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WISDOM Project

Summary of the First PhD Scientific Seminar

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Summary of the
“First WISDOM PhD Scientific Seminar”
19-21 December 2007
UNU-EHS

The Seminar in a Nutshell

Forty-four participants including the 14 PhD Researchers of the WISDOM (**W**ater-related **I**nformation **S**ystem for the Sustainable **D**evelopment **O**f the **M**ekong Delta in Vietnam) project participated in the First WISDOM PhD Scientific Seminar. The seminar was organised by UNU-EHS and took place at the UN-Campus in Bonn, Germany between the 19th and 21st of December 2007.

The seminar was opened by Prof Janos Bogardi, Director of UNU-EHS Bonn and UNU's Vice Rector a.i. for Europe.

(Prof Janos Bogardi, UNU-EHS)

The objective of the seminar was to stimulate the scientific exchange between WISDOM project partners, PhD researchers and external experts in an early phase of the project. Keynote presentations were given by three guest speakers (Prof. E. Plate from the University of Karlsruhe, Dr. R. Few from the University of East Anglia and Dr. B. Affeltranger from the Quebec Institute for International Studies). Two other German-funded projects implemented in the Mekong Delta were also presented by Prof. H. Stolpe of the University of Bochum and Dr. J. Clemens of the University of Bonn. In addition the PhD students of the WISDOM project presented their research proposals and discussed the linkages between their research topics and that of fellow Researchers.

The seminar was divided into four thematic sessions:

1. Hydrology and Flood forecasting
2. Water Quality
3. Water Policies and Knowledge Management
4. Water, Livelihoods and Vulnerability

Each session started with a keynote presentation, followed by presentations of PhD research proposals and concluded with a discussion. In addition, the German Aerospace Centre (DLR) – coordinator of the project - gave an updated overview of the project progress and introduced the WISDOM Information System. Representatives of two ongoing German-Vietnamese projects (IWRM and SANSED) shared their knowledge and experiences in the region. A brainstorming session was organised for the PHD Researchers with the aim to foster cooperation between the different scientific disciplines and research institutions.

This report provides a summary of the presentations, discussions and outcomes of the seminar.

Seminar Objectives

The objectives of the First WISDOM PhD Scientific seminar were to:

- Bring together external scientists, WISDOM project partners and PhD scholars to share their knowledge and ideas in an early phase of the project
- Provide PhD scholars with a platform to present and discuss their research outlines
- Inform about the deliverables for the WISDOM Information System by DLR
- Discuss the selection of study sites in the Mekong Delta
- Discuss and organize effective methods of data sharing
- Overcome gaps in communication among the PhD scholars and thus to strengthen the cooperation between them
- Identify possible linkages and synergies between working groups
- Foster understanding between different research disciplines of the project and thus establish real interdisciplinarity within the project
- Coordinate organizational matters like progress reports of the different work packages
- The main objective of the brainstorming session was the development of cooperation strategies between PhD Researchers. This paved the way for fostering synergies between the natural and social scientists but also within disciplines

(Dr Fabrice Renaud, UNU-EHS)

Summary of Results

A summary of the **results of the general discussion** is presented in the table below.

Summary of general discussion results
The participants used this platform to share information and ideas amongst invited external scientists, WISDOM project partners and PhD scholars about the Mekong Delta and its specific, water related problems.
The seminar provided a good opportunity to increase participants' knowledge of the region.
PhD scholars presented their research outlines and improved them through intensive discussions.
DLR informed about the deliverables for the WISDOM Information System. Remaining open questions have been identified as the method of integration of social data into the system and the presentation format of information (maps, tables, text etc.). The participants all agreed that these subjects need more discussion, and that a follow-up meeting should be organized on this topic.
Participants were sensitized to the imperative necessity of the involvement of local decision makers into the research activities to achieve the project goals.
The selection of joint study sites in the Mekong Delta was discussed. The working groups from GFZ, INRES and UNU agreed to carry out their activities mainly in Tam Nong district (Dong Thap province) and in Cai Rang District (Can Tho province).
Participants agreed to share existing resources (data sets, publications, local contacts, samples etc.).
Effective methods of data sharing were discussed. DLR committed to set up an OpenSSH server with sftp protocol at the University of Würzburg.
Methods of communication among PhD scholars were discussed. The scholars decided to setup a moderated, web based communication platform and to organize videoconferences on a regular basis. Representatives of each host institute were elected to coordinate these activities.
The intensive discussion improved the mutual understanding of specific views, needs and expectations of project members with natural and social scientific background and thus helped to establish real interdisciplinarity within the project.
The projects members of IWRM-Vietnam, SANSED and WISDOM agreed to coordinate their contacts with Vietnamese partners (SIWRR, MOST, MONRE etc.) and expressed their interest on cooperation in the Mekong Delta.

The PhD Researchers of the four research groups within WISDOM (Hydrological/Hydraulic Processes; Water, Policies & Knowledge Management; Water Quality; Water, Livelihoods & Vulnerability) presented their research outlines, including their objectives and possible outputs of their research work. Additionally the presentations showed how interactions between the different research fields could be implemented, particularly concerning data requirements and output. A summary of the different PhD topics and suggested information exchange and cooperation is summarised in the figure below.

Finally organizational matters were discussed, including progress reports of the different work packages and fine-tuning regarding the coordination of fieldwork sites and schedules.

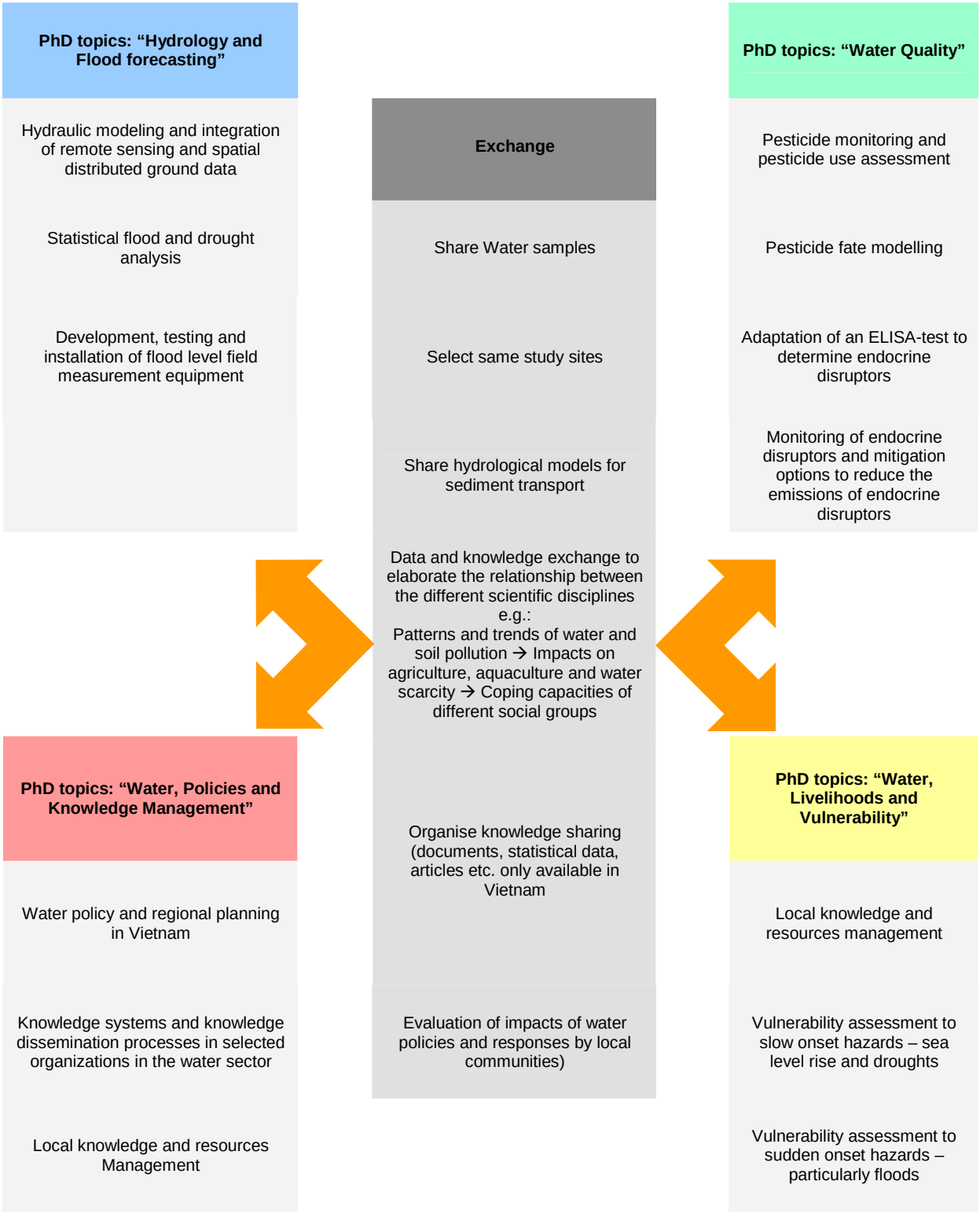

Figure: PhD topics and suggested information exchange and cooperation

Introduction to the WISDOM Project

WISDOM is a German-Vietnamese initiative comprising seventeen institutions based in Germany and Vietnam. In Germany, the project is funded by the German Federal Ministry of Education and Research and is coordinated by the German Aerospace Centre. In Vietnam it is coordinated by the Southern Institute of Water Resources Research.

A large proportion of the research is conducted by fourteen PhD Researchers originating from Europe and Vietnam.

The main objective of WISDOM is to overcome gaps in the water-related information flow among research institutions of different disciplines. The cooperation between the information generating agencies and decision making authorities will be strengthened. Moreover stakeholders will have the possibility to build-up, maintain, use and extend their capacity for processing, modelling and analysing spatial and statistical information with respect to sustainable natural resources management and water related development in the Mekong Delta of Vietnam.

Vietnamese Partners:

SIWRR	The Southern Institute of Water Resources Research
VAST-GIRS	Vietnamese Academy of Science and Technology - Division of Remote Sensing and GIS
DITAGIS	Center for IT and GIS of the University of Technology of the Vietnam National University
Sub-NIAPP	Sub-National Institute for Agricultural Planning and Projection
SISS	Southern Institute of Social Sciences
CTU	Can Tho University (The College of Technology and the Mekong Delta Development Institute)
SRHMC	Southern Region Hydro-Meteorological Centre
IDR	Institute of Development Economics Research, University of Economics

German Partners:

DLR-DFD	German Aerospace Center - German Remote Sensing Data Center
UNU-EHS	United Nations University - Environment and Human Security
ZEF	Center for Development Research, University of Bonn
INRES	Institute for Plant Nutrition, University of Bonn
GFZ	GeoForschungszentrum Potsdam
Uni Karlsruhe	University of Karlsruhe
DHI	DHI Water & Environment, Germany
EOMAP	Earth Observation and Mapping tec. , GmbH & CoKG
2wcom	Wiresless-World Communication, Germany

Figure: WISDOM Project Partners
Source: DLR Information Brochure 2006

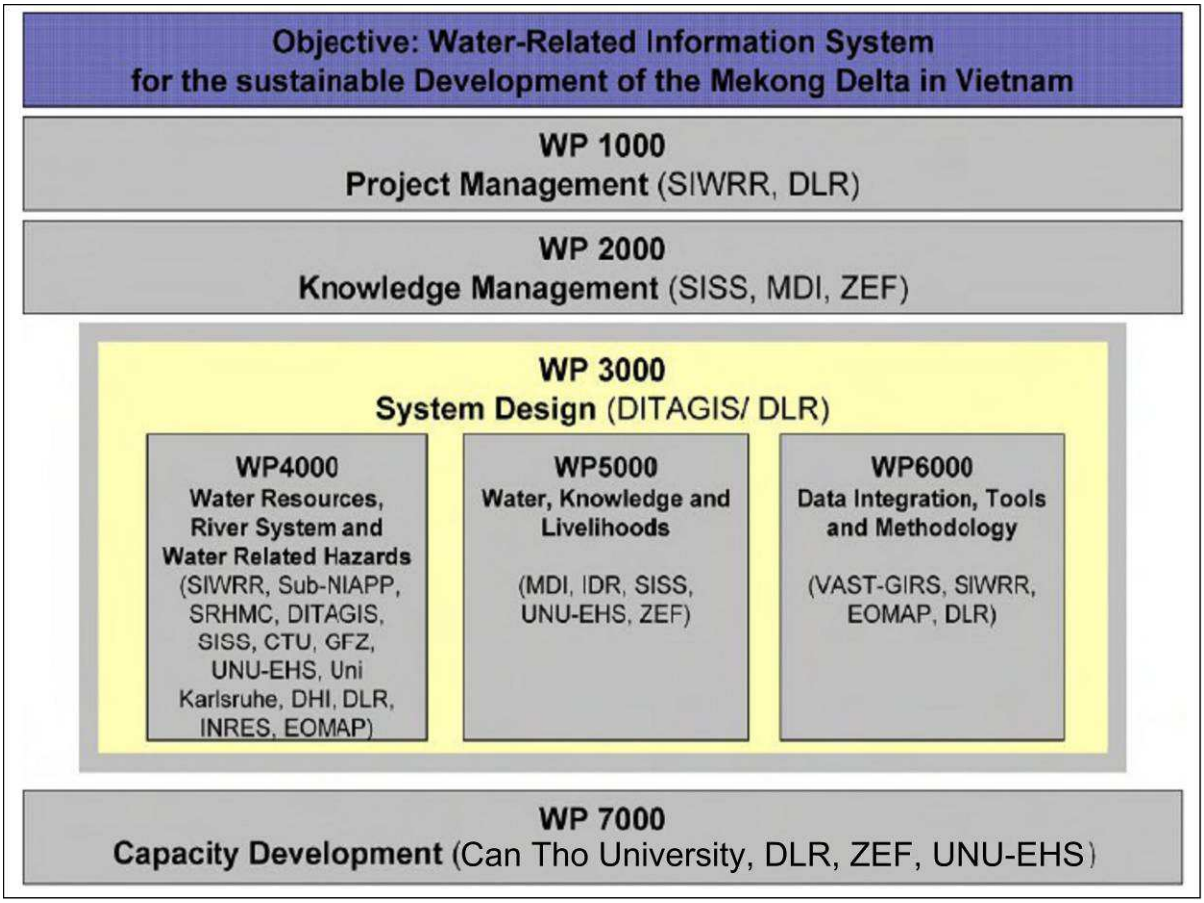

Figure: WISDOM Project Structure
Source: DLR Information Brochure 2006

The aim of the project is to design an information system that integrates multidisciplinary expertise of research institutes, universities, state agencies and small and medium enterprises.
To enhance the current information flow the envisioned information system will be integrated into existing technical and administrative structure.

The project is structured into the following working packages:

"Knowledge Management" (WP 2000)

- Assess frameworks for water policy, regional planning and water resource management
- Identify opportunities for improving knowledge management and regional planning in relation to water resources

"System Design" (WP 3000)

- „Translate" the user-requirements of WISDOM into a functional IT-structure

"Water Resources, River System and Water-related Hazards" (WP 4000)

- Characterize the hydrology of the river basin
- Integrate remote-sensing data into flood modelling and locally adapted flood risk assessments
- Investigate environmental aspects of the flooding with respect to xenobiotics and their environmental fate

"Water, Knowledge and Livelihoods" (WP 5000)

- Analyse the socio-economic impact of water and resource management
- Understand the political and institutional transformation process
- Increase the understanding of local water-related information systems
- Incorporate vulnerability assessment to capture water-related risks
- Capture the different types of water-related livelihoods in the context of major ongoing societal changes

"Data Integration, Tools and Methodology" (WP 6000)

- Design, develop and implement solutions which will be of scientific and operational interest
- Analysis of the status-quo
- Development of adapted components like hydrological and hydraulic models, socioeconomic intersections and remotely sensed products

"**Capacity Development" (WP 7000)**

- Support the coordination among stakeholders
- Promote a conducive environment for water-related information systems
- Design strategies for introducing water-related information systems

For the research in the Mekong Delta three **study sites** (see Figure below) were selected:

- Various locations in Can Tho Province (central part of the Delta)
- Tam Nong District in Dong Thap

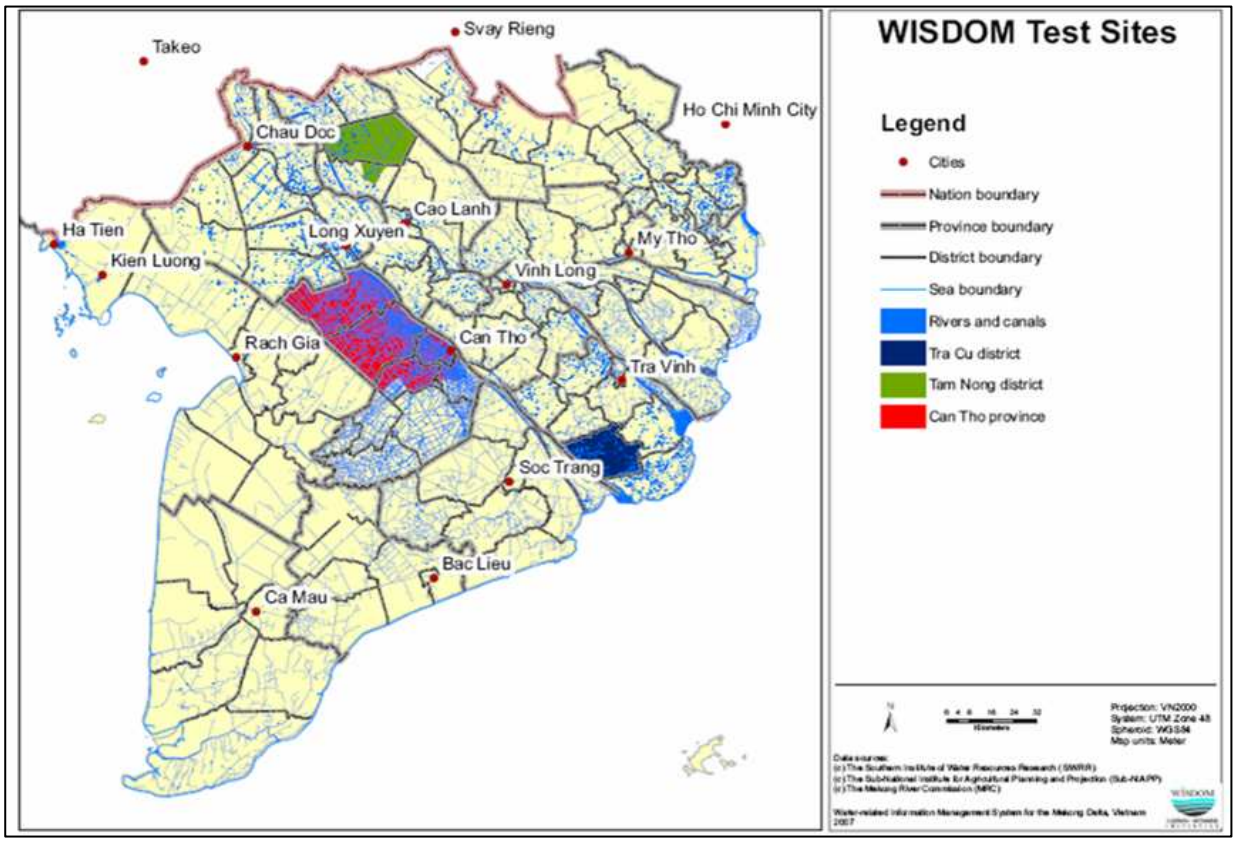

Figure: WISDOM Test Sites
Source: DLR Project Homepage

Province (northern part of the Delta)

- Tra Cu District in Tra Vinh province (southern part of the Delta)

For more details on the WISDOM project please refer to the information brochure, which is available online on the Homepage of UNU-EHS at:

http://www.ehs.unu.edu/category:46?menu=90

or the project Homepage at:

www.wisdom.caf.dlr.de

Introduction to the WISDOM Information System

Dr Thilo Wehrmann (DLR)

The presentation outlined the general characteristics of an information system. This included: What is standardised data management? And what are the tasks of an information system?

Because the data varies in data format, data type, accuracy, and documentation it is necessary to define standards for data. Existing spatial data in the WISDOM project are e.g.: modelled inundation areas and flood plains; socio-economic data and remote sensing data. The remote sensing data can deliver, for example data information about land cover, precipitation or water quality.

Discussion results

To ensure that the Information System can be applied successfully the information that will be relevant for decision makers needs to be defined at the outset. Data presentation issues also need to be addressed at an early stage. Social data will be an integral part of the system and standards and methods have to be defined before intensive research starts. In addition the scale of the research (regarding social sciences) has to be outlined in more detail. Also discussed was, if the specific information will applied for urban or small community planning.

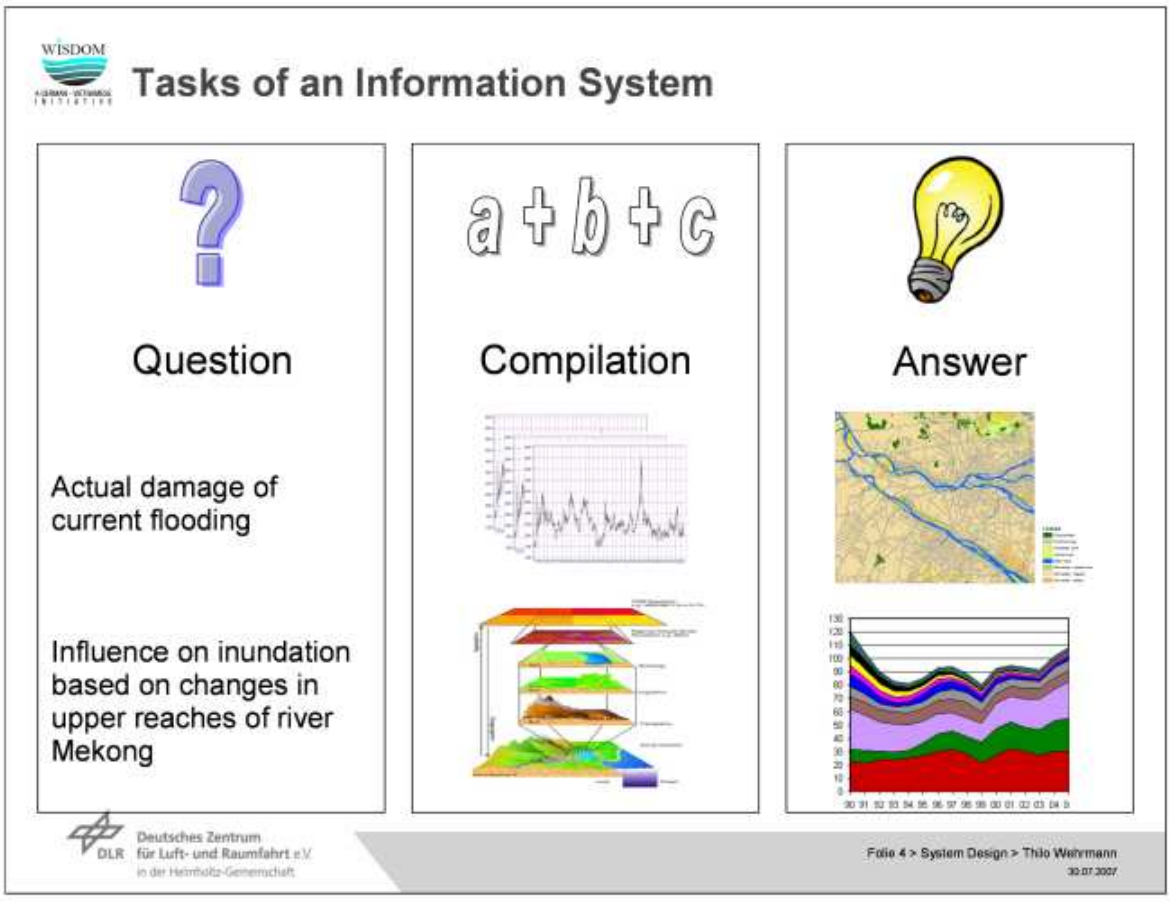

Figure: WISDOM Information System

News in WISDOM

- DLR has a new project coordinator: Dr. Claudia Künzer
- A GPS training and geodata management course will be organised by DLR before the PhD students leave for their field work in April 2008. This will take place in Bonn
- A summary of the field trip in December 2007 by GFZ to the study site in Tam Nong is available on the project website
- A demonstration of the Information System for Vietnamese partners will take place in January 2008
- Field trip EOMAP in January 2008
- Data sharing has to be organized via sftp server in at the University of Würzburg: http://wisdom.geographie.uni-wuerzburg.de/index.php?option=com_frontpage&Itemid=1|

(Dr Thilo Wehrmann, DLR)

Hydrology and Flood forecasting

Flood forecasting for the Mekong Delta

Prof. Erich Plate

University of Karlsruhe

In his keynote, Prof. Plate addressed the main physical as well as socio economic and cultural characteristics of the Mekong River, its riparian countries and its people. Additionally, strategies for solving flood problems on the Mekong were outlined and non-technical solutions, like early warning systems introduced.

The Mekong River has a catchment area of about 795,000 km² and a length of approximately 4,600 km. The total runoff is 475,000 Mio m³/a. Some introductory information was presented on three of the four riparian countries (Laos, Cambodia and Vietnam), as the main beneficiaries of the work of the Mekong river Commission. They are characterised by a different topography and by various different economic and social factors.

Floods on the Mekong are influenced by the Southwest Monsoon and Typhoon activity over the Gulf of Tonkin. Moreover causes of present and future floods also depend on other factors, e.g. lack of infrastructure; political settings; population growth; environmental change (climate change, soil erosion etc.)

There are different possibilities of risk management for solving flood problems in the Mekong Delta. The "brute force" solution for controlling the Mekong floods, the building of barrages and dams has not come to pass, due to the conflicts which ravaged these countries for many decades. Modern thinking is to prefer "soft" solutions, i.e. to leave the river untouched and to learn to live with the river. Traditionally many communities have learned to live with the floods and houses are built on stilts with living areas above the highest flood levels. The present concept is to try to reduce losses of lives while maintaining the beneficial floods and the fishery undisturbed, with early warning as considered the most feasible approach for this.

Based on this concept, the Mekong River Commission (MRC) has started to develop a four point strategy to improve flood protection on the lower Mekong. This

strategy requires as first priority an improvement of the existing early warning system. An early warning system is a chain with the links: 1. a meteorological forecast, 2. the transformation of this forecast into water levels, 3. a conversion of water levels into warnings; 4. warning of the people at risk (PAR) and 5. the reaction of the PAR. The quality of forecast can be improved by reducing the error by means of better physical rainfall - runoff models, and by using weighted ensemble averages of flood curves for the forecast preparation. Moreover the transmission of the forecasts to the decision makers has to be improved.

Discussion

The early warning systems should not only be for protecting people, but a median range forecast is also planned for food protection so that the forecast is early enough to save crop harvests. Therefore an early warning system has to be created that gives the farmers at least one week of reliable forecast.

The contribution of the WISDOM project to the forecasting activity shall be first of all to attempt the improvement of the present forecasting system. For this purpose, a criterion is to be developed and tested for assessing the quality of the forecast. The second step is to develop a model for ensemble forecasting, by means of which an ensemble of forecasts is generated. For each forecast time, the pdf (probability density function) of possible errors shall be obtained, from which a warning can be derived. This tool will be one of the outcomes of the research of WISDOM.

But forecasting is not enough for obtaining a good warning system. The responses of the PAR have to be considered and people oriented warning strategies to be developed, which is a task for social sciences. Cooperation of engineers and social scientist on developing such a system is a solid foundation for success of such a project.

PHD Research concepts: Hydrological/ Hydraulic Processes

Mr Hung Nguyen Nghia,
Mr Viet Dung Nguyen,
Mr Jose Delgado
GFZ

For the research on hydrological and hydraulic processes the Tam Nong district in the Dong Thap province was chosen. The study area is one of the most affected regions by flooding in the Mekong Delta. The research of this working package is divided into three PhD topics:

1. Statistical flood and drought analysis (Mr Jose Delgado, GFZ)
2. Hydraulic modelling and integration of remote sensing and spatial distributed ground data (Mr Viet Dung Nguyen, GFZ)
3. Development, testing and installation of flood level field measurement equipment (Mr Hung Nguyen Nghia, GFZ)

Statistical flood and drought analysis

Mr. Jose Delgado (GFZ)

Objectives

- Statistical analysis of the data - multivariate statistics, time-frequency analysis, extreme value statistics (flood and drought)
- Identification of possible correlation with large scale circulation patterns
- Test of correlation between detected trends and other regional temporal variables (land use change); same for global climate change
- Bringing elements of response to the question: How does flood and drought regime respond to global climate variability?
- Derivation of synthetic discharge series for the Mekong considering the detected trends and cycles
- Application of hydrological model for the Mekong basin. Input for 1D Mekong Delta model.

Methodology

- Literature research on time series and trend analysis in hydrometeorological data series and large scale teleconnections
- Collection of hydrometeorological data sets for the whole Mekong basin

Challenges

- Need of data and specifically variables directly related with the monsoon system
- At least 50 years of records are necessary to detect climate change

Hydraulic modeling and integration of remote sensing and spatial distributed ground data

Mr. Viet Dung Nguyen

(GFZ)

Objectives

Bringing elements of response to the question: “How to improve 2D hydraulic models in inundated area in Mekong Delta using integrated data from remote-sensing, in-situ data and studying on multi-objective global optimization techniques?”.

- Developing 1D hydraulic model for the whole Mekong Delta
- Development and implementation of 2D floodplain inundation model (using MIKE 21 and MIKE flood)
- Development of (a) multi-objective global method(s) for 2D hydraulic models
- Calibration of the hydraulic model given the time series from point measurements in the inundation area and gauging stations and the spatial explicit remote-sensed data
- Application of the calibrated model using synthetic flood hydrographs provided by WP4110 for flood hazard assessments and for the assessment of possible mitigation measures

Methodology

- Suggest a framework for research and study (see first figure next page)
- Literature research on optimization techniques (see second figure next page)

Challenges

- Need topographical and structural data in Cambodia and Vietnam
- Accuracy of hydrological data

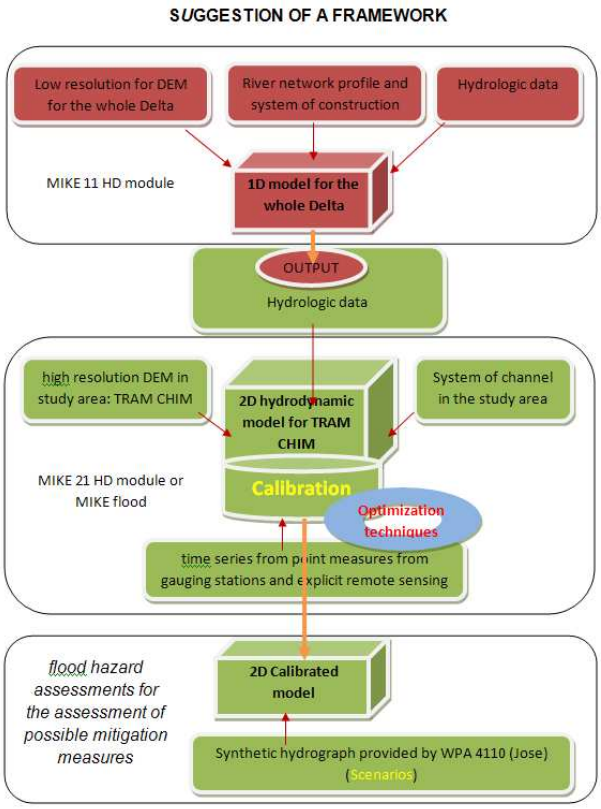

Figure: A framework for research and study

METHOD	LITERATURE
1. Single-criteria	
SCE-UA	*Duan et al 1992, 1993*
SCEM-UA	*Vrugt et al 2003a*
Bare	*Thiemann et al, 2001*
GLUE	*Beven and Binley, 1992*
DDS	*Tolson & Shoemaker, 2007*
Assimilations	*Several persons*
2. Multi-criteria	
MOCOM-UA	*Gupta et al, 1998*
MOSCEM-UA	*Vrugt et al, 2003b*
E-NSGA-II	*Kollat and Reed, 2006*
SPEA2	*Ziezler et al, 2001*
Software: Matlab, Visual Studio (C/C++, Basic), Fortran,…	

Figure: Preparation for optimization techniques

Development, testing and installation of flood level field measurement equipment

Mr Hung Nguyen Nghia (GFZ)

Objectives

- Development, testing and installation of flood level field measurement equipment.
- Improvement of knowledge of sedimentation process in floodplains.
- Environmental impact assessment of flood control measures with respect to sedimentation/nutrient availability and contaminants

Challenges

- What are uncertainty factors and risks (e.g. related to equipment)? What if the equipment does not work, or is stolen?
- What are the dependent variables (field contact)?
- Need of contact with provincial officers and many other stakeholders (It takes time and travel).
- How to get a better link with other PhD students (Pesticide group) in order to implement the task “Environmental impact assessment by sedimentation”?

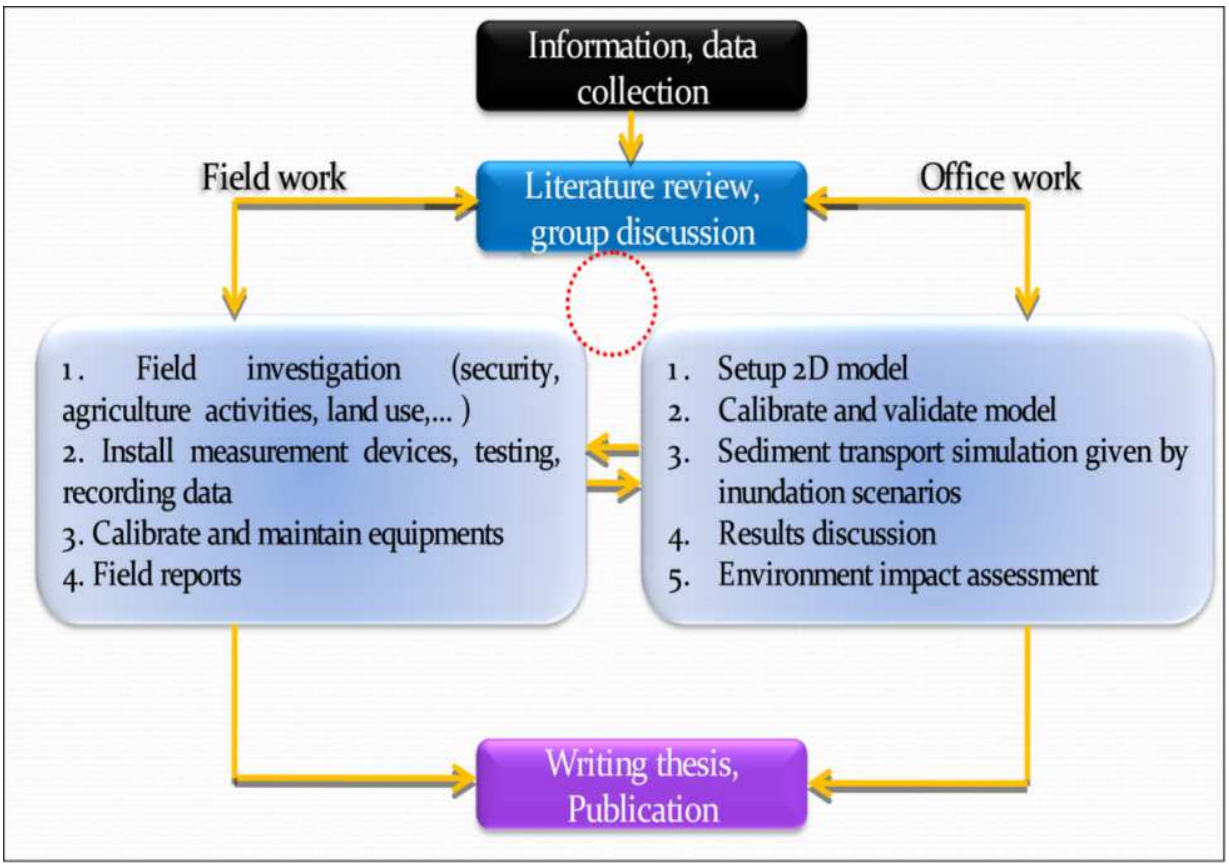

Figure: PHD Structure

General Discussion

During the subsequent discussions the following main ideas and questions were raised:

Requested data outputs for the information system have to be more clearly defined, because the research concept has to be focused on the form of the required data. In addition, how can the research results and the collected data of this group be connected to other research topics within the WISDOM project? Furthermore, how far are other research members dependent on the generated results of this group? A possibility to encourage the cooperation would be that other project members choose the same study area to ensure a wider data exchange.

Moreover it is also important for the success of the research to involve decision makers into the research and planning.

Introduction to other projects in Vietnam

IWRM Project

Prof Harro Stolpe

(Ruhr-Universität Bochum)

The VN-GER Workgroup on Water and Environmental Technology is based on the Bilateral Protocol on Cooperation in the fields of Water and Environmental Science and Technology 10/2005 between MOST and BMBF. A project office to support the workgroup and the Vietnamese–German-projects was opened in Hanoi in October 2007. The German partners are the University of Bonn, the University of Bochum and the University of Greifswald.

For the Can Tho, Lam Dong and Nam Ding region, the IWRM project is developing methods for:

- Investigation and evaluation of the actual situation of water resources, water use / land use, socio-economic situation (GIS-maps)
- Prognosis of future development: quality and quantity of water resources, land use, population growth etc. (calculation, modelling)
- Assessment of total water demand in case of fulfilment of all water demands (drinking water, water for agriculture, water for industry etc.)
- Assessment of total waste water discharge in case of fulfilment of all water demands (drinking water, water for industry etc.)
- Contamination potentials of water resources by discharge, runoff, infiltration (fertilizers, pesticides, non-point-source-emissions, point-source-emissions)
- Water constructions (weirs, reservoirs, pumping stations etc.)
- Special land use (flood areas, land use restrictions, protected areas etc.)
- Groundwater yield (sustainable yield) and Surface water yield (sustainable yield)

- Additional resource options: bank infiltration, artificial recharge, water transfer etc.
- Problem areas of water resources (mining, salt water intrusion, contaminated areas etc.)
- Vulnerability of water resources (ground water, surface water)
- Monitoring points (ground water, surface water, climate)

Discussion

An increased cooperation between the IWRM-Vietnam project and WISDOM would be mutually beneficial. Special topics of discussion could be: pollution modelling, fertilizers and pesticides and socio-economic settings. In addition PhD topics of the different projects but working in the same study areas have to be discussed to avoid overlaps and to increase synergies. Furthermore there needs to be a coordinated approach between the various projects/partners when approaching Vietnamese project partners (SIWRR, MOST, MONRE etc.).

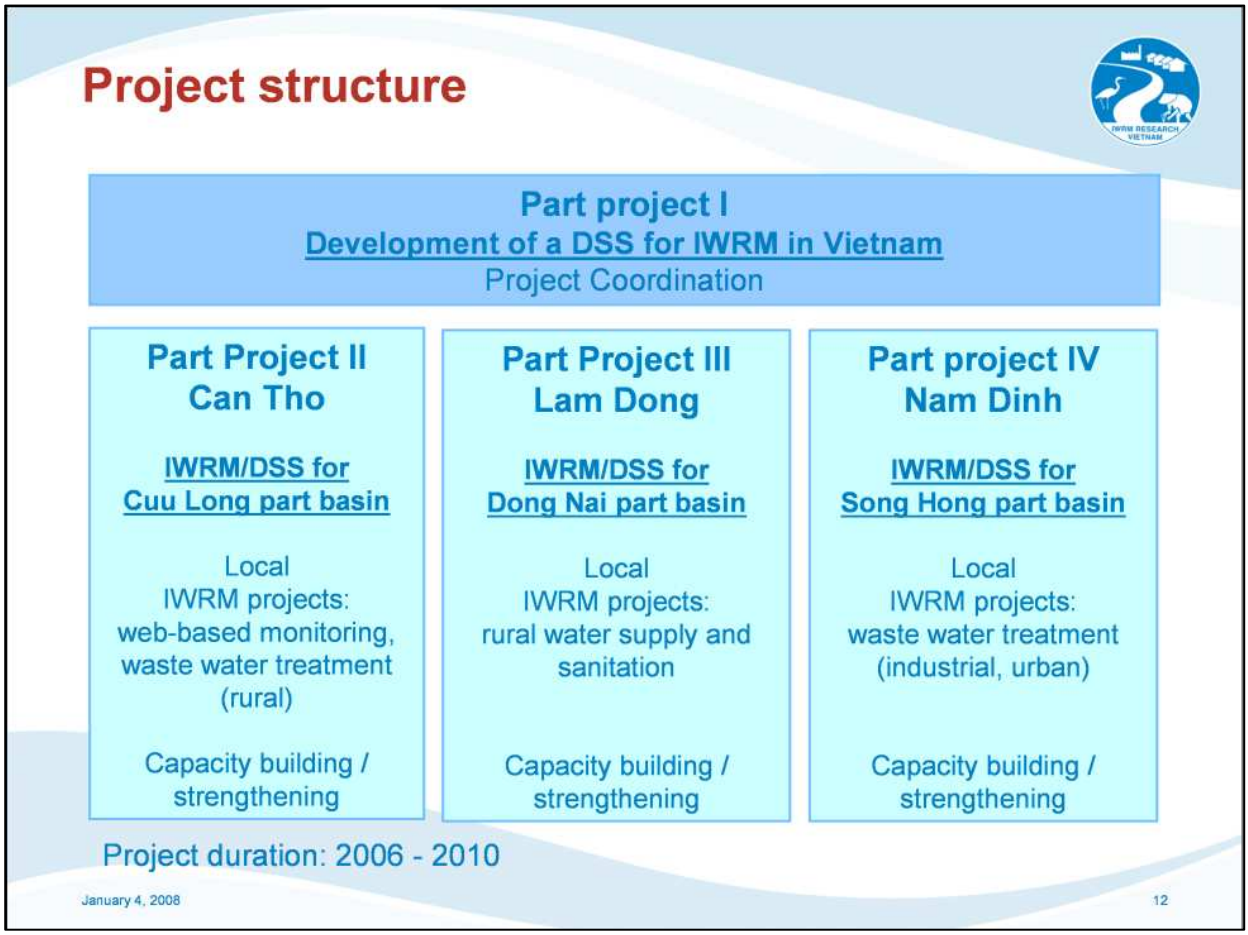

Figure: IWRM Project Structure

SANSED Project

Dr Joachim Clemens
(INRES – University of Bonn)

Research within the SANSED project is carried out in Can Tho province in Vietnam. The German part of the project ends in 2008 the Vietnamese part continues until 2010.

The program is structured as follows:

The main idea is the implementation of recycling of nutrients and improvement of waste & water treatment into the water management. Current deficiencies in waste-water treatments are:

- Nutrient losses (household)
- Pathogens & pollutants
- Public health concerns

In the project, separation systems were installed and tested for the separation of urine, faecal matter and grey water to produce:

- Biogas from faecal matter
- Mineral fertilizer from urine
- (Irrigation water from grey water)

Dependent on the material, the substrates were treated biologically or chemically and then tested on their fertilizer quality.

Additionally small water supply stations were constructed and optimized.

Results of project showed that:

- Hygienically safe organic and inorganic fertilizers can be produced
- Fertilizers can tackle site specific problems such as Al-toxicity
- Soil biological activity can be increased

Discussion

The project is focussing on waste water treatment on a small scale level. This has the advantage that investment of small treatment systems can be done step by step unlike big sewage systems. To include waste water treatment into a sustainable IWRM, experiences showed that it is necessary to involve the local institutions and to consider national laws. The experiences also showed that it is generally easier to implement technologies and wastewater management on a provincial level than on a national level.

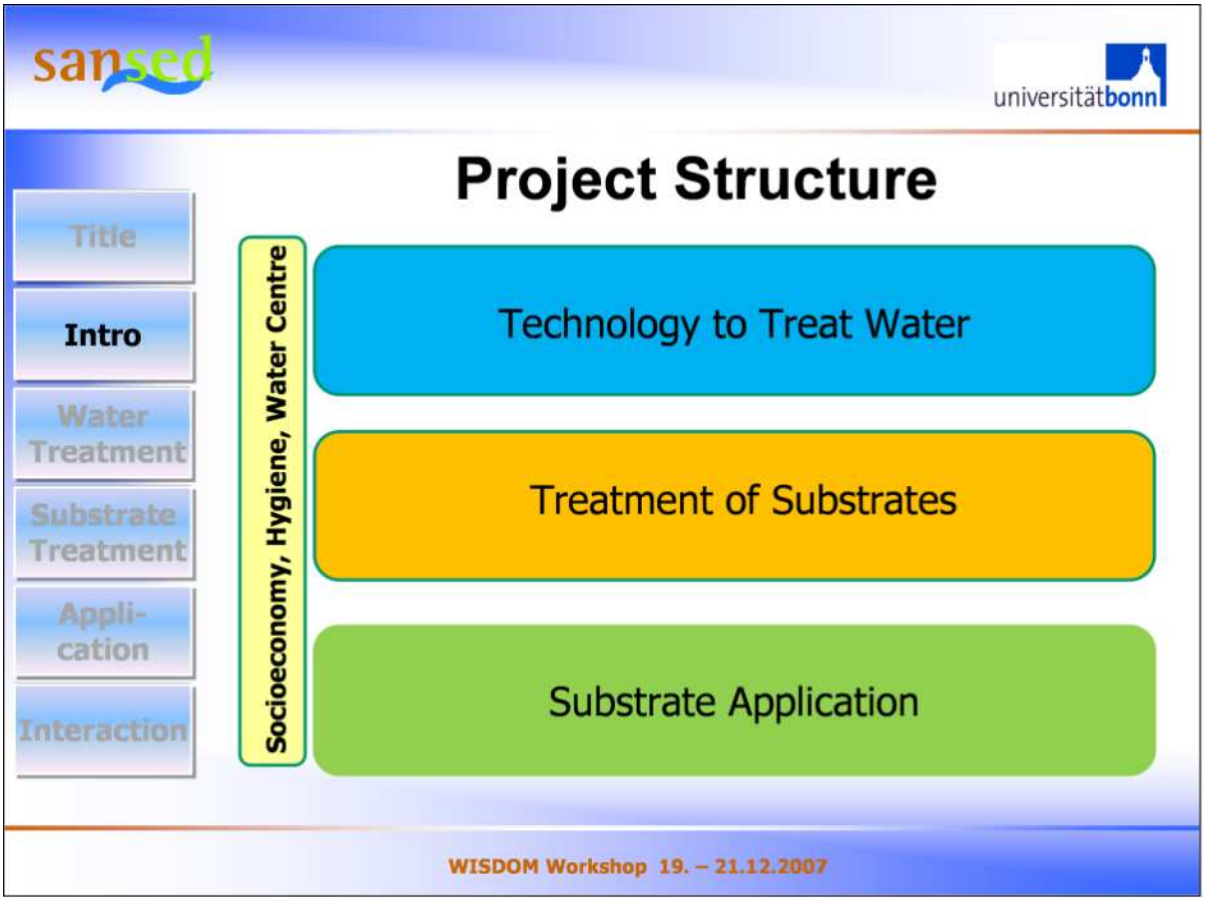

Figure: SANSED Project Structure

There is an official invitation to participate in Water Center activities in the new College of Environment: (Can Tho) at the beginning of 2008, which is reserved for German/ Vietnamese water projects.

Water quality

PHD Research concepts: Water Quality

Ms. Loan Vo Phuong Hong,
Ms. Hong Le Thi Anh
Mr. Toan Pham Van
Mr. Thai Hoa Nguyen

The research field “Water Quality” has the goal to monitor, model and analyze the presence of agro-chemicals and other toxic substances, such as endocrine disruptors, in surface water.

The water quality research is split into the following four topics:

1. Adaptation of an ELISA-test to determine endocrine disruptors (Ms Hong Le Thi Anh, INRES)
2. Monitoring of endocrine disruptors and mitigation options to reduce the emissions of endocrine disruptors in case study areas of the Lower Mekong (Mr Thai Hoa Nguyen, INRES)
3. Pesticide monitoring and pesticide use assessment in selected case study areas of the Lower Mekong (Mr Toan Pham Van, UNU-EHS)
4. Pesticide fate modelling in the Lower Mekong (Ms Loan Vo Phuong Hong, UNU-EHS)

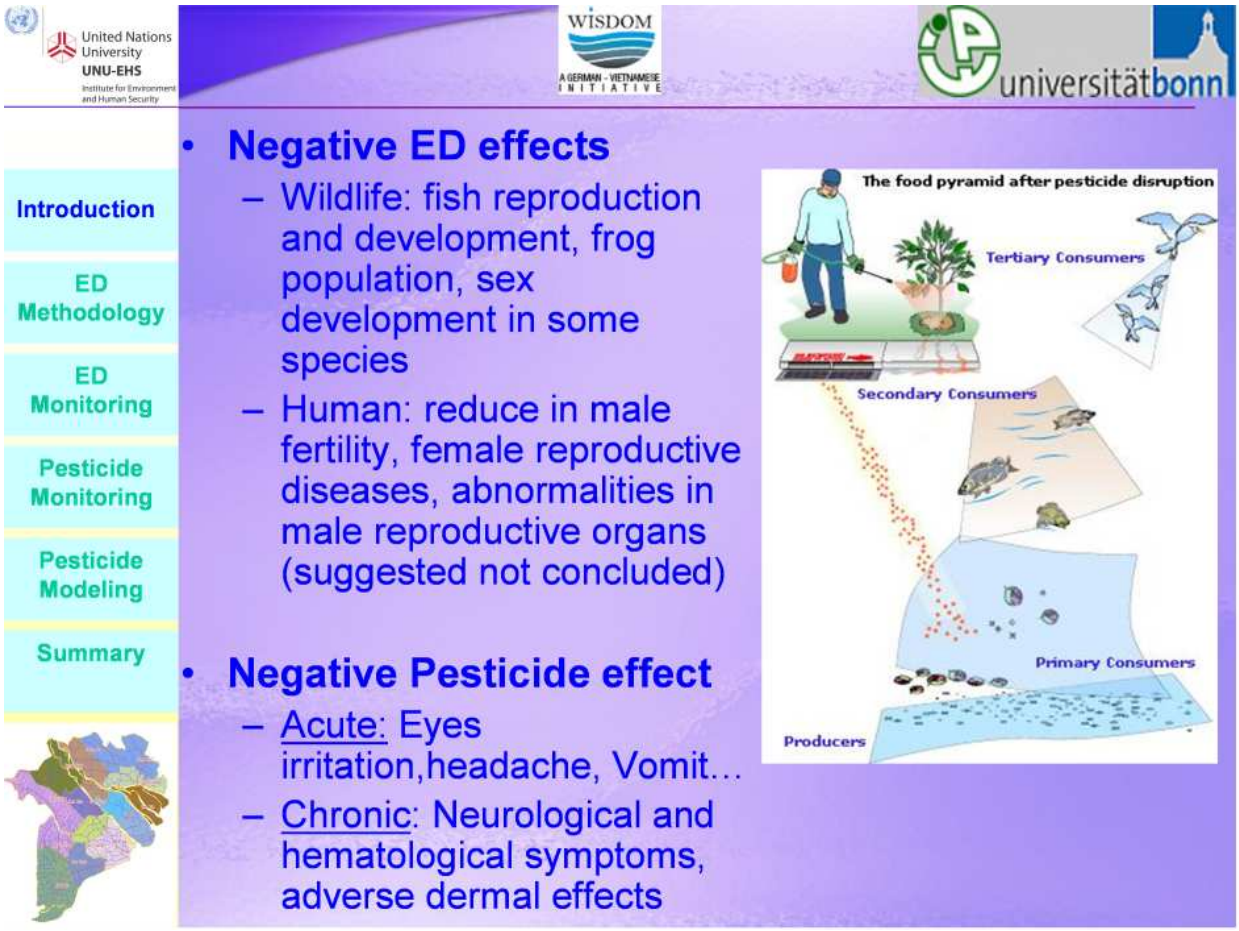

Figure: Negative endocrine disruptor and pesticide effects

Adaptation of an ELISA-test to determine endocrine disruptors

Ms Hong Le Thi Anh (INRES)

Background

The EU definition of an endocrine disrupter is that it is an exogenous substance or mixture that alters function(s) of the endocrine system and consequently causes adverse health effects in an intact organism, its progeny or (sub)populations.

Sources of EDs: are man-made chemicals and natural chemicals (generated by industry, agricultural activities, domestic waste, etc)

Objectives

- To develop and adapt suitable extraction techniques for selected endocrine disruptors from different matrices (water, soil, plant, compost, slurry)
- To transfer the YES (Yeast estrogen assay) method to Vietnam
- To analyze endocrine disruptors by YES
- To optimize method at hot spots
- To transfer the techniques to other members in WISDOM project

Methodology

- Literature review
- Testing YES assay at INRES on the stability under Vietnamese conditions
- Setting up YES assay method in Vietnam
- Applying YES assay to determine endocrine disruptors at hot spots in Vietnam
- Organize a workshop on YES assay in Vietnam

Expected output

- A stability YES assay to analyze EDs under Vietnamese conditions
- Suitable extraction techniques for different matrices
- Concentration of endocrine disruptors at hot spots from study sites

Monitoring of endocrine disruptors and mitigation options to reduce the emissions of endocrine disruptors in case study areas of the Lower Mekong

Mr. Thai Hoa Nguyen (INRES)

Objectives

- Measure endocrine disruptors' concentrations in surface water
- Identification of the main sources of endocrine disruptors
- Propose mitigation measures to reduce EDs

Methodology

- Literature review
- Sampling site selection and screening
- Establishment and implementation of an ED monitoring strategy
- Geographic Information System (GIS) to map EDs concentration
- Participatory Rapid Appraisal to propose mitigation measures

Expected Output

- Interpretable concentrations of ED for one year minimum
- The main sources of EDs and their potential pollutant areas will be identified
- Mitigation strategies and measures will be developed

Pesticide monitoring and pesticide use assessment in selected case study areas of the Lower Mekong

Mr. Toan Pham Van (UNU-EHS)

Background

The Mekong Delta (Vietnam) has a total area of approximately 40,000 km^2. Land use for farming and aquaculture covers 2/3 of the total area and about 70% of the farming area is covered by rice fields.

Population growth, the limited land and potential food shortages force farmers to put an intensive farming system into place. 500,000 tons of pesticides are applied annually and banned pesticides are still used. There is no information network dealing with pesticide concentration in surface water. Besides, surface water is the main source for supplying drinking water in the region.

Objectives

- Providing information on pesticide residue concentrations in surface water
- Assessing pesticide usage and management by local farmers
- Proposing mitigation measures to reduce pesticide pollution

Methodology

- A monitoring strategy will be established and implemented
- Participatory discussion with local farmers
- GIS will be a media in providing information on pesticide residue concentrations and will serve as an assessment tool for water quality management

Expected output

- The situation of pesticide management (pesticide use, spraying times, etc.) in selected case study areas
- Time-series over 15 months of pesticide concentration which reflects surface water quality in the region
- Mitigation methods for limiting pesticide residue in surface water bodies

Pesticide fate modelling in the Lower Mekong

Ms. Loan Vo Phuong Hong (UNU-EHS)

Background

Once models are calibrated they become less costly than long-term monitoring programmes and different assumptions can be tested very quickly thus serving as a good decision-making tool.

Objectives

- Quantify pesticide entry into surface water via different hydrological routes
- Quantify residue concentrations in surface water
- Propose pollution mitigation measures and test their potential effects
- Develop scenarios to support decision-making for the reduction of pollution of surface waters
- Provide time series of pesticide residue to the information system

Methodology

- Selection of case study areas
- Identification of model parameters
- Collection of required data
- Un-calibrated simulations
- Sensitivity analysis
- Calibration of selected hydrologic and pesticide residue input data
- Building scenarios to test mitigation measures

Expected Output

- Time series of residue concentrations in case study areas
- Different scenarios for the case study areas
- Upscale/transpose the modelling framework to similar areas

Discussion

During the subsequent discussions the following main ideas and questions were raised:

To enhance the research it is strongly necessary to cooperate with colleagues working on endocrine disruptors and hydraulic modeling. This could be achieved by sharing water samples between the groups. In any case cooperation between the hydrological modelling and sediment transport and quality should be initiated and maybe one model should be shared in the same test site. In addition cooperation with the social scientists within WISDOM is important to propose effective mitigation strategies.

Water, Policies and Knowledge management

Politics of hydrological data on the Mekong river basin

Dr Bastien Affeltranger
(Associate Researcher, Quebec Institute for International Studies, Canada)

The objective of the presentation is to «Help consider WISDOM from a basin perspective». It answered the questions: What are Mekong's hydrological issues made of? What are the water availability and utilization patterns, technical and social structures of water claims? What are the implications for environmental information management?

The Mekong is a river with many faces and each riparian state has different interests regarding the water use such as hydropower, irrigation and water supply.

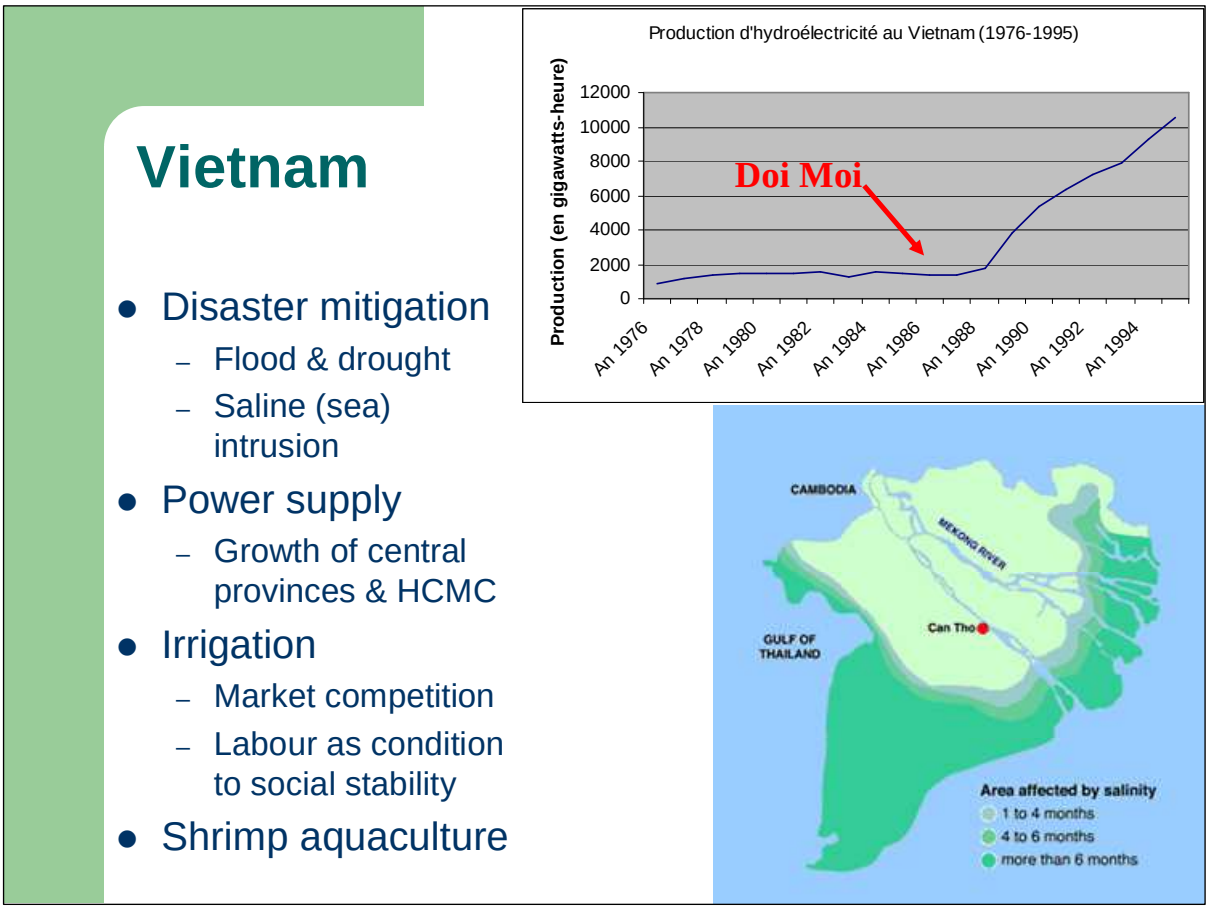

Figure: Hydropower Production (1976-1995), Area affected by salinity

Water and water uses in Vietnam

The main hydrological-related problems in Vietnam are floods and saline water intrusion.

The Mekong Delta relies heavily on its agriculture and shrimp aquaculture sectors for economic development, thus the region is dependent on water quantity and quality. Hydropower (e.g. Se San dam, located in higher midlands) plays a growing part in the energy supply of the country since the Doi Moi economic boost.

Institutional background

The making of Mekong hydropolitics is determined by:

- The State systems: executive authorities and bureaucracies;
- A rising water/power nexus with deep historical roots;
- Organization and distribution of hydrological data.

In Vietnam the state system is under transition with a former command-control economy progressively shifting to a more free market. This trend enhances the influence of non-state actors and helps understand the stress on public budgets. All these factors influence the making of hydropolitics in many ways. In particular, some State services with a mandate to administer hydrological data may consider these as a (geo)political resource. As a result, poor access to water-related information limits the contribution of civil society (e.g. non-governmental

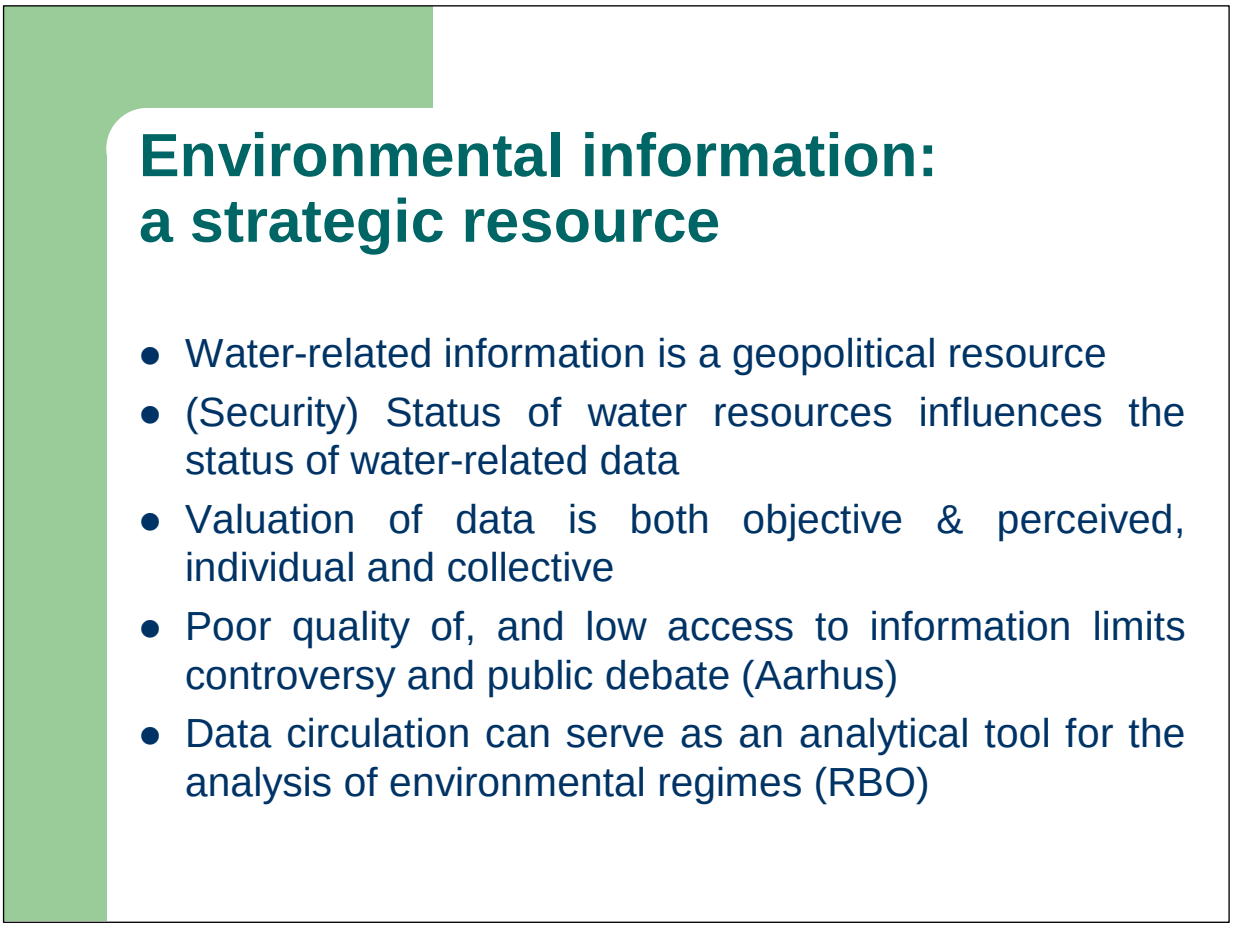

Figure: Environmental Information as a strategic resource

organizations NGOs) and academics to environmental controversies. Daily operation of the Secretariat of the Mekong River Commission (MRC) may be impacted as well.

Managing environmental data and information

The problems of information management are however not only due to organizational weaknesses but also on technical weaknesses, such as the uneven distribution of hydrological stations and ailing maintenance of some hydrometric networks.

Conclusion

Resource institutions and information sources for WISDOM fieldwork should include: natural resources management Ministries, Energy Ministry, NGO's, the MRC, central and local water administration etc.

Discussion

Decision making is often done under uncertainty. This uncertainty is related to the gap of information and information handling. Therefore it is important to evaluate which information is required by decision makers.

The collected information within the WISDOM project should be shared with the Mekong River Commission to provide a wider platform for information sharing.

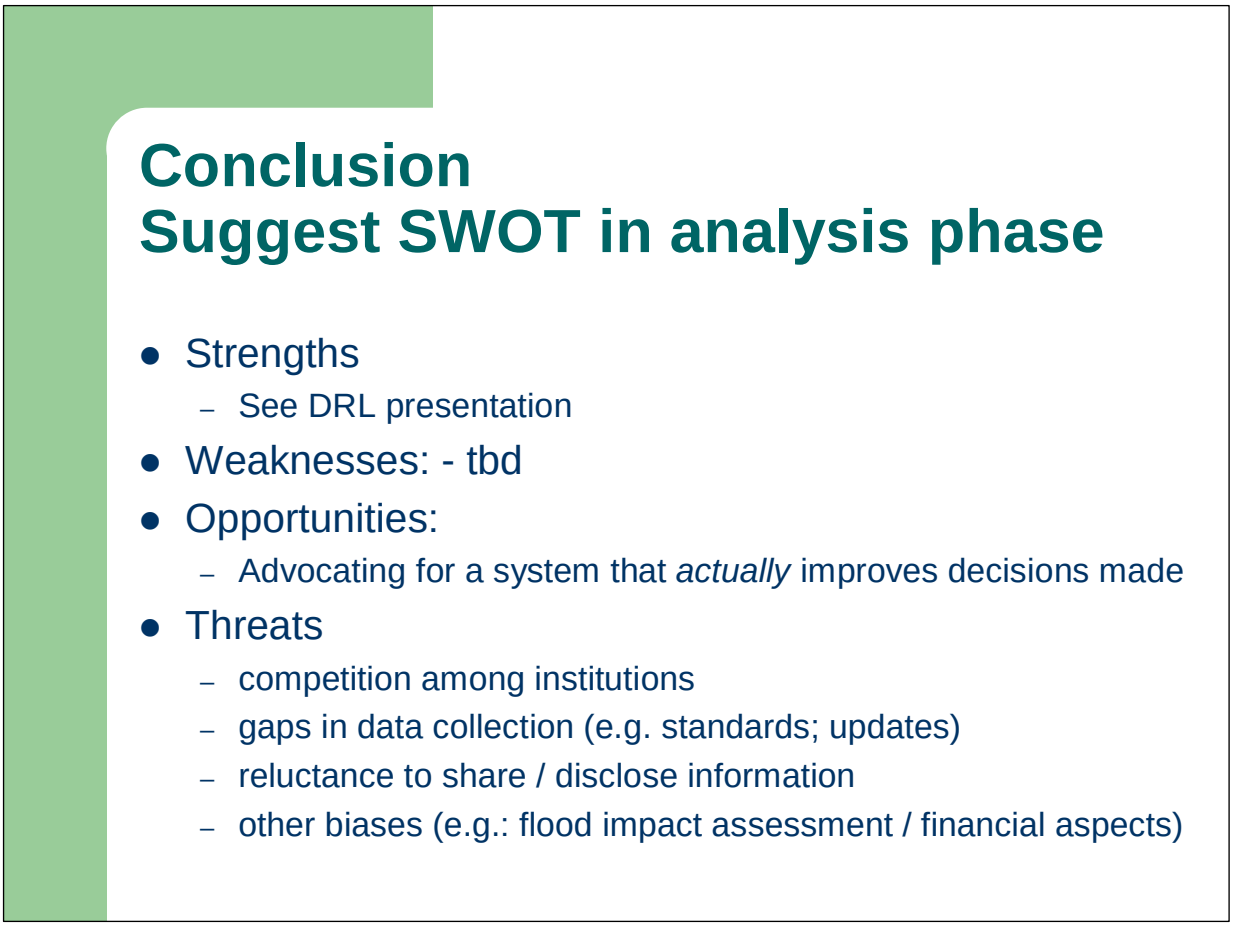

Figure: Conclusion

PHD Research Concepts: Water, Policies and Knowledge management

Ms. Nadine Reis, Mr. Huu Pham Cong, Ms. Tatjana Bauer, Ms. Theresa Steyrer (ZEF)

The working package Water, Policies and Knowledge management is divided into the following topics:

1. Water policy and regional planning in Vietnam (Ms Nadine Reis, Mr Huu Pham Cong)
2. Knowledge systems and knowledge dissemination processes in selected organizations in the water sector in the Mekong Delta (Tatjana Bauer)
3. Local knowledge and resources management in the Mekong Delta (Theresa Steyrer)

The presentation tackled the general theme of the session and the individual PhD topics were not presented.

To provide a general overview of the research field the group presented the general approach of "Knowledge Management".

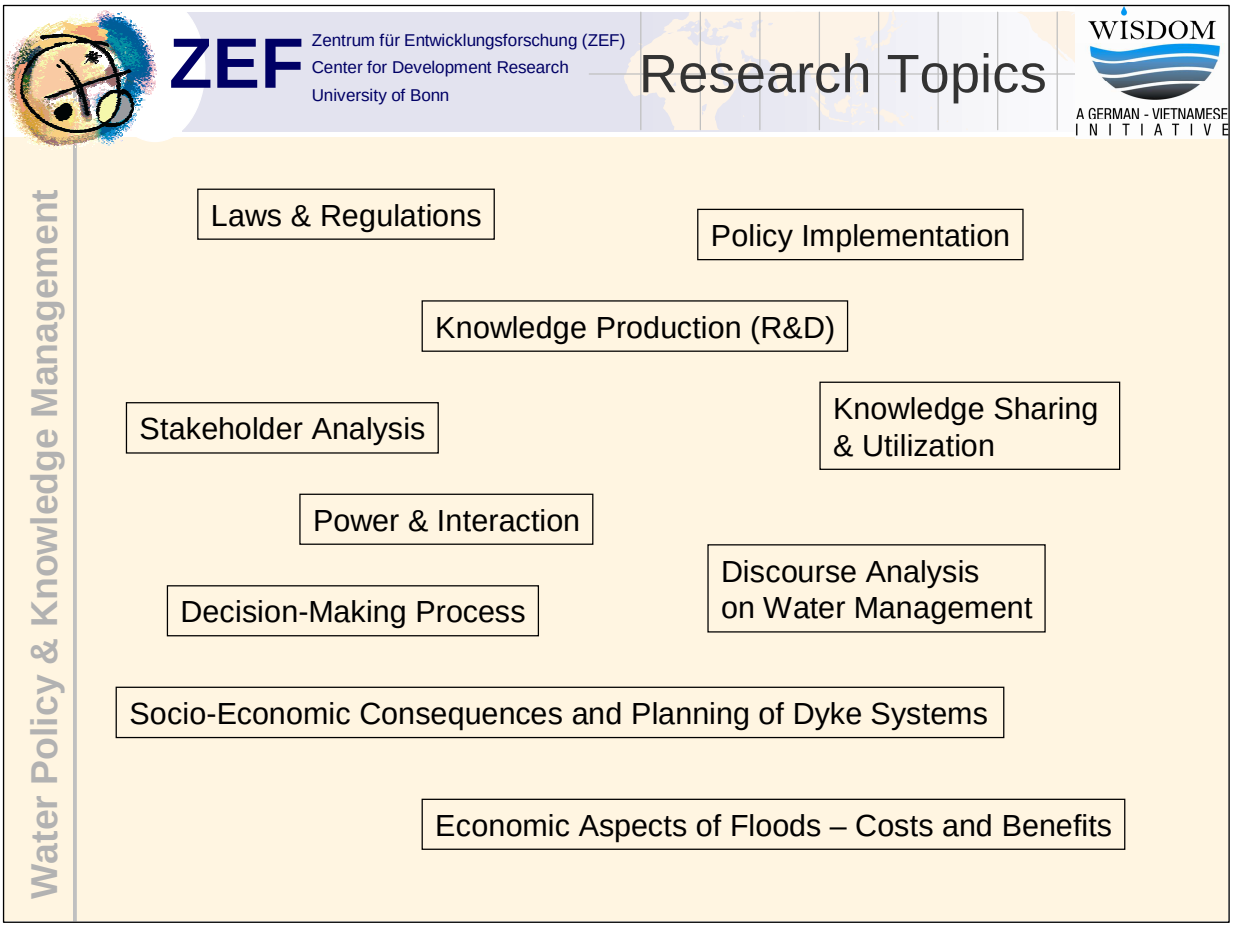

Figure: PHD research topics

What is Knowledge Management?

Knowledge Management describes practices used by organizations to identify, create, represent & distribute Knowledge. One basic element is the so called data-information-knowledge-chain. Knowledge Management should help in Management and governance of water resources. It should also be used in the organizational structure and institutional plurality of the water sector

What do we understand under Institutional Mapping?

- Planning & management from central to local levels
- Central level holds the decision-making power
- Analysis of instruments & structures
- Negotiation processes

What do we understand under "Water Policies & Planning"?

- Larger development plans & water policies
- Policy processes
- Existing legal framework
- Assessment of issues such as the dissemination of legal knowledge, the means and instruments for law enforcement, the diversity of interests and the issue of control

Output

Figure: Expected Output

Discussion

The main point of discussion was centred on the integration of the knowledge generated by this research into the WISDOM information system. For this, approaches from bringing together rather qualitative results of the social sciences with more technical dimensions of the natural sciences are in the process of development.

Drafting an institutional landscape with information on power structures and competencies was identified as the key aspect in this regard.

Water, Livelihoods and Vulnerability

Health and climatic/seasonal hazards in the Mekong Delta: vulnerability and response

Dr. Roger Few

(School of Development Studies,

University of East Anglia, Norwich, UK)

Risk in relation to health

The third expert keynote discusses the impacts of hazards on elements of social vulnerability in relation to health issues. Hazards in the Mekong Delta are mainly connected to floods and dry-season conditions and occasionally to other phenomena (typhoon, etc.). These hazards impact on health in different ways: by increasing the exposure to diseases, physically by drowning, or through injuries, malnutrition, and stress. During extreme events these hazards have an impact on health system functionality.

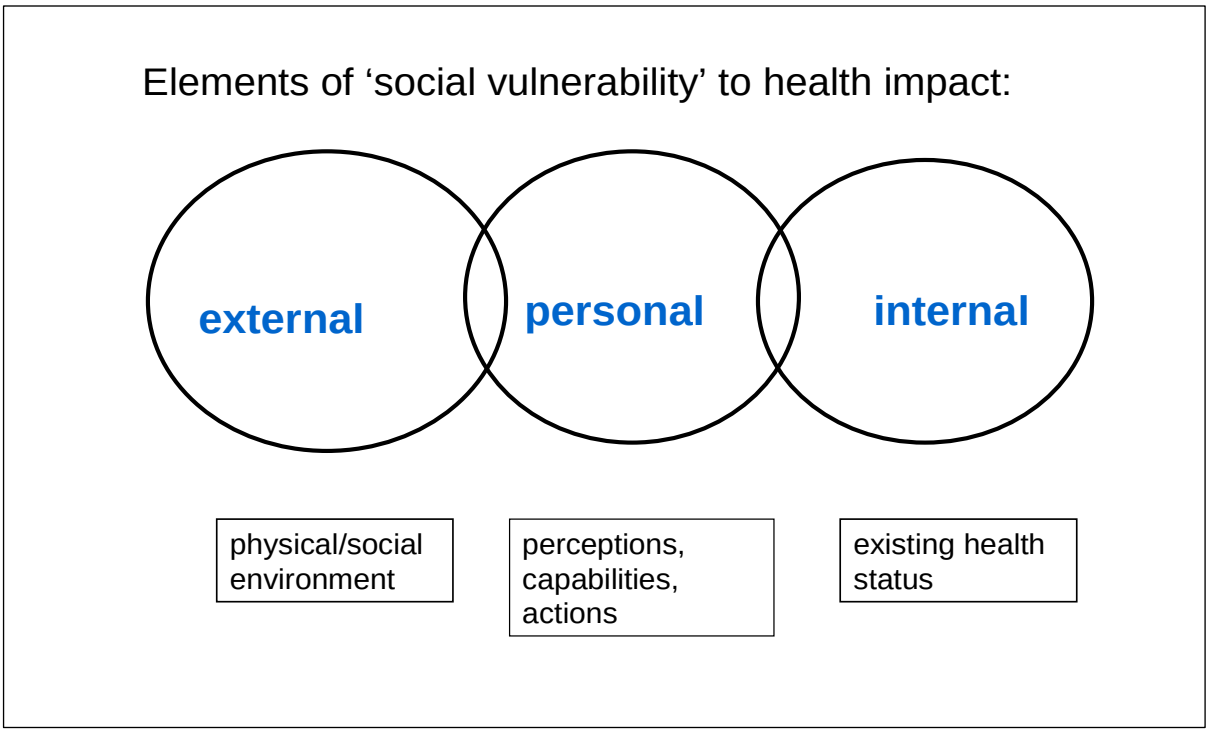

Figure: Conceptualizing vulnerability to health risk

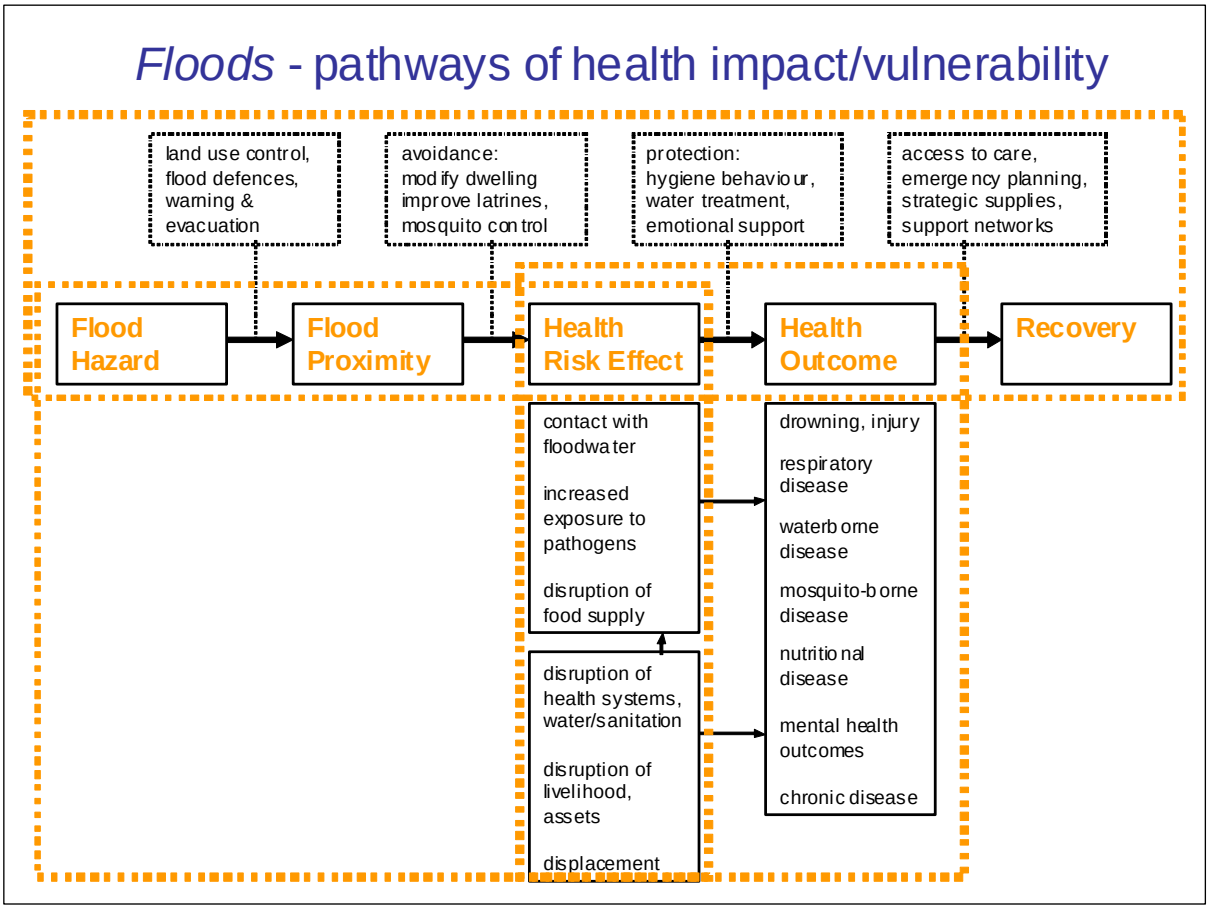

Figure: Floods – pathways of health impact/vulnerability

Responses

On the household side there are mainly two coping mechanisms, on the one hand preparedness actions (e.g. resilient buildings) and on the other, reactive actions (e.g. waste guards, clearing waste, planks, and evacuating family members).

Responses of institutions towards risk are different from those above. Distribution of information (hazards, health risks, advice), provision of health services (medical kits, check-ups) and other instruments (credits, dykes, etc.) are used to face the risk.

Coping capacity

The physical location is on the one hand exposed to hazards (including dykes etc.) and on the other hand may limit the access to information, services and income opportunities, while the economic factors are mostly related to poverty (informal housing – also exposed to hazards), materials, the ability to reduce health risk effects, etc.). Public awareness, education on hazards, and health risks should be seen as a focal point, as "knowledge and understanding" is often regarded as a barrier to change in health behaviour and therefore a barrier in developing enhanced coping capacities. Therefore one key question is: "Is it an ability to understand *or* willingness and/or ability to act?" to reduce risk.

Discussion

The perception of risk varies with the different perspectives (household/ community/ mass organizations (e.g. NGOs). For example, households see the greatest risk in poverty while health facilities see it in poverty, knowledge gaps and coping behaviors.

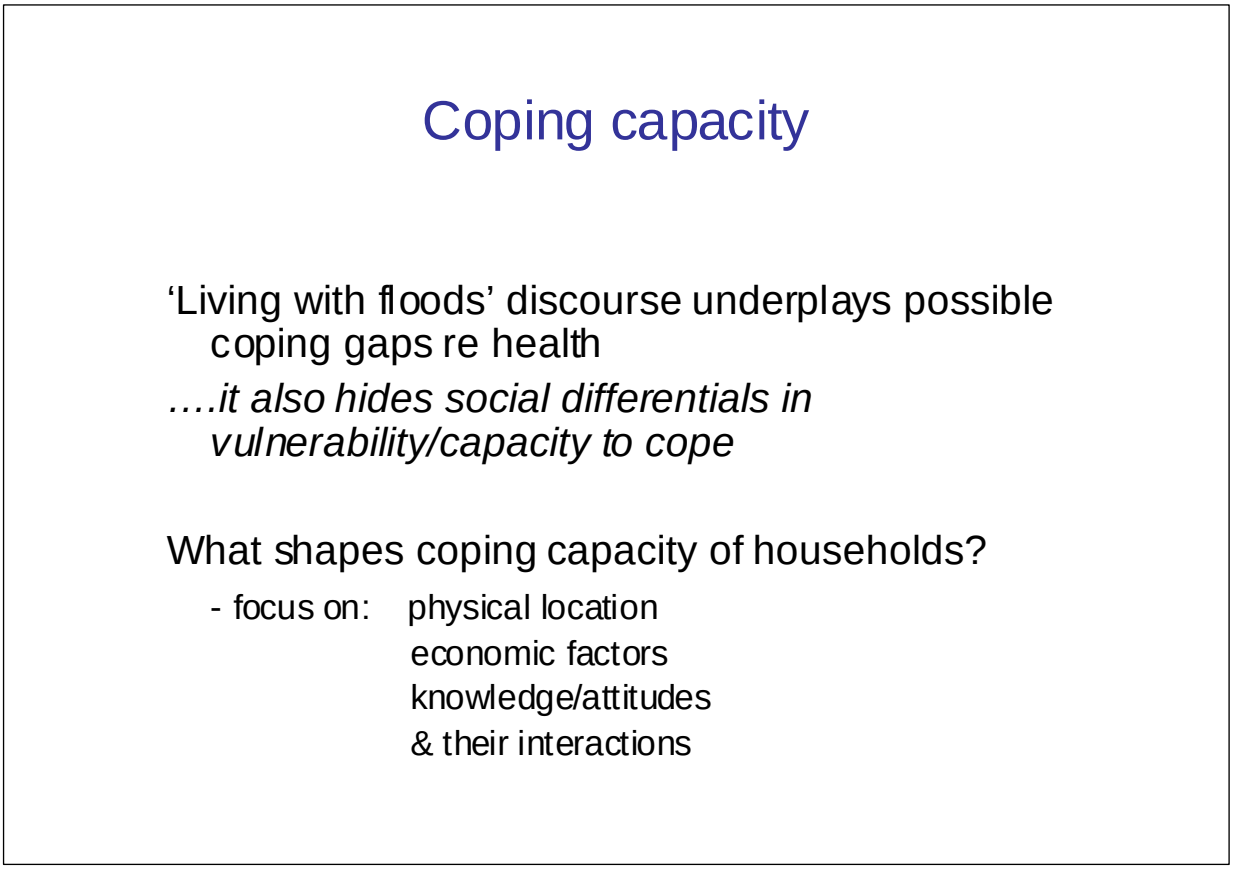

Figure: Coping capacities

During the discussion suggestions like fast burying and boiling water were addressed as disaster responses related to health. Connected to this, the question on the relationship between poverty and vulnerability (as poverty is often a part of vulnerability) was discussed.

Reducing the vulnerability of Livelihoods should include a change in reconstruction as one should not rebuild to the same state as before a disaster, but rather to a more resilient state.

It was also mentioned that beside physical injuries, psychological impacts should be taken into account in the risk/health issue.

PHD Research Concepts: Water, Livelihoods and Vulnerability

Ms Judith Ehlert, Mr Tuan Vo Van, Ms Francesca Burchi

The working package Water, Livelihoods and Vulnerability is divided into the following PHD topics:

1. Local knowledge and resources management in the Mekong Delta (Judith Ehlert, ZEF)
2. Vulnerability assessment to slow onset hazards – sea level rise and droughts in the Lower Mekong (Francesca Burchi, UNU-EHS)
3. Vulnerability assessment to sudden onset hazards – particularly floods in the Lower Mekong (Tuan Vo Van, UNU-EHS)

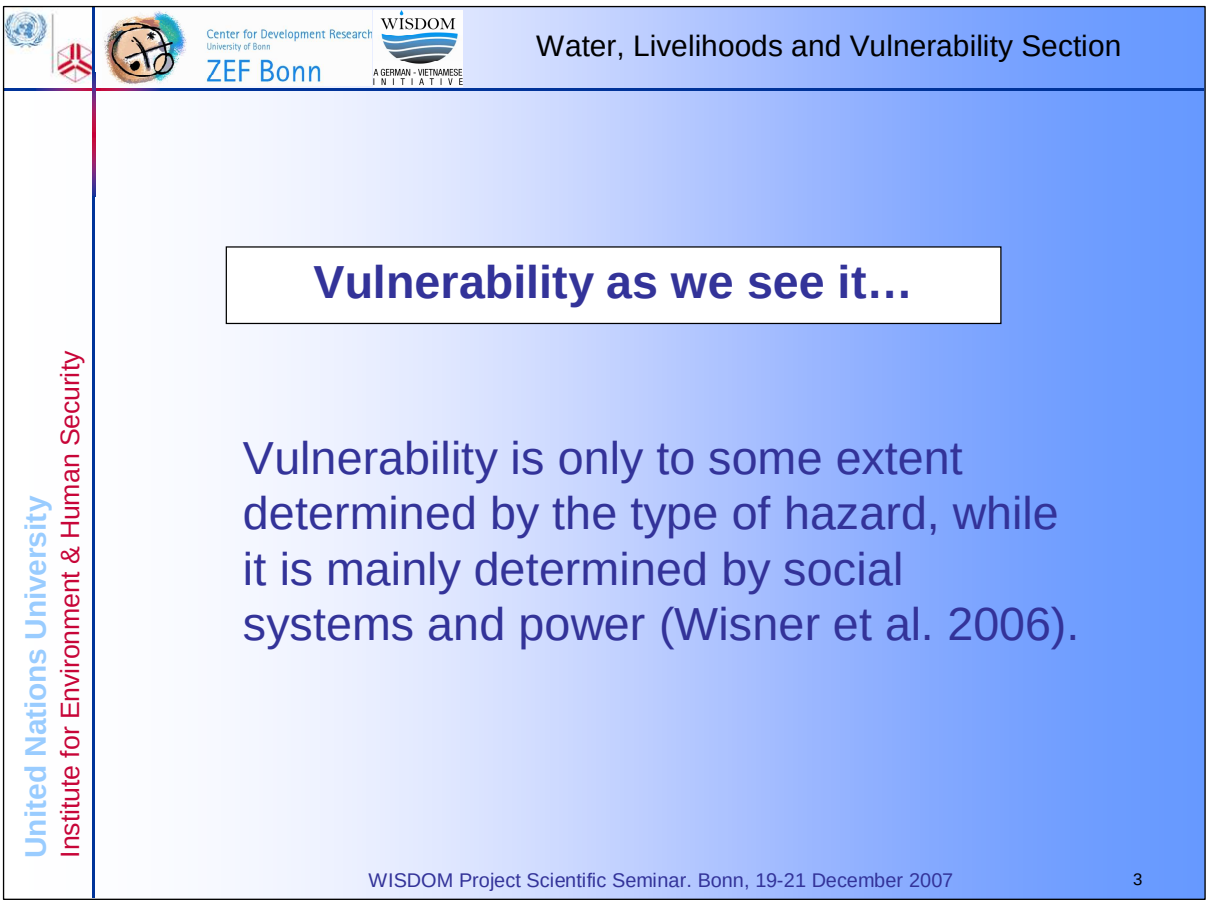

Figure: Definition of vulnerability

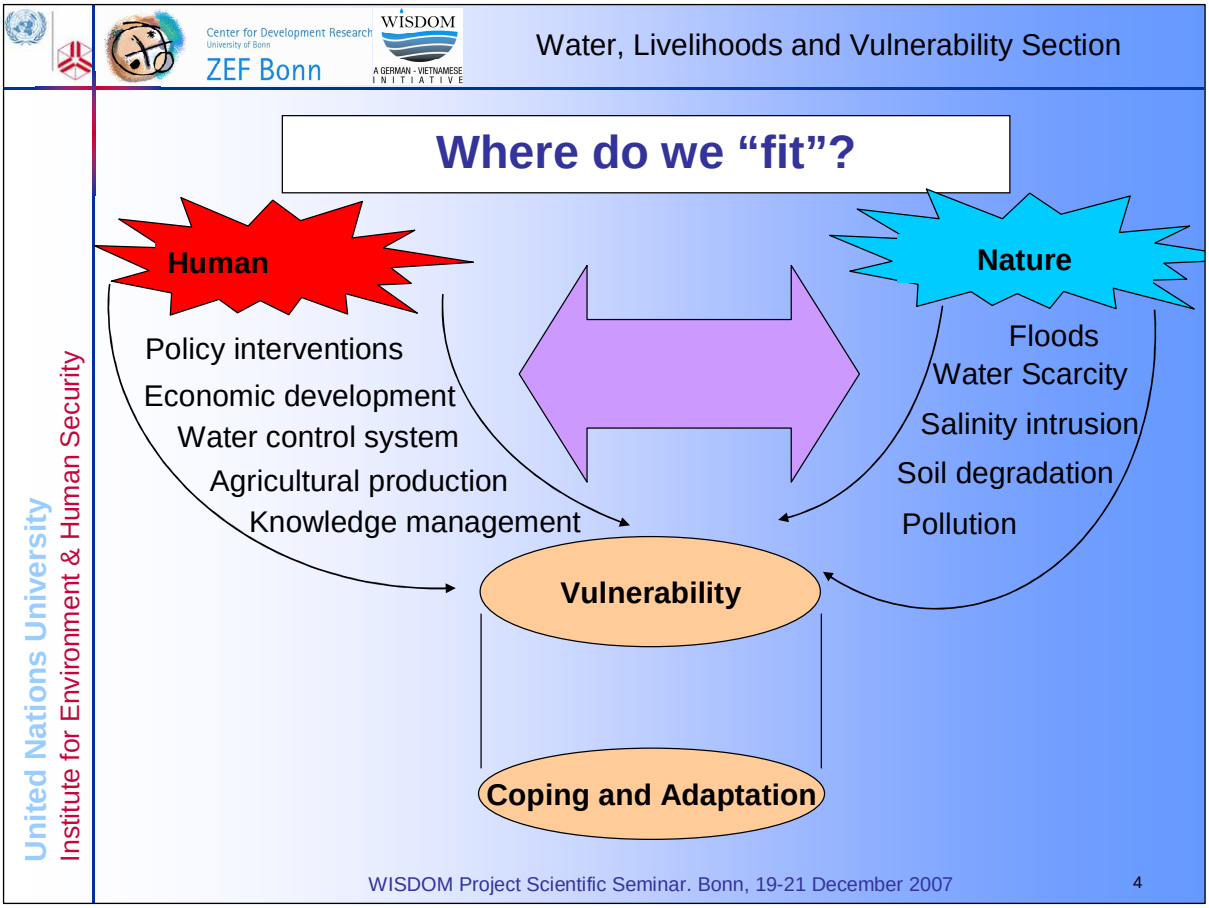

Figure: Position of Vulnerability section within the human- and natural-science topics

The group sees itself as the bridge between the other groups within the WISDOM Project. In order to make this visually clear to the seminar participants the presentation included a slide (showed above) in which “human” and the “nature” come into play when we deal with vulnerability and adaptation processes. However such classification does not reflect a division between the “human” and “nature” sides of hazards. The group is very well aware that under the so called “nature” classification the hazards listed are mainly human-induced. This was underlined by the PhD students as it represents an important clarification for understanding the interactions between humans and the environment in determining vulnerability and coping.

Objectives

1. Analysis of different perceptions of floods and water scarcity and related policy interventions
2. Understanding the coping and adaptation capacities of rural communities to the impacts of natural and man made hazards

Methodology

- Research area: district level and commune levels
- High and low flooding depths
- Protected and unprotected areas in the high flooding depth
- Water scarce areas
- Quantitative methods (household survey, census data)
- Qualitative methods (wealth ranking, mapping, seasonal calendar, timeline, observations, Venn diagram, semi-structured interviews, focus group discussion, in-depth interviews, workshops etc.)

Expected output

- List of criteria and indicators for vulnerability assessment to floods and water scarcity → Mapping
- Coping and adaptive strategies of different social groups to floods and water scarcity → Quantification

Discussion

Opportunities and challenges with regard to information exchange were discussed particularly with respect to this group. Here the linkages between social and environmental aspects become very obvious. Particularly the topic of water scarcity broadens the scope of the entire project but at the same time poses important challenges that should be handled thoroughly. This is because water scarcity in the Mekong Delta it is not related to the lack of water in quantity but in quality (during the dry season a lot of water available has poor quality).

Brainstorming Session

The Brainstorming session was moderated by Dr Thomas Zschocke, Academic Officer at UNU-EHS.


(Dr Thomas Zschocke, UNU EHS)

In particular **the brainstorming session led to the following key results** and suggestions to strengthen the cooperation of the researchers:

The absolute priority set by the PhD students is to establish a platform for discussions and exchange of information/ ideas/ concerns that will arise during the different phases of the research. In order to meet this priority, meetings must be held before the field trips, during the field trips and after the field trips. This objective can be achieved through:

- Video conferences to be able to reduce distances between the different institutes where the PhDs are located while based in Germany.
- Establishing a Web-based communication platform to be able to reduce the distances and obstacles that may arise when the researchers will be in the field at different times.

Moreover to facilitate communication and organizational matters a representative for each institute was elected to coordinate and organize the meetings:
Mr Jose Delgado for GFZ;
Ms Tatjana Bauer for ZEF;
Ms Hong Anh Thi Le for INRES;
Ms Francesca Burchi for UNU-EHS

(Ms Francesca Burchi for UNU-EHS and Jose Delgado from GFZ presenting the

brainstorming session results)

Appendices

1. Timetable

Programme

First WISDOM PhD Scientific Seminar

Date: 19 – 21 December 2007
Location: UNU-EHS, UN Campus, Hermann-Ehlers-Str. 10, Room 2705
Moderation: Dr Thomas Zschocke (UNU-EHS)

Wednesday, 19 December 2007

13.30 – 13.40	**Welcome** Prof Janos Bogardi (UNU-EHS)
13.40 – 13.50	**Self-Introduction** All
13.50 – 14.00	**Information on the Workshop** Dr Fabrice Renaud & Dr Thomas Zschocke (UNU-EHS)
14.00 - 14.15	**Progress in WISDOM** Dr Michael Schmidt (DLR) represented by Dr Thilo Wehrmann (DLR)
14.15 - 15.00	**Keynote I: Flood forecasting for the Mekong Delta** Prof Erich Plate (University of Karlsruhe)
15.00 – 15.15	**Discussion**
15.15 – 15.30	**Coffee Break**
15.30 – 16.00	**PhD Research Concepts: Hydrological/Hydraulic Processes** Mr Hung Nguyen Nghia, Mr Viet Dung Nguyen, Mr Jose Delgado
16.00 – 16.30	**Discussion** Initiated by Dr Heiko Apel (GFZ)
16.30 – 16.45	**Effective Cooperation - Introduction** Dr Thomas Zschocke (UNU-EHS) & Dr Jan-Peter Mund (DLR)
16.45 – 17.45	**Effective Cooperation - Brainstorming**

Thursday, 20 December 2007

09.00 – 09.45	**Introduction to the WISDOM Information System** Dr Thilo Wehrmann (DLR)
09.45 – 10.00	**Discussion**
10.00 – 10.30	**IWRM Project** Prof Harro Stolpe (Ruhr-Universität Bochum)
10.30 – 11.00	**SANSED Project** Dr Joachim Clemens (INRES)
11.00 – 11.15	**Discussion**
11.15 – 11.45	**Coffee Break**

11.45 – 12.15	**PhD Research Concepts: Water Quality** Ms Loan Vo Phuong Hong, Ms Hong Anh Thi Le, Mr Toan Pham Van, Mr Nguyen Hoa
12.15 – 12.45	**Discussion** Initiated by Dr Joachim Clemens (INRES)
12.45 – 13.45	**Lunch**
13.45 – 14.30	**Keynote II: Politics of hydrological data in the Mekong Basin** Dr Bastien Affeltranger (Associate Researcher, Quebec Institute for International Studies - Canada)
14.30 – 14.45	**Discussion**
14.45 – 15.15	**PhD Research Concepts: Water, Policies & Knowledge management** Ms Nadine Reis, Mr Huu Pham Cong, Ms Tatjana Bauer, Mrs Theresa Steyrer
15.15 -15.45	**Discussion** Initiated by Prof Solvay Gerke (ZEF) - tbc
15.45 – 16.15	**Coffee Break**
16.15 – 17.45	**Effective Cooperation - Brainstorming continued**

Friday, 21 December 2007

09.00 – 09.45	**Keynote III: Health and seasonal/climatic hazards in the Mekong Delta: vulnerability and response** Dr Roger Few (University of East Anglia - UK)
09.45 – 10.00	**Discussion**
10.00 – 10.30	**PhD Research Concepts: Water, Livelihoods & Vulnerability** Ms Judith Ehlert, Mr Tuan Vo Van, Ms Francesca Burchi
10.30 – 11.00	**Discussion** Initiated by Dr Jörn Birkmann (UNU-EHS)
11.00 – 11.15	**Coffee Break**
11.15 – 12.15	**Effective Cooperation – Brainstorming continued**
12.15 – 12.45	**Report on Effective Cooperation**
12.45 – 13.00	**Closing Remarks** Prof Janos Bogardi (UNU-EHS) & Dr Michael Schmidt (DLR)

2. Participant List

WISDOM project Seminar

Date: 19th – 21st December 2007
Time: from 1.30pm (19th Dec.) to 1pm (21st Dec.)
Location: UNU-EHS, UN Campus, Hermann-Ehlers-Str. 10, Room 1916

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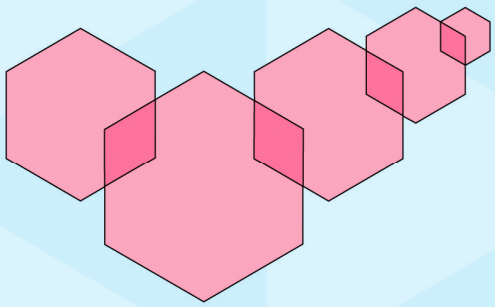

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