Paulina Hetman

Supervisor: **Jan Sendzmir**

Research Project: **Social-network Approach to Transformability Analysis**

Abstract: Conventional river management regimes are often seen as "undesirable" in their failure to address the potential impacts of climate change, such as increasingly frequent weather events (flood and drought). My analysis will focus on transformability of water resources management regimes from current conventional ones to those that are more adaptive to the challenges of global change. Specifically, it will examine factors that aid or inhibit transition from regimes reinforced by a conventional, industrialization paradigm to regimes where greater development of social capital makes them more resilient to global change. I will study an integrated model joining the components representing a network of interacting agents (social part) and the aggregated components representing the dynamics of ecological system (linked *agent-based* and *system dynamics* model).
The main goal of the research is to give insight into these characteristics of the social network that support transformability and augment a successful regime shift. Are there any identifiable symptoms of transformation on the level of network structure? I will study the influence of different network structures (with different network characteristics such as centrality, connectivity, assortativity and transitivity) on the resulting scenarios.

Biographical Sketch: Paulina graduated in 2000 from the Wroclaw University of Technology with a master's degree in Applied Mathematics. She received her Ph.D. in Applied Mathematics (Probability, Stochastic Modeling) from Wroclaw University of Technology in 2005, her thesis being on stochastic modeling of relaxation processes. She is currently working in the Institute of Mathematics and Informatics, University of Opole, Poland as an assistant professor. For the last two years Paulina worked as a researcher in the EU-funded project CAVES (Complexity, Agents, Volatility, Evidence and Scale) which couples policy concerns for complex human-environmental systems with linked physical, biological and social models. Complexity-related issues have been the common and leading aspects of all her research since the beginning of her scientific career (starting from finance-related problems, through studying relaxation patterns, to social and social-ecological systems). She is particularly interested in combining social network analysis and opinion dynamics methods (such as system dynamics, agent based modeling, stochastic processes and game theory).

Koichi Mikami

Supervisor: **Mike Thompson**

Research Project: **Cultural Theory Analysis of Technological Development and Regulation: Cultural Differences in Perceptions of Risk and Distributions of Accountability**

Abstract: In the field of the Social Studies of Science and Technology (SSST), it is argued that technological development is a social process as well as a scientific one. The process of technological development requires changes in not only technical capabilities but also social contexts. These two aspects are indispensable parts of technological development, and the process is sometimes referred as 'co-production'. Based on this perspective, this project aims to understand the roles of risk and accountability issues in this process of co-production. The project consists of two main tasks. The first one is to refine the theoretical framework that explains the relationship among technology, culture and risk perception. Whereas the notion of risk has been recognized as a key concept in the area of biotechnology, why a particular type of risk is emphasized in some cultures often remains unexplained. For this reason, Cultural Theory, which is originally developed in the field of cultural anthropology, is employed for the basis of the theoretical framework. The second task is, using this theoretical framework, analyzing the social contexts of tissue engineering and regenerative medicine in the U.K. and Japan. This analysis covers the regulative as well as market situations in the two countries, and focuses on what kind of risks are recognized in the process and how the accountability of such risks are distributed.

Biographical Sketch: Koichi is a second-year DPhil student at the James Martin Institute for Science and Civilization, the University of Oxford. He graduated from Waseda University, Japan, with a BA in Economics in 2004, and also holds two master's degrees, one in Management Research from the University of Oxford, and the other in Sociology from the London School of Economics and Political Science. Koichi's research interest is the interaction of scientific/technical and cultural/social aspects in technological development of therapeutic biotechnology. The title of his doctoral research is 'Cultural Theory approach to tissue engineering and regenerative medicine in the U.K. and Japan', and he conducts a comparative study of development and regulation of these therapeutic biotechnologies in the two countries.

Risk and Vulnerability (RAV)
Program Leader: Joanne Bayer

Saskia Werners

Supervisor: **Joanne Bayer**

Research Project: **Risk Reduction and Adaption to Climate Variability in a Managed River Basin**

Abstract: Increasing evidence of global change adds to the uncertainties that resource management has to cope with. My main research interest is how to adapt water management to climate change. In research areas other than water management, diversification has been shown successful in increasing adaptive capacity, learning and innovation. However the relationship between diversification and the ability to adapt to climate variability and change has been a neglected research topic in river basin management. In my research I analyse under what conditions diversification of water management interventions can reduce climate related risks. Committed to practical applicability, my research in the summer program will focus on the specific case of the Tisza river basin. The Tisza River is the largest tributary of the Danube. Over the past 150 years the Tisza River was heavily modified. To cater for large-scale mono-agriculture and river transport the river was canalised and straightened and the floodplains drained. The reoccurrence and high visibility of floods caused resources to be funnelled into an extensive flood defence system. At present, floodplain rehabilitation and land use change are proposed to replace or complement traditional engineering solutions in water management in the Tisza region. With my research I aim to answer: **Under what conditions can floodplain rehabilitation and mosaic land use (change) offer an alternative water management strategy to reduce climate related risks in the Hungarian Tisza River Basin.** To address this question I aim to build conceptual and simple quantitative models that link risk management and climate adaptation to the economic concept of portfolio management and to resilience concepts of the adaptive cycle, regime shifts and transformability (see e.g. www.resalliance.org). The research concludes with a discussion of the challenges faced when trying to evaluate the spatial and temporal consequences of an alternative water management strategy that runs counter to a region's long-established tradition.

Biographical Sketch: Saskia's main research interest is adaptation to climate change in water management. More specifically she evaluates under what conditions diversification of water infrastructure and use reduces climate related risks. Based at Wageningen University and Research Centre in the Netherlands, her work and Ph.D. research are firmly rooted in the global change community. Her graduate studies on Water Management and Engineering (Heriot-Watt University-Edinburgh/UK, 1997), Environmental Sciences and Experimental Physics (Free University-Amsterdam/NL, 1995) are complemented by her practical experience, working in the national government and the private sector

Nancy Wozabal

Supervisor: **Georg Pflug**

Research Project: **Measures of Risk in Natural Catastrophe Management**

Abstract: This research aims at studying the performance of different measures of risk as well as to adapt concepts of risk measurement and management to the setting of disaster management. This is a relatively new application area for risk measures. Since the current research in the field of risk measurement and management is focussed on financial risk of private enterprises, the topic of measuring risk in a complex macroeconomic environment is a challenging issue. The Risk and Vulnerability Group at IIASA assesses the probabilities and magnitudes of macroeconomic losses stemming from natural catastrophe and develops models to price the risk associated with these events. These models aim at designing governmental policies to cope with the losses in case of disaster, such as reinsurance or so called disaster bonds. Since natural disasters are rare events and there are not many contracts of this sort, the prices cannot be based simply on expected losses but have to take into account a risk dimension. An interesting challenge is to find measures that quantify risk which are meaningful in this context i.e. representing the risk preference of the government. Since the policy decisions are multi-stage, dynamic risk measures will also be investigated. Another issue to be considered is incorporating these measures of risk into a framework that assist in the decision making i.e. to integrate these measures into the model which performs a cost analysis for various objectives.

Biographical Sketch: Nancy graduated from St. Stephen's College (Delhi university) with a bachelor's degree in Mathematics in 2001. She went on to do her master's in Applied Statistics at the Indian Institute of Technology Bombay. She is currently pursuing her Ph.D. at the University of Vienna, and her research deals with analyzing the asymptotic properties of risk measures. Her research interests include asymptotic statistics and stochastic optimization.