UNIVERSITÄT STUTTGART

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

WORKSHOP REPORT [DRAFT_ZERO]
1st Numerical Modelling – Policy Interface Meeting

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NMPI 2007

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NMPI 2007

1. Preface

This report is culmination of a long process of consultation with various workers in environmental systems modelling on the issue of the uptake of numerical models. It contains a chronology of events that eventually resulted in the 1st Numerical Modeling – Policy Interface (NMPI) workshop. It identifies several key issues that have lead to the "disconnect" between numerical modelling and policy. It also highlights the urgent need to improve the interface especially in the global effort to implement adaptation strategies to climate change. The document is also meant to serve as background material to the second NMPI workshop expected to be held in Nottingham, England on the 20th and 21st of June 2007.

Acknowledgments: The NMPI scientific committee benefited from the advice and council of many individuals. The enthusiastic support of Professor Paul Kirshen of the faculty of civil and environmental engineering of Tufts University and Dr. Herman Karl of MIT-USGS Science Collaborative (MUSIC) is gratefully acknowledged. The advice provided by Dr. Suzanne Moser of the United States National Center for Atmospheric Research's (NCAR) Institute for the Study of Society and Environment (ISSE) must also be mentioned. She supplied numerous articles that helped to shop some of the core ideas of various themes within NMPI. Finally the valuable advice from the over 50 workshop attendees has also been incorporated into the findings and recommendations. To the team from the HLRS - Höchstleistungsrechenzentrum Stuttgart (High Performance Computing Center Stuttgart) we say special thank you for the support in live interactive streaming of the first NMPI workshop. To the large group of experts outside the workshop (and outside the network) who provided valuable commentary on the early drafts of this report and who have received no specific mention in section of the document, we say thank-you.

Although this report was prepared by the scientific committee of the first NMPI workshop under the auspices of the Universitaet Stuttgart and the British Geological Survey, all opinions, findings, and recommendations expressed here are those of the author and do not necessarily reflect the views of neither the Universitaet Stuttgart nor the British Geological Survey.

2. Executive Summary

Numerical modelling in the context of NMPI refers to the process of using mathematical and other related approaches to capture and represent biophysical processes in the environment in computer based simulations for the study and prediction of environmental events or the behaviour of human-engineered systems in nature. The development of computer simulation of environmental phenomenon has drawn from a deep pool of scientific, mathematical, computational, and engineering knowledge and methodologies as a result scientist and engineers are better able to predict and optimize systems affecting our environment. Developments in the science have been rapid and helped to revolutionize science of environmental prediction.

The term policy is utilized in the context of NMPI to imply a well defined conglomeration of ideas or a specific plan of how and when to approach a particular situation or problem that has been agreed officially by a group of individuals, an organization or a government. In the case of NMPI a special emphasis is placed on water, in other words, policy relevant to water resources from a holistic perspective. Although from a conceptual perspective, policy, in NMPI was intended to fit the definition out in the previous sentence, in reality it is used broadly to encompass the realm practice, in other words, the use of numerical models for the operational management natural / environmental systems. An appropriate example would be the use of ensemble flood forecasting system (a system of numerical models) for short term mitigation of floods as well as their long term management of inundation through their use in medium to long term policy formulation.

The interface, within the context of NMPI, represents the grey zone that characterizes the process of using results from computer-based simulation to advice policy and / or management of water. Due to the rather broad nature of the domain under consideration, NMPI is compartmentalized into five themes. The themes are framed based on geopolitical considerations and relevance to current water management subject matter (including climate).

3. Introduction and Background

For too long the results of numerical models conceived for environmental management have had poor uptake by those who may greatly benefit from them. Given that we may only have a one or two decades left to try to provide solutions to the problems caused by accelerating environmental change, getting the interface right between modellers and the intended user of the models is extremely important. Recognising the seriousness of this problem, a workshop was convened as a 1st step on the path to finding solutions. The aim of the workshop was to explore ways to bridge the gap between model developers and decision makers, to identify problems and to develop a research agenda to solve those problems.

The workshop was held over two days at the University of Stuttgart and organised jointly with the British Geological Survey (BGS). It involved parties in the numerical modelling-policy interface, mainly from Europe, but also including delegates from the US, Canada, China, Egypt, Ghana, Ethiopia, Uzbekistan and Pakistan. After a day of talks by academics, government research institutes, and EU officials, to enable everyone to get on the same level, the second day consisted of break-out groups to discuss three particular issues. These were the model-policy interface with particular reference to a specific sectors (e.g. water-hazards), how the numerical modelling-policy interface differs in different parts of the world, and the nature of the network to be set-up after the workshop. The break-out groups were attended by all the workshop delegates and the results of the break-out groups were summarised in a plenary session (See Appendix III).

4. Summary of the findings of each break-out groups

There were many common themes identified in the talks on day one, and yet a diversity and richness of experience was found. The problems identified in preventing uptake of modelling results included the need for a demand for the model, early and appropriate stakeholder involvement, importance of trust between all the parties involved, capacity building in the client organisation, management of expectations and the language used between the parties involved in the process. The repeated identification of problems in each talk gave the workshop participants confidence that a common definition of the problem could be reached. The break-out groups built on the themes identified in the talks and also provided new ideas.

4.1 Output from the break-out groups

The “Hydro-hazards in the 21st Century” thematic sessions sought to systematically define current and pertinent issues relating to the development and use of numerical models in water-related geo-hazards monitoring and prediction. The sessions were initiated with an exploratory discussion of the modern definitions of hazard, risk and uncertainty, and the identification of key questions that the NMPI network should tackle in relation to these concepts: how should informational gaps that remain unfilled – in hydro-hazards avoidance, mitigation and adaptation – be identified? What are the most efficient and effective ways of filling these gaps using numerical models, taking care not to overstep their limitations? How should numerical modellers work to ensure that the modelling products filling those gaps are used, and used appropriately, by policy makers? In particular, participants diagnosed the lack of renewal in monitoring programs, and poor respect for empirical data, as indicative of ineffective and inefficient model development and application in the service of hydro-hazards decision making.

The later sessions of the “hydro-hazards” break-out group identified core, necessary and immediate challenges for the modelling community: the improved translation of modelling uncertainty to policy and decision makers; the recognition of a broader spectrum of useful models in policy and decision making; a need to improve the education of numerical modellers in the policy making process; the need for new strategies to enable modellers to shape concepts of risk in the public arena; and new common frameworks for communicating risk and uncertainty within

participatory modelling processes. The sessions concluded with the strong recommendation that NMPI provide an international platform through which modellers and policy/decision makers would have the opportunity to better communicate and learn from each other.

The break-out group on the global nature of the numerical modelling policy interface examined how the issue of successful model uptake changes over different countries over the world. Three types of countries were considered: the developed world, such as Europe, US, Canada, etc., transitional economies such as China, India, etc. and developing countries such as those in sub-Saharan Africa. From the discussions, universal themes were drawn out that applied to model deployment in any situation. These included the main tenet of successful model application, that of trust, perception and communication between all parties involved. Other universal themes included data problems, the importance of the inclusion of stakeholders, the involvement of NGOs, albeit in different roles, models as arbiters between parties of differing views, the need for capacity building to enhance model uptake, how personalities can help or hinder the situation and the role of stories, both in terms of social scientists and environmental scientists.

However, despite there being universal issues that transcended national boundaries, model uptake by policy makers had regional similarities. It has to be recognised that that there were no generalisations, even for countries themselves and that problems were heterogeneous and depended on climate, scale, government and local economic development. Generally, the economically poorer the country, the greater the problems: for data collection, the problems are greater due to socio-political instability, the policy making system is less well developed, confidence with numbers is lower as is the level of knowledge, and the economic situation is likely to be less stable. Countries experiencing rapid economic growth posed a different set of problems, with reallocation of water between sectors as move to a more industrial and less agricultural economy occurred, attitude to environmental costs is different as the monetary economy is seen as more important than the damage to the environment, and the scale and ambition of water engineering schemes is likely to be grander with the issue of trans-boundary transfers more likely to be important.

For developing countries, models represent a real opportunity to aid their improvement. The most important is the idea of a fresh start, in which countries that have limited infrastructure have a "clean-slate" which represents an opportunity. When combined with cheap, readily available IT, the fresh start can result in leapfrogging whereby the country can put in place the most appropriate technology that can be both sustainable and scaleable. Models can be used for synthesing data in regions that are data sparse. Models can also promote partnerships and allow the increase in knowledge/confidence of a natural system. Modelling can result in capacity building, promote the two-way transfer of ideas and allow the development and testing of technological improvements. Globalisation, especially the availability of goods and services via the internet and the motivation of individuals from developing countries is seen as an advantage.

4.2 Nature of the network

The final break-out group concerned the nature of the network that would be set-up as a result of the workshop. This break-out group, as would be expected, discussed both the need for the network and the mechanism for disseminating information. By common agreement, there is no one group that is currently providing a platform for people producing predictive information to communicate with those who need it. The most important consideration is to take the need of practioners as the starting point. There should be a strong emphasis on demand driven way of working. Cost-effective measures must be used to enable a diverse mix of people to develop the network and to enable as full as participation as possible. The network should start with academically based people and integrate people with different backgrounds as the network developed. Special consideration should be given to motivation and incentive to engage people. During the discussion there was a shared concern about motivation and the need for personal gains. Therefore the network had to provide different benefits to different people. The drivers will change geographically, e.g. China needs more models and the situation is different.

To make the NMPI network really work, a process of developing an identity was discussed. This involved creating a concept paper, producing a flyer and leading to a special edition of a journal. The concept paper should be broadly formulated to allow members of the network to put their own views. The idea of "learning alliances" as

used in the EU funded SWITCH project was seen as useful (see www.switchurbanwater.eu). A secretariat would also be necessary to co-ordinate activities and to provide a “bridging” function between different types of decision makers and research communities.

5. Conclusions and next steps

The workshop demonstrated a need for further study of the interface between numerical modelling and policy makers. To move the NMPI process onwards, the following is required:

(1) Secretariat or nodal point with clearly defined functions is required.

(2) Need to formulate a clear and comprehensive concept note.

(3) Set up working group to start the drafting process of the concept note.

(4) Contact other international science initiatives to see if there is any overlap.

(5) Develop a medium for communication for core group prior to the next workshop (e.g. a wiki site or editable website as in www.wikipedia.org).

These actions will lead to a successful follow-up workshop to be held at BGS Keyworth, Nottingham, England (20th/21st June). It is envisaged that a special session in an appropriate international workshop will also be run.

6. Appendix I: Submitted abstracts

1. Application of the GIS-based EPIC Model for the Analysis of Water-Food Relations and Policy Implications in China

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The continuous population growth and rapid economic development have led to an increasing demand for water in China. In many areas, especially the North China Plain and the northwest part of the country, water scarcity and overdraft of water resources have become widespread problems, causing serious environmental and ecological degradation. As food production is the largest water user, the future of food production could be affected by water scarcity and depletion of water resources. Understanding the water-food relations and regional variations are important for formulating effective and suitable policies to deal with the challenges.

Applying a GIS-based EPIC model (GEPIC), this study analyzes the water-food relations across regions in China. For a large country like China, socio-economic and natural conditions, including water endowments, vary significantly across regions. Water productivity in the production of a given crop differs across regions and so as the water use value in the production. This fact renders a significance to consider crop structural adjustment and inter-regional food trade to alleviate regional water stress in the country. A systematic analysis of water-food relations across regions for different crops provides bases to support the policy formulation in this regard.

As a first step, the GEPIC model is applied to simulate winter wheat yield and water productivity on irrigated and rainfed land in different regions in China at a spatial resolution of 5 arc-minutes. The water-food relations established are used to examine the likely effects of alternative irrigation strategies aiming at reducing agricultural water use on yield and total production of winter wheat in the regions concerned and for the country as a whole. The initial findings show that irrigation is crucially important for achieving high yield of winter wheat in the northern part of China, especially the North China Plain. On average, the aggregate crop

yield is 70% higher under the irrigated conditions than that under the rainfed conditions. In the southern regions where rainfall is relatively plentiful, the role of irrigation for increasing the winter wheat yield is less significant. The intensification of water stress and the associated environmental problems in much of the northern regions in China give rise to a consideration of paradigm changes in agricultural water management. Two scenarios for reducing irrigation water supply in the North China Plain are postulated and the effects on winter wheat are examined. The results show that different irrigation reduction strategies with a same amount of water saving could have different effects on winter wheat production.

Keywords: water scarcity, water-food relations, GEPIC, irrigation, the North China Plain, policy implications

2. SWITCH - Changing the way we mange water in the city of the future.

Kala Vairamoorthy

SWITCH is an EU 6th Framework integrated research project that aims to develop scientific, technological and socio-economic solutions for the sustainable and effective management of water in the city of the future – 2050. The project involves 32 partners from across the globe, including 17 from the EU and 12 from developing countries.

With increasing global change pressures (urbanisation, climate change etc.), coupled with existing un-sustainability factors and risks inherent to conventional urban water management, cities of the future will experience difficulties in efficiently managing scarcer and less reliable water resources. In order to meet these challenges, SWITCH calls for a paradigm shift. This paradigm shift is based on several key concepts of urban water management including: resilience of urban water systems to global change pressures; interventions over the entire urban water cycle; reconsideration of the way water is used (and reused); greater application of natural systems for water and wastewater treatment; governance and financial management structures, covering the entire urban water cycle.

It is anticipated that SWITCH will generate new technical know-how and a number of technologies that support the above key concepts through 40 PhD studies, 10 study sites and 9 demonstration cities. In addition, it will develop an integrated modelling approach that will enable a full understanding of the implications of these concepts across the entire urban water cycle, while allowing optimal designs to be generated. These integrated urban water models will be driven by sustainability indicators, and will recognise uncertainties associated with global change pressures.

An important component of SWITCH is that it aims to bring together all stakeholders involved with, or who have interest in, urban water management. These multi-stakeholder learning alliances will guide and support SWITCH on the implementation of research and demonstration activities, by taking account of local problems and needs. Clearly, this will substantially contribute to a reduction in the vulnerability of cities and their capacity and preparedness to cope with global changes.

It is anticipated that during the next five years, SWITCH will produce knowledge, technologies, models, techniques, institutional frameworks and improved management tools for sustainable urban water management for the city of the future.

3. A Strategic Approach to Environmental Prediction: Evolving Perspectives from Canada

Mark Cantwell

ABSTRACT

A threshold seems to have been breached over the last decade in the ability of science and technology to be usefully employed to predict likely or conditional states of the natural environment. The implications for developing and harnessing this predictive capacity may be enormous benefits to humanity by allowing more informed decision-making concerning the protection of the natural world and the enhancement of human health, safety and prosperity. At a time of unprecedented adverse global environmental change, these new advancements and their potential are catching the attention of government, industry, and civil society around the world. Canada's Federal Department of Environment is considering how the potential benefits of environmental prediction may be more easily realised for Canadians and the global commons. This presentation summarizes the lessons learned in developing a strategic approach to Environmental Prediction - including a notional Vision for Environmental Prediction - and sets out the objectives, principles, and processes by which this Vision may be achieved. It presents a novel way for producing useful knowledge about the future in order to better manage the cumulative risks and opportunities of a changing world.

4. The MIT-USGS Science Impact Collaborative (MUSIC)

B. E. Kock

The MIT-USGS Science Impact Collaborative (MUSIC), an innovative action research partnership between the Massachusetts Institute of Technology and the United States Geological Survey, is reviewed: the group, co-directed by Professor Larry Susskind (MIT) and Dr Herman Karl (USGS) seeks to conduct innovative theoretical and practical research around the incorporation of high quality science into environmental decision-making. The group's 8 MSc interns and 1 PhD student work principally on partnership projects with US federal agencies. Themes currently being addressed range from public process design in natural resources management, and interdisciplinary model development for collaborative decision-support, to capacity-building projects for environmental decision-making around the US. The diverse background of the group – counting geologists, physicists, political scientists, anthropologists and environmental engineers among its student and faculty members – provides for uniquely interdisciplinary projects, and cross-fertilization of ideas between communities of knowledge and practice. Some of the research questions being explored at present include: how ecosystem management can be conducted across multiple jurisdictions; and what institutional, societal and political transformations are necessary to move towards sustainable and collaborative governance of natural resources. The overwhelming emphasis of the group is on research that makes a practical difference in the communities it works in, bridging the divide between local and expert knowledge.

One of the MUSIC projects currently underway, collaborative agent-based modeling of the Lower Arkansas River Basin, in SE Colorado, is described in detail as an example of work that integrates the social and natural sciences. The project is aiming to embed social and environmental systems modeling more effectively and efficiently within a public decision-making process. Using a variety of tools, including role-playing games, system dynamics and agent-based modeling, the project seeks to support local moves to resolve conflict and further the cause of sustainable water resources management in the region.

(Beaudry E. Kock, PhD candidate, Department of Urban Studies and Planning/Department of Civil and Environmental Engineering, MIT)

5. Pedagogies of the Science Policy Interface: Challenges in Graduate Education in Integrated Water Resources Management

Paul Kirschen

Water: Systems, Science, and Society (WSSS) Interdisciplinary Graduate Education Program, Research Professor, Civil and Environmental Engineering Department and Fletcher School of Law and Diplomacy, Affiliated Faculty, Department of Urban and Environmental Policy and Planning, Tufts University, Medford MA 02155 USA, paul.kirshen@tufts.edu

Complex global water issues require a combined engineering and natural, physical, and social sciences approach, and water professionals have been discussing the integration of relevant disciplines since at least the 1960s. Yet, at least in the United States, planning and regulatory processes have typically favored an approach of "integrated multidisciplinary" efforts that involve people working first from their disciplinary perspectives and then later attempting to integrate their results with mixed success.

A 2001 report of the US National Research Council stated: "What is needed for understanding water resources is a more holistic conceptual framework… solutions cross traditional disciplinary and societal boundaries". The World Bank, the World Commission on Dams, and the Global Water Partnership also describe the need for such approaches, which is known as integrated water resources management. Many of the Millennium Development Goals target water issues. Thus there is an established need for innovative, interdisciplinary or integrated approaches to widespread and diverse water-related problems and associated training programs.

Within a University, many well-known challenges exist to train students in integrated analysis and carry out interdisciplinary research. Universities are organized by departments; tenure and promotion are given for recognized expertise in a particular area; doctoral research is encouraged to be in a single, well defined, topic; team teaching competes with other faculty expectations; relatively few interdisciplinary journals; and student concerns about gaining depth and employment.

The Tufts University Water: Systems, Science, and Society (WSSS) Graduate Education Program answers the need for a combined approach by

creating a research and graduate program where cutting edge interdisciplinary research is conducted, and a participating student from one discipline is, from the beginning, educated to consider problems from the viewpoints of the other relevant disciplines. The WSSS Program includes doctoral and masters graduate students from the following schools at Tufts: Arts and Sciences, Engineering, Medicine, Veterinary Medicine, the Friedman School of Nutrition Science and Policy, and the Fletcher School of Law and Diplomacy.

6. Adaptation to regional and local climate change: the potential use of model output by water sector policy makers

Charlotte van der Schaaf – Water policy advisor, GTZ, Eschborn

Adaptation to climate change is one of the main future issues for development cooperation in the water sector. There is a general agreement within countries about the need for enhanced regional and local climate change scenarios. Research on the vulnerability of society and ecosystems to climate change impact is important, particularly for the water sector. Better databases on frequency, intensity and effects of extreme events and regional climate change scenarios would facilitate the development of effective adaptation strategies. In this short talk, I will discuss what specific impacts climate change can and will have on the water sector in developing countries, what social and economic consequences these might have and in what way we think numeric models could (and should) support policy-making.

7. Model-based tools to support practical water management? -Some results of Harmoni-CA

Ilke Borowski
Institute of Environmental Systems Research
Universität Osnabrück

The WFD implementation poses new challenges to the water managers. This creates needs for new information and communication technology based tools (ICT-tools). Those tools generated by several successful EC funded research projects can provide important insights for the implementation of the WFD, especially for the later implementation cycles. European research projects focusing on river basin management, e.g. those from the CatchMod Cluster or from the cluster on Human Dimensions in Water Management have contributed strongly here. However, often knowledge about these projects has not been wide spread. The reasons for the gap between research and water management are manifold ranging from difficulties in communication between the two groups to structural barriers.

The European Concerted Action Harmoni-CA (www.harmoni-ca.info) was thus been established to approach this gap. During the last five year in various paths were followed:

- improving exchange through the development of the WISE-RTD as a web-portal which presents contributions from research – projects to the challenges of the WFD
- building capacity with a series of guiding documents which tackles especially difficult issues in the context of computer-based modelling tools and the WFD implementation, such as synergy with monitoring approaches to improve data availability; the role of uncertainties; or the role of human dimensions
- identifying available resources by carrying out reviews on the actual use of specific tools such as decision support tools (DSS) or tools addressing the interaction between agriculture and water management
- identifying ways for an improved uptake of model-based tools into water management and more general to improve the science-policy interface.

This presentation will focus mainly on the lessons learnt from the activities of Harmoni-CA/WP5 which has taken a learning approach to both

communities by organizing a series of events where scientists and policy makers can directly exchange.

7. Appendix II: Background documents to the first workshop

Write-up on Working Group / Parallel Sessions

1. Background

This document is an attempt to shed light on the rational behind the themes of the parallel sessions of NMPI 2007. To start this we shall restate the global objectives of the NMPI workshops. The meeting in Stuttgart is expected to:

1. Define the issues (problems) that characterize the interface between the development of environmental models (not exclusively numerical models) and end-users of these models;
2. Use the identified issues (problems) to set an agenda for research;
3. To announce the formation of NMPI Network of researchers.

The systematic definition of the problems that characterize the interface is expected to be undertaken in a thematic fashion during the parallel sessions of the NMPI 2007 in Stuttgart. Below is an enumeration of the five themes proposed for the parallel sessions, they include:

1. Strategies for developing NMPI network- technical focus
2. Geo-hazards in the 21st century -technical focus
3. China focus group – crosscutting focus
4. Implications of Numerical Modelling / Policy interface for adaptation (climate change)- crosscutting focus
5. NMPI & Adaptation (climate change) in developing countries - crosscutting focus

It should be mentioned that although technically the first theme is **not** an issue characterising the modelling - policy interface, without a coherent and consistent approach to the development of the NMPIN, the remaining four themes will not have a framework or vessel through which their aims can be actualized. The five working groups of NMPI 2007 in Stuttgart are expected to be the “engine rooms” of the workshop. The next section will dwell on the nature and objective of each of the five themes of the parallel sessions.

2. Parallel Sessions

4.3 Theme 1 - Strategies for developing NMPI network - technical focus

The output of this session is expected to contribute directly to the five year short-term strategy document of the NMPI network. Knowledge sharing is expected to be a hallmark of NMPI initiative. NMPI is expected to provide a common platform for both model developers and end-users to compare notes and to improve dialogue within and between both camps. It is worth mentioning that the scientific committee of NMPI is cognizant of the numerous initiatives underway globally to improve the science – policy nexus.

What our nascent network expects to bring to the table is a forum where a more refined or, better still, a smaller slice of the science – policy nexus can be analysed in better detail within a specialized group across themes with global implications. The latter approach carefully and vigorously will help to better compartmentalize an aspect of the science – policy nexus and thus invariably will add value to current and future initiative that hope to improve this well established nexus.

The group is expected to cover the following points:

i. the technical challenges in establishing and sustaining a functioning network including issues related to logistic needs and financing;

ii. how to create a framework to develop the necessary structures to implement the recommendations from NMPI 2007 in Stuttgart's themes 2 to 5;

iii. how to develop a realistic workplan to avoid the all-too-common disease that afflicts a great deal of networks (a disease that normally results in the natural deaths of many a network);

iv. how to profit or benefit from exciting global initiatives;

v. mechanisms to ensure all the regional NMPI nodes are active and actively working with each other across themes.

To summarize the working group will be expected to produce a document that proposes a simple but effective way of instituting the NMPI network.

4.4 Theme 2 - Geo-hazards in the 21st century - technical focus

Although the term geohazards conjures images of earthquakes, mudslides, subsidence etc… within NMPI 2007, the term will be used to refer loosely to hydro-disasters mainly flooding and its allied consequences such mudslides. Seaborne threats such as ocean-floor-quake induced tsunamis shall also be considered. The main of objective of this session will be to systematically define current and pertinent issues that define the development / use of numerical models to monitor and predict geo-hazards and the impact on end-users of these tools. The theme is expected to be addressed from a technical focus i.e. problems that will be identified are expected to deal with issues such as the following:

i. the interpretation of risk and how is it communicated to the end-user or target audience;

ii. how to develop and build confidence with identified end-user;

iii. how to address the issue of uncertainty and how develop approaches that ensure the correct levels of uncertain are transmitted properly, in timely fashion to policy makers

iv. what methods and tools ought to be developed to assess the uptake of forecasting tools within specific end-user groups

Due to time constraints the working group will be expected to use case studies to elaborate the issues and problems they identify.

4.5 Theme 3 - China focus group – crosscutting focus

Natural resource use in China over the next decades is expected to increase significantly. Water for agriculture and energy production will be play critical roles in the country's wish to sustain its blazing pace of development. The country's water resources though are expected to be impacted upon negatively by climate change.

The latter has not been lost on the Chinese government as serious attempts are put in place to ensure sustainable use of water resources. The China focus group will be expected to define current and critical issues in China related the numerical modelling - policy interface in the water environment. Bottlenecks related to how when and how models are used to bear on policy. Examples from case studies will

be most welcome. The problems are expected to be enumerated and ranked. Recommendations for research will be expected.

4.6 Theme 4 - Implications of Numerical Modelling / Policy interface for climate change? (Adaptation) - crosscutting focus

The theme is expected to address how general environmental policy development processes are currently influenced by numerical models and vice versa. The group will be expected to focus on “decision support” to provide a milieu that links present and future aspects of resource management to adaptation, vulnerability and feedback mechanisms. With geopolitical emphasis on the northern hemisphere (encompassing NMPI two regional groupings mainly Europe and North America), this group will be expected document the potential impact neglecting the numerical - policy interface will have on adaptation efforts in the north? Recommendations will be expected to contain a short term action plan (with a five year horizon). Once the problems have been enumerated they are expected to be ranked.

4.7 Theme 5 - NMPI & Adaptation (climate change) in developing countries - crosscutting focus

The theme is expected to address the potential role the NMPI network can play in the following regions: Central and South America, Region, Africa, and Asia (without China). Emphasis is expected to be placed on the role the NMPI network can play in improving the use of numerical models / tools for improved water resource management especially in food production systems, and control of hydro-disasters (overlap with theme 2) in light of climate change ? . Health is also expected to be considered e.g. the increase in extreme flooding could potentially lead to increases in endemic diseases such malaria. The identified problems and issues are expected to be ranked. The issues will be expected to be elaborated in such a manner which would help to develop specific proposals for the purpose of addressing deficiencies.

8. Appendix III: Programme 1st Workshop in Stuttgart

"Numerical Modelling - Policy Interface (NMPI) Workshop 2007 at the Universität Stuttgart

NMPI 2007 Workshop, **12th – 13th March 2007,** Venue: *Rektoramt, Senatssaal, Keplerstrasse 7, 70174 Stuttgart, Germany*

Monday, 12th March: Presentations and Discussions

Time	Presentation	Speaker	Organization
08:15-09:30	Registration		
09:30-09:40	Welcome address	Rektor	Universität Stuttgart
09:40-10:10	Scientific Background to NMPI 2007	Giselher Kaule	Chair NMPI 2007, Director, ILPÖ, Universität Stuttgart
	Illustrations of problems	John Rees	Co-Chair NMPI 2007, Head, Policy & Science Coordination, British Geological Survey
	NMPI Vision / Workshop Structure	Desmond Manful	NMPI 2007 Organiser, Research Associate, ILPÖ, Universität Stuttgart
	NMPI Vision / Workshop Structure	Andrew Hughes	NMPI 2007 Co-organiser, Groundwater Modeller, British Geological Survey
10:10-10:40	Presentations by Research Directorate General (DG RTD), European Commission	Cornelia Nauen	Principal Scientific Officer D.1: International dimension of the Framework programme, Directorate D - International Cooperation
		Pierre Valette	Head of Unit : L-2, Research in the economic, social sciences and humanities, Directorate L - Science, Economy and Society
10:40-11:00			**Coffee Break**
		Part I -- Chairperson: Giselher Kaule	
11:00-11:15	Difficulties and challenges of applied multidisciplinary research for global change	Charles Rodgers	Senior Scientist, GLOWA-VOLTA Project Coordinator, Centre for Development Research, University of Bonn, Germany
11:15-11:30	MIT-USGS Science Impact Collaborative	Herman Karl	Director, MIT-USGS Science Impact Collaborative (MUSIC)
		Beaudry Kock	Assistant director, MIT-USGS Science Impact Collaborative (MUSIC) Massachusetts Institute of Technology (MIT), USA
11:30-11:45	How to interpret and sell forecasting	András Bárdossy	Director, Institute of Hydraulic Engineering, Universität Stuttgart, Germany
11:45-12:00	Can we learn from computer science to better cater to needs of water system users?	Nick van de Giesen	Director, Dept. of Water Management, Technical University of Delft, Netherlands
12:00-12:15	Pedagogies of the Science Policy Interface	Paul Kirshen	Co-Chair and Director, Water: Systems, Science, and Society (WSSS) Interdisciplinary Graduate Program, Dept of Civil Engineering, Tufts University, Medford, USA
12:15-12:45			**Q&A Session**
12:45-13:45			**Lunch Break**

Time	Presentation	Speaker	Organization
		Part II -- Chairperson: Silke Wieprecht	
13:45-14:00	Model-based tools to support practical water management? - Some results of EU Harmoni-CA	Ilke Borowski	Institute of Environmental Systems Research, University of Osnabrueck, Germany
14:00-14:15	Models and stakeholders: Lessons learnt from research projects in different continents (EU Rivertwin)	Thomas Gaiser	Senior Scientist, Institute for Soil Science and Land Evaluation, Hohenheim University, Germany
14:15-14:30	EU SWITCH Project: An introduction	K. Vairavamoorthy	Professor of Sustainability, UNESCO-IHE Institute for Water Education, Netherlands
14:30-15:00		**Q&A Session**	
15:00-15:20		**Coffee Break**	
		Part III -- Chairperson: Hans-Georg Schwarz-von Raumer I	
15:20-15:35	Impact of Hydro-research on water-related policy issues in China	Gørild Heggelund Yahua Wang	Senior Research Fellow, Director of Global Programme, Fridtjof Nansen Institute, Olso, Norway Assistant Professor, School of Public Policy & Management, Tsinghua University, Beijing, China
15:35-15:50	Application of the GIS-based EPIC Model for the Analysis of Water-Food Relations & Policy Implications in China	Yang Hong	Swiss Federal Institute for Aquatic Science and Technology, Switzerland
15: 50-16:05	A Strategic Approach to Environmental Prediction: Evolving Perspectives from Canada	Mark Cantwell	Environmental Prediction Strategy Development & Foundation Projects, Meteorological Service of Canada, Environment Canada, Canada
16:05-16:20	Providing better forecast possibilities in groundwater modelling using optimization and grid technologies	Sabine Roller Hubert Hérenger	Distributed Systems, HLRS - Höchstleistungsrechenzentrum Stuttgart, Germany
16:20-16:30		**Q&A Session**	
16:30-18:00	Panel Discussion / Background to day two programme including introduction to working groups, Chairperson: John Rees, British Geological Survey		
19:00-	**Workshop Dinner (Mezzo Giorno)**		

Tuesday, 13th March: Discussions based on working groups / Parallel Sessions

09:30 - 15:00 **Part I (**Parallel Sessions, venues are indicated in the text below**)**

Time	Working group topic	Chairperson	Venue
			Parallel Session 1
09:30-15:00	Strategies for developing NMPI network - technical focus	Cornelia Nauen	Senatssaal Side Room, Rekoramt, Stadtmitte Campus, Universität Stuttgart
			Parallel Session 2
09:30-15:00	Geo-hazards in the 21st century - technical focus	András Bárdossy	Room 9.06, K1,Keplerstrasse 11, Stadtmitte Campus, Universität Stuttgart
			Parallel Session 3
09:30-15:00	China focus group - crosscutting focus	Goerild Heggelund	Aquarium, ILPÖ Secretariat, K1, Keplerstrasse 11, Stadtmitte Campus, Universität Stuttgart
			Parallel Session 4
09:30-15:00	Implications of Numerical Modelling / Policy interface for adaptation - crosscutting focus	Mark Cantwell	Room 9.07, K1, Keplerstrasse 11, Stadtmitte Campus, Universität Stuttgart
			Parallel Session 5
09:30-15:00	NMPI & Adaptation (climate change) in third countries - crosscutting focus	Paul Kirshen	Fakultätsraum, K1, Keplerstrasse 11, Stadtmitte Campus, Universität Stuttgart

10:30-10:45 **Coffee break / Morning Parallel Sessions**

12:00-13:00 **Lunch Break**

14:00-15:00 Drafting recommendations within each working group

15:00-18:00 **Part II** (Plenary Session, *Venue: Rektoramt, Senatssaal, Rekoramt, Stadtmitte Campus, Universität Stuttgart)*

15:00-15:20 **Coffee break / Plenary Session**

15:20-17:00 Presentation of results of the working groups, Chairperson: Helmut Kobus, Institute of Hydraulic Engineering, Univ. of Stuttgart
17:00-17:30 Discussion and final recommendations, Chairperson: John Rees, British Geological Survey

17:30-18:00 Conclusions and closing remarks of the workshop, Giselher Kaule and Desmond Manful

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9. Appendix IV: List of Participants

10. Appendix V: Presentations (First day of 1st Workshop in Stuttgart)

Speaker	Role	Title of talk (abridged)	Download
Giselher Kaule	Chairperson NMPI 2007	Scientific Background to NMPI 2007	
John Rees	Co-Chair NMPI 2007	Illustrations of problems	LINK
Desmond Manful	Organiser / Initiator	NMPI Vision / Workshop Structure I	LINK
Andrew Hughes	Co-organiser	NMPI Vision / Workshop Structure II	LINK
Cornelia Nauen	Research Directorate General of European Commission (EC)	EC Perspective	LINK
Pierre Valette	Research Directorate General of European Commission (EC)	EC Perspective	LINK
Charles Rodgers	NMPI Expert	Multidisciplinary research for global change	LINK
Beaudry Kock	NMPI Expert	IT-USGS Science Impact Collaborative	LINK
András Bárdossy	NMPI Expert	Applying Numerical Models	LINK
Nick van de Giesen	NMPI Expert	Catering to the needs of water system users	LINK
Paul Kirshen	NMPI Expert	Pedagogies of the Science Policy Interface	LINK
Ilke Borowski	NMPI Expert	Model-based tools to water management?	LINK

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Thomas Gaiser	NMPI Expert	Models and stakeholders: Lessons from Rivertwin	LINK
Kala Vairavamoorthy	NMPI Expert	SWITCH Project: An introduction	LINK
Yahua Wang	NMPI Expert	Hydro-research & water-related policy in China	LINK
Yang Hong	NMPI Expert	Model based Water-Food Analysis in China	LINK
Mark Cantwell	NMPI Expert	Environmental Prediction: Met Service of Canada	LINK
Sabine Roller	NMPI Expert	Forecast possibilities in groundwater modelling	LINK

11. Appendix VI: Bibliography

12. Appendix VII: Group Photo: First NMPI Workshop In Stuttgart