦ Accommodation 'Water & Climate' priorities in Nat Water Management Plan [Bangladesh] ♦ Improved cooperation with upstream countries [Bangladesh] ♦ Greater involvement of regional institutions in International Conventions; IWRM approaches [West Africa] ♦ Integration of national policies and laws into ratified/signed international agreements [Southern Africa] ♦ Strategy on water resources management under climate change, aligned with national interest [Lena] ♦ Formulate nation-wide drought management strategies & Protect the natural environment, including wetlands, through better management of environmental flows [Murray Darling] ♦ Strengthening of inter-state co-operation [Aral Sea] ♦ Developing appropriate legal and financial mechanisms [Aral Sea]
[commitments]	• The Global Environmental Change Programmes (IABP, IHDP, WCRP, Diversitas) have committed to a joint Global Water System Project to integrate the knowledge necessary to understand the role of water in the Earth's system, as conditioned by human and natural factors. • *NOAA / US Water Cycle Program will establish the water cycle as a major cross-cutting theme with linkages to all the components of the climate system and will contribute to international cooperation on research in climate and water* • *NASDA and ESA (Europe), through CEOS and IGOS-P, will make great efforts to contribute to the WSSD Plan of Implementation of a joint observation and research agenda for water cycle*	• SOPAC commits to Water quality monitoring and capacity building programme • International Association of Hydrological Sciences (IAHS) commits itself for a decade to contribute to capacity building necessary for local water resources management by collaborating with other water related programs • Several organisations and groups involved in monitoring and research of the world's freshwater resources, establish a World Water & Climate Network. Host: Japan; chair: Prof. Charles Goldman [Lake Biwa Research Institute / NGO] • *CAPNET will support mobilization of the regional networks for implementation of the capacity building activities.*	• *Several applied research initiatives (Red Cross, Wallingford, IUCN, SEI, Wageningen UR) are committed to work with local partners to develop and demonstrate "grassroots" approaches for vulnerability assessment, develop tools for adaptation, disaster risk reduction, ecosystem management and sustainable livelihoods.* • The national (e.g. Bangladesh), regional (Central America, West Africa, Mediterranean, Southern Africa, South East Asia), basin (e.g. Thukela, Lena, Small Valleys, San Pedro, Murray-Darling) and small island states (e.g. Pacific and Caribbean) dialogues commit to prepare an Action Plan / Strategy / Policy for coping with climate variability & change in the water sector.

Research, data collection & exchange	Capacity building, information exchange, networking	Management, governance
• *The IGOS-P water cycle theme agrees to examine the status of insitu water cycle measurements as part of its exercise in developing the Global Water Cycle theme report and will encourage the development of the necessary data* • Through it's Hydrology & Water Resources Programme, WMO is committed to supporting National Hydrological and Meteorological Services in their data collection & dissemination activities eg, HOMS and WHYCOS. • National Hydrological and Meteorological Services and users of hydrological data and information are committed to exchange needs • WMO Commission for Hydrology has arranged for production of documents to disseminate and promote Resolution 25 (Cg-XIII). The World Hydrological Cycle Observing System (WHYCOS); Global Runoff Data Centre (GRDC); Global Terrestrial Network – Hydrology (GTN-H); Flow Regimes from International and Experimental Network Data (FRIEND); Hydrology for Environment, Life and Policy (HELP) • International Association of Hydrological Sciences (IAHS) commits itself for a decade to reduce the predictive hydrological uncertainty and deliver site specific hydrological information by collaborating with other water related programs • Partners from Australia, US [*Department of Agriculture*], and China have committed to carrying out a collaborative project between 2003-2006. Partners are planning to host activities including workshops and research exchanges in the next 12-36 months. Others are welcome. • European Commission (EU): for the 6th Framework Programme (2003-2006), 700 M€ will be invested in the programme "Global Change and Ecosystems", about 90 M€ in the INCO programme on water-related aspects and other resources in the Aeronautic and Space programme on GMES: all these research programmes contribute substantially to Water and Climate and will be fully open to international co-operation, providing funding to all "non-OECD" third countries	• *UNESCO-IHE is determined to disseminate and expand the training package for water and climate with and through regional and national institutes provided financial support is available.* • The World Water Forum of Journalists is committed to producing at least 100 articles on water and climate per year. These will appear in local, national and international newspapers around the world in order to raise awareness about water and climate-related issues. • *The Dialogue commits itself to advancing the Dialogue between users and providers of information, particularly in the area of climate change projections and their consequences for water resources.* • REDICA Network on Climate Change and Water Resources Management • River Bureau, Ministry of Land, Infrastructure & Transport, Japan commits to create knowledge base & international cooperation programs on inland waterway transport (IWT) • Establishment of a Network of Asian River Basin Organizations (NARBO) among WARDEC, Asian Development Bank (ADB) and Asian Development Bank Institute (ADBI). Goal of NARBO: help achieve IWRM in river basins throughout Asia, especially in developing countries. Objectives: promote exchange of information and experience among river basin organizations (RBO) and associated water sector agencies in Asia and strengthen capacity and effectiveness of RBO. • Continue exchange of experiences in NCR among research institutes (ICBA, MEDRC and others), governments of the region, networks (GWP-Med) & donors (in particular World Bank and Islamic Development Bank). • *The World Meteorological Organization (WMO) is committed to improving the dialogue between national climate services & water managers on use of climate forecasts in water management decisions* • Caribbean and Pacific organizations (CEHI and South Pacific Applied Geoscience Commission [SOPAC]) have signed a Memorandum of Understanding providing for cooperation on matters including the freshwater environment, capacity-building, data and information management, applied research, sharing of expertise, implementation of the recommendations relevant to small island countries from this meeting, preparations for Barbados +10 and other matters of mutual interest	• Asian Development Bank and the Gender and Water Alliance will sign a letter of intent on a "Gender and Water Partnership"., a mechanism for regular dialogue and collaboration between ADB and GWA on mainstreaming gender into water resources and management policies, strategies and programmes, including that of disaster and flood management programmes. • *Thirteen countries have endorsed the Pacific Regional Action Plan (PRAP) on Sustainable Water Management, providing a basis for development of national policies, institutions and plans, and for strengthening regional and interregional cooperation on water management* • Pacific Water Association commits to regional water demand management programmes • EU commits to a programme for Water Governance • GEFs "special climate change fund" should be operational by 2005. • *The Organization of American States is committed to working with the smaller states of the Caribbean and Central America in support of their climate change / sea level rise mandates and to assist them in locating sufficient financial resources to carry out such programs.*