

# GRADUATE RESEARCH SERIES PHD DISSERTATION

Vol. 1



UNITED NATIONS  
UNIVERSITY

**UNU-EHS**

Institute for Environment  
and Human Security

Flood Risk Perception  
and Communication  
within Risk Management  
in Different Cultural Contexts

*by Xiaomeng Shen*



A Comparative Case Study between Wuhan, China, and Cologne, Germany

### **About Graduate Research Series**

The Graduate Research Series of the United Nations University Institute for Environment and Human Security (UNU-EHS) publishes outstanding dissertations and selected Master's theses of graduate students who have completed their studies within the research programme of the Institute.

UNU-EHS conducts policy relevant research to advance human security through knowledge-based approaches to reducing vulnerability and environmental risks. A key component of its activities is the graduate education programme. It is designed to create a new generation of scientists in order to strengthen the scientific capacity especially in transitional and developing countries.

The Institute provides young scientists the opportunity to work in research projects in an interdisciplinary, policy relevant context while pursuing their advanced degrees. The Graduate Research Series was established as a means to share outstanding original research from these young scholars with the wider scientific community.

**GRADUATE RESEARCH SERIES**  
**PHD DISSERTATIONS**  
Publication Series of UNU-EHS  
Vol. 1

UNU-EHS  
Hermann-Ehlers-Str. 10  
53113 Bonn, Germany  
Tel.: + 49-228-815-0200  
Fax: + 49-228-815-0299  
E-mail: [info@ehs.unu.edu](mailto:info@ehs.unu.edu)  
[www.ehs.unu.edu](http://www.ehs.unu.edu)

Copyright UNU-EHS 2010  
Cover Photo: Martin Willms  
Cover Design:  
Andrea Wendeler  
Layout: Andrea Wendeler,  
Carolina Garzón  
Copy Editors: Ilona Roberts,  
Katharina Brach

*The views expressed in this  
publication are those of the  
author(s). Publication does  
not imply endorsement by  
the UNU-EHS or the United  
Nations University of any of  
the views expressed.*

ISBN: 978-3-939923-38-1  
e-ISBN: 978-3-939923-39-8  
ISSN: 2077-737X

Printed at Druckerei  
Paffenholz, Bonn, Germany  
March 2010  
500 print run





Xiaomeng Shen

### About the Author

*Xiaomeng Shen is an Associate Academic Officer in the Environmental Migration, Social Vulnerability and Adaptation Section at the United Nations University Institute for Environment and Human Security (UNU-EHS).*

*She is the project manager of the Munich Re Foundation (MRF) funded Chair on Social Vulnerability. The research of the project concentrates on initiating policy-relevant research and capacity building.*

*Additionally, she is the focal point for cultural and social dimensions of vulnerability and comparative risk perception. The culture sensitive bottom-up approaches of the conducted research means to enhance risk management and social resilience especially in developing countries.*

*Ms. Shen earned her PhD in Geography at the University of Bonn, Germany, while conducting her research within the structure of UNU-EHS. Her current research focuses on disaster risk management in different cultural settings, institutional vulnerabilities, and environmentally induced migration.*

*Flood Risk Perception and Communication  
within Risk Management  
in Different Cultural Contexts*

*A Comparative Case Study  
between Wuhan, China, and Cologne, Germany*

Xiaomeng Shen

In Cooperation with



Zentrum für Entwicklungsforschung  
Center for Development Research  
University of Bonn

## Acknowledgement

世有伯乐，然后有千里马。千里马常有，而伯乐不常有。故虽有名马，  
 辱于奴隶人之手，骈死于槽枥之间，不以千里称也。  
 (韩愈, 768-824)

*Without the horse master Bole there would be no horses of one thousand miles.*

*A horse which can run one thousand miles in one stroke is not at all rare.*

*However, a master like Bole, who can tell which horse has such ability, is rare.*

*As a consequence, many horses of excellent capacity only have an ordinary life being humiliated by ordinary man without earning a name of being a horse of one thousand miles (Han Yu, 768-824 A.D.)*

I thank Professor Bogardi for being a wise “master of horses” who saw my potential (which is still not even known to myself; I feel more like the donkey of Don Quixote) and has been “whipping”/supporting me through my entire PhD rearing process. No other words can better describe his contribution to my personal academic development than the story of the horse master Bole.

It is Professor Jürgen Pohl who gives the word “Doktorvater” (doctor father - the German expression for PhD supervisor), a true meaning. Without his fatherly encouragement and sometimes even psychological support, on top of all his inspiring academic guidance, I might still be fumbling in the total darkness of confusion.

Dr Katharina Marre as my tutor within the United Nations University Institute for Environment and Human Security (UNU-EHS) has accompanied me throughout my PhD journey and always been there for me whenever I needed a guiding and helping hand. I thank her for her constant intellectual inspiration, important comments, and invaluable feedback, especially through the writing-up phase.

I also wish to thank Professor Libor Jansky for helping me to find and define additional dimensions of my work and for his useful counsel.

In addition, my thanks go to my friends Basak Baglayan Ceyhan and Patrick Schröder who went through the “construction phase” of my PhD work, breathing in all the dust and hearing all the noise of a construction site as well as helping me to polish the facade of my work by proofreading. The final proofreading was jointly accomplished by my friends Claudia Maurer, Susanne Krings, and Olivia Dun. I owe them many thanks - and dinners (if you find any mistakes in my work, do not hesitate to contact them).

I thank the United Nations University Institute for Environment and Human Security for funding my PhD research as well as providing me with an excellent working environment with pleasant and helpful colleagues.

Last but not least, I owe many thanks to the following institutions in China and Germany for assisting me to organize my research and providing me with valuable information essential for my field work:

## Institutions in China:

The Agency for Foreign Affairs in the City of Wuhan  
 The Division for Special Tasks of the Municipal Government of Wuhan  
 The Bureau for Water Resources, Wuhan  
 The Flood Control and Drought Relief Headquarters, Wuhan, including  
     *Division for Dike Construction and Maintenance*  
     *Division for Technical Planning*  
     *Division for Water Resource and Quality*  
     *Division for Flood Protection*  
     *Division for Drainage*  
 The Division for Flood Protection within the Flood Control and Drought Relief  
     *Headquarters of Huangpi District, Wuhan*  
 The Bureau for Water Resources of Huangpi District, Wuhan  
 The Division for Flood Protection within the Flood Control and Drought Relief  
     *Headquarters of Caidian District, Wuhan*  
 The Bureau for Urban Planning, Wuhan  
 The Environmental Agency, Wuhan, including  
     *Division for Foreign Affairs*  
     *Division for Technology*  
     *Division for Environmental Monitoring*  
 Agency for Agriculture, Wuhan  
 Bureau for Meteorology, Wuhan  
 The Changjiang<sup>1</sup> Water Resources Commission including  
     *Division for International Exchange*  
     *Division for Flood Water Allocation*  
     *Division for Technical Planning*  
     *Division for Dike Construction and Maintenance*  
     *Division for Flood Protection*  
     *Bureau for Construction*  
 Department of Water Hazard Research, China Institute of Water Resources  
 and Hydropower Research  
 National Disaster Reduction Centre  
 Ministry of Civil Affairs  
 Ministry of Water Resources  
 World Wildlife Fund, Wuhan Office  
 Infantry Base of People's Liberation Army, Wuhan

---

<sup>1</sup> Changjiang is another standard usage for Yangtze River in China. Both of the usages are applied interchangeably in different contexts in Chinese scientific literature and as official names.



**Institutions in Germany:**

Flood Protection Centre, City of Cologne

Drainage Enterprise Cologne

Citizens' Group Westhoven

Fire Brigade, City of Cologne

Regional Farmers' Union Köln-Erftkreis

Conservationists' Union Cologne

Federal Bureau for Nature Conservation

The Federal Army Force

Regional Agency for Spatial Planning, Cologne

## Foreword

It is a double privilege for me to write this foreword for our new „Graduate Research Series“. It is my privilege to introduce a series that will be one of our dissemination media for the best PhD dissertations and MSc theses produced by young scientists who work within the structures of our Institute and who, through their research activities, contribute to the achievement of the Institute's mandate. We all hope that with this publication, the work that is being implemented in our Institute by our PhD and MSc Researchers will be accessible to a wider audience than a typical dissertation or thesis usually is.

It is also my privilege to introduce the first dissertation to appear in this series: that of Dr Xiaomeng Shen who has been with UNU-EHS since almost the beginning of the Institute and has proved to be a very meticulous and dedicated researcher. This has resulted in her being granted her PhD degree by the University of Bonn with the distinction *magna cum laude*.

The work of Dr Shen has demonstrated how the concept of flood risk is perceived and communicated within social processes in different cultural contexts. Her fieldwork took her to Cologne in Germany and Wuhan, Hubei Province in China, two very contrasting regions of the world. Whereas most of the national comparative risk studies focus on the identification of differences in risk perception, communication and management strategies across countries, this dissertation goes further to analyse how these differences are embedded in their cultural contexts both from historical and cultural perspectives and at a theoretical level as determined by Cultural Theory.

The contrast in risk perception and communication between the two case study areas is striking and many cultural factors can explain them. In China, flood risk management is taking place in a context of the necessity to maintain economic growth and, historically, embedded in the notion that mankind and nature are at war. Participatory decision-making is quasi non-existent. In Germany, there is a tendency to move away from protecting communities from flooding by the use of engineering structures towards flood protection by leaving more space to rivers. Flood risk management is very participative. Without making a judgement on which system is more effective than the other, Dr Shen takes us on a scientific journey of discovery that allows us to understand why such contrasts exist.

Understanding the different realities societies construe and their different ways of viewing risk is essential for international risk governance, especially in the light of climate change which requires the cooperation of the international communities. This dissertation has provided an empirical case study and in-depth analysis of the interplay of risk perception, communication and culture and is a contribution that could prove useful to many actors involved in risk governance.



Dr Fabrice Renaud  
Director a.i.  
UNU-EHS

## Abstract

**Key words:** decision-making, spatial planning, conflict of interests, human nature relationship, cultural theory, retention area, scientism.

Preparedness, early warning, and emergency management all contribute to flood risk mitigation and are closely linked to risk perception and communication. Risk perception and communication of decision makers considerably influence their approach to risk mitigation strategies and therefore have a great impact on institutional coping capacity/ vulnerability.

This PhD thesis investigates flood risk perception and communication amongst key institutional stakeholders involved in flood risk management in the different cultural settings of China and Germany. Using qualitative social research methods, this study aims at: first, understanding the discrepancies of risk perceptions between different actors; second, identifying flood risk communication features among flood risk management organizational units and between risk management and the general public; third, comparing the perception and communication characteristics in different cultural contexts; and finally, analysing how differences are embedded in culture and exploring the potential of cross cultural transferability of good practices and its implementation with consideration of cultural diversity.

The research results have shown significant differences between the flood risk management strategies as well as risk perceptions and communication patterns. According to Chinese flood risk management, technical flood protection shall, can, and has to serve as the main flood risk management measure to ensure the economic development in flood plains due to population pressure. German risk management, on the other hand, combines other management instruments such as spatial planning in addition to engineered flood protection.

In China different actors show great confidence in existing flood protection measures and risk management organizational features. This is also communicated within risk management authorities as well as the general public, whereas in Germany the importance of risk awareness raising activities is strongly advocated. Flood risk is perceived to be controllable and predictable with “scientific methods” in China, which displays a strong belief in a technical approach. In Germany, on the contrary, uncertainty in flood risk management has penetrated into the authorities’ mental maps despite the engineered protection measures.

Risk communication takes place in a top-down structure in China and is more intensive during flood events. In Germany risk communication is horizontal and occurs in a participatory manner also during “flood free” periods. However, the consensus finding process seems to cause tensions among different German stakeholders and therefore sometimes impairs the efficiency of flood risk management. The flood risk management strategies both in China and Germany showed strengths, but also revealed some difficulties. A cultural analysis illustrates how cultural factors impact on risk management, the advantage each society has, and the challenges faced.

## Table of Contents

<b>A. Introduction</b>	<b>1</b>
1. Water, Ah Water!	1
2. Flood Mitigation	3
3. The Significance of Cultural Understanding	7
4. Objectives of the Study and Research Questions	8
5. Structure of the Thesis	8
<b>B. Notion of Risk and Problem Dimensions of Flood Management</b>	<b>9</b>
1. Risk as a Manifold Concept	9
2. Challenge in Flood Management	14
<b>C. Sites of Field Work</b>	<b>17</b>
1. Location, Population, and Economy	17
1.1 Wuhan, China	17
1.2 Cologne, Germany	20
2. Historical Flood Events	23
2.1 Wuhan, China	23
2.2 Cologne, Germany	24
3. Engineered Measures	25
3.1 Wuhan, China	25
3.2 Cologne, Germany	26
<b>D. Methodological Approach</b>	<b>28</b>
1. Research Design	28
1.1 Qualitative Social Research Method	28
1.2 Research Subjects	29
1.3 Range of Methods Applied and the Field Work	29
2. Field Work Experiences	30
2.1 In Germany	31
2.2 In China	31
3. Data	33
3.1 Data and Data Transcription	33
3.2 Data Analysis	34
4. The Role of the Researcher	35
<b>E. Research Results</b>	<b>35</b>
1. Flood Risk Perception	36
1.1 Institutional Arrangement of Flood Protection	37
1.1.a Wuhan, China	37
1.1.b Cologne, Germany	43
1.1.c Synopsis	46

1.2. Spatial Planning and Land Use	47
1.2.a Wuhan, China	47
1.2.b Cologne, Germany	51
1.2.c Synopsis	53
1.3. Decision-Making, Conflict of Interests, and Reconciliation	54
1.3.a Wuhan, China	54
1.3.b Cologne, Germany	75
1.3.c Synopsis	86
1.4. Perception of General Public by the Risk Management Agencies	91
1.4.a Wuhan, China	91
1.4.b Cologne, Germany	93
1.4.c Synopsis	93
1.5 Human Nature Relationship	94
1.5.a Wuhan, China	94
1.5.b Cologne, Germany	99
1.5.c Synopsis	101
1.6 The Role of the Military (Excursus)	102
2. Flood Risk Communication	103
2.1 Inter-Agency Communication and Cooperation	104
2.1.a Wuhan, China	104
2.1.b Cologne, Germany	106
2.1.c Synopsis	108
2.2 Information and Risk Awareness	108
2.2.a Wuhan, China	108
2.2.b Cologne, Germany	109
2.2.c Synopsis	112
2.3 Questioning of Authority	113
2.3.a Wuhan, China	113
2.3.b Cologne, Germany	113
2.3.c Synopsis	116
<b>F. Theoretical Analysis</b>	<b>116</b>
1. Two Approaches of Risk Analysis	117
1.1 The Psychometric Paradigm	117
1.2 In the Light of the Cultural Theories	120
1.2.a Culture: An Ambitious and Ambiguous Concept	120
1.2.b Cultural Theories and Their Approach to Risk Analysis	121
1.2.c Constraints and Significance of Cultural Theory	136
2. Cross-Cultural Risk Perception Studies	138
<b>G. Discussion</b>	<b>140</b>
1. Link Between Theory and Empiricism	140
1.1 Ways of Life: Social Relations and Cultural Biases	140
1.2. Conception of Human and Nature	146

1.3. Risk Selection and Risk Discourse	147
1.3.a Risk Selection	147
1.3.b Risk Discourse	150
1.4 Synopsis	151
2. Generalization and Transferability	152
3. Limitation of the Research	153
<b>H. Conclusion</b>	<b>154</b>
1. Flood Risk Perception and Its Cultural Context	155
2. Flood Risk Communication and Its Cultural Context	158
3. Final Remarks: "...residing in rivers and lakes forgetting each other"	159
<b>List of Boxes</b>	<b>161</b>
<b>List of Charts</b>	<b>161</b>
<b>List of Figures</b>	<b>161</b>
<b>List of Maps</b>	<b>161</b>
<b>List of Pictures</b>	<b>161</b>
<b>List of Tables</b>	<b>161</b>
<b>References</b>	<b>163</b>
<b>Acronyms</b>	<b>176</b>



## A. Introduction

“水能载舟，亦能覆舟” (魏征, 580-643)

*Water can carry a boat or sink it.*

*(Wei Zheng, 580-643 A.D.)*

### 1. Water, Ah Water!

The famous saying “water can carry a boat or sink it” by the Chinese Prime Minister Wei Zheng of the Tang-Dynasty (618-907 A.D.) uses the characteristics of water as a metaphor to describe the relationship between rulers and their people. People are symbolized by water which can be utilized and beneficial for the ruler; the ruler is symbolized by the boat which relies on the water to carry it. However, water can be a double cross. Once the harmony between water and the boat is disturbed, water brings destruction.

This relationship concept can be transferred to the relationship between water and human beings. Water is indispensable for human life as not only does it provide natural resource services essential for the development of human civilization, but also nurtures intellectual inspiration. In Chinese literature one can find countless poems using water as a metaphor. In one of the most famous poems written by Li Bai (701-762 A.D.), water is used as metaphor for the endlessness of sorrows: “Although I draw my knife across the water, the river continues to flow. When I raise my cup to lessen my sorrows, the sorrows only grow” (Allan 1997: 29).

Philosophers such as Confucius (551-479 B.C.) meditated on the source of life and exclaimed: “Water, ah water!”, trying to find the fundamental principles of life (Allan 1997: 31). Maybe the Chinese have conferred a unique meaning to water in the intellectual domain; however, it is not only the Chinese who have shown a propensity towards water in the course of history. Pohl points out the significance of the natural event of flooding for human civilisations:

The frightening as well as fruitful floods of Euphrates and Tigris in Mesopotamia, and the floods of the Nile in Egypt or of the Yangtze and the Huanghe in China have greatly influenced the development of mankind (Pohl 2003: 202-203).

Wittfogel even contends that the need for irrigation and flood protection is a decisive factor which lays the foundation for the formation of society (Wittfogel 1955: 44-45).

In addition to the environmental services and intellectual inspiration water and flood events provide for humankind, the power of water also manifests itself in destruction. Floods often have great negative impacts on human well-being. They cause loss of human life, economic damage, damage to ecosystems and historical and cultural sites, and aggravate human health problems. In the last decade of the 20th century, floods killed 100,000 people worldwide and affected over 1.4 billion people (Jonkman 2005: 151-152). According to Munich Re (Kron 2003: 80), about one third of all reported damages and one third of all economic losses is flood-related. Over the last decades there have been more casualties due to flooding than have been caused by all other types of natural catastrophes taken together



(Kron 2003: 80). During the period from January 1975 to June 2002, freshwater flood events are reported to have killed 176,864 people and affected 2.27 billion according to the International Disaster Database. Less developed countries are especially affected by floods. Among the five floods with highest casualties during this time period, China is listed twice (see Table 1) (Jonkman 2005: 158). According to Burton et al., absolute losses from natural hazards are much greater in industrial than in developing societies, whereas proportional losses and deaths are extremely high in mixed and indigenous societies (Burton et al. 1993: 238). However, wealthy countries are not exempted from flood disasters. Some of the most costly flood events occurred on the Rhine and its tributaries in 1993 and in England during 1998 and 2000. The worst of all recent European floods occurred in Eastern and Central Europe in 2002 (Wisner et al. 2004: 201). During this flood event on the Elbe River in Germany, 20 people died in Saxony, 110 were injured and tens of thousands of people were evacuated. The monetary loss amounted to billions of Euros (Unabhängige Kommission der Sächsischen Staatsregierung 2002: 1).

Table 1: Overview of the Five Freshwater Flood Events with Most People Killed, Jan. 1975 - June 2002

Country	Year	Month	Day	Killed	Total affected	Description
Venezuela	1999	12	19	30,000	483,635	flash and river floods and landslides around Caracas and other areas
Afghanistan	1988	6		6345	166,831	floods in Badakhshan, Baghlan, Heart, Kabul, Jouzjan, Samangan, Takhar provinces
China, P. Rep.	1980	6		6200	67,000	floods in Sichuan, Anhui, Hubei
India	1978	7		3800	32,000,000	floods in north and northeast India
China, P. Rep.	1998	8	6	3656	238,973,000	river floods combined with storms and landslides in Hubei, Hunan, Sichuan, Jiangxi, Fujian, Guanxi provinces

Source: Jonkman (2005: 159)

Humankind cannot eliminate the natural process of flooding and does neither want to forsake the use of water resources in flood prone areas, nor flood plains as a place of habitation. This means accepting a life with risks and benefits. But as time goes on, it is becoming increasingly difficult to maintain the balance between the risk of flooding and the gain incurred by living close to water resources. There are several reasons for this: according to the Intergovernmental Panel on Climate Change (IPCC) (2007), global climate change is causing more frequent and intensive flooding events; engineering flood protection measures need steady maintenance.

nance and follow-up measures which affected societies are not willing to carry out; unsustainable land use practices increase the risk; urbanization is putting a rising population number in jeopardy; development of infrastructure increases the value of assets at risk (Bogardi 2004: 6). Thus, flood mitigation is gaining more and more importance, posing an ever-challenging task.

## 2. Flood Mitigation

Currently, there are two main discourses on flood disasters. The dominant view considers flood as a natural phenomenon. The alternative discourse sees flood disasters as being jointly produced by the interaction between the physical hazard and social vulnerabilities. The latter discourse brings to the fore social relations, structures, institutions, and governance, as well as political processes in understanding flood disasters (Lebel et al. 2006b: 3; Dixit 2003: 166; Stefanovic 2003: 231; Few 2003: 47). As a consequence of differences in perspectives within these discourses, the implications for flood mitigation strategies differ as well.

If the first approach is applied, the focus is on physical events. The implication for mitigation is the prediction of their magnitude and occurrence using hydrological and meteorological science. Technical measures such as dikes and dams are solutions to alleviate floods. However, these technical measures often intensify flood problems. Interventions to mitigate disasters are relief activities after the event has occurred. Such aid measures intend to restore the situation and help people to bounce back to their original "normal" life. Even when a flood disaster occurs repeatedly in the same area, the same relief and recovery aid measures are provided. Relief is currently the dominant approach which is championed by different actors such as regional governments and international donor agencies. However, this approach largely ignores the mitigation potential during the normal time between two flood events (Dixit 2003: 166). This hazard-led approach does not involve the affected people in the decision-making about mitigation. Instead, mitigation is carried out in a bureaucratic manner through a top-down approach (Dixit 2003: 166).

Short term reductionist strategies have their place at certain times and within certain scales. However, numerous studies reveal that disasters are not only the outcome of natural hazards, but also of socio-economic structures and political processes that make individuals and families vulnerable (Lebel et al. 2006a: 3; Wisner et al. 2004: 216; Dixit 2003: 166). This perspective is labelled as the "alternative approach" which focuses on how social systems operate to make people vulnerable to disasters. This approach recognizes the fact that natural hazards do occur, but vulnerability is equally important for the outcome of a disaster (Dixit 2003: 166; Heijmans 2001).

Due to asymmetric socio-economic relationships, for instance, those families which have no access to basic resources, such as land, food, and education, are particularly vulnerable. "Disasters are the unresolved problems of societies during 'normal' times, and these problems affect the way people are impacted by disasters" (Dixit 2003: 168; Wisner et al. 2004: 206). Is it helpful to analyse these unbalanced relationships and social processes to identify the root causes of disasters? Dixit advocates it is vital to change those patterns of relationships and institutional

arrangements which worsen vulnerability to disaster. To reduce vulnerability of different groups, families and individuals affected by disasters should be involved in all stages of decision-making and implementation (Dixit 2003: 168). Lebel also pointed out that viewing disaster solely as a technical problem ignores the importance of participation and transparency and conceals the politics of shifting risk to already vulnerable groups (Lebel et al. 2006b).

Yet, public participation in flood mitigation has not been widely practiced; instead, the public are treated as irrelevant to the technical exercise of assessing and managing risk and designing institutional responses. Despite the knowledge and promotion by international agencies of community-based flood disaster management, national agencies remain sceptical about its implementation. Reasons for this scepticism lie in the fact that this approach requires “addressing fundamental issues of governance and social justice that may undermine positions of authority” (Lebel et al. 2006b: 3-4).

In practicing public participation, simply informing the public is not sufficient. Neither would it be appropriate to use it as an opportunity to shift the burden on to communities for actions that should have been the responsibility of public authorities. The aim of participation should be empowerment of marginalized and vulnerable groups in decision-making around whom and what should be at risk (Lebel et al. 2006b: 4).

Whilst public participation in river basin management is strongly advocated by the scientific community (Jansky 2002; Wisner et al. 2004; Lebel et al. 2006b; Dixit 2003; Bradbury 1989; Tierney et al. 2001; Krasovskaia et al. 2006), case studies in many Asian areas such as Nepal, Vietnam, and Thailand show that the dominant response to flood mitigation has been hierarchical and guided by the motivation to control both water and people. Consequently, flood mitigation is translated into structural measures which have been proved to be insufficient (Dixit 2003; Lebel et al. 2006b; Lebel et al. 2008). Dixit concludes:

That the appropriate response to flooding lies in providing unhindered drainage is an intellectual blind spot because of the political-economic incentives of structural flood control measure (Dixit 2003: 174).

The role of the state in the creation and distribution of risks needs to be given much greater emphasis. Governments are seen as important actors in hazard mitigation. However, they are often facilitators of risky organizational and institutional practices; at the same time they are also autonomous actors pursuing their own interests and creating risk in the process (Tierney 1999: 234).

The state's involvement in producing risks is tied to its role in reproducing the neo-liberal political economy of growth. The state promotes conditions which are favourable to economic expansion and a positive business climate. Government agencies at all levels are eager to promote economic growth, even if growth is accompanied by higher levels of risk. Likewise, regulations that might reduce risks cannot be implemented without difficulties, if those regulations are not in line with powerful economic interests (Tierney 1999: 234).

Lebel et al. often observed “risk redistribution” instead of risk mitigation in their case studies on flood mitigation. In these case studies, interventions reduce risks for one group while increasing them for another. Lebel et al.’s study describes a common phenomenon of risk redistribution in order to protect major cities. For instance, the protection of the central business district of Bangkok frequently put the surrounding suburbs and upstream districts or farmlands at risk by using them as retention areas. Due to lacking prior involvement of the farmers and compensation mechanisms, a serious conflict was provoked (Lebel et al. 2008: 3). At the same time, the information made available to the urban population emphasized structural measures which protect the interests of local elites in urban areas. The social and environmental impacts of such measures on affected areas are not mentioned (Lebel et al. 2008: 4). Disasters are less counteracted where there is no social mobilization and therefore no political interest to mitigate. On the contrary, when the big business sector is threatened, politicians are likely to take action (Lebel et al. 2008: 11).

In addition, the reliance on structural measures leads to crisis-driven management, since engineering measures can fail. Simultaneously, more building and investment behind dike systems are generated due to the structural protection, in return, more people and assets are put at risk (Lebel et al. 2008: 5).

Holling et al. also investigate the question of why flood control and irrigation developments create large ecological and economic costs, and increasing vulnerability. They contend the failure of managing renewable resources is that uncertainty in nature is presumed to be replaced by certainty of human control. Social systems benefit from human accomplishments, but in the meantime this success creates its own failure. This explains why flood control creates vulnerability. Effective flood control leads to human settlement densities in fertile flood plains, consequently investments increase. When a severe flood eventually overwhelms physical structures such as dams and/or dikes, the social and economic structures are interrupted and have to be restructured again (Holling et al. 2002: 6).

Significant flood events in the past decade have triggered a rethinking process about mitigation strategies, especially those flood events in the developed world which led to the collapse of confidence in engineered flood prevention in these countries (Wisner et al. 2004: 201). Cutter believes that the ideology of conquering and taming nature (the inherited European ideal that man can actually control nature), rather than living in harmony with it, was and still is the driving force in the production of physical vulnerability in metropolitan areas (Cutter 2005: 2). As a result, rethinking past flood mitigation strategies, the thought of enabling rivers to flow freely, and the approach of “living with floods” arose (Wisner et al. 2004: 201-203).

However, this “new” approach is not completely new. During the Chinese Western Han Dynasty (206 BC-24 AD) flood disasters occurred frequently. From 39 BC to 11 AD there was a flood disaster on average every seven years due to dike breaches. The most affected area at that time was Jizhou (today’s Heibei and south-west of Shandong province) which was already densely populated back then. The economy in the area was prosperous and the density of townships was

the highest in China. Yet, the economy was often severely affected by flood disasters. Thus, the Emperor called for officials and scholars to develop flood mitigation strategies (Tan et al. 2005: 49).

One of the most famous strategies was recommended by Jia Rang. He proposed three different approaches which he categorized into best, moderate, and worst practices. He considered the first approach as the best approach which, at the core, dictated that human beings “should not compete with water for land” (不与水争地). He suggested relocating people living between the Taihang Mountains and the dike along the northern river bank of the Yellow River so that the river could flow freely. Jia’s worst practice would be to build dikes and fight with floods. He argued that not only was it unfeasible to renovate and build dikes, but that, contrary to their purpose, structural measures were costly and also detrimental to flood management. Thus, he considered this approach to be the most unfeasible one. The moderate approach which combines dike building and creation of retention areas was considered to be the most practicable approach (Tan et al. 2005: 49).

Although Jia Rang’s flood mitigation strategy of allowing rivers to flow freely has become a canonical work in the Chinese flood management history, neither his best practice nor his moderate approach have ever been seriously practiced (Tan et al. 2005: 49). Already in the early China of the Western Han period, Jia Rang’s opponents argued that his best policy was not applicable due to the advanced economic development and population density.

Today, two thousand years later, Western academics and flood managers have reinvented Jia Rang’s thoughts. At the same time, the Chinese water management authorities at the national level have also started to advocate the “new” idea of “leaving flood space to flow”. Still, despite the growing understanding of disasters, losses of life and property from flood disasters remain unacceptably high and are increasing. Institutional changes which intend to reduce the risks of flood-related disasters have not been successful. Lebel et al. and Dixit point out several reasons for this: the emphasis is still placed on emergency relief instead of prevention; therefore institutions fail to reduce vulnerabilities to prevent disaster. They stressed the failures of approaches that see disaster management as a technical problem calling for expert judgments and systematically excluding interests of the most socially vulnerable groups. Furthermore, the overemphasis on structural measures contributed more to a redistribution of risks in time and place than risk reduction. The lack of integration of flood management into normal development planning in flood-prone regions is another reason for the failure to reduce flood risk (Lebel et al. 2006b: 8; Dixit 2003).

Under such circumstances, an extensive study investigating why these failures in flood mitigation persist seems to be a significant beginning. Examining flood risk perception and communication/discourse is essential to understand this persistence, since different mitigation strategies result from competing understandings and interpretations of flood risk. To know how risk is construed by different actors is essential to understand why some strategies are pursued and others ignored.

Krasovskaia contends that one of the central roles in non-structural mitigation measures belongs to the assessment of flood risk perception. Since a response to the flood risk depends on how it is perceived, perception studies deserve to become an integral activity in flood assessment (Krasovskaia et al. 2006: 1/8). Especially in China, natural hazard research focuses mainly on the analysis of the physical processes of the specific event, resulting in the publication of voluminous reports to provide an overview of the major hazards in China. It is important to note that perceptions are frequently ignored when analysing natural hazards in China (Wong and Zhao 2001: 191-192). Thus, there is a special need for research on flood risk perception and discourse.

### 3. The Significance of Cultural Understanding

David Alexander states that culture shapes the collective and individual reaction to the threats, risks, and impacts of disasters. One can reason that culture is a fundamental determinant of vulnerability and socio-economic impact of disaster. In fact, culture is paramount in decision-making as whether to mitigate a natural hazard or ignore it. Often the decision is not based on how dangerous the hazard is in absolute or objective terms, but rather on how it is perceived (Alexander 2000: 73). To understand risk perception, context and culture factors are vital: "It is a mistake to view the perception of hazards and disasters in isolation from competing demands on people's attention from other events" (Alexander 2000: 79).

Natural disasters emerge within a complex set of interactions between human and environmental factors. Understanding human factors such as values, assumptions, and forms of behaviour is central to the task of wiser, more informed decision-making (Stefanovic 2003: 245). The Yokohama message, summary of the outcome of the World Conference on Natural Disaster Reduction in 1994, advocates:

Community involvement and their active participation should be encouraged in order to gain greater insight into the individual and collective perception of development and risk, and to have a clear understanding of the cultural and organizational characteristics of each society as well as of its behaviour and interactions with the physical and natural environment. This knowledge is of the utmost importance to determine those things which favour and hinder prevention and mitigation or encourage or limit the preservation of the environment for the development of future generations, and in order to find effective and efficient means to reduce the impact of disasters (World Conference on Natural Disaster Reduction 1994: 1).

Integrating all perspectives such as the economic and technical analysis and risk as a social construct is necessary for both the analysis of risk experience and the prescription of risk policies in order to do justice to the phenomenon of risk in societies. Although many still believe that risk policies should be based solely on technical and economic considerations, there is a strong case to involve social and cultural sciences in the discussion to understand the complexity of the behaviour of individuals and groups towards risk (Renn 1998b: 65).

#### 4. Objectives of the Study and Research Questions

Proceeding on these assumptions, a cultural comparative study on risk perception and communication/discourse appears to be a suitable approach to understand the problems in flood mitigation (McDaniels and Gregory 1991: 103-104). Therefore, this study aims to determine the commonalities and differences in flood risk perception and communication and to understand how these differences are embedded in cultures and thus to understand the problems in flood mitigation. It will identify cultural blind points which are not tangible within a single cultural perspective. Furthermore, the study investigates the transferability of good practice and lessons learnt in different cultures and the potential of improved flood mitigation strategies.

Flood perception studies usually focus on the perception of laymen. The perception of decision makers, in contrast, is only poorly investigated (Krasovskaia et al. 2006: 2). To complement existing studies, this thesis focuses on the perception and risk communication of decision makers and experts in flood management. Perception is understood as risk discourse which reflects different ways of construing flood risk of different actors.

The questions this research endeavours to answer are:

1. How do different actors involved in flood management in China and Germany perceive flood risk?
2. How is the perception of these actors embedded in their respective cultures?
3. How is flood risk communicated among these actors and to the general public?
4. Which cultural features are reflected in flood risk communication in China and Germany?

#### 5. Structure of the Thesis

The thesis is divided into eight chapters. After the first introductory chapter, a brief description of risk as a manifold concept gives an overview of different perspectives of risk in current discourse. These perspectives are of great relevance to the research, because differences in perspectives result in different policy implications which lead to different problems and challenges in flood mitigation. Using the concept of disaster cycle, this chapter illustrates the complexity of flood mitigation due to actors' different risk perceptions. As a consequence, different actions are taken in various risk management phases within a disaster cycle. In chapter C the general features of the chosen field sites in China and Germany will provide information on the geographical, demographical, as well as socio-economic factors. In addition, the existing structural measures in these two field sites are elucidated. Chapter D elaborates on the methods applied in this research and the challenges posed by the field research followed by a description of the set of data and the role of the researcher. The empirical research results are illustrated in chapter E. This chapter is divided into two main parts: in the first part risk perception is illustrated by different problem di-

mensions, each of which is discussed in subchapters illuminating risk perception from various perspectives. Risk discourse of the actors as the focus of the data analysis does not only reveal differences and commonalities between Chinese and German actors; the analysis also endeavours to show how these differences are ingrained and embedded in cultural practices from a historical and genetic perspective. The data presentation and analysis are juxtaposed in the synopsis at the end of each subchapter to provide an overview of comparison of each discussed aspect. In the second part of chapter E, risk communication features are discussed. Similar to the first part of the chapter, differences and commonalities and their cultural roots are identified and elucidated. In chapter F a theoretical analytical framework will be introduced to provide a general benchmark for different cultural spaces. In this chapter, the main theoretical approaches in empirical risk perception research are introduced, namely the psychometric paradigm and the cultural theories on risk as well as their application in cultural studies. In chapter G the data analysis is linked to the cultural theory and thus, patterns of the research results can be identified through this lense. In addition, the explanatory power of the theory is explored on the basis of empirical data. Transferability, potential for generalization, and limitation of the research are discussed. In the last chapter the research results are summarized to answer the research questions, and policy implications of the research are presented.

## **B. Notion of Risk and Problem Dimensions of Flood Management**

### **1. Risk as a Manifold Concept**

In the last decades risk research has become a lucrative business in the Western world. An “explosive increase” of risk research with numerous publications in different disciplines on the subject can be observed. However, a common denominator of risk definition has not yet been developed, not to mention an inherent risk theory (Banse and Bechmann 1998a, b: 151).

Whoever controls the definition of risk controls the rational solution to the problem at hand. Different options to reduce risks will be considered to be the best or most cost-effective according to different definitions of risks, hence, different actions are desired to be taken. “Defining risk is thus an exercise in power” (Slovic 2000b: 411).

For an example of everyday use of the concept of risk, one can refer to the Oxford English Dictionary (OED) which provides two basic meanings for risk: 1. Hazard, danger; exposure to mischance or peril. 2. The chance or hazard of commercial loss, spec. in the case of insured property or goods. Also (freq. without article), the chance that is accepted in economic enterprise and considered the source of (an entrepreneur’s) profit (Oxford English Dictionary 2007).

Thywissen includes various definitions of risk in her comparative glossary to show the diversity of risk definitions (Thywissen 2006: 23-28). These definitions provide different risk notions of different scientific disciplines as well as institutions. The following examples from the comparative glossary were chosen for their re-



presentative value as far as different takes on the notion of risk are concerned and will therefore be interpreted as such later on:

Swiss Re: "Used in an abstract sense to indicate a condition of the real world in which there is a possibility of loss; also used by insurance practitioners to indicate the property insured or the peril insured against."

United Nations Environment Programme (UNEP): "The probability of exposure to an event, which can occur with varying severity at different geographical scales, suddenly and [un]expectedly or gradually and predictably, and to the degree of exposure."

Schneiderbauer and Ehrlich: "The probability of harmful consequences or expected losses resulting from a given hazard to a given element at danger or peril over a special time period."

United Nations Disaster Relief Organization (UNDRO): "The objective (mathematical) or subjective (inductive) probability that the hazard will become an event. Factors (risk factors) can be identified that modify this probability. Such risk factors are constituted by personal behaviours, lifestyles, cultures, environmental factors, and inherited characteristics that are known to be associated with health-related questions. Risk is the probability of loss to the elements at risk as the result of the occurrence, physical and societal consequences of a natural or technological hazard, and the mitigation and preparedness measures in place in the community. Risk is the expected number of lives lost, persons injured, damage to property and disruption of economic activity due to a particular natural phenomenon, and consequently the product of specific risk and elements at risk."

From the definitions of the OED to the collection of Thywissen's glossary it is clear that defining risk is doubtlessly a challenging task, for "risk" has many layers in its semantic. The manifold meanings of risk are determined by various perspectives of the observers. The first meaning in the OED defines risk to be equal to "hazard, danger; exposure to mischance or peril". This confirms the observation of Luhmann that in the largely English-language literature the words risk, hazard, and danger are available and are usually employed almost synonymously (Luhmann 1993: 22). Luhmann describes the reasons for the lack of distinction in the "voluminous literature on risk research" as carelessness in concept formation and linguistics (Luhmann 1993: 22). The second meaning provided by the OED is identical with the one of Swiss Re. Risk is seen to be the probability of losses. This represents the perspective of the economic domain and specifically the insurance industry, as well as a dominant conception of risk in general (Kunreuther and Slovic 1996: 119). The international disaster management communities such as the United Nations include aspects such as probability, exposure, potential losses, and casualty, as well as objective and subjective components of risk. The subjective and objective components of risk are significant, since the implication of the differences would mean different approaches to risk research. There are different ways to classify these perspectives. In mainly German-speaking risk research domain alone, Banse and Bechmann identified eleven different perspectives:

The insurance industry, the natural science and technical perspective, the decision theory (rational choice), psychological, economic perspectives, jurisprudence, sociology, political science, cultural anthropology, social theory, and the philosophical and ethical perspectives (Banse and Bechmann 1998b: 29-61).

Bechmann summarizes three basic orientations: a formal-normative approach, a psychological-cognitive approach, and a cultural-social approach (Bechmann 1993). If one sees risk as an objective entity, its mitigation would be technical such as the formal-normative approach which is applied in insurance industry or engineering science. If one takes human dimensions and subjective components of risk into consideration, the psychological-cognitive and cultural-social approach seem to be more appropriate, although there is still further deviance in research approaches concerning subjective risk concepts. Conceptions such as vulnerability can be introduced within these later approaches. This taxonomy can be further simplified into two main concepts of risk which are of relevance for this specific research: the concept of risk as a physically given attribute and the concept of risk as social processes (Bradbury 1989: 381).

"The traditional, technical approach defines risk as the product of the probability and consequences (magnitude and severity) of an adverse event" (Bradbury 1989: 382) (see the definitions of Swiss Re, UNEP, and Schneiderbauer and Ehrlich). According to Otway and Thomas as well as Kates and Kasperson this concept of risk dominated the risk research domain until two decades ago (Bradbury 1989). This risk concept "obscured or overlooked" human judgement and treated risk as an objective fact which is free from values. Bradbury criticizes the assumption that risk management decisions are rational to the extent that they are based on the realist, non-personal factors of technical analysis. She argues that technical approaches are inappropriate to address decision-making within society, since societal rationality has additional dimensions. She points out the political and the ethical dimensions as two key dimensions to be considered: first, if there is a discrepancy between the experts' opinions and the public demand, what shall be done? Second, how to address the problems of values in expert judgement?

The assumption that the technical analysis represents absolute rather than relative truth leads to the problem as how to relate society to risk issues (Bradbury 1989). Social scientists argue risk does not exist "out there", independent of human minds and cultures waiting to be measured (Zwick 2006: 89).

Pohl elaborates the problem by departing from Luhmann's distinction between the concepts of danger and risk. In this school of thought risk is related to human beings. If potential loss can be attributed to a decision made by a human being, one speaks of risk; if it is triggered by an external stressor, one speaks of danger (Pohl 1998: 156). Further on he elucidates this distinction adopting Luhmann's example of an umbrella: before the invention of the umbrella, there was only the danger to get wet when going out. Therefore it was dangerous to go out. Under such circumstances one usually only has danger awareness but no risk awareness, since the possibility to always stay at home is virtually not taken into consideration in case it rains. Things have completely changed since the invention of the umbrella. One can no longer live without risks. The danger that one may get wet in the

rain becomes the risk one takes, when one does not take the umbrella along. But yet, if one does take the umbrella along, one takes the risk to leave it somewhere. The potential of danger is "out" there, but risk is only "produced" by humans. Even the avoidance of risk bears risk within it. Therefore, the choice lies between two decisions: one takes the umbrella but risks to lose it, or one takes the risk to get wet without taking the umbrella. Either choice will become a dilemma, and every decision is a risky undertaking (Pohl 1998: 156).

However, Pohl does not rule out the concept of subjective risk. Solid empirical findings (Geipel et al. 1997) show that individuals overestimate the flood risk due to their recent experience. It is a significant result of hazard research that lay people often over-estimate the potential damages of hazard events with a low probability but high impact. One can therefore speak of a distorted subjective risk perception. However, similar to Bradbury, he contends hazard research in the social science domain shall not stop there. The concept of risk is often "objectified" as a product of probability and damage potential. However, this approach misses the societal dimension in relation to risk. People assess risk in a social context and their assessment is embedded in their societal environment. To bring society into the picture of risk, hazard research in the social science domain shall contribute to the risk discourse. Within the risk discourse there can be diverse meanings which are conferred to risk e.g. God punishes man. But yet, this interpretation of risk has lost its significance in the modern society. This is where a decision component comes in.

Not the danger which originates from the nature is the enemy, but rather the decision-makers are the target. At least it is certain that the decision-makers are more approachable than the nature or the divine intervention (Pohl 1998: 158).

Bradbury goes even further stating,

...the omission of key dimensions (political and ethical) leads to attempts to apply inappropriate solutions, that is, attempts to solve the wrong policy problem (Bradbury 1989: 383).

Since the technical approach cannot link risk and human society and its political and ethical dimensions, the concept of risk as social processes is seen as an important contribution to compensate for the shortcomings of the technical approach (Bradbury 1989: 394).

Cultural scholars contend that risk and technology are not physical entities which exist independently from humans. They are social processes. Thus, the risk discussion shifted its focus on probabilities to the risk perceiver including both experts and lay persons. Consequently, social institutions and the social and cultural context in which risk is assessed and managed become the focus of attention. The notion of risk as a social construct is pronounced:

It is clear that truth does not exist independently of people, whether taken to be individuals, significant social groups in the general public, professional or political/industrial groups. It is people, and not independent facts, who constrain the way concepts are framed, questions posed, and research goals set. And it is people who design event and fault trees, close options, choose attribute sets, fund data collection, interpret and pub-

lish findings. Once the criterion of an absolute truth is abandoned, then surely no one can avoid the inference that people see the world differently and that these differences emerge from different experiences of differently constructed social worlds (Bradbury 1989: 389) (citing Otway and Thomas 1982: 70).

The major contribution of cultural literature on risk is the insight into the problems which have been neglected. It also provides insight into how to reformulate risk management and risk communication problems. Therefore, cultural insights provide “a firm theoretical foundation for an appropriate design of policy” (Bradbury 1989: 390).

Cultural approaches identify the problem of decisions with regard to social acceptability based on statistical probabilities. Bradbury notes that solving problems this way only leads to ignorance of deeper dimensions of the problems. Although cultural approaches recognize the importance of technical and economic approaches in delivering information for decision-making, they criticize the technical and economic analysis being used to drive decisions unaccompanied by other analytical frameworks. Cultural approaches argue that an improved technical analysis is not the key to improved risk management decisions. It is highlighted that decisions involve trans-scientific aspects in addition to scientific and technical questions, and that these trans-scientific questions cannot be answered by science. It is reasoned that the

...level, acceptability and distribution of risk involve questions of values, and since differing values are held by those affected, risk management decisions must take into account the political, social, and ethical, as well as the technical aspects of the policy problem (Bradbury 1989: 391).

According to the cultural approach, policy problems are addressed by taking into consideration different perspectives on risk and the value-laden nature of risk decisions. The role of public participation in decision-making is emphasized to guarantee the representation of different cultural perspectives. Policy problems shall be solved through negotiations amongst all socio-cultural groups including technical analysts, policymakers and the various groups involved in and affected by policy implementation. Managers should be able to understand their own stances and that of other groups on risk issues. Institutional means for adjustment should be developed. It can be concluded from this viewpoint that risk acceptance and acceptability cannot be determined by technical analysis alone, but rather need to be negotiated among different cultural groups, “that is, socially constructed” (Bradbury 1989: 391). Clark states this is essentially a question of policy analysis rather than science. The priority is placed on the consent of the governed to the process by which decisions are made. The competing claims as to what risk constitutes and how to reach a societal decision concerning the control of risk shall be equally represented by different groups sharing differing values. Similarly, Funtowicz and Ravetz advocate a “civilised dialogue of risks”. They formulated an analysis with two dimensions: a factual and an evaluative dimension. They contend if both dimensions can be attributed low values, which means that the data collection is well-established and the stake is low, the technical approach can be applied. However, if both dimensions are assigned high values meaning that the data is not certain and the stake is high, then a dialogue must be

initiated to resolve the problem “by political debate rather than civil war” (Bradbury 1989: 392).

According to Dunn (1982), knowledge is socially constructed on the basis of competing knowledge claims and the expansion of learning over time. This view has the implication that risk communication is part and parcel of the process of negotiation among alternative cultural perspectives, which also means the negotiation of shared meanings over time (Bradbury 1989: 393).

Several implications for politics are worth mentioning: the concept of social construction highlights the importance of a two-way process of knowledge sharing and negotiation. This is different from the linear model of communication in which the public is to be blamed for lack of knowledge. It leads to different priorities in management strategies. In the linear model the priority for management would be the publication of information products; however, the two-way model would focus on the development of interaction between different actors. Information sharing is seen to be means instead of an end itself.

Communication is seen as an integral part of decision-making in which participation is essential. The dialogue with various groups of experts, private sector, civil society, and organizations which express the public's view is seen as part of the management process. The communication process is seen as a common enterprise of creating values and generating mutual meaning.

The cultural concept of risk addresses the policy problem of risk and provides a larger framework for solutions than the technical approach. It advocates that risk management should initiate dialogue through participation to address different societal/cultural groups. Communication is seen as an essential part of the dialogue (Bradbury 1989: 394).

This view is shared by Kunreuther and Slovic and expressed in their joint paper on “Science, Values, and Risk”. They argue that since addressing risk controversies with more science is likely to exacerbate conflict, a process-oriented solution which introduces more public participation into both risk assessment and risk decision-making is proposed. This approach is to make the risk decision process more democratic. This solution, in line with the cultural approach, includes negotiation, mediation, and other forms of public participation. Risk is conceptualized as a game in which the rules must be socially negotiated within the context of specific decision problems. It also advocates the involvement of interested and affected parties to define and play the game, thus “emphasising institutional, procedural, and societal processes rather than quantitative risk assessments” (Kunreuther and Slovic 1996: 123-125).

## **2. Challenge in Flood Management**

As shown in the last chapter, different understandings of the concept of risk lead to different policy implications and consequently different risk mitigation strategies. In the case of flood risk there are different fields of actions in which the respective risk concept impacts what and how actions are taken and how problems are solved

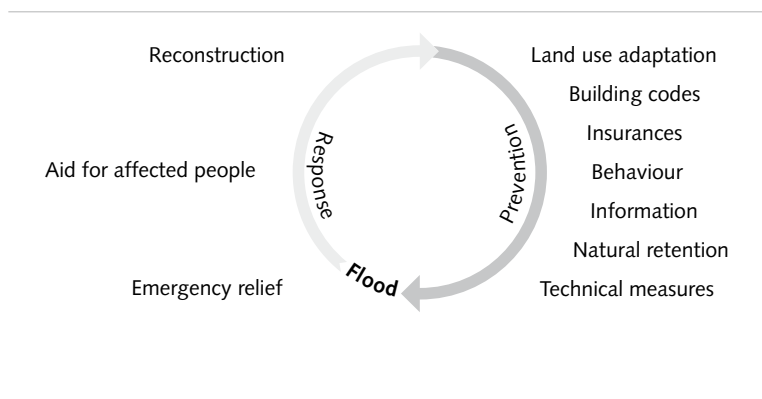
in taking these actions. In the following chapter the fields of action will be identified and problems in those fields will be elaborated on.

Literature on risk management usually describes the management process as a cycle that encompasses various phases of actions such as mitigation, preparedness, response, and recovery. The actions taken in different phases are overlapping and interwoven (Federal Emergency Management Agency 2008; Swedish Rescue Service Agency 2008; Geenen 2008; Pfeil 2000). Pohl views preparedness, adjustment and adaptation as the focus and the time dimension of risk management. In the case of flood risk management actions at various levels can be taken in these phases (Pohl 2003: 202-203):

In the phase of preparedness, individual preventive measures such as flood retrofitting can be practiced as a short-term measure; in an intermediate term (adjustment phase) both technical flood protection measures such as construction of dams and dikes, as well as creation of retention areas and legislative components such as spatial plan regulation, construction codes, regulation of environmental and social protection can be implemented; the third phase which is considered to be the most important and challenging involves changes taking place only in a very long term. This includes local collective memory and the perception of the relationship between man and nature (Pohl 2003: 202-203).

In terms of space, a clear border of areas affected by flood events can be defined in comparison to other natural hazards. Risk management takes place within the affected areas. However, due to the fact that a flood event often does not only affect one community, local flood protection without taking into account the entire potentially flooded area is not the most effective way to mitigate flood risks but only result in risk redistribution. The construction of dikes at one place raises the water level at other places. This conflict of interests between the populations and communities in upper and lower reaches is a commonly described problem in flood-

Figure 1: Cycle of Disaster Management



Source: DKKV (2003: 19)

related literature. A further space dimension of flood events is the impact of climate change which takes place at a global level in an ecological context (Pohl 2003: 202).

Similarly, according to the German Committee for Disaster Reduction (DKKV), flood risk management includes two major components: flood prevention and emergency management which are embedded in the cycle of disaster management (see Figure 1). In this model, fields of actions are clearly defined in different phases. In the phase of emergency management, actions focus on flood fighting, humanitarian and reconstruction aid, as well as recovery aiming at building up stronger social resilience (DKKV 2003: 19). Compared to the prevention phase, consensus and "objectivity" are more easily achieved in this phase (Pohl 2003: 205).

In the prevention phase there are seven fields of action:

- Spatial precaution aims at minimizing construction within flood plains;
- Construction precaution regulates ways of construction with construction codes to adapt new buildings to flood events;
- Risk precaution aims at financial risk mitigation through insurance;
- Behaviour precaution prepares the population for dangerous situations through education;
- Information precaution targets early warning and information for the population;
- Natural water retaining capacity shall be increased by reforestation of mixed forest and recovery of retention areas and wet land;
- Technical flood protection measure such as dams, dikes and gated retention

Box 1: List of Actors in Flood Risk Management

- 
- Individuals and private households
  - Firms
  - Executive administration at different spatial and factual levels
  - Political unions (citizens's groups, environmental activists, local unions of political parties)
  - Media
  - NGOs
  - Disaster economy
  - Scientific community and consultants
  - Technical planning and spatial planning organizations
  - Legislative organs
  - (Political) executives
- 

Source: Pohl (2003: 205)

basins shall minimize the flood potential (DKKV 2003: 19).

The four components of preventive flood protection summarized by the Independent Commission of the Saxon State Government are also included in the DKKV framework (Unabhängige Kommission der Sächsischen Staatsregierung 2002: 23).

Box 2: List of Organizations in Flood Risk Management

- 
- Emergency management agency
  - Health agency
  - Navigation
  - Water protection
  - Sewage
  - Civil engineering
  - Hydraulic engineering
  - Agriculture
  - Tourism, local recreation, green space
  - Nature conservation, environmental issues
- 

*Source: Pohl (2003: 205)*

The complexity and challenges of the fields of action in the preventive phase can be illustrated with the list of the actors and organizations involved (see Box 1 and 2).

All involved actors and organizations represent different interests due to their different technical and political backgrounds. Decisions are made according to their understanding of risk from their specific perspectives. Hence, risk judgement is biased through factors such as data availability and particularly represented interests (Pohl 2003: 205). However, flood prevention and emergency management as an integrated management approach are tasks which can only be accomplished by close cooperation and coordination as well as communication between all actors. Lack of any of these components leads to problems in flood risk management (DKKV 2003: 127). Yet, contesting understandings of flood risk often leads to challenges in risk communication. Therefore, it is essential both to understand discrepancies in flood risk perception between different actors and stakeholders and to identify gaps in risk communication. The following empirical study aims to reveal risk perception and communication which lead to different actions of flood management and coping strategies to mitigate flood risk.

### C. Sites of Field Work

The City of Wuhan in China and the City of Cologne in Germany were chosen to be field sites for the empirical investigation. The field site selection was largely determined by the nature of a comparative study apart from the pragmatic consideration. The first criterion was to find two comparable sites which are both flooded frequently. Due to the consideration of utilizing the geographical convenience of the researcher, the City of Cologne in Germany was first chosen to be a field research site which has been confronted with flooding problems in the past decades as the following chapter will further elaborate on. Since Wuhan in China is one of the most frequently flooded cities along the Yangtze River and it has similar economic importance as the City of Cologne as the following chapter will show, Wuhan was chosen as an example for flood management in China. In this chapter



a brief introduction to the location, population, and economy, as well as historical flood events will provide an overview of the main features of the field work sites.

## 1. Location, Population, and Economy

### 1.1 Wuhan, China

Map 1: Position of the Changjiang River Basin in China



Source: Shi and Wang (Eds.) (2003: 107): *Atlas of Natural Disaster System of China*

The City of Wuhan, Hubei province, lies upon the Yangtze River and its tributary, the Han River, in the People's Republic of China. The Yangtze River, with its total length of over 6,300 kilometres, is the longest river in the People's Republic of China. The Yangtze catchment area covers 1.8 million square kilometres and has a yearly discharge of 960 billion cubic metres. It originates in Tanggula Mountain and runs through eleven provinces, regions, and cities before it empties into the East China Sea (see Map 1). There are 437 tributaries whose catchment areas cover more than 1,000 square kilometres apart from a considerable number of tributaries which cover less than 1,000 square kilometres. The Han River is the longest tributary with a total length of 1,577 kilometres and a discharge average of 1,500 cubic metres per second (Xu et al. 2003: 1).

Wuhan is located in the middle reach of the Yangtze River (see Map 2). The geographical position of Wuhan is at 29° 58'–31°22' latitude and 113°41'–115°05' longitudes. Due to this position sub-tropical monsoon dominates the climate. Year-

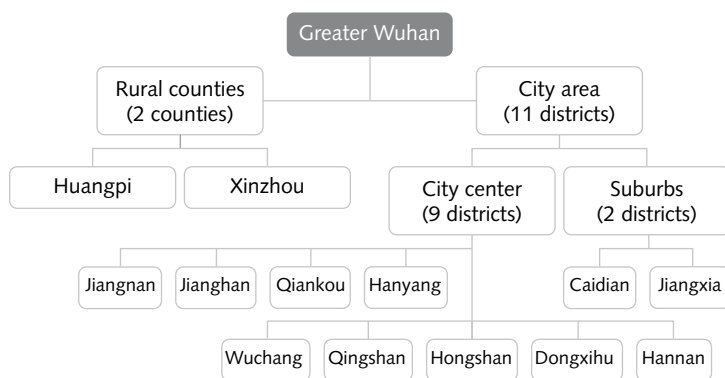
ly rainfall is 1205 mm. Rainfall between June and August amounts to 40% of the total value.

Wuhan lies in the Jiangnan plain. The Yangtze and Han rivers run through the city and divide the city into three districts: Hankou, Wuchang, and Hanyang. The Han empties into the Yangtze River in the City of Wuhan. The length of the Yangtze River which lies within the City of Wuhan is 73.4 kilometres and that of the Han River is 62 kilometres. (Xu et al. 2003: 380).

The city area is 22 to 28 metres above sea level with most areas in the city 24 metres above the sea level. Worth noting is that these areas are three to eight metres lower than the highest water level of the rivers.

The metropolitan area covers ca. 8,467 square kilometres and is divided into 13 administrative districts. Nine of these districts belong to the core area of the metropolitan area of Wuhan. Two of them are suburban areas and another two are rural counties (see Chart 1). As the provincial capital, Wuhan is the political, economic, and cultural centre of Hubei province, as well as the intersection of water, air, and land transportations (Wuhanshi Tongjiju 2006).

Chart 1: Administrative Concept of the City of Wuhan

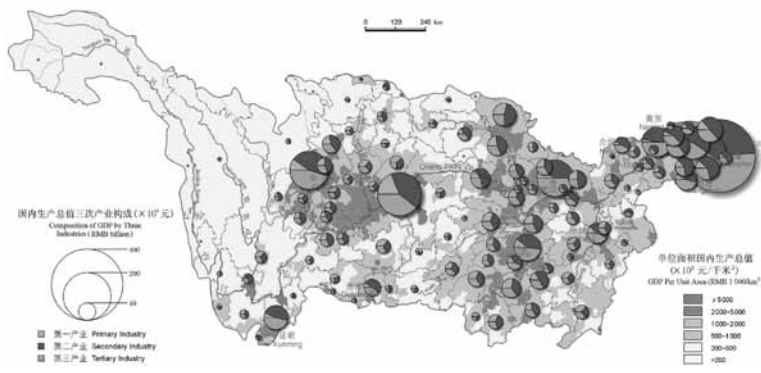


Source: Wang (2002: 20)

According to statistics of 2006, Wuhan has a total population of 8.75 millions and the population density is 964 persons per square kilometre. Of the total population, 8.19 millions inhabitants have official registrations. Among these, 2.99 millions belong to the urban population and 5.19 millions belong to the rural population (Wuhanshi Tongjiju 2006).

Wuhan is one of the most important economic zones in the Yangtze River Basin (see Map 2). The Gross Domestic Product (GDP) of the City of Wuhan is 259 billion Yuan in 2006 and per capita GDP is about USD 3,790. Net annual income of the urban inhabitants is 12,369 Yuan (ca. 1,237 Euros) and of the rural inhabitants is 4,748 Yuan (ca. 475 Euros) (Wuhanshi Tongjiju 2006).

Map 2: Gross Domestic Product of the Changjiang River Basin (2000)



Source: Shi and Wang (Eds.) (2003: 108): *Atlas of Natural Disaster System of China*

## 1.2 Cologne, Germany

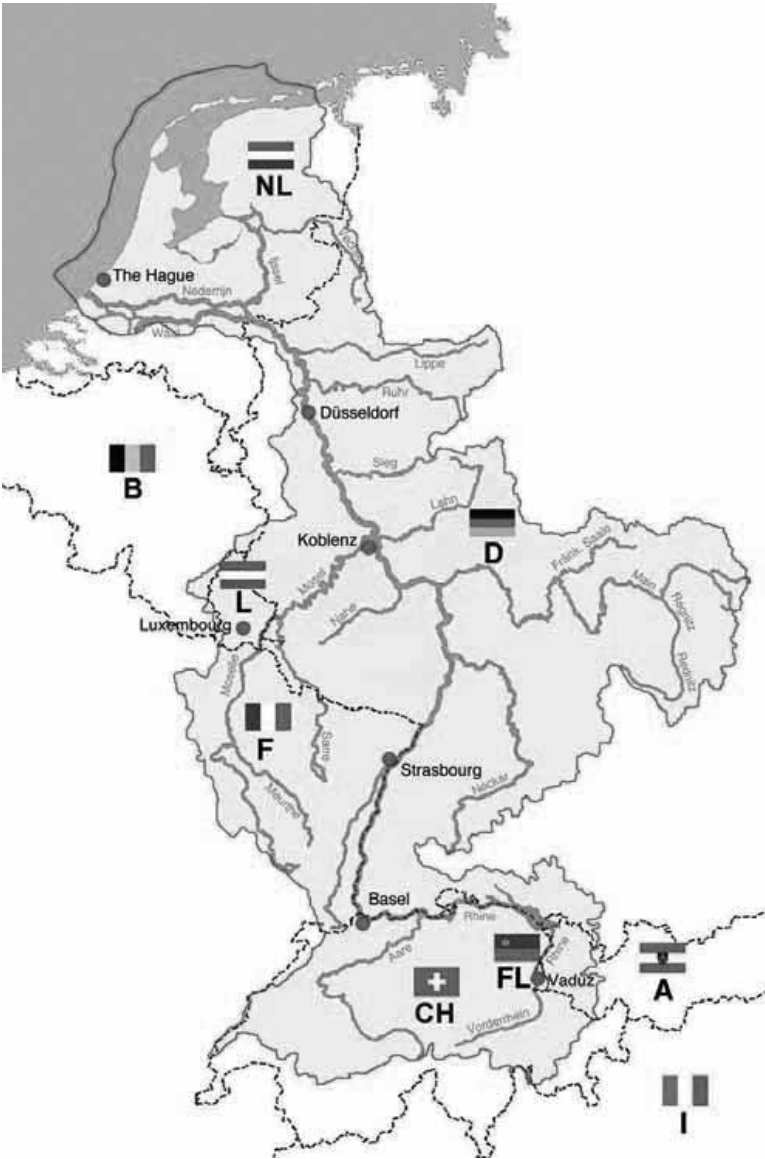
The City of Cologne is situated in Germany upon the river Rhine which connects the Alps and the North Sea. The Rhine emanates in Grisons in Switzerland through the confluence of two source rivers: the Vorderrhein and the Hinterrhein. It is 1,320 kilometres long and covers a catchments area of 185,000 square kilometres. It runs through nine countries and has seven tributaries (see Map 3). The average yearly rainfall in the catchments is 900 millimetres and thus, the Rhine catchment area is one of the regions with the highest precipitation in Europe (IKSR 2005).

The Rhine is divided into six river sections: the Alp Rhine from the confluence of the source rivers at Reichenau (Switzerland) to Lake Constance, the High Rhine from the outlet of Lake Untersee to Basel, the Upper Rhine from Basel to Bingen, the Middle Rhine from Bingen to Cologne, the Lower Rhine from Cologne to Lobith and the Rhine delta from Lobith to North Sea/Wadden Sea (IKSR 2005).

The City of Cologne is located in the Middle Rhine area. The geographical position of Cologne is at 50°56'33.2607 latitude and 06°57'32.3136 longitude. The length of the river bank on the west side of the Rhine is 40 kilometres and the river bank on the east side is 27.3 kilometres. The highest spot in Cologne is located at 118 metres and the lowest at 37.5 metres above sea level. The zero point for the measurement of the water level in Cologne is 34.98 metres above sea level (Stadt Köln 2006a: 9).

The climate in Cologne is mild and humid. Yearly rainfall is 803 mm (between 1961 and 1990) according to the statistics of the Deutscher Wetterdienst (Deutscher Wetterdienst 1996-2007).

Map 3: Rhine Catchments



Source: Internationale Kommission zum Schutz des Rheins Koblenz (IKSR 2009)

Cologne has a city area of 405.15 square kilometres and is divided into nine administrative districts (see Map 4) (Stadt Köln 2006a: 11). Cologne has a total population of 1,024,346 according to the statistics of 2005. The population density is 2,434.1 people per square kilometre. The GDP in 2004 was 39,243 billion Euros (The Chamber of Commerce and Industry in Cologne 2007: 7; Stadt Köln 2006a: 11).

Map 4: Structure of the City Area of Cologne



Source: Stadt Köln - Amt für Stadtentwicklung und Statistik (2006a: 11)

2. Historical Flood Events

2.1 Wuhan, China

From the year 1188 onwards flood events in Wuhan have been recorded in written documents. Altogether Wuhan was flooded more than 50 times in the last 800 years. The most severe flood disasters occurred in 1870, 1931, 1935, and 1954. The highest water level recorded in 1931 was 28.28 metres and the three city areas Hankou, Wuchang, and Hanyang were flooded for almost 100 days with the lowest locations being six metres under water. More than 70% of the population were affected and the death toll reached 32,600. In 1935, the highest water level recorded was 27.58 metres; the city area of Hanyang was flooded for up to 90 days. An area of 35.5 square kilometres was inundated and 115,000 people were affected. In 1954, the highest water level reached 29.73 metres and the dike in Hanyang breached. Most of the factories had to interrupt their productions due to the dike breach (Xu 2003: 380-383).

Between 1865 and 2003 the water level has exceeded 27.30 metres 13 times according to the measurement in Wuhanguan [a measure station whose measurement is taken as standard for flood protection planning] water station. Flood events of such magnitude occurred eight times between 1980 and 2003. The magnitudes of the flood events in 1996, 1998, and 1999 are comparable to the most severe flood event in 1954. Table 2 shows the flood events during which the water level was higher than 27.30 metres [the water level of 27.30 metres is defined as “warning level” for flood protection in Wuhan. More details will be elaborated in Chapter E.1.1.a].

Table 2: Statistics of the Water Levels above 27.30 Metres Measured in Wuhanguan Water Station between 1865 and 2003

Year	Water level	Year	Water level
1954	29.73	1980	27.76
1998	29.43	2002	27.76
1999	28.89	1935	27.58
1996	28.66	1968	27.39
1931	28.28	1988	27.39
1983	28.11	1870	27.36
1995	27.79		

Source: Wuhan Shuiwuju (2004)

## 2.2 Cologne, Germany

According to the “Flood protection concept of Cologne”, Cologne is the most affected city by floods in Europe. The first registration of flooding can be traced back to 920. The severest flood was recorded in 1784 when the water level in Cologne reached 13.55 metres, the highest water level documented since 1342, caused by ice congestion. The last flood event due to ice congestion occurred in 1963, since then this type of flood has not reoccurred in Cologne (Der Oberstadtdirektor 1996: 10). Table 3 provides an overview of those flood events where the water level exceeded nine metres (the zero point for the measurement of the water level in Cologne is 34.98 metres above the sea level) and these events have been documented since 1816:

Table 3: Water Levels above Nine Metres since 1816

Year	Water level	Year	Water level
1845	10.34 m	1948 (21. Jan)	9.24 m
1850	10.28 m	1955	9.80 m
1876	9.74 m	1958	9.31 m
1882	10.52 m	1970	9.87 m
1920	10.58 m	1980	9.31 m
1924	9.80 m	1983 (April)	9.84 m
1926	10.69 m	1983 (May)	9.96 m
1930	9.15 m	1984	9.11 m
1944	9.08 m	1988	9.95 m
1945	9.01 m	1993	10.63 m
1946	9.32 m	1995	10.69 m
1948 (02. Jan.)	10.41 m		

Source: Stadt Köln (1996a: 10)

Among the eleven flood events during which the water level was above 9.50 metres in the last 100 years, five of them occurred in the last 12 years. One can observe that in the period from 1950 seven flood events with water levels rising above nine metres occurred in the last 15 years, whereas only three such flood events occurred in the 30 years before 1950. This shows that the frequency of flood events has been increasing over the last decades (Der Oberstadtdirektor 1996: 10).

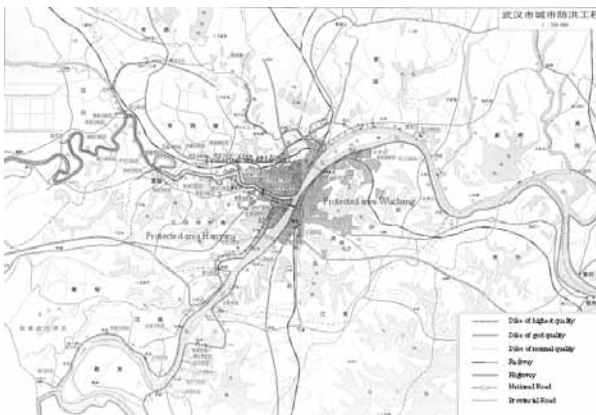
### 3. Engineered Measures

#### 3.1 Wuhan, China

The fact that both the Yangtze and Han River run through the City of Wuhan means a great challenge for the Municipality of Wuhan to cope with flood events. The Chinese water authorities intend to meet this challenge by applying engineered measures which are believed to be essential to guarantee the functionality of the city in case of a flood event (Xu et al. 2003: 382).

Among these, the most important measure in Wuhan is dike construction. The first dike was built as early as in Beisong-Dynasty (1111-1118). By 1949, there were altogether 108 kilometres of dike with a protection level of 28.28 metres. After the great flood in 1954, the protection level was raised to 29.73 metres which equaled the highest water level reached during this flood event. During 1972-1973, 1.50 metres were added to the protection level of 29.73 metres to ensure more safety, and in 1982 this standard was again added another half metre. This protection level is to protect the City of Wuhan against flood events with a 20-30 years' recurrence probability. There were altogether 286 kilometres of dikes in the City of Wuhan by the year 1992. These are built at different protection levels for differentiated protection objects such as the protection of critical infrastructure and chemical industries. However, detailed criteria for different protection purposes are not available in the researched literature. By 1992 the length of the dike with the highest protection level was 178 kilometres within the City of Wuhan. The three districts Wuchang, Hankou, and Hanyang which are divided by Yangtze River and Han River are enclosed by dikes and flood walls (see Map 5) (Xu et al. 2003: 382).

Map 5: Engineered Measures in the City of Wuhan



Source: Xu et al. (2003: 384-385)



According to the synopsis of the flood control plan of the City of Wuhan, there are nowadays altogether more than 800 kilometres of dikes in Wuhan, considered to be the only guarantee for the safety of the city in case of a flood event (Municipality of the City of Wuhan 2004: 1).

However, despite the increase of the length and the continuous improvement of the dike quality and standard, the city would not be able to withstand a flood event with a water level exceeding the flood protection level of flood events with 20-30 years of recurrence probability without additional measures (Xu et al. 2003: 382; Wang et al. 2002b: 53).

According to the "Report on the Plan for the Integrated Management of Yangtze River" which was set up as early as 1959 (Xu et al. 2003: 381), Wuhan with its population of ca. 8.75 millions falls into the category of cities which have to be protected against flood events with more than 200 years of recurrence probability (see Table 4) (Cheng and Shang 2005: 70). To reach this level, the plan dictated that in addition to the retention areas in the Jingjiang and Chenglingji areas, a retention volume of 6.8 billion cubic metres had to be created nearby Wuhan. Thus, the retention areas of Xilianghu, Dongxihu, Wuhu, Zhangduhu, Baizhanghu, and Dujiatai were built up between 1954 and 1973. The retention area of Dujiatai alone can detain 11 billion cubic metres of water (Xu et al. 2003: 381).

In 1973 the Reservoir Danjiangkou was built at the upper reach of Han River with a volume of 7.8 billion of cubic metres (Xu et al. 2003: 381). In addition to this there are now other 273 reservoirs with different volumes. The total water detaining volume of the reservoirs now sums up to 925 millions cubic metres (Municipality of the City of Wuhan 2004: 1). Apart from these water detaining measures, a pumping system was built up to increase the drainage volume. There are 50 pumping stations with a total pumping volume of 714.68 cubic metres per second. The completion of the Three Gorges Project is expected to significantly increase the flood protection standard in Wuhan (Xu et al. 2003: 382).

### **3.2 Cologne, Germany**

Due to the low elevation of the City of Cologne, an area of 3.000 hectares would be flooded once the water level of the Rhine reaches seven metres. Therefore, to prevent inundation, technical flood protection measures have been put in place. A computer-supported system of 120 water gauging stations, 500 distributing regulators and 54 pump stations with a total pumping volume of 110,000 cubic metres guarantees that sewage is fed into a sewage plant up to a water level of 10.70 metres (Der Oberstadtdirektor 1996).

In addition to the pumping system there are 16 kilometres of dikes, 8 kilometres of high embankments, and 11 kilometres of protection walls which are built along the 67 kilometre river bank inside the Cologne city limits. For some of the districts such as Zündorf and Altstadt mobile flood protection elements will be installed on existing flood walls. This special technical measure is meant not only to protect the area from inundation, but also to prevent the city's landscape in flood free periods from being impaired (Der Oberstadtdirektor 1996: 96).

Table 4. Statistics of the Cities which Have Reached National Standard for Flood Protection

Non-agricultural population	National standard (According to recurrence probability)	Number of cities with flood protection task	Number of cities which have reached the national standard	Percent of the cities which have reached the national standard	Number of cities which have not reached the national standard	Percent of the cities which have not reached the national standard
Mega city (> 2 million)	> 200	13	3	23.1%	10	76.9%
Very big cities (1 - 2 million)	Pop. > 1.5 million.: > 200; Pop. < 1.5 million.: 100-200	25	5	20.0%	20	80.0%
Big cities (500,000 - 1 mill.)	100 - 200	53	10	18.9%	43	81.1%
Medium sized cities (200,000-500,000)	50 - 100	207	64	30.9%	143	69.1%
Small cities (< 200,000)	20 - 50	322	154	47.8%	168	52.2%
Total		620	236	38.1%	384	61.9%

Source: Cheng and Shang (2005: 70)

## D. Methodological Approach

### 1. Research Design

#### 1.1 Qualitative Social Research Method

In order to operationalize the research plan described above, appropriate social science methodologies, particularly qualitative techniques, will be applied. The pluralization of ways of lives in contemporary society demands social scientists to investigate their research topics in diverse social contexts and perspectives. Due to the novelty of these social contexts and perspectives they have to adjust their classical deductive methods. Social science engages itself with new social areas which are not known to us in the first place. By doing so, one cannot aim at testing existing theory, but generating new theories. Blumers states that the starting point of a social scientist for a research is always the lack of knowledge about the field to be investigated (Flick 2002: 12-13).

However, standard quantitative social research seems unable to fully embrace this challenge. Bonß and Hartmann elaborated their observation on the “Entzauberung” of science: science can no longer claim to offer the ultimate truth. Complex research results are often neither accessible nor widely applicable in political and social life, as one would desire them to be. In order to keep up with standard quantitative research, qualitative research questions and research results are often far removed from the reality (Flick 2002). In addition, no matter how strict a method control is practiced, research and research results cannot avoid being influenced by the researchers’ social and cultural background. The ideal of objectiveness in science is dishonoured. Under such circumstances it can no longer be claimed that science is always based on a true objective theorem. Subjective and situational statements are the remaining terrain which can be reached by qualitative methods. Nevertheless the research results must be supported by logical and cogent arguments. Qualitative research can serve the purpose to generate this type of findings (Flick 2002).

As a consequence, qualitative social research focuses on using appropriate methods and theories which are based on the research objects. It not only analyses different perspectives, but also takes the researcher’s reflection about his or her research into account and moreover this reflection is seen as part and parcel of generated knowledge (Flick 2002). It is the research object as much as the researcher that determines a research method. As the research object cannot be fractioned into single variables, qualitative methods investigate the object in its daily situation and in a holistic manner (Flick 2002). Objectives of qualitative social research are not only to test existing theories, but also to discover new theories with empirical validity (Flick 2002).

This research investigates risk perception and communication in different cultural settings, which are situational and embedded in time and space. A positivistic approach is not adequate for cultural studies, as cultural studies are constructivist both in their production of contexts and in their analysis of power relations (Winter 2003: 212-213). Deploying cultural theory coming from an interpretive rather than

a positivistic tradition for this research, a qualitative method seems to be feasible, especially because many cultural empirical studies applying positivistic quantitative methods have not yielded the expected result (Tansey 2004b : 29).

## **1.2 Research Subjects**

To investigate the risk perception and communication of various stakeholders and actors a broad range of interviewees has been chosen. The interviewees cover government officials of different agencies such as the flood protection agency, environmental agency, Fire Brigade, etc., and representatives of Non-Governmental Organizations (NGO) such as the conservationists' union, farmers' union, and citizens' groups, as well as the military.

In China interviewees at different management levels for flood protection were invited to attend the discussion with the researcher, since flood protection in China is arranged in a hierarchical way and all management levels from the central to the local government are involved in flood protection decisions. This includes the national, river basin, and local levels.

In Germany the interviews focused on the regional and local levels, since the main responsibility of flood protection and management rests with the local and regional agencies.

## **1.3 Range of Methods Applied and the Field Work**

The qualitative research methods applied in this research include semi-structural interviewing, informal interviewing, participant observation, and general field observations.

Semi-structural expert interviewing is frequently practiced due to its flexible form which allows the interviewer to conduct the interview in a relatively informal atmosphere and therefore leaves room for new leads. The written guidelines which determine the interview structure still provide a comparable framework. This method is especially applicable to research which involves high-level bureaucrats and elite members of a community who have time constraints (Bernard 2006: 212; Kelle and Kluge 1999: 63). Since the research subjects in this study all belong to this category, semi-structural interviewing seemed to be the most appropriate method to generate data.

The interviews were mostly conducted at the work places of the interviewees, especially the interviews with government officials. Some of the discussions took place in a more informal way during a working lunch or dinner. Meetings with interviewees in Germany were sometimes also arranged in a cafeteria. By doing so, the atmosphere was more relaxed and the interviewees were more at ease to talk about sensitive topics.

Due to the specific cultural background in China meetings were often continued during lunch time. This allowed the researcher to have the chance to conduct more informal data collection. The information collected on such occasions was

documented in form of a field diary, since taking notes was not appropriate under such circumstances.

Both in China and Germany the planned one-to-one interviews were often adapted to focus group discussions, since interview partners were sometimes joined by their colleagues spontaneously. The field experience shows that this type of discussion contributed to data collection on the one hand, since more information could be generated and the statements of the interviewees were controlled by each other to provide the researcher a more objective picture of the information, which is also described by Flick (Flick 2002); on the other hand, group discussion may hinder some interviewees to speak freely.

The method of participant observation was only applied in Germany, since it is an uncommon practice for the Chinese agencies to accept researchers as observers within their offices.

The participant observation took place in two forms: working in the Flood Protection Centre (Hochwasserschutzzentrum, HSZ) as an intern in December 2005 and participation in the internal meetings of the local, regional, and international actors. During the period of the internship, the researcher was integrated into the team of HSZ and took part in their daily work and meetings within and outside of HSZ with other agencies and actors. The researcher could gain an insight into the work of HSZ and the interaction between the agencies and other actors such as interest groups or private enterprises.

During the field work data collection was carried out in two or more phases. The data collected in the first phase was at least partly interpreted, so that the researcher could determine which type of data should be further collected to fill in existing gaps (Flick 2002).

The field work in China was divided into two phases. The first field phase lasted from the end of August until the middle of October 2005. In this field phase a bottom-up strategy was applied, since the researcher mainly interviewed local river basin and flood managers in Wuhan. After analysing the data collected during the first field trip a second field phase was carried out between November and December 2006. The objective of the second field phase was to generate the data which should fill in the "gaps" of the data collected during the first field work. Further interviews were conducted with interviewees at the river basin and at national level, as well as with a NGO.

The field work in Cologne was conducted during the period of 2005 and 2007 due to the geographical vicinity of the researcher to the City of Cologne; therefore there was no clear cut field work phase like in China.

## **2. Field Work Experiences**

It is worth noting that the researcher had very different experiences during the field work conducted in Wuhan, China, and Cologne, Germany. These differences lie in the access to the field and the attitude of the interview partners towards the research and the researcher as well as the ways how they respond to questions.

### 2.1 In Germany

The access to the field in Germany was effortless. After the researcher identified the interview partners who might provide interesting information, these partners were contacted via e-mails or phone calls. Almost all the persons being contacted offered a meeting to the researcher. Those who did not consider themselves to be the "right person to speak to" recommended other interview partners. At the beginning of each interview, the researcher asked the interview partner if they had any objections to recording the discussion. All interview partners consented to it and the researcher had the impression that they felt comfortable with the fact that the interviews were recorded.

The interview partners in Germany showed great openness and interest to the research topic and the researcher. They were willing to provide all relevant information. In addition, they often voluntarily offered information materials such as brochures, papers, internal documents of their agencies, and other literature. This attitude led to a smooth communication between the researcher and the interview partners. The interview atmosphere was informal and relaxed. The interview partners were not hesitant to express their objection to the current practice in their or other agencies as well as the entire flood management in Germany.

### 2.2 In China

Compared to the experience in Cologne, Germany, the access to the field in Wuhan, China, proved to be a great challenge. Before the first phase of the field work, the researcher sent introductory letters to potential interview partners elucidating the research interests and research objectives. These letters were written both in Chinese and English, an official letterhead of the United Nations University was attached. However, none of these letters were replied to.

After the first failure of the official contact, the researcher decided to use personal contacts to establish access to the field, as it seemed to be more promising in a Chinese cultural context to the knowledge of the researcher as a Chinese national. The researcher chose a more informal way to establish the access to the flood management agency of the municipal government of the City of Wuhan by making use of her own social network. Drawing on an acquaintance's personal contacts to the head of one of the divisions in the Agency of Foreign Affairs in the municipal government of Wuhan proved most promising. The procedure involved confidence-building measures in accordance with the Chinese conventions, such as personally inviting the contact person, who is living in Germany, for dinner. Subsequently, the researcher obtained the name and address of the person working in the Agency for Foreign Affairs in Wuhan. The contact person in Germany suggested to the researcher not to send any official letter to the Agency for Foreign Affairs asking for assistance until he in turn would have settled the situation with his friend in a face-to-face situation during a trip to China. Finally, the contact to the Agency for Foreign Affairs was established through a number of personal contacts and the researcher received an official letter from the respective agency inviting her to conduct her research in Wuhan. The researcher was now officially assisted by the Division for Foreign Experts of the Agency for Foreign Affairs instead of

the division which the researcher had originally contacted. The reason for this was that the latter division was only "in charge of Europe". Since the researcher was conducting her research for the United Nations University, she counted as a "foreign expert", although she informed the agency that she is a Chinese national [the Division for European Affairs and the Division for Foreign Experts are independent sections within the Agency for Foreign Affairs].

As the researcher arrived in the field, it became apparent that an additional research permission from the mayor of Wuhan was needed. Luckily, she was supported by an invitee to the Urban Training Programme (UTP), Mr. D., organized by the United Nations University. This participant was the deputy head of the Division for Special Tasks of the municipal government of Wuhan and therefore had close collaboration with the mayor's office. Thus, the researcher was able to obtain the research permission shortly after and the field work could finally begin.

During the first phase of the field work (August-October 2005), the Agency for Foreign Affairs was supportive in organizing meetings requested by the researcher. Introductory letters were produced by the agency introducing and allowing the researcher to establish further contacts with the interview partners. Once a meeting had been arranged by the Agency for Foreign Affairs, the researcher could enter the office building of the interview partners with an introductory letter of the Agency for Foreign Affairs and her own ID card. After the scrutiny of the suspicious guards, the researcher could finally speak to her interview partners.

Doubtlessly, the establishment of the access to the field in China for the first field work phase was challenging, however, unexpectedly, the second field phase required even more persistence and communication skills.

As the researcher contacted the Agency for Foreign Affairs in Wuhan asking for assistance in the second field work phase, the head of the Division for Foreign Experts, Ms. W. replied through her assistant Ms. Z. that her agency "was not going to be involved in this research" anymore without providing any reasons. However, later in the field the researcher found out (again!) through her personal contact with Ms. Z. about the reason for the unwillingness to assist. Mr. D. who then had attended the UTP taking place in Germany, had returned to Wuhan and informed Ms. W. that the research conducted in Wuhan by the researcher might "have negative impact on the image of the City of Wuhan". Thus, the access to the field through the Agency for Foreign Affairs was no longer an option.

Under such circumstances, the researcher had to establish contacts to further interview partners without the above agency. As a consequence, the research could not be conducted officially due to the missing research permission and the introductory letters of the agency. Subsequently, the researcher had to mobilize her social network in China including those contacts she established during the first field work phase to gain access to more interviewees. Often the researcher, sticking to the culturally expected way of establishing contacts, had to invite several people to dinner in a row in order to reach the end of the chain, the desired interview partner. The advantage of this practice was that the discussions were no longer official and the atmosphere of the discussion was more at ease.

However, the difficulty in gaining access to the field resulted in constraints in sampling. The desired interview partners were sometimes not accessible despite of all the efforts of the researcher. Another constraint was the attitude of the interviewees. They were cautious in responding to the questions of the researcher and often perceived the questions to be a threat in spite of the efforts of the researcher to formulate the questions as "harmless" as possible. In order to put the interview partners more at ease, the researcher had to forbear from recording most of the interviews.

The reasons for this could be seen in the following: firstly, the interviewees were not familiar with social research practices and therefore were not used to being interviewed by a researcher; secondly, the interviewees could not estimate the consequences of their answers and predict which impact the research results could possibly have on them; thirdly, Chinese are unwilling to express criticism which could harm the harmony of the society, and they are especially unwilling to do so in front of a *wairen*, an "external person". A Chinese saying reveals this unwillingness: "The scandals of the family shall never go beyond the family". The researcher was considered to be an external person irrespective of the fact that she is a Chinese national. As long as she does not belong to a Chinese *Danwei*, a working unit, it is assumed that she represents the interests of the "others". More importantly, she is beyond the control mechanism within a *Danwei* whose main function is social control (Weggel 1994: 52). In such a case, cautiousness in providing information became necessary for the interviewees.

The different field work experiences in China and Germany demonstrate different behavioural patterns of the interview partners. These patterns are clearly embedded in their social relations and societal rules. Chinese are shaped by the Confucianism consensus tradition whereas the Germans are shaped by Kantian conflict tradition (Finger 2007: 45). That is why the Chinese actors interviewed seldom criticized or blamed anyone, and the German actors seemed to talk about failures and mistakes or conflicts between actors more openly. The field work experiences as part of the data will be further analysed in the framework of the cultural theory in chapter G.

### 3. Data

#### 3.1 Data and Data Transcription

In this research different types of data collections were carried out: qualitative semi-structured interviews which were partially recorded during the field work, a field work diary, and notes taken during the participant observation in Cologne. In addition the researcher had the opportunity to get an insight into the internal documents of respective risk management agencies and take notes as data. Also, further documents such as reports on meetings with other actors and agencies were collected as part of the object of analysis.

Especially the field work diary produced during the field work in China is an important data resource due to the fact that information exchange also took place in a situation in which recording and note taking were not possible. This type of



data generation is described as informal interviewing in social research methodology (Bernard 2006: 211).

The qualitative interviews for this research were conducted in the respective native language of the interview partners in China and Germany. For further interpretation these interviews were transcribed. In order to keep the information as accurate as possible, the interviews were transcribed into the same language in which the interviews were conducted. The data was only translated into English when a citation was necessary.

Data transcription was undertaken with a combination of different transcription methods to serve the purpose of the interpretation and in the meantime to avoid unnecessary time consumption. Therefore, a literary transcription which intends to stay as close as possible to the spoken language of the interview partner with all distinguishing marks such as "hmms" and "ehs" was not applied here. Instead, only the data with a direct relevance to the research question was transcribed into normal written German or Chinese. In addition to this, special reactions of interview partners were noted and commented in the transcription, for example, a particularly long pause was marked when the interview partner began elaborating on a certain relevant topic or special emphasis of words or sentences. This combination of transcription techniques is considered to be the appropriate method for most of the works in the discipline of geography (Pfaffenbach 2006: 164-165).

Due to possible consequences for the interviewees a list of interviews and names of interview partners is not included. This applies for all data, collected both in China and Germany.

### 3.2 Data Analysis

Transcribed interviews serve as the basis of the data interpretation, whereas the field work diary and field notes provide contextual information.

As a preparation for the data analysis category systems were constructed. There are two possibilities for the creation of a category system: to attach a certain phenomenon to a class of phenomena which are known (subsumption); or to construct a new category to describe or explain an empirical phenomenon (abduction) (Kelle and Kluge 1999: 58). Thus coding can be undertaken in two different forms as well: one can prepare a category system and build a code accordingly or so-called abductive coding generates a new category based on collected data (Kelle and Kluge 1999: 59).

Even if one develops codes without having a category system, it does not necessarily mean that coding takes place in an abductive manner. This type of coding can be based on the researcher's theoretical knowledge generated before.

A category system is developed according to the researcher's existing theoretical knowledge and research questions. Theoretical knowledge includes general theoretical concepts which are not empirically tested but have a heuristic function, background knowledge for a specific research situation, and empirically verified social theories (Kelle and Kluge 1999: 59).

Guidelines for interviews play an important role in category and code development, since some of the categories are already settled during the process of drafting guidelines. Interview partners are addressed with questions according to previous drafted guidelines so that an interpretation accordingly seems to be a logical consequence. Nevertheless more categories and codes emerge due to new information which is not anticipated by researcher before the field work (Kelle and Kluge 1999: 65).

In this research code building is carried out in following steps:

1. A category system is developed according to guidelines of the semi-structured interviews undertaken.
2. By going through the interviews, unexpected new information comes up and is coded in new codes or categories as complementary to existing categories.

According to the developed coding system the data was structured and categorized for the data presentation and interpretation.

#### **4. The Role of the Researcher**

Despite all methodical examinations, as a researcher one can never be free of his or her social and cultural background. The research question, hypothesis as well as the interpretation of data, are influenced by this background and by personal or institutional research interests (Flick 2002).

However, subjectivity of a researcher is not seen as a disturbing variable which impairs research results; rather, it is part of the research process. In natural science, the standard methods are sufficient for analysis, but these methods cannot always be applied for social science, for human beings are the research subject. It is inevitable that the researchers incorporate their own "personal potential" into the research, to detect more than a standard method would enable them to do so (Seiffert 2003: 257). In such a case it is essential to reflect upon the researcher's personal behaviour, observation, impression, irritation, influences, feelings, etc. in the research process. This type of reflection is considered to be part of data collected, which is also incorporated into data interpretation (Flick 2002).

The long experience of having lived and worked in both research target countries China and Germany enabled the researcher to have a deeper insight into the social and cultural contexts of the field sites and guaranteed smooth interaction between the researcher and the interviewees. The interpretation of the data has often been based on these experiences and knowledge about the respective societal and cultural conventions. But yet, the researcher as a human being is inevitably value-laden and therefore biased. Being aware of this fact, the researcher constantly reflected her interpretation and endeavoured to put her interpretation into perspectives.

## E. Research Results

*Each society has its regime of truth, its 'general politics' of truth: that is, the types of discourse which it accepts and makes function as true.  
(Michel Foucault, as cited in Gorden 1980: 131)*

In chapter B different fields of action in flood risk management and potential problem dimensions in taking these actions have been discussed. In the following chapter the problems which have surfaced during the field work in Wuhan and Cologne will be elaborated on. These problems show how different actors perceive flood risk in different ways and how they construe their own realities and truths. In turn their risk perception leads to different ways of flood risk communication and flood risk mitigation strategies.

Flood risk perception is a "construct" which one cannot observe directly. It is therefore essential to translate this unobservable construct into observable parameters so that this construct can be described in operational language. To look at perception in a more operational manner, one needs to create an operational language to describe this phenomenon (Seiffert 2003: 203-207). The observable parameters used here to elucidate differences and commonalities in flood risk perception among different stakeholders in flood risk management agencies between Wuhan, China, and Cologne, Germany, are the problem dimensions in flood risk management which reflect commonalities and differences in perception and communication. These problem dimensions will be discussed under the following aspects:

- organization of flood risk management in terms of institutional arrangement of flood protection and flood protection measures which are being practiced;
- the role of spatial planning in flood risk management and the principles according to which it is being shaped;
- distribution of risk in the process of planning and decision-making as well as representation and enforcement of different interests and reconciliation of conflicts;
- differences of perceptions of different stakeholders;
- constraints and advantages of flood protection strategies as perceived by management agencies which will also shed some light on their risk perception;
- different notions of human nature relationship which impact on flood risk perception.

Using these categories in flood risk management the following chapter will endeavour to describe flood risk perception of Chinese and German actors and elucidate the differences and commonalities as well as why these differences emerge.

Flood risk communication and perception are two interdependent elements in risk management. However, for the purpose of analysis flood risk communication will be elaborated in a separated subchapter. The analysis of risk communication includes the aspects of inter-agency communication and cooperation, information and risk awareness, as well as questioning of authority.

## **1. Flood Risk Perception**

### **1.1 Institutional Arrangement of Flood Protection**

#### **1.1.a Wuhan, China**

The institutional arrangement of flood protection in the City of Wuhan is an integral part of the national flood protection system in China and is closely linked to the other administrative levels of management due to its hierarchical structure. Therefore, an overview of the flood protection system in China is essential to understand how flood risk in Wuhan is managed.

The flood protection system in China is based on China Water Law, China Flood Control Law, China flood protection regulation, China river management regulation, Reservoir and dike safety regulation, Guidelines for the safety construction within retention areas, Plan for extreme flood events on important rivers, as well as other respective policies and guidelines regulating national economic and social development (Cheng et al. 2004: 29; Wang 1999). The State Council is the top decision-making organ in cases of critical flood situations. The Chinese government assumes the whole responsibility and sets up flood control headquarters at various levels as the flood control executive body (Interview 2005/2006).

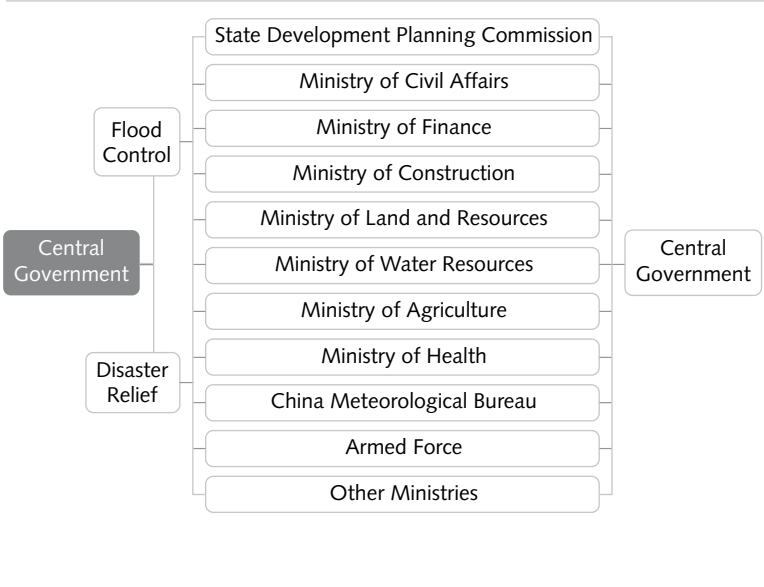
There are four flood management levels: The first level is the central government whose executive body is the national agency State Flood Control and Drought Relief Headquarters (SFCDRH). SFCDRH is located within and supported by the Ministry of Water Resources (MWR); however, it reports to the State Council. A Vice Premier takes the role of the General Commander of SFCDRH while the Minister of Water Resources serves as the standing deputy head. Other leadership members including leaders from related ministries and stakeholders at national level are also represented within the SFCDRH (see Chart 2).

The executive office of SFCDRH supports routine operations and is responsible for the formulation of flood control standards and criteria as well as a national approval of flood control options regarding flood management options during a flood.

The second level is the Yangtze River basin management level. The executive body is the Yangtze Flood Control Headquarter (YFCH) which is located within the Changjiang Water Resources Commission (CWRC). CWRC is one of the seven river basin commissions created by the Ministry of Water Resources to implement water resource management policies at river basin level. YFCH is a leading decision-making body of the Yangtze flood control in which the Hubei Governor serves as the head, the CWRC Commissioner as the standing deputy head, and the vice governors of the remaining five provinces in the middle and lower basin as deputy heads.

According to the empirical data collected during the field work (Interviews 2005/2006) this structure of leadership is an expression of an informal strategic consideration: since most of the retention areas are located in Hubei province, the governor of the province as the head of the YFCH can largely elevate the decision-making efficiency. This arrangement is a result of some pragmatic considerations:

Chart 2: Organization for Flood Control and Disaster Relief in China



Source: Wang (1999: 37)

The Governor of Hubei province, having the most retention areas and the biggest retention volume in the Yangtze middle and lower reaches (see Table 5), is put into a strong position to simplify the decision-making process significantly in cases of severe flood events in which retention areas have to be used to guarantee the safety of important objects at risk. This arrangement also avoids potentially conflicting situations among different decision makers.

Table 5: Retention Areas of Yangtze River Catchments

Nr.	Retention area	River	Province	Total area (km²)	Agricultural area (km²)	Population(x10,000)	Retention volume (x100,000,000 m³)
1	Jingjiang Fenhong Qu	Yangtze	Hubei	921.30	340.00	46.42	54.00
2	Wanshi Kuoda Qu	Yangtze	Hubei	96.00	58.00	6.20	2.00
3	Renmin Dayuan	Yangtze	Hubei	255.00	184.00	19.24	11.88
4	Huxi Beixu Qu	Yangtze	Hubei	86.00	50.67	5.40	3.80
5	Dongtinghu Xuhong Yuan	Yangtze	Hunan	2834.04	1490.34	146.41	65.68
6	Honghu Fenhong Qu	Yangtze	Hubei	2782.80	868.67	96.90	189.40
7	Xiliang Hu	Yangtze	Hubei	1032.00	564.67	56.50	42.30
8	Dongxi Hu	Han	Hubei	444.00	236.67	18.00	20.00
9	Wu Hu	Yangtze	Hubei	289.00	122.67	10.20	18.00
10	Zhangdu Hu	Yangtze	Hubei	309.00	236.00	28.20	10.00
11	Baitan Hu	Yangtze	Hubei	204.00	174.00	30.30	8.80
12	Dujiatai	Yangtze, Han	Hubei	614.00	226.00	10.40	22.90
13	Poyang Hu	Yangtze	Jiangxi	508.80	187.34	15.40	26.20
14	Huayang He	Yangtze	Anhui, Hubei	1460.00	746.67	79.00	62.00
			Total	11835.94	5485.67	568.57	636.96

Source: Li (1999: 284)

The advantage of this informal institutional arrangement can only be gained under certain cultural conditions. First, self-sacrifice has always been one of the important virtues held high in Chinese culture whereas sacrificing the others to protect one's own interests is much criticized. The decision which retention areas are to be sacrificed to serve the "greater goal and interests" is therefore also a moral game. The other governors must not be given the opportunity to blame for a moral judgement that the interests of the other provinces were jeopardized. The Governor of Hubei province shall rather be honoured for his "self-sacrifice". And "self-sacrifice" has a deeper root which is embedded in the Chinese culture. If self-sacrifice means to sacrifice oneself, how can then a governor of a province be more self-sacrificing than by sacrificing flooding retention areas in his own province rather than the adjacent provinces? This behaviour does not come as a surprise if one looks at the concept of a state in Chinese culture. It is reflected even in the Chinese language. The term "nation state" in Chinese language means literally "state family". A state is more perceived as a family and the governmental officials are even today called "parental officials" in many official occasions and especially in daily language. If a governor plays a parental role to guarantee the family's prosperity and to protect the interest of a bigger unit e.g. the interests of a region or even the interests of the whole country, then the act of sacrifice is more than justified – it becomes a moral obligation. Thus, this strategy can only be functional in a specific cultural context. The social value of self-sacrifice and the concept of governing in such a cultural framework lead to social expectations which justify and encourage this kind of behaviour.

The executive office of the YFCH, set up at the CWRC, acts as the technical adviser of the YFCH by preparing flood control plans before the event and flood management options during a flood such as operation of major detention basins and provision of flood forecasts. Flood management orders are issued by the YFCH instead of the CWRC.

State Flood Control and Drought Relief Headquarters oversee and direct YFCH's operations during major flood emergencies.

The third level to manage flood risk is the provincial level. The Hubei Provincial Flood Control and Drought Relief Headquarters (PFCDRH) are located within the Provincial Bureau of Water Resources and chaired by the provincial governor. They are in charge of the transmission of field data to the YFCH and/or to the SFCDRH as required. They implement orders from the YFCH or the SFCDRH to use detention basins and organize and coordinate emergency civil protection operations and evacuation efforts for affected areas through provincial governmental departments. They are also in charge of all flood forecasting and river management work within their own provincial areas, particularly for the Yangtze tributaries within the provincial area, and they give orders to the city/county and provide guidance for flood management operations. A major flood management role of the provinces, however, is the implementation of decisions from the YFCH and the SFCDRH, particularly breaching the dikes, when ordered, to flood detention basins located in different provinces. Unlike the detention basins in Western countries, including Germany, where they can only have flood-compatible uses and thus they are usu-

ally free of inhabitants or major infrastructures, the situation in China is different: while the state is making efforts to relocate people from high hazard detention basins, many are still densely populated and contain major infrastructure. This is a result of China's huge predominantly rural population. Detention areas will only be used to store excess water for major floods but people will still live in them during minor floods (Interviews 2005/2006).

Therefore, potential cost to the provinces and the local people of flooding these basin areas can be high - in terms of human as well as in terms of monetary losses. This is even amplified when considering that compensation laws and flood insurance are still embryonic in China and only the very basic needs are met in the event of major flood damage. For this reason, a decision to flood a critical basin is made only as a last resort and to prevent more catastrophic damage elsewhere. In this regard, the SFCDRH and the YFCH together with the CWRC play a key role as "neutral" parties in deciding which of the detention basins located in the various provinces should be flooded to achieve the maximum hydraulic impact for damage reduction purposes both locally and downstream.

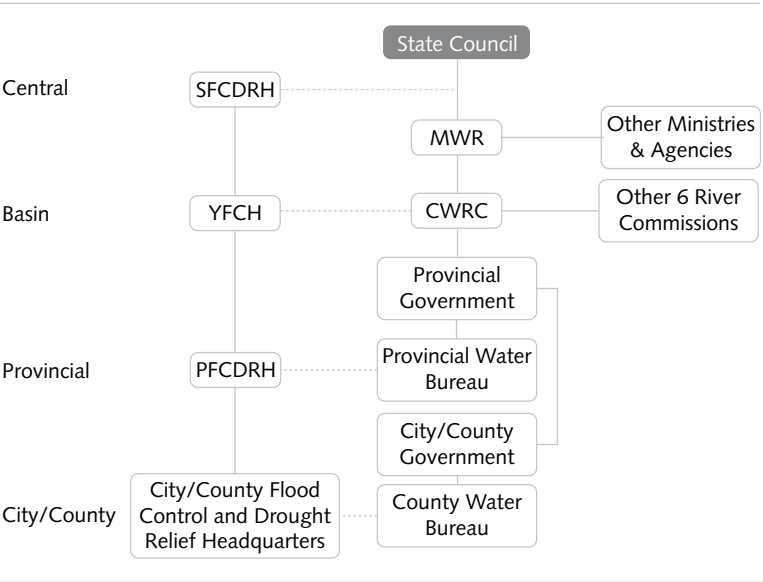
The informal institutional arrangement mentioned above also contributes to the efficient implementation of the operations with regard to the retention area, since the Governor of Hubei province serves as the head of the YFCH as well as the head of the Hubei Provincial Flood Control and Drought Relief Headquarters. He at the same time takes over the same role of a decision maker and of an executive operator.

The fourth level of flood risk management is the city/county level which works on a local scale. Wuhan Flood Control and Drought Relief Headquarters are established within the Municipality Water Bureau which is the main executive body for the implementation of structural and non-structural measures for flood protection in Wuhan as well as the organization of flood fighting at the local level. The mayor of the City of Wuhan functions as the head of the Flood Control and Drought Relief Headquarters whereas the head of the Bureau of Water Resources in the Municipality Government of Wuhan acts as the deputy head. The headquarters consist of members of respective governmental departments at municipal level, army force stationed in Wuhan and the head of the civil armed force (Municipality of the City of Wuhan 2004: 2).

Chart 3 gives an overview of the organizational features of flood risk management in China and how the management at Wuhan local level is interlinked to higher management levels.



Chart 3: Organizational Features of Flood Management in China



Source: Wang (2005)

The organization of flood management in China is highly hierarchical. Flood control headquarters/offices at various levels are all commanded by government heads (vice premier, governors, mayors) with water resources departmental heads as executive deputy commanders; the government leadership has the authority to mobilize all necessary resources.

Line departments (army, finance, civil affairs, supplies, communications, transportation, energy, health etc.), which have designated representatives in the flood control headquarters/offices, shall take action once the order is received from the headquarters according to the division of responsibility.

At the local level, flood risk management is organized in the same hierarchical style as in the higher management levels. Municipality, district, and street/community all set up their own flood control headquarters and leadership is taken over by the heads of the communist party and of the administration. Other governmental departments and units such as urban construction, petrol, electric power, railway, transportation, navigation, etc. which are assigned to take over flood management tasks, also set up their own flood control headquarters (Municipality of the City of Wuhan 2004: 2).

According to an internal document of the Municipality Government of Wuhan the following arrangement is made at the operational level of flood management of Wuhan Municipality:

The Hubei Provincial Flood Control and Drought Relief Headquarters have scheduled the time frame from 1 May to 15 October to be a flood protection phase in Wuhan. Referring to different water levels measured in Wuhanguan, three flood protection phases are defined in Wuhan, according to the document No. E. Xun Ban (1999) 46 of the Hubei Provincial Flood Control Office. The first phase is the cautious phase with a water level of up to 25 metres; the second phase is warning phase with a water level of up to 27.30 metres and the third phase is guarantee phase with a water level reaching as high as 29.73 metres or even above. Different actions are taken in accordance with the respective phases. These actions mainly include controlling the safety of dikes and other infrastructures inside of the river embankments, handling of flood protection materials, and pumping. When water levels reach warning thresholds, the deputy heads of flood control headquarters at different levels are required to be present at the headquarters to supervise the flood protection measures. An emergency management team which is responsible for the safety of dikes is set up. When the water level reaches 28.28 metres, both head and deputy head of the flood control headquarters are required to be personally present at headquarters. When the water level reaches 29 metres, flood protection enters the emergency state. Flood management is carried out in a martial order style. When the water level reaches 29.73 metres (guarantee level), the municipality headquarters declare a state of emergency in the entire city. Safety of dikes will be ensured by 24 hours of intensive controlling. Critical stretches of dikes and dams as well as any constructions on it are guarded day and night by leaders, technical staff, civil force, police, and armed force. The army stationed in Wuhan will join forces with an emergency rescue team which is again organized in a hierarchical manner and responsible for dike safety (Municipality of the City of Wuhan 2004: 8-11).

According to the China Flood Protection Law, once Flood Control Headquarters have announced a state of emergency, all departments involved at all levels must submit to the need of flood protection. Emergency cases can be handled with exceptional regulations to shorten the decision-making process. This approach leads to the fact that many cases such as illegal construction within the embankments which raised the water level could be cleared up during severe flood events, whereas it becomes a challenge for the administration to solve these problems in flood-free periods (Interviews, 2005/2006). This problem is further described under the topic "Decision-making, conflict of interests and reconciliation" (see Chapter E.1.3). When extreme flood events occur, all human and material resources shall be mobilized to protect dikes with all means (Municipality of the City of Wuhan 2004: 11).

### **1.1.b Cologne, Germany**

In contrast to the clear hierarchical flood risk management structure in China, Germany adheres to a decentralized flood risk management structure. Promoted by financial problems, a political change took place in flood related policies which includes deregulation, decentralization and privatization (*Entstaatlichung*) and the emphasis on self-responsibility (Pohl 2002: 35).

The organizational feature in Germany can be described in three different categories: preventive flood risk management (vorbeugender Hochwasserschutz), flood management, and emergency management (Gefahrenabwehr und Katastrophenschutz) (Der Oberstadtdirektor 1996). The engineered flood protection, which is part and parcel of flood risk management, has been described in Chapter C.3.2.

According to the Basic Constitutional Law of the Federal Republic of Germany flood protection is the responsibility of each federal state. Due to the German federal system (föderalistisches System), each federal state is treated as an independent state which can issue its own laws and regulations. Not only on a federal, but also on a state level, flood protection takes place through spatial planning instruments (Raumordnung) and policy guidance. But the implementation of flood risk management as well as crisis management belongs to the tasks of the respective local community. Therefore, in this study focus is on the organizational features at the level of the Municipality of Cologne.

It can be observed that flood management is carried out by the Flood Protection Centre due to the charismatic personality of the director. One interviewee proved this observation: "In our experience the state does nothing. The local flood management takes the lead, since the Flood Protection Centre has a leader with a strong personality" (Interview 28, 21 August 2006).

Depending on the water level and the forecasts of the water level different agencies take the leadership. The reason for the division of competence is that the agency in charge of crisis management is not familiar with the daily tasks of other agencies which are involved in flood risk management (Neuhoff 1994).

The HSZ in Cologne is part of the Municipal Agency for Drainage. In 2001 the Municipal Agency for Drainage was transformed to a community owned enterprise according to public law. The question was raised as to how to replace HSZ. Considering that flood protection is a sovereign task of the state, HSZ was distributed to the Municipal Agency for Construction. This arrangement should help better integrate flood prevention measures into urban planning, though this purpose does not yet seem to be fulfilled for various reasons (see Chapter E.1.3).

HSZ is in charge of carrying out appropriate measures before the water level in Cologne reaches or is expected to reach 10.70 metres. Currently further construction of technical flood protection is being carried out. It aims at raising the protection level from 10.70 to 11.30 metres. Once the planned constructional measures for flood protection are completed in the future, the competence of flood protection stays with the HSZ until a water level of 11.30 metres is reached and further water level rise is forecasted.

For high frequency and small magnitude flood events the consequences are well-known and plans have been made accordingly. Collected experience through the last decades in coping with flood events also contributes to efficient organization. Dangerous situations, which have to be handled with emergency response, rarely ever happen. With a water level lower than 10.70 metres the HSZ is in the

position to take full responsibility for carrying out the necessary measures to minimize potential damage (Neuhoff 1994). According to the Flood Direction of the City of Cologne (Hochwasservorschrift) the tasks of the HSZ include:

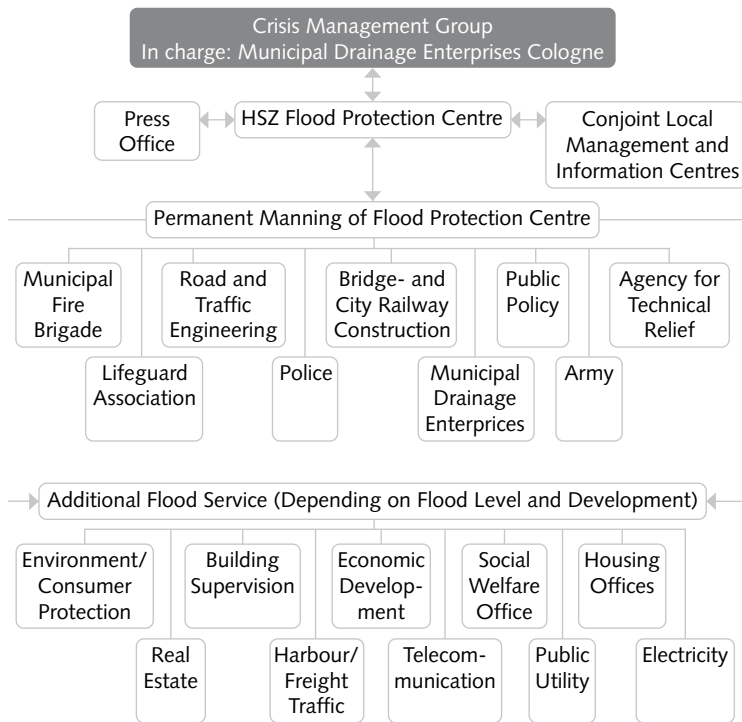
- “Informing all municipal agencies about the current situation and development of water levels in Cologne as well as flooded and potentially affected areas;
- Informing and warning citizens through the media;
- Disseminating information amongst the general public and consulting service for citizens;
- Coordinating measures to be undertaken as defined in the Flood Direction for the City of Cologne (Hochwasservorschrift) as well as other special measures of flood protection; specific technical flood protection measures shall be defined and undertaken by the respective technical departments;
- Coordination of organizations and institutions involved in flood protection;
- Informing and the supervision of the media” (Der Oberstadtdirektor 1996: 166).

A crisis management group (Krisenstab) is to be set up inside the HSZ office, as soon as the water level reaches 7.50 metres with further rises being expected. According to the recommendation of the HSZ the directors' board of the Municipal Agency of Cologne for Drainage shall create and is in charge of the crisis management group (Stadt Köln 2006b: 4). Members of the crisis management group include the Fire Brigade, Street and Traffic Technical Department, Department for Bridge and Tram Construction, Public Security (öffentliche Ordnung), Technical Aid Organization, German Association for Rescue, Police, Department for Drainage, and the Federal Army (see Chart 4).

Once the water level in Cologne has reached 11.30 metres, the Lord Mayor of Cologne decides whether the Operational Leadership and Crisis Management Group (Einsatzleitung und Krisenstab) should be set up inside the Municipal Fire Brigade and Agency for Fire Protection, Rescue Service, and Civil Protection. This leadership and management group would then assume the supervision of the HSZ. Practically this means that not only responsibility is shifted from the HSZ to the Fire Brigade, but also a physical relocation of the Crisis Management Group from the HSZ to the office building of Fire Brigade takes place. This also applies for emergency cases should some areas of the city be flooded due to dike breach (Stadt Köln 2005).

With rising water levels planning becomes more and more complex. There is a lack of experience in managing extreme flood events. Thus, emphasis of flood management rather lies on averting dangerous situations. In such cases the responsibility is shifted from a management approach of the HSZ to civil protection approach of the Municipal Fire Brigade and Agency for Fire Protection, Rescue Service, and Civil Protection.

Chart 4: Organization Chart of the Crisis Management Group



Source: Stadtentwässerungsbetriebe/Hochwasserschutzzentrum Köln  
(Flood Protection Centre Cologne 2005)

Such a case is defined as “high impact event” (Großschadensereignis) and its management regulation is embedded in the Law for Fire Protection and Assistance (Gesetz über den Feuerschutz und die Hilfeleistung, FSHG). According to FSHG (article 1, paragraph 3) an event is considered a “high impact event”, if a large number of people’s lives and health or considerable amounts of assets are endangered and if coping with the event requires support of an operational leadership due to great need of extensive coordination (Stadt Köln 2005: 4).

### 1.1.c Synopsis

The organizational features in China are designed for flood fighting and emergency management, where in Germany the emphasis of risk management lies on preventive measures. In China the organization of flood risk management is hierarchical and flood risk management is seen as a task of the state in which all individuals are obliged to participate in flood fighting (Zhonghua Renmin Gongheguo Zhuxiling No. 88 1997). In Germany the organization is decentralized. Individuals are obliged

to take their own preventive measures to protect their private property (Bundesgesetzblatt 2005). In China there is an informal practice to shorten the decision-making process as described above in the case of the Governor of Hubei province as the head of Yangtze Flood Control Headquarters. In Germany, however, the cultural context does not encourage this kind of informal practice.

The leadership of command in China is assumed by the government and the Agency for Flood Management is understood as an operational unit and technical consultant. In Germany the institutional arrangement allows flood risk management to take over large scope of decision-making and to be intensively involved in decision-making process due to the subsidiary principal.

This hierarchical institutional arrangement of flood protection in China proved to be efficient in terms of emergency management during the flood event, but due to its strong focus on protection by engineered measures and on flood fighting it also reveals its structural weakness in reconciling conflicts between stakeholders, and consequently causes tension and problems among stakeholders. These problematic issues will be discussed in detail in chapter E.1.3.

## **1.2. Spatial Planning and Land Use**

### **1.2.a Wuhan, China**

The guidelines of the land use plan with regard to flood management are defined in Article 23 of the Land Use Law of the People's Republic of China as the following: "Within the administrative competence of river, lake, and reservoir management as well as protected area and retention area, land use must be in line with the development plan for the integrated management of river, lake, and reservoir; it must meet the requirements of water flow in river and water detaining function in lake and retention area" (Zhonghua Renmin Gongheguo Zhuxiling No. 28 2004).

However, flood protection through spatial planning in China is focused on structural flood protection measures. This focus is also prevalent in the Urban Spatial Plan of the City of Wuhan and in the way how different actors in flood risk management understand the meaning and function of a spatial plan.

According to Wang (Wang 2002: 37-38), the urban plan approved by the People's Municipal Government of Wuhan in 1999 covers a plan period from 1996 to 2020. This plan emphasizes the further economic development of Wuhan and aims to build up a good educational system and an extensive public service network. At the same time the plan claims to take ecological aspects into consideration while endeavouring to achieve a "reasonable distribution of functions in the city" within the service network. The main focus of the plan is, however, the economic development especially of the tertiary sector which is concentrated within the third city ring. This area will play a very important role in Wuhan's economic development; it lies within the city's "flood protection circle" protected by dikes.

According to the above plan, population growth and land use within the inner city are strictly controlled. But a significant increase both in population and land use for construction is inevitable (see Table 6). Under these circumstances the

Table 6: Population Development and Land Use in Wuhan

Year	Permanent inhabitants (millions)	Actual inhabitants (millions)	Building area (km <sup>2</sup> )	Building area per inhabitant (m <sup>2</sup> p.p.)
1996	3.55	3.79	364.0	69.6
2000	3.65	3.95	281.2	71.2
2005	3.90	4.26	311.0	73.0
2010	4.15	4.58	343.3	74.9
2015	4.35	4.88	390.4	80.0
2020	4.50	5.05	427.5	84.7

Source: Wang (2002: 38)

emphasis of the plan with regard to flood protection clearly lies on the structural measures. The plan highlights the improvement of dike quality and further construction of the dike system. The dikes within the city area shall be elevated by two metres in addition to the water level of the 1954 flood (29.73 metres) and serve to be a "guarantee dike" (the last mile). The dikes within the administration of the City of Wuhan but outside the third ring area shall be elevated by 1.5 metres to the same record water level of 1954. In addition to the dike protection the existing five retention areas Xilianghu, Dujiatai, Wuha, Zhangduhu, and Dongxihu shall remain as retention areas until the Three Gorges Project will have been completed in 2009. Then the function of these retention areas will be revised (Wang 2002: 38).

These spatial planning guidelines for structural measures are also reflected in the interviews with statements spatial planners gave at city, river basin, and national management levels. The interviewed municipal spatial planner understands flood protection through spatial planning in Wuhan to be categorized in different protection areas mainly according to potential economic losses, population density, and respective protection measures which are characterized by different dike categories. Planning safety measures such as a safety platform in retention areas is another important component of planning practice (Interview 10, 26 September 2005). Other actors at the river basin level understand spatial planning to be the allocation of flood water: "We have 40 retention areas in the Changjiang flood plain. If flood water comes and cannot be detained inside the river ... and if we are having 50 billion cubic metres of water which exceeded the potential volume of the river, we can then use the retention areas. For instance, the Honghu retention area can detain 16 billion cubic metres of water, the Jingjiang retention area can detain 0.4 billion cubic metres, plus with the extended retention areas in Jingjiang we can have 7.6 billion cubic metres volume altogether and ... if an extreme flood event occurs, the allocation of water is the task of spatial planning" (Interview 25, 19 December 2006).

Similarly, the interviewee at the national level sees spatial planning as one of the most important instruments in flood risk management, although his technical focus became quite evident during the interview: "We have been using this instrument since the 1950s. It is a unified and standardized arrangement of the entire flood protection system. It regulates flood protection, hydropower, ship-

ping, irrigation, etc. within a river basin spatial plan. Based on this plan we develop the flood protection plan regulating the development of reservoirs, dikes, and retention areas. In addition, we also have some non-structural measures such as telecommunication and hydrologic forecast. This is the foundation of our work" (Interview 19, 8 December 2006). However, a policy change can also be observed: "...Especially after the Great Flood in 1998, we have put [more] emphasis on flood management. The new flood management concept is understood as a people-centred approach which highlights the harmonious relationship between man and nature. Consequently we control the population and economic development in high risk regions; at the mean time we [also] manage water in rivers as resources under the condition that flood protection is ensured. This is a new concept which we started to practice" (Interview 19, 8 December 2006).

The new concept is a policy shift

from emphasis on structural engineering solutions in shuili (water management) enterprise to a broader resource-defined concept of 'resource' water management (ziyuan-shuili) in support of water sustainability (Boxer 2001: 1).

Although this policy shift has been introduced in 1999, its implementation still remains a Herculean task. Taking into consideration China's water engineering history of two millennia and a well-established Marxist theoretical and ideological framework that is grounded in instrumental rationalism, the challenge of understanding and realizing this new concept is immense.

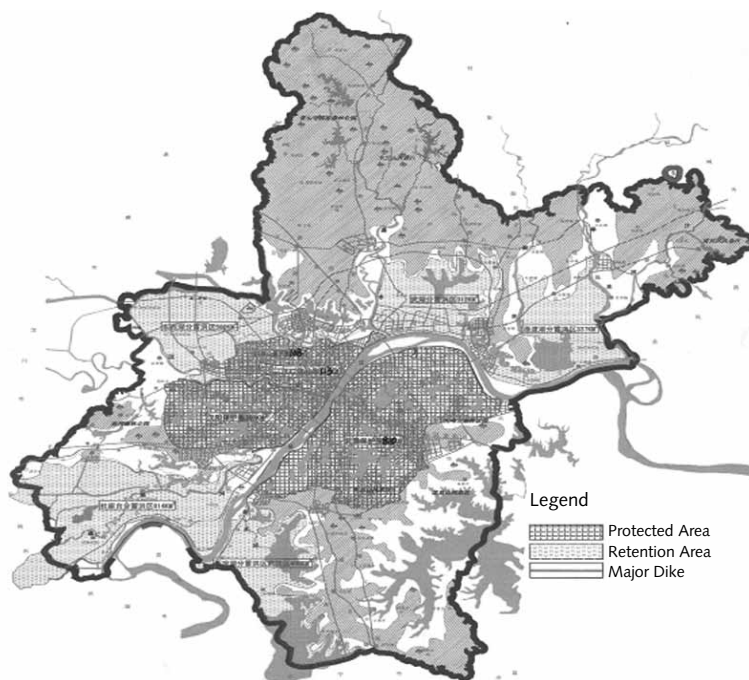
Before the Great Flood in 1998 in the Changjiang River basin, urban flood protection in terms of urban planning had not been practiced. Only after the introduction of the China Flood Law, flood protection has been taken into consideration in the urban planning process. Even the China Flood Law does not fully forbid land use practice within the retention areas, but recommends to limit the land use as much as possible (Zhonghua Renmin Gongheguo Zhuxiling No. 88 1997).

The strong emphasis on economic development and consequent dependence on structural flood protection measures as well as the belief in this technical approach leads to problems in management of the retention areas and vulnerability of the city.

As the interviewee described, there are problems in the retention area of Dongxihu located close to the City of Wuhan (see Map 6). Dongxihu is a focal point of conflicts. The local government wants to minimize the scale of the retention area in order to avoid the limitations for economic development, which would be the inevitable consequence of the regulations set up by the central government. This is backed up by the Urban Planning Department of Wuhan. The planning department argues that this particular retention area has never been put into practice and the flood protection plan is made in a conservative manner. In addition, the department supports "more intensive land use to achieve a higher efficiency of the respective land" (Interview 2005/2006). This issue is even further exacerbated by the administrative structure of the management of the retention area: construction projects are obliged to apply for permission to the local planning office. If there is



Map 6: Flood Protection in Wuhan



Source: Chengshi Guihuaaju (2003)

a conflict between land use and economic development, the local planning office does not consult directly with the municipal government, but with the local district government and subsequently makes decisions in line with the local district government's interests. The district planning office is not directly under the municipal government but under the district government, therefore even the Lord Mayor cannot exercise pressure.

The implementation of the land use regulation for retention area is also hampered by "management failure". In the past construction projects often started before the permission was actually granted. Once projects have been completed, it is extremely difficult for the government to revoke them, as the potential economic losses would be so high that the local government would be neither willing, nor able to bear them: "Once a construction project has become reality, even the Municipal Government has to give in" (Interview 10, 22 September 2005).

Only in very special cases a compromise is possible. In this context many interviewees mentioned the case of illegal construction sites in Hanyang, one of the inner city districts located within the river bank, which would have significantly hindered the safety of flood protection, as it took away a large volume of water retention area. In that case the intervention of Prime Minister Zhu Rongji eventu-

ally caused this illegal construction to be removed. But if “illegal projects” within retention areas are not in purely private ownership, it would be very difficult to regulate them (Interview 2005).

Since the land use plan with regard to flood prevention is not strictly institutionalized, the implementation is especially hampered in flood free periods. There are two main reasons for it: firstly, the urban plan has a clear emphasis on economic development; secondly, the institutional arrangement of flood risk management focuses on flood fighting and emergency management. Consequently, the flood management unit has more power to carry out the necessary measures during a flood event than to take preventive measures. However, during “flood free” times the authority of the unit does not embody administrative competence which enables the Flood Protection Agency to ask for support from the police. Therefore, the implementation is hindered during “flood free” times. For instance, a sand factory was built up along the Yangtze River inside the embankment. This factory would have impaired the water flow during flood events. The Flood Protection Agency of Wuhan ordered the owner to remove the factory, as it was an illegal construction. However, the owner of the factory simply ignored this order, and due to the lack of any enforcement mechanisms on the side of the Flood Protection Agency, they were unable to invoke assistance from the police department. The municipal government is the last remedy which can solve such issues, since the municipal government has the power to mobilize the police. Through the support of the police such a case can be solved without going through legal procedures. This, in return, leads to a large work load for the Municipal Government, which is the highest authority at local level (Interview 1, 30 August 2005). The above example also shows the structural weakness in the institutional arrangement of flood risk management.

### 1.2.b Cologne, Germany

The Spatial Regulative Report of the Federal Government of Germany (BBR 2000) states that flood risk has not yet been sufficiently taken into consideration during the development of settlement and infrastructure. Anthropogenic activities which contribute to increased economic losses shall not be ignored in recent and future planning processes. Apparently, structural measures such as river training and the construction of dams as well as dikes increase water level. New settlements which are built in areas protected through dikes experience increased economic damage during flood events due to a lack of retention areas. The development of new settlements and the change of land use pattern, turning green areas into agricultural land, are also responsible for increased losses during flood events (BBR 2000: 163).

The report clearly conveys the message that the structural river training programmes as well as other technical flood protection measures have increased the flood risk. Especially the negative effect of engineered measures and the anthropogenic impact on economic losses is highlighted. This marks a turning point in flood management policy in Germany. This guideline has been institutionalized as a legal regulation for spatial planning (Bezirksregierung Köln 2006a).

Accordingly, in 2000 the Minister Conference on Spatial Planning made preventive flood management recommendations in land use management. The emphasis on the safeguarding and recovery of natural flood plains and risk prevention in areas behind the dikes, which could potentially be flooded, reflects a nature orientated approach in flood risk management. The concept is geared towards an approach to live with floods rather than to fight floods. The Minister Conference for Spatial Planning also recommends natural or nature orientated preservation measures for development as well as renaturation of the areas along the river bank. The recommendations are in line with the European Union (EU) Water Framework Directive (The European Parliament and the Council of the European Union 2000). The legal regulations and the recommendations are mainly implemented through spatial planning (Raumordnung), that is the Spatial Plan of the Federal States (Landesplanung) and the Regional Spatial Plan (Regionalplanung) (Bezirksregierung Köln 2006b: 46).

The Regional Spatial Plan is drafted by the Agency for Spatial Planning of the regional government of Cologne according to the Flood Law (Hochwassergesetz), Water Resources Act, and the European Water Framework Directives and authorized by the Regional Council (Regionalrat), which consists of representatives of local politicians. The proportion of different political parties among the members in the Regional Council is determined by the results of the respective local elections. Due to the strong presence of local politicians who lobby in the interest of local communities, the Regional Council often makes decisions in favour of local needs. This ensures on the one hand that the interests of local communities are paid attention to while on the other hand it sometimes hampers the implementation of flood prevention measures through spatial planning due to the conflicting economic and ecological considerations. Conflicts and solutions during the planning procedure will be discussed in chapter E.1.3.

The City of Cologne as the centre of the Greater Cologne Region must align its urban planning in regard to flood risk management, which in turn must be in line with the regional spatial plan of Greater Cologne Region (Regionalplan Köln). At the local level of the Municipal Government of Cologne the Urban Land Use Planning (Bauleitplanung) consists of a Zoning Plan (Flächennutzungsplan) and a Development Plan (Bebauungsplan). The Zoning Plan is the underlying basis to the more detailed Development Plan.

Flood prevention through spatial planning means that no construction shall be undertaken in areas which will potentially be flooded. For any construction in such areas, the Zoning Plan has to be changed which requires permission from the Regional Government of Cologne. If the construction project is in conflict with the flood prevention measures of the Regional Plan, the permission for the respective construction will not be issued. In such a case the local community can insist on its project plan and a consensus-finding process will start. During this process a dialogue between different stakeholders such as environmental organizations, organizations of nature conservation, and representatives from the regional government who are responsible for flood prevention would unfold endeavouring to

find a solution which is acceptable for all stakeholders. However, if this effort fails, a decision has to be taken by the Regional Council.

In the interviews the statements of different stakeholders of public administration involved in the planning process reflect their differing risk perception. Local communities often try to win more construction area despite of an existing flood risk, for the sake of their economic development and an improvement of the labour market. Also transnational enterprises located in flood plains are reluctant to be marked as located in a potential flooded area on the map of the Regional Spatial Plan, for they are worried about their image, and their spatial development potential – and the implications this might have on their flood insurance. This consequently obscures their risk perception in a certain way that they seem to be more willing to take risks.

Local politicians have strong interests in short-term economic prosperity due to the election system. They presume that the potential voters who would benefit from a stronger labour market would also vote for their lobbyists.

Interestingly one can observe different attitudes among politicians and representatives of public administration. Whereas politicians are more interested in pushing forward and maintaining economic development, the representatives of the administration show more interest in flood prevention. One interviewee states that “politicians are often enthusiastic about their construction plan which shall create more employment opportunities but ignore flood risk, representatives of administration think in a longer time frame. But administration is just an executive institution and hardly has any influence on the politicians’ decisions. If politicians are determined to realize a plan, the administration has to follow. It was reported by interviewees that representatives of administration remain silent during a dialogue between the planning agency and politicians with their administration representatives, if they have different opinions than their politicians” (Interview 33, 25 January 2007). The priority of economy, ecology, or sustainability is a major source of conflict, which is also a driving factor for how these actors perceive flood risk.

### 1.2.c Synopsis

Spatial planning in China understands risk management mainly as structural measures and allocation of flood water volumes. The Urban Planning in the City of Wuhan therefore puts its main emphasis on structural measures in flood risk management. Despite of the introduction of the new water management concept of “resource” water management, which has evolved from and added to the structural engineering paradigm, the imprint of socialist historical legacy and Confucian cultural tradition is still strongly reflected in spatial planning ideologies. The ambitious “new concept of resource water management” which seeks “boldly to reshape deep-seated assumptions about the universal efficacy of engineering solutions for water supply, control, and quality problems” (Boxer 2001: 335) still faces numerous challenges, especially at the local level.

In Germany a change in flood management policy took place after a series of flood events in the last two decades and this change is reflected in the spatial

planning guidelines. The spatial plan in Germany emphasises the counterproductive effect of engineered measures and highlights the anthropogenic influence on flood risk through settlement establishment in flood plains. The change of this flood risk concept has also been translated into legal regulations which endeavour to achieve the goal of a more proactive than reactive flood management; however, even the new regulation contains some compromises due to clashing interest between economic and sustainable development considerations according to its critics. Nevertheless, spatial planning seems to be an effective instrument in flood risk management in Germany.

### **1.3. Decision-Making, Conflict of Interests, and Reconciliation**

Decision-making is a risky undertaking. Every decision is intrinsically tied to cost and benefit. In our post modern society, while wealth distribution has remained the origin of conflicts and injustice, risk distribution amplifies social injustice even more. The conflicts of distribution of wealth and the distribution of risk are superimposed (Beck 1986: 25). Who shall reap the benefits and who has to carry the cost? Decisions in flood management such as determination of flooding retention areas need to take those cost-benefit considerations into account. Or, more precisely, it has to be decided whose interests are taken into consideration and whose interests are sacrificed. How are these decisions justified and how are the victims compensated to keep the social balance? Who is involved in the decision-making process? What conflicts are caused by decision-making and how are these conflicts reconciled? In this chapter these questions are to be answered by looking at the risk distribution through decision-making, principle of decision-making, involvement of stakeholders, and the overall decision-making process. It is worth to note that dike construction on the one hand protects people and their property; on the other hand it enables flood risk distribution and has become an important instrument to do so.

#### **1.3.a Wuhan, China**

In China there is a clear hierarchical decision-making structure which is illustrated in the institutional arrangement described in chapter E.1.1. The heads of administration such as the Prime Minister at national level, the governor at provincial level, and the Lord Mayor at the local level carry the whole responsibility for flood protection. Since flood protection in China mainly focuses on flood fighting, the most critical decision-making process seems to take place during a flood event. However, the decision-making dilemma during a flood event is preassigned by decision-making principals practiced within Chinese cultural context.

The major principle of flood protection according to the respective laws and regulations can be summarized as follows: an overall plan must be made for flood protection; parallel to this unified overall plan, other interests are also taken into consideration; prevention and integrated management are set up to be the main goal; the interests of all are superior to the interests of a limited number of people (Cheng and Shang 2005: 54). The hierarchy of interests is also often formulated as “state interests are superior to community interests that are superior to individual interests”. This principle lays the foundation for the decision-making approach of

water management in China. It has ensured the efficiency of a decision-making process on the one hand; on the other hand, however, it has caused some tensions among different stakeholders as revealed in the statements of the interviewees.

The interviewees describe the following conflicts caused by decision-making in a top-down manner:

### **The Central-Local Conflicts**

The decisions of the upper level administration often do not take into consideration the local needs and local conditions, which creates a mismatch in decision-making and implementation.

A local official states: "If you listen to the talks of the Ministry [of Water Resources], you will think that it is all so up-to-date with Western standards. But once you go to the local level, it doesn't work at all. What the upper level talks about is what should be done, but the local level simply cannot implement it" (Interview 16, 6 December 2006).

However, the representative of the central government contends: "...Risk prevention has to start with risk awareness. In addition to this, we need matching policies and administrative systems. But the local governors and officials often don't understand it. If you ask a county governor, according to which criteria he wants to set up his new district, he would say, first, at locations with the biggest economic potential; second, at locations which are suitable for development" (Interview 17, 7 December 2006).

Yet, at local level the perception reveals different perspectives: "In fact, the Ministry [of Water Resources] just talks the big empty words... it is high up there and does not have any idea about the local conditions. It gives random orders and makes all those glorious speeches, but when it comes to the local level, there is no way to implement it" (Interview 23, 17 December, 2006).

This is not just the perception of the risk managers at the local levels, as also the upper levels including the river basin and national levels realize this difficulty. The problems caused by this decision-making approach demonstrate the conflict of interests of different stakeholders. "Local protectionism" (see next page) is a typical conflict reported by interviewees.

The Chinese central government has introduced a new management concept which emphasizes disaster reduction as an integral part of development strategy. However, governmental officials including those at national level all regard economic development as the most important indicator for their political achievement. "Development" is equated with economic development. Especially local politicians and officials are facing this challenge:

"Local **parental** officials are not like us whose task is only to take care of disaster reduction; they have to shoulder the entire responsibility of their region. Besides, they are under pressure to prove their political achievement. If the figure of my GDP [Gross Domestic Product] is not high enough, then I, as a mayor, would

be considered to be 'no good for nothing' ...It doesn't make any sense to create an environment with mountains covered with forests and clear water everywhere, while people go starving" (Interview 17, 7 December 2006).

China Daily, the most important official Chinese newspaper in English language which is a counterpart of the People's Daily, the "voice of the communism party", also confirmed this perception:

Local environmental watchdogs exist to oversee implementation of environmental policies and standards. But local officials want an ever-increasing gross domestic product to decorate career records (China Daily 2007: 10).

Economy and ecology are considered to be conflicting interests that can hardly be reconciled. This leads to a controversial debate as to whether higher priority should be given to the economic development or the environmental governance. At local level due to the population pressure and the political goal to reach the GDP requirements, "local protectionism" especially in retention areas has been a common practice, which basically means to first meet the need for economic development even at the expense of proper flood protection measures.

Local protectionism is directly reflected in non-state initiated dike building in officially defined retention areas:

Due to frequent flood events, soil quality in retention areas is particularly high. Farmers try to achieve ever higher yields off this fruitful land and thus have begun to construct dikes on their own initiatives. These dikes built by farmers or collective efforts of a village or community are called "secondary dike (Zidi)" or "people's dike (Minyuan)". These dikes usually protect a village as a unit (Interview Huang). Over time, the protected areas have developed, both, in terms of population and infrastructure. Especially during the period of the "Great Leap Forward Movement" (1958-1960) dikes were rapidly increased to allow agricultural production in the wetland areas. The construction of dikes in Dongxihu (East and West Lakes) District, one of the five retention areas to protect the City of Wuhan, began 1958 during the "Great Leap Forward Movement". Altogether 94 kilometres of dikes were built up and the construction and renovation of the existing dikes

...changed the original geography and formed an independent lake system. Many small lakes and river arms disappeared through many years of construction and management. The West Lake completely vanished (Dongxihu Government 2007).

Since the 1980s along with population growth in retention areas, the value of infrastructure has also increased. Dujiatai for instance, one of the five major retention areas which greatly contributed to the safety of Wuhan during flood events, now has a population of 256,200 people according to the statistics of 2004 and annual GDP amounts to approximately 2.1 billion Yuan. The potential flood damage in retention areas has been rising and subsequently these areas have become the focus and symbol of conflicts (Lu 1998: 389-390).

Due to the historical development and the legacy of the "Great Leap Forward", as well as the local economic interests, these dikes inside the retention areas have

not only been tolerated in an informal way, but were even supported by the local governments. An interviewee explains:

"It is not that these 'secondary dikes' cannot be controlled. The upper governmental levels are fully aware of this fact. But after the economy in these protected areas has been largely developed, one is not willing to control it. During flood season, when the pressure of the lower reach increases, only then people are forced to breach the dikes to ease the pressure of the lower reach. Besides, industrial areas within the retention areas have to be protected. People inside can be evacuated to high-lying land. The problem is that although the state has respective regulations for retention areas, it is local officials who are supposed to implement these regulations. For the latter the economic loss is clearly the driver for decision-making. In fact, local officials advocate that the state should strengthen engineering protection" (Interview 5, 7 September 2005).

In this statement one point stands out: there is a conflict between the regulations of the central government and the local implementation due to different interests. The state has overall interests to reduce flood risk by gaining more space for retention, while on the other hand the local government intends to protect its economic interests which are seen as the main indicator of achievement. This way of measuring one's success in governance and management is driven by the requirement of the central government which relies on economic growth to stabilize its position and strengthen the Chinese Communist Party's credibility (Yang 2005: 66). Current discussions show that the central government is considering the introduction of "Green G.D.P." ["Green G.D.P." was an effort to create an environmental yardstick for evaluating the performance of every official in China. It recalculated gross domestic product, or G.D.P., to reflect the cost of pollution. The project was initiated in 2004 as President Hu Jintao's most ambitious attempt to change the culture of fast-growth. However, the project was stripped of official influence in 2007 (Kahn and Yardley 2007)] which is to take into consideration the environmental impact due to the rapid growth of economy in China over the last two decades (Yang 2005: 66). Nevertheless, economic growth at local level remains an important goal for local officials who, as "parental officials", have to protect people's livelihood and at the same time, serve the central government. The Chinese local governments, as Wisner et al. also observed, have powerful incentives to build in inappropriate places and "to defy or avoid central government planning guidelines for land use" (Wisner et al. 2004: 210). Flood prevention through non-structural measures is not seen as a part of development strategy by local government.

Some of the interviewees refer to this mismatch between central government's policy and local implementation as a problem of the "system". The system is understood as to be incompatible with the current social and economic situation. In fact, the discussion as how to reform the political system to face the new ecological and political challenge has been going on in China for the last decades. However, no tangible political reform can be observed.



### Conflict between “Bigger and Smaller Interests”

Despite of the outstanding water engineering and water management history in China (Needham et al. 1971), during flood events the situation in retention areas often leads to calamitous decisions. Officially these secondary dikes are often built without permission. But after they have been constructed, they are tolerated as “historical legacy” and subject to ad hoc rules. In Wuhan, according to the Flood Protection Headquarter, these “secondary dikes” are only under protection before the water level reaches 27 metres. Above 27 metres, decisions about the protection will still be warranted based on a case to case basis according to rainfall forecast etc. “Since these areas are supposed to be river bed anyway, people living there or having their agricultural production have to live with the possibility to be flooded. They have their harvest, if flood is not severe; otherwise they have to give up their harvest. The main thing is to ensure the safety of people” (Interview 1, 30 August 2005). The security concept as understood by Municipal Flood Protection Headquarters does not, however, include the security of livelihood. Livelihood in such a case depends on compensation by the government according to the compensation regulation for retention areas. Since this compensation system is still not yet well developed, flooding a retention area is the last decision to be taken. And in case of flooding, the local government and the population are facing a great challenge as how to recover, given the insufficient compensation provided by government.

The top-down decision-making approach is perceived to be an “effective and efficient” instrument in flood risk management. It is counted as one of the greatest advantages of the “socialist system”: “The best thing about our socialist system is our system of responsibility with the head of the administration as leadership. No other country can keep up with us in this regard, whether it is the USA or other countries. I have been to more than 30 countries to exchange experience with them. I found out that the best one is our system (...) Each level takes its responsibility for the level below it. By issuing orders, we avoid see-saw and bargaining. It is an order! If you resist the order, you’ll be punished; if you don’t obey it, you’ll lose your position right there, irrespective if you are a governor of a county or the head of a village. The Governor of the county Sanzhoulanyuan [one of the largest protected retention areas by dike in the county Jianli, Hubei Province (Liu 1998)] didn’t want to flood his retention area, because it was too painful for him. So he was dismissed right there! The Deputy Governor took over his position. If there would be anyone else who resists the order, he will also be dismissed and punished. So nobody dares to do it again, because no one wants to be dismissed. Why should he want to do that? To me, the biggest advantage in flood protection in China is the system” (Interview 25, 19 December 2006).

The conflict of interests can also be small scale, for example, when the water level has reached a certain level it is forbidden to use pumps within low-lying areas, especially in retention areas, for the capacity of the river within the embankment has reached its maximum. In order not to increase water levels by pumping water back into the river, many areas have to live with a certain degree of flooding. This has caused some tension between local communities and the flood protection agency (Interview 7/9, 8 September/22 September 2005).

But more vehement conflicts have to be faced when it comes to flooding settlements within a retention area. To understand this particular constellation one needs some background knowledge about retention areas in China.

In case of extreme flood, in order to ensure the safety of important cities and economically well-developed regions, so that total damage can be reduced, lakes and low-lying land are often used to detain water. This is to protect the interests of all by sacrificing the interests of some (Wang 1999: 282-283).

Historically these retention areas are lakes and low-lying land connected with rivers and therefore natural wetland. After the foundation of the People's Republic of China, these areas are diked to enable better control and efficiency of use. Most of the retention areas are controlled by floodgates and considerably contributed to the flood protection in China. However, development of settlement and economy has become the greatest impediment for the functionality of retention areas.

For instance, the retention area Mengwa upon the Huai River, which was flooded on 10 July 2007 has an exceptional population density of 724 per square kilometre (Wang 1999). The Chinese government has realized this problem and thereupon "Some Recommendations on Strengthening the Development and Management of Retention Areas" was issued in 2006. The recommendations are drafted by the Ministry of Water Resources, National Development and Reform Commission and Ministry of Finance "sufficiently incorporating the critics and recommendations of local government, relevant departments and experts" (Office of the State Council 2006).

According to this document the Ministry of Water Resources elaborates the current situation: there are altogether 97 retention areas which are listed for compensation in case of use. These retention areas cover 30.6 thousand square kilometres with a population of 15.95 million. Between 1954 and 2004 the most important retention areas have altogether been put into use 458 times and thus retained 1,230 billions cubic metres of water. These retention areas make it possible to implement the Chinese flood prevention strategy which intends to protect the important objects by sacrificing less important objects and to protect the whole by sacrificing the parts. Flooding is effectively controlled and the safety of important areas is ensured. This has made a great contribution to the flood prevention and disaster reduction according to the Chinese government ([www.gov.cn](http://www.gov.cn) 2006).

However, with the economic and societal development as well as population growth, many retention areas have been constantly developed and used, consequently the capacity of retention largely decreased. Today the management of the retention areas severely lags behind its economic development. Safety measures and structural measures to regulate floods are far from sufficient. At the same time, a large population is living inside the retention areas. The living standard of these people is relatively low on average. The mechanism of compensation and releasing is not completed. Once the retention areas are flooded, there will not only be great loss but also negative impacts on social stability. Retention areas have become an eminent weak point in flood control mechanism which urgently has to be improved ([www.gov.cn](http://www.gov.cn) 2006).

The guidelines of the central government of water resource management point out that a people-centred and scientific development ideology is essential. To “leave flood space and at the same time take appropriate risk” is a management concept which is to be set up. Flood control is to be transferred to flood management.

In the period of the 11th five-year-plan (2006-2010), management of retention areas is one of the most important tasks of flood control. It aims to increase the flood protection level to guarantee the safety of the population as well as to facilitate the development of the people in these areas into a modestly affluent society (Xiaokang Shehui 小康社会).

According to the preliminary statistics, recent safety measures in retention areas can only guarantee the security of 3.3 million people which covers only about 20% of the total population (www.gov.cn 2006).

The case of the retention area Sanzhou Lianyuan during the Great Flood of 1998 illustrates the challenge of retention areas and varying perceptions of different stakeholders concerning this issue as well as controversies of the top-down decision approach. The Great Flood of 1998 was a flood event which affected 29 provinces, autonomous regions, and cities in China and the death toll according to the official report exceeded 4,150 (Wang 1999: 31). Hubei province was one of the most affected provinces by this flood event. The most difficult decision-making that needed to be made during this event concerned the use of the Jingjiang retention area. Given the population of ca. eight million people living behind the Jingjiang dike, the use of the retention area of 5.4 billion cubic metres would have made many of these people homeless and the economic loss would have been immeasurably high (Interview 6, 7 September 2005). One interviewee described the dilemma of this decision:

“The Prime Minister Wen Jiabao [Wen, Chinese Prime Minister, was then Chinese Vice Prime Minister who was head of the SFCDRH in 1998 and the highest decision maker for the emergency management during the Great Flood] could not sleep the entire night. He was walking up and down on the dike and he said, if he decides not to use the Jingjiang Retention Area, he might well be a culprit of the history for thousands of years. Because if the retention area is not used, the dike may breach and cause the death of tens of thousands of people” (Interview 4, 6 September 2005).

From this statement one can observe how decisions like these are made by an individual in power, who consequently takes over responsibility.

In the end the central government decided not to use the Jingjiang Retention Area and made every effort to protect the dike. The consequence was that many smaller retention areas either suffered dike breach or had to be abandoned (Interview 9, 22 September 2005). Sanzhou Lianyuan was one of these abandoned retention areas; therefore, this case will be used to elaborate on decision-making in conflict situations.

A journalist of the China Youth Daily, one of the most important official newspapers in China, documented this controversial event (Liu 1998):

Due to the lasting high water level in Jingjiang, the Hubei Provincial Flood Control and Drought Relief Headquarters “felt impelled” to abandon the protection of Sanzhou Lianyuan, the biggest retention area protected by dike in Jianli county. It covered altogether 186.13 square kilometres and had a population of 60,000 people. The retention volume was ca. one billion cubic metres. Since the first flood wave passing Jianli County at the beginning of July 1998, the county government decided to take Sanzhou Lianyuan as one of the most important areas to be protected together with six other areas. On 5 August three of these protected areas had to be abandoned, however, the water level kept rising. “To **protect Jingjiang dike**, the main dike along the Yangtze and the safety of Dongting Lake and the **City of Wuhan**, Sanzhou Lianyuan which had not been flooded for 18 years had to be inevitably abandoned to ease the pressure”.

Direct loss of this retention area was about 5 billion Yuan (about 500 million Euros). On 8 August 2 pm the flood protection headquarters of the Jianli County received the order from the Hubei Provincial Flood Control and Drought Relief Headquarters to flood Sanzhou Lianyuan. The Governor of the County, Mr. Zhao, asked Mr. Liu, the party secretary of the Municipality of Jingzhou [Jianli County belongs to the administration area of the municipal government of Jingzhou], if the evacuation could be extended to the next morning, because there was only one road for evacuating local workers and people. It would be very difficult to complete the evacuation for flooding the retention area. But Mr. Liu said, the order must be obeyed and the evacuation had to be completed on time. The flooding time could not be postponed. After the evacuation was completed by 10 pm, the flood protection headquarters were surrounded by thousands of local farmers. They damaged some boats parking in front of the headquarters to show their anger that their homes were going to be flooded. About 400 farmers gathered on the dike where the breach was about to be made and only returned home the next morning. One farmer said: “We can protect the dike; we even gathered more than 2,000 sand sacks at our own cost.”

The county government decided to carry out the dike breach to flood the Sanzhou Lianyuan at 12 am on 9 August. But this had to be postponed to 2 pm due to the clash between the farmers and the police. Farmers did not want their land, crops, and possessions to be flooded and they even knelt on their knees to plead not to flood their homes “with great sadness”, reported the journalist from the China Youth Daily.

More than 70 farmers gathered on the dike holding spades and sticks to stop the police from breaching the dike. The police felt impelled to use fire weapons with rubber bullets to warn the farmers. Two farmers were injured which caused even more furious conflict, for the other farmers did not know that the bullets were made of rubber. Other farmers who had tried to harvest their rice which was not yet ripe in the field saw a bleeding farmer carried by four policemen. In the following, the situation between the same policemen, who had been fighting the floods together with the farmers for more than 40 days, and the local population turned

into a furious conflict. A 70-year-old woman even tried to stop the policemen by throwing herself on the dike.

A journalist asked one of the farmers: "When the county government and the village committee informed you about the evacuation, you agreed, didn't you?"

The farmer said: "We know that we have to sacrifice our 'small home to protect the bigger home', but when it comes to breaching the dike, we just cannot take it! Inside the dike are our homes! It is not because we cannot protect the dike anymore, but we have to breach it to flood ourselves, who of us can just do this?"

Farmers cursed the Deputy Governor of the county and the deputy chief of the police who were commanding the breaching. The conflict continued until a journalist cried: "For the interests of all, you shall sacrifice your own small homes. We are going to report your great sacrifice to all the Chinese people. The people will remember your sacrifice."

Finally the dike was breached at 3:05 pm. But as the farmers saw the water flowing into the protected area towards their homes, they were outraged again and rushed to the breach. Some of the farmers asked the policemen: "You come from Hunan province, don't you? Why don't you go to the other side of the river [on the other side of the Yangtze River in Sanzhou stretch lies a city of Hunan Province] and dig your holes there?"

The farmers were so upset that they were about to take Mr. Zhang, the head of the village Tuomu hostage. Mr. Zhang said: "I don't want to breach the dike. But as a communist party member, I have to obey the order. I don't mind people attacking me and cursing me. We all know that the dike breach is for the interests of greater number of people. Seeing the farmers cry I also feel their pain. They have been protecting the dike for more than 40 days. I feel terrible about it."

When the Deputy Governor of the County Jianli was asked to comment, he just shook his head and said in a sad voice: "I don't have anything to say". The Governor of the County Jianli wrote a report to the disciplinary committee, the party secretary and the Lord Mayor of the Municipality of Jingzhou:

"I have been supportive in the process of carrying out the order of flooding the Sanzhou Lianyuan. But honestly, I have to say, I don't completely agree with this decision. I feel sorry for those people who lost their belongings they built up for decades all at once. And I feel sorry to give up the effort in protecting the dike we made in more than 40 days. Although we have made all our effort, still we could not carry out the order of the Hubei Provincial Flood Control and Drought Relief Headquarters on time for different reasons. Being the head of the Flood Protection Headquarters of the county, I take the full responsibility. Some of the comrades reported me to the leaders in the municipal and provincial governments saying that I intentionally postponed the time of the dike breach, I don't want to make any comments on that."

A news report on the flooding of the Sanzhou Retention Area on the China Youth Daily on 11 August is the only report on this event. In response to it, the

Jianli County government disseminated 100 copies of this report and sent a letter to the China Youth Daily to express their gratitude for the realistic description of the event and telling the truth to the people (Liu 1998).

In the case of Jianli County a top-down decision-making approach which intends to ensure the interests of the majority (state and big cities) by sacrificing the interests of a minority (local community) shows its efficiency and strength in emergency management in protecting “more important areas” such as the City of Wuhan, but at the same time it reveals vehement conflicts between higher decision makers and local governments as well as the local population. The decision could be enforced, but the price is high not only in economic terms. Social injustice caused by this decision will significantly impact local people’s trust towards the government. As it is already stated by the speaker of the Ministry of Water Resources, flooding inhabited retention area has “negative influence on social stability”. Also, one interviewee expressed his concern about the controversy of this decision-making principal:

“Despite of the efficiency to protect bigger interests, we must recognize that the sacrifice of some of the regions or people could be immense. Sometimes it has indeed devastating consequences for affected people” (Interview 18, 7 December 2006)

However, this decision-making approach is perceived by local and river basin water management officials to be one of the “biggest advantages of the socialist system”, for this decision-making approach is deeply rooted in traditional Chinese culture.

The advantage and intention of such an arrangement is to keep “a holistic perspective (Daju Guannian) in decision-making” (Interview 2005/2006). “Holistic” means the “priority of the greater interest” according to interviewees in Wuhan and at the national level. The word “ju” (局) originally means a military unit (Editorial Department of the Shangwu Yingshuguan 1984: 0903). This terminology stems from Chinese chess game. It is a strategic thinking for sacrificing less important figures such as “soldiers” (which is an equivalent of “pawn” in European chess) to save more powerful and thus important figures such as “horses” to achieve the final goal of winning the game in the end. “Holistic thinking” (daju) is a popular vocabulary among interviewees in China. Hu argues the main difference between Chinese culture and Western culture is that the Chinese culture emphasizes a holistic approach whereas the Western culture cares more about “details”. Daju, a holistic perspective, is the focus of attention in Chinese culture. He names the following example on different expressions on time: Chinese always states the year in writing before stating smaller units such as month and date, on the contrary, the Westerners write smaller units in front of greater units such as month and year (Hu et al. 2005: 20).

This concept of “holistic perspective” is coupled with the concept of “ren” (仁), “benevolence”, the core of Confucian ethics and morality. It means interpersonal relations which are organized in a strict hierarchical manner. The persons at higher hierarchical level should be merciful in treating persons under their governance, in

return, persons who are at lower level of the hierarchy are expected to obey whatever they are required to do:

It is the feeling of compassion and its consequent expression in 'humaneness' which must be cultivated by the ruler if he wishes to become a true king to whom all the people in the world will turn (Allan 1997: 115).

This principle applies for family relations and the basis of Chinese society is family. Hu and Hermann-Pillath observe that most of the Chinese enterprises are family business (Hu et al. 2005; Hermann-Pillath 2000: 59). The importance of family and its internal relationship is also reflected in the differentiated and detailed ways of addressing family members. For example, the English word "aunt" has many different expressions in Chinese according to how the person is related to the others. The notion of family is transferred to the concept of a country. According to the Confucian understanding of the hierarchy the emperor is the son of heaven and his officials are the parents of the people. "Self-cultivation, foundation of a family, governance of a country and peace of the earth (齐家, 治国, 平天下)" are the order of a person's development. Foundation of a family is seen to be a practice of governance of a country. In other words, a country is to be governed according to the same principles of managing a family.

Whereas family and country are given a paramount significance, individuals are far less important. The interests of the individual are included in the interests of a group. Hu names another example: the word "I" in English is written in capital letter, but in Chinese "I" has to be written in a very modest way to stress the importance of the group and the country and at the same time minimise the meaning of an individual. It was a common way to address oneself with words such as "the humble person" or "good-for-nothing". Because of the central role of the family in Chinese society, interpersonal relationship around the family can be extended to people coming from the same town or village (Hu et al. 2005: 21-22).

Due to these traditional values which are still valid today, the top-down decision-making approach giving "bigger interests" higher priority than "smaller interests" is based on and justified through these values. Social expectation requires individuals to sacrifice their own interests and in return, this social expectation is strengthened through such events:

Values and meaning are not existing fixed terms, for which we just need to find a form of expression; rather, social meaning of a culture is construed through spectacular performances (Böhme 2006).

The case of Sanzhou Lianyuan is one of these spectacular performances. This is reflected in the title of the report: "The Sad and Glorious Abandonment". The words "sad" and "glorious" express exactly the moral of this story. Sacrifice is sad for the people affected because they lose their homes and even their livelihood; at the same time it is glorious, because this sacrifice is one of the social values held high by Chinese society. Thus, a tragedy is conferred the meaning of heroism. Social justice in Chinese society in the sense of a Western democratic society is not ensured by focusing on the individual's interests, but rather by moral obligation. "If

one is in difficulty, all are expected to help him out". This is the principle according to which sacrifice is compensated and justified. The society which benefits from individual sacrifice is in return expected to contribute to the recovery of affected people. Xiangruiyimo (相濡以沫), a Chinese idiom meaning "mutual help in difficult situations" (literally meaning "ventilate each other with his saliva"), expresses this spirit. However, this idiom stems from the classical Taoist philosophy and had a very different connotation in its original meaning. Zhuangzi wrote:

Once the water of the fountain dries up, the fish in the water are exposed to land. To ventilate each other the fish offer each other's saliva. Yet, it was better if the fish would be residing in rivers and lakes forgetting each other... (Chen 1983: 178).

However, the meaning of this idiom today evokes positive associations due to the change and adoption of different values. In contrast to the ideal of loosely organized Taoist society in which each individual takes care of himself and has no obligations towards the other societal members, the change of meaning of this idiom reflects a strong advocate of the evolution of values from more individual-based society structure to a hierarchical society with high social coerciveness. The social coerciveness of a hierarchical society and expectation of social obligation and solidarity, in return, it supports and justifies the way of life of hierarchies. Disaster is meant to happen to some people, but the social solidarity principle encourages and obliges the people who benefit from the sacrifices of others who offer their help. This shall weld the society together.

This notion of cultural reproduction depends on a specific human concept. Unlike the belief of the Western free market thinking that every human being is self-seeking, the Confucian concept of human beings believes that "man is born good" (Weggel 1997). Only based on this belief the Chinese value system can be functional.

### **Conflict between Different Departments**

Due to different duties of different departments they all have their own working focus. An interviewee gives an example: the Flood Management Agency in charge of the reservoir only cares about whether the dam breaches or not and if it has enough water to produce hydropower, but it does not care about the people's need for irrigation water or if they would be flooded. This is justified by the priority of the higher interests of all. They argue, if the dam breached, the loss would be much bigger for more people involved. It is common for the management to focus on the protection of the dams and dikes. But the agency for disaster mitigating activities puts people in the centre of their management strategy. They have to face the questions people raise such as "Why should we be flooded? If you didn't use our region as retention area to protect your dikes and dams, we wouldn't be flooded" (Interview 18, 7 December 2006)

The Water Management Unit often focuses on "water" as a technical term. The management's working objective is to keep water within the embankment. In the mean time the objective of the Disaster Relief Department is to ensure the safety of people and people's livelihood during and after the disaster event. Officials often



see the clear scope of work as an advantage for defining responsibilities, but they sometimes overlook the interdependence of many of the tasks in flood management. There is an obvious lack of interaction and communication between different agencies which impedes integrated water management. For instance, in Wuhan urban planning and flood protection and prevention are implemented by different agencies. These agencies are not interested in the other agency's "business", thus, each agency only takes its own objectives into consideration. Each agency takes care of its own working focus without taking into consideration the tasks and interests of the other agency, thus conflicts emerge (Interview 2005/2006).

The difference in working focus is also reflected in statistics generated by different agencies. For instance, the Agency for Water Management only registers casualties due to flooding. But if there is a wind storm, there are not only casualties due to the flooding, but also casualties due to the wind storm. Thus, the Agency for Disaster Relief registers all casualties during an event. Consequently, there are often different statistics between the Agency for Water Management and the Agency for Disaster Relief. The only way to find out whose statistics are closer to the real casualty rate is to ask lower administration levels such as the provincial and community level to double check the statistics (Interview 18, 7 December 2006).

"We all speak different languages and lobby different interests. No one is willing to take on the other agency's perspective" (Interview 18, 7 December 2006). Although there are consultation meetings between agencies, the situation has not been changed. Coordination and conflict reconciliation highly depend on higher officials' involvement.

### Conflict Reconciliation

Conflict reconciliation takes place in a hierarchical style. As the case of Jianli County shows, conflict is solved by way of moral obligation, order, and police force. Once the social coerciveness fails to oblige people to take the action as expected by authorities, a hierarchical order is put in place to enforce the implementation. If this order is questioned, punishment is one of the final steps taken, for instance, the Governor of the County Jianli was dismissed due to his hesitation in dike breaching. When local people resist the orders of the provincial flood protection headquarters, police force is initiated. There is no discussion or consensus finding process in an emergency case.

Even in daily water management situation the hierarchical structure is regarded as one of the biggest advantages of the socialist system in China by the water managers: "One should not **bargain** with the government. This is not like in Western countries. Once an order is issued, it will be implemented under any conditions" (Interview 1, 30 August 2005). Consensus finding is seen as bargaining and is considered to be selfish and therefore a negative trait of a human being. According to Chinese values one is not entitled to striving for one's right. Since altruism is expected from each individual, the act of striving for one's right is not encouraged.

Similarly, reconciliation of conflicts among different governmental agencies largely depends on the "mediation of the leaders": "If there is conflict, we all go to

the leaders. They are supposed to tell us what to do. The Prime Minister mediates between the ministries and the ministries can mediate between local officials. The key to conflicts is the mediating power of the leader. Without this mediation, governance would be very difficult in China. If the leader is determined to do something, then success is guaranteed, otherwise nothing can be achieved" (Interview 18, 7 December 2006).

Also the conflicts between stakeholders in different river stretches are "mediated" by "united management": "If the river crosses boundaries of provinces, the river basin administration is in charge of reconciliation of the conflicts. Local conflicts within a province will be solved by higher governmental levels. Thus, conflicts can be avoided within one provincial administration unit. Besides, we have the unified Flood Protection Law. From top to bottom, local governments are subordinate to the central government. There are local regulations; these have to be in line with the state's regulations. If they are conflicting with each other, the state's regulation overrules the local regulations. Some of the foreign countries always criticize China in the name of democracy; in fact, these countries are very envious of China. In China, a big project can be easily realized if the central government advocates it. This is unthinkable in foreign countries" (Interview 19, 8 December, 2006).

However, it can be observed that the strength of hierarchy has been weakened: "Before, we just disseminated the documents with red letter head [Red letter head has only been used by government when important official recommendations and orders are issued] with our recommendations, but today, this is not functioning anymore" (Interview 17, 7 December 2006). In addition to this challenge to the central government's authority, stakeholders try to postpone the execution of the flooding of their retention areas by using "excuses". The most frequent excuse is that they need more time to evacuate people.

"Changing local politicians' mentality" is recommended to be the solution to central and local conflicts. "The greatest challenge we are facing is to change the way of thinking of local politicians. If local politicians are not interested in disaster reduction, there is no way to improve their disaster management" (Interview 17, 7 December 2006). Suzhi (素质), "quality", which refers to a person's professional qualification as well as his/hers overall moral and value standard, is perceived to be a key word for the improvement of local politics and implementation of policies of the central government. This perception is not only valid for officials at national level, even at local level many water managers see the insufficient "quality" of the cadres as a big obstacle for the "correct understanding" of the central government's policy and consequently impair its implementation. The implementation difficulty of the major shift "from flood control to flood management" in water management is considered to be caused by the lack of "quality" of local managers rather than the mismatch of policy and local conditions. The quality of a person's character, especially the moral standard, is seen to be essential for "correct" implementation of China's water policy. It is the local level and the executive individuals who are to be blamed for difficulties in implementation. Thus, the local level officials are the main actors which have to change or improve their behaviour by raising their qualification and moral standards. Suzhi, the "quality" of an actor, is

to be blamed instead of the latent weakness of the system itself. There is no wonder that suzhi has become a national blame for almost every failure of the society. "Raising the quality of the cadres and citizens" has been one of the major societal goals for many years in China.

### **"Scientific Evidence" as an Important Decision-Making Criterion**

Beck states, the current discussion in the Western world on environmental destruction is only or at least dominantly based on natural science paradigm. It is largely misconceived that the "impoverishment formula" also has a social, cultural, and political meaning. Beck calls it the "technocratic and naturalistic" (technokratisch und naturalistisch) approach. But this approach is blind to power and distribution structures, bureaucracy, currently valid norms, and rationalities (Beck 1986: 33). This description of the technocratic approach in Western world coincides with the statement of Chinese water management officials. Decision-making based on "scientific evidence" is a strong feature of decision-making in Wuhan and among other management levels:

"Which retention area is to be used depends mainly on the safe retention capacity. First of all, the retention has to be efficient; secondly, we choose places which have the smallest potential for human and livelihood losses, (...); thirdly, we take into consideration the existing engineered construction. For instance, we raise the question of whether the retention area is gated or not. Once the plan has been made, the leaders have to give their go" (Interview 4, 6 September 2005).

From this statement one can observe that a decision is determined by two dimensions: the political dimension which is simplified as the proof of higher officials, and the "scientific dimension" which is considered to be an objective and value-free undertaking. The criteria in this statement are clear: retention capacity, casualty, and economic loss and the existing engineered measures. These criteria can all be translated into figures or technical terms.

Rayner summarized the way how hierarchical culture deals with risk as to formalize it like all the other themes (Rayner 1992). This behaviour pattern is very eminent among the interviewees in water management. When asked about what can be done to reduce flood risk in Wuhan, flood managers often have very similar response as follows:

"Flood risk reduction is just to relocate flood water in different retention areas; decide which reservoir will be used for what purposes; to implement the emergency plans for flood management; consultation to the higher leaders; to collect information of dangerous situations and respond to it..." (Interview 19, 8 December 2006).

Science seems to be entirely neutral to assess risks and therefore free from any blame. At the same time science becomes also a strong instrument to justify the government's behaviour in assessing, managing risk, and their decision-making. If science is a moral-free, objective device, then it is science which is to be blamed in case of failure. Furthermore, science can also be an instrument to stabilize authority, because experts always know better and it is the expert who has access to science and the justification to act accordingly. If science would be questioned

as it is constantly done in Western societies, then discourse had to be allowed and authority would be challenged. Therefore discourse is not encouraged in order to strengthen authority.

Similar to the Chinese risk managers, the proponents of the 104th US Congress' regulations on risk management advocate extensive risk assessments because the regulations have to be based on 'sound science'. Slovic criticized that this language reflects the 'traditional narrow view of risk and risk assessment based 'only on the best reasonable available scientific data and scientific understanding'. He argues technical analysis is essential for better information, more consistency and accountability for risk decision. However, addressing risk conflicts with more science is more likely to enlarge the conflict (Slovic 2000b: 410-411).

While many Western scholars strongly advocate the approach of "taking the naturalness out of natural disaster", Chinese water authorities still emphasize the "naturalness" of a natural disaster and therefore support their risk management strategy using "pure" scientific paradigm: "Flooding is inevitable, because it rains when it rains, no one can stop it. It is a **natural** phenomenon" (Interview 25, 19 December 2006).

Since conflict reconciliation in China is reduced to be mediation of higher officials and agencies as well as administrated in form of an order, conflicts are often hidden. But not talking about conflicts does not eliminate conflicts. Once conflicts have to be solved by police force, social stability is heavily impaired. Science based on instrumental rationality can be used as an argument to support the top-down approach. However, blind spots due to this approach can lead to further problems.

### **Risk Distribution in Decision-Making**

Based on the principle of interest priority, risk distribution is clearly defined according to criteria of population density and economic status. This leads to externalization of flood risk in urban areas which rank high in terms of population and economic considerations. Flood risk in the City of Wuhan is assigned to the retention areas located close to the city and retention areas in upper and lower reaches of Yangtze River. The city is protected by dikes. Dikes, as a result of development of technology, are not only used for protection, but also as an instrument to channel risks. This inevitably leads to conflicts of interests. As revealed from the statements of the interviewees and the example of the retention area Jianli County which was flooded to protect "more important objects such as the City of Wuhan", conflicts emerge despite of moral obligation of affected communities and people. Nevertheless this approach is perceived to be the most rational way to distribute risk and whose acceptance of stakeholders is not questioned: "The safety of the City of Wuhan should certainly be guaranteed by all means. The other areas can take more risks. Flooding one or two counties in rural areas is not a big deal. We have to take a certain risk and we can calculate risks and see which region can take which risk" (Interview 6/7 September 2005). Douglas states:

If some degree of risk is inevitable, suppressing it in one place often merely moves it to another. Shifting risks may be more dangerous than tolerating them, both because those

who face new risks may be unaccustomed to them and because those who no longer face old ones may become more vulnerable when conditions change (Douglas and Wildavsky 1983: 197).

In the City of Wuhan one can observe that the confidence in dike and retention areas as safety measures against flood risk is quite strong amongst local flood risk managers. A dike breach scenario within the city area is unimaginable for them. They do not take this into consideration in their agenda: "The dike will never breach. Even if it is about to breach, we have to protect it with all efforts even with our lives and do not allow it to happen. This dike has been stabilized after the Great Flood 1998. One can say it is unbreakable" (Interview 6, 7 September 2005). The overconfidence of dike protection leads to lack of preparedness of flood risk through dike breach. Externalizing risk distribution jeopardizes both the City of Wuhan where inhabitants and local managers completely rely on transporting risk to other areas and the retention areas that are not flooded on a regular basis, for people living in these areas are often not aware of the risks they are facing. Especially in retention areas such as Dongxihu, which has never been put into use since its construction in 1957 (China Water Resources News 2007). "Local people living in retention areas are often not aware that they are living within a retention area which can be flooded in case of severe flood events to ensure the safety of more important protection objects" (Interview 4, 6 September 2005). Thus, risk distribution has become an ever challenging undertaking.

However, this externalizing risk distribution is again justified by cultural tradition. The interviewee of the Ministry of Water Resources argues:

"In China it is not like Western countries that people risk to live in flood prone areas in order to make more money due to its cheap real estate prices. If they are flooded, they require financial aid paid by all tax payers. In China people have to live in retention areas, otherwise they cannot make a living at all. This is like a family with two sons: if one son gets a better land protected by dikes, another son has to farm in high risk locations. Once flood occurs, the son with safer land is obliged to help the son living in a high risk area. The same applies for people in retention areas. Once a disaster occurs and their land has to be flooded, then they will get help from all over the country. This is our **culture**" (Interview 16, 6 December 2006).

The dilemma is that this principle functions well if everyone obeys this cultural rule. But in reality the interests of affected people are far from being protected through moral obligation. Without a legal mechanism, compensation solely based on and enforced by moral obligation is not ensured.

### Public Participation

There are local managers who seem to be at a loss as to how to respond to public participation when confronted with this topic. This shows that public participation is indeed a new concept to many of the local flood managers. They are more used to the traditional way of coping with flood which focuses on engineered measures and dike protection during flooding events.

Other water managers perceive public participation to be a new concept of decision-making which is not completely in line with the traditional Chinese culture. The flood managers in Wuhan who are very sceptical about this approach argue:

“We don't have too much public participation in our country. This is due to our thousand year old culture. People are willing to be guided and led. The relationship between people and government is a relationship of leading and being led. People don't want to make their own decisions. They have been used to it since thousands of years” (Interview 4, 6 September 2005).

Traditional culture here refers to the Confucian tradition which dictates the behavioural pattern for different hierarchies: lords rule over their subjects and the fathers rule over their sons (君君臣臣父父子子) (Song 1985: 51).

An emperor who has the ‘Mandate of Heaven’ (天命 *tianming*) should govern over people and the people should follow whatever the emperor requires from them. A Chinese saying states: “If the monarch wants his subjects to die, then they have to die; if a father wants his son to die, his son has no other choice than to follow his father's will.” Luan (亂), chaos, has always been the most fearful thing for the Chinese rulers. Lucian Pye, as cited in Cultural Theory (see Chapter F), elaborates:

Following on ‘the intense Chinese fear of luan, chaos, disorder and confusion, they turn to ‘the classical Confucian assumption that all will be right with the world if everyone conscientiously performs his or her assigned role (Thompson et al. 1990: 228)

This feudalist behavioural model evolved, especially after the New Culture Movement in 1919 in China, when feudalist ideas were challenged by Western democratic thoughts. Democracy and modern science are seen to be the greatest challenge to traditional Chinese culture. However, compared to the rapid development in scientific research, democracy has largely lagged behind when it comes to influencing Chinese society. China's feudalist societal form was long lasting and its hierarchical structure is deep-rooted. Decision-making of an individual in a high position replaces rule of law and order. The hierarchical structure in China is well-established. During the Qing-Dynasty (1644-1911), for instance, there were nine different ranks amongst the officials and even regulations on official clothes, food, housing, and transportation for different officials. Even today, ranks in Chinese society play an important role which maintains the functionality of a hierarchical societal structure. This is reflected in how people with different titles are addressed. Unlike in Western countries where only academic titles such as Dr or Professor are the common titles with which the respective person is addressed, in China also people with different positions are addressed according to their ranking. For instance, if a person has the position as head of an agency, he is not called Mr. so and so, but called “head” plus his family name e.g. “Head Li” (Hu et al. 2005: 32).

Due to this well-established strict hierarchical approach which is still valid today in China, water managers do not see any need to involve the general public into the decision-making process. Also the understanding of public participation differs:

"The implementation of public participation is sometimes very difficult, for instance the collection of the flood protection fee. According to the Chinese Flood Protection Law, people living in flood prone areas should submit a flood protection fee. But in the lower reach of the Yangtze River, there is no problem with flooding, but more problems with drought. They do not see any point in financially supporting flood protection. Farmers do not need to pay a flood protection fee, but they have to provide their labour for free" (Interview 9, 22 September 2005).

"Public participation? Yes, we also practice public participation. During a flood event, whoever one is, as long as one has a job and belongs to an official unit, one has to participate in flood fighting. In Wuhan, during the Great Flood 1998, every company, every governmental agency has to send people to protect the dikes. This is compulsory for employees. We involved tens of thousands of people to protect the dikes." (Interview 25, 19 December 2006).

It is obvious that public participation is understood by flood managers from the perspective of hierarchies. Involving the public means that people are assigned with obligation and tasks instead of being entitled to express their opinion and protect their rights. This is a specific way of framing public participation within Chinese cultural context. It is a typical top-down decision-making approach. Public participation is understood in a way that the authorities tell people what they have to do and people should take it as an order and follow.

Another reason for lack of public participation also has cultural roots. The individual is understood as part of a group. The concept of group in China is understood as a certain professional entity or a neighbourhood (Interview 20, 11 December 2006). Since there is no private ownership in China, individuals are all bound to a collective. Public participation in China does not mean participation of individuals but their representatives who are always part of the government.

But yet, demand for public participation has been growing. The leading Chinese environmentalists have demanded for more public participation in environmental issues:

Social democracy requires that people must have the right to know (...) the environmental crisis that is happening; socialist democracy requires that people must have the right to monitor environmental issues, especially the right to monitor the public projects which have an impact on the environment; socialist democracy requires that people must have the right to participate in environmental issues, especially in the making of strategies concerning environmental security ... To develop environmental culture will lay an important cultural foundation for the evolution of the socialist democratic system (Yang 2005: 60)

Nevertheless, the question remains as how long it will still take for this approach to penetrate flood management which has a strong technical background.

### **Sustainability Aspects**

In decision-making processes the concept of sustainability in development strategy is not taken as an important criterion. The main arguments are:

"Western countries have passed the period of rapid (economic) development; therefore they can afford to think about sustainable development such as how to use natural resources in a more rational way. But China's main task is still to feed billions of people, we have to use land in an intensive way, this is why the retention areas are still partially densely populated" (Interview 21, 11 December 2006).

"Talking about sustainable development is still much too early for China. We cannot even ensure the interests of this generation, let alone the next generation. (...) It is inevitable to repeat the mistakes of the developed countries. If people's livelihood is endangered, there will be social chaos. This is very detrimental to societal stability" (Interview 16, 6 December 2006).

"China's greatest contribution is to feed 1.3 billion people. Irrespective of how the others talk about CO<sub>2</sub> emissions, ecological change or environmental pollution, no one can deny this contribution to the world. No other country is capable of it, not the Europeans, not the Americans. It would be a real disaster on this planet if our 1.3 billion people would go starving or become asylum seekers" (Interview 17, 7 December 2006).

"We must develop economy first so that we have enough money to pay attention to the environment later on" (Interview 11, 27 September 2005).

Several messages in these statements are worth highlighting:

Sustainable flood mitigation is only possible after economic development has reached a certain standard. To ensure the economic development, retention areas have to be utilized for agriculture and industry. Different stakeholders and actors show great willingness to pay the price with environment and unsustainable practice in water management:

"Even in the retention area Dujiatai [Dujiatai is the retention area which has been flooded 20 times since its construction in 1954 (Research Group of Retention Areas (2006))] it is impossible to give up agricultural activities. In New Zealand the land close to the volcano which erupted recently has been given up. If this would have happened in Wuhan, we would have bought the land immediately to plant trees. We cannot give up production within the retention areas and let it be idle. The purpose of flood protection and retention is to ensure production and development. Like human beings, one would not stop eating only because one could choke on his food. As long as water doesn't come, we must keep farming, otherwise it would be a waste of nature" (Interview 12, 27 September 2005).

Furthermore, economic development compromising sustainability is seen to be the only option to ensure social stability which includes "feeding" the people. Sustainable flood management is even regarded as a risk for societal stability, for the people living in retention areas would lose their livelihood.

In regard to sustainable development issues almost all interviewees have more or less a defensive attitude. This is probably due to Western media coverage which has been criticizing China for its environmental problems. In response to it, interviewees always try to put this critique in perspective by actively relating their



statements to “the Western countries” and highlighting the different conditions in China. Among these conditions population size seems to be the most frequently mentioned and emphasized variable.

Population is perceived to be the greatest challenge in flood risk management. Due to the population size and density of the City of Wuhan, flood risk has to be distributed to the less populated rural areas. But even the retention areas which are situated in rural areas are populated. Population growth and consequently economic development in retention areas have been long lasting since the 1950's. The continuous construction of “secondary dikes” created a landscape assembling scales within retention areas. Due to the population growth, more and more dikes have been erected expanding protected areas for agricultural land use. In the last two decades urbanization and industrial development have been taking place rapidly which has made engineering flood protection even more essential. Therefore total population and population density on flood plains in China is seen as the main reason for the unshakable importance of engineering measures:

“...We do not have any other choice due to our huge population. We have too many people and too little land. We cannot allow water to flow rampantly like the Americans or Europeans. They have a lot of land but not many people, so they can leave water flow rampantly. If we would do the same thing, we have to flood all our cities such as Yichang, Shashi, Wuhan, Nanjing, and Shanghai. This is unthinkable” (Interview 25, 19 December 2006).

Flood management seems to be caught in a vicious circle: the larger the population becomes, the more economic activities are generated. Consequently the higher the respective area is ranked as protected objects due to its potential human and economic losses. Flood management authorities see no other option than strengthening engineering measures. Sustainable flood management seems to be an unrealistic requirement under these local conditions.

The policy shift “from emphasis on structural engineering solutions in shuili (water management) enterprise to a broader resource-defined concept of ‘re-source’ water management (ziyuanshuili)” took place in 1999 (Boxer 2001). In early 2003 the State Flood Control and Drought Relief Headquarters and the Ministry of Water Resources of China explicitly pointed out that a shift “from flood control to flood management” should be implemented in China in regard to flood management (Cheng 2006: 75).

Despite of this new approach in water management which has been advocated at national level, change in decision-making has hardly taken place at local levels. Interviewees have strong scepticism towards the implementation of this new policy. They believe that there will not be a great change in flood management strategy in the near future. Engineering measures will stay the dominant component of flood management. Structural measures are far from being “saturated” in comparison to Western countries. Local flood managers doubt if this policy shift would find enough acceptance and understanding among local flood managers.

### 1.3.b Cologne, Germany

#### The Central and the Local

In Germany the counter flow principle (Gegenstromprinzip) in flood management decision-making processes greatly contributes to easing the tension between stakeholders. This aspect is well reflected in spatial planning which is one of the most important flood preventive measures in Cologne.

There are different levels of planning processes and authorities including the European Union, the federal level, the federal state level, and the community level. EU as the highest level of legislation does not give any concrete instructions. This is called subsidiary principle [According to the subsidiary principle a national task shall be implemented by the units at lower administration levels under the federal administration. The state shall only intervene, if communities or federal states are no longer in the position to cope with their difficulties. According to the Article 36 of the European Convention, mobilization of the European Union is only allowed, if the tasks ahead require EU's intervention and its member states authorize the EU to do so, for example, in the case of the conservation of fish population in the North Sea. This principle aims to avoid extreme European centralism and to strengthen a people-centred approach (Bundeszentrale für politische Bildung 2005)] according to which each country is responsible for itself to take concrete measures in flood protection. At the national level and the federal state level the laws on spatial planning provide guidelines for drafting the regional plan in each respective region. The regional plan obliges communities to follow its guidelines once the plan is approved by the regional council. In the mean time, the communities are involved throughout the entire planning process. For the regions Cologne, Bonn/Rhein-Sieg, and the river basin Erft alone as many as 211 stakeholders were involved in the planning process for flood protection aspects of the regional plan which was approved in 2006 (Bezirksregierung Köln 2006a). These stakeholders include communities' representatives such as mayors, relevant technical departments, NGOs, energy enterprises, chemical industries, fishery branch, and conservation agencies. "All actors and stakeholders who are somehow affected spatially are involved" (Interview 33, 25 January 2007). And according to the administration law every stakeholder can apply to participate in the planning process. Depending on the relevance of the stakeholder the regional council decides if the applicant would be taken into consideration (Interview 33, 25 January 2007). This principle applies also at the community level. The community has to involve its citizens into the process of creating the zoning plan and development plan.

Extensive public participation in the planning process largely eases tension between stakeholders, especially between different administrative and political levels. It is based on democratic principles and provides all stakeholders from the upper administrative and political level such as national and federal state level, to the lowest administration and political level such as the community level as well as each individual to voice their opinion. The interests of individual citizens and community autonomy (Kommunale Selbstverwaltung) are taken seriously and justice is the focus of this approach. Due to the regional council which consists of local politicians, the communities are given great power to lobby local interests. Although

this approach cannot eliminate all conflicts, it endeavours to find consensus and common acceptance of the final decision among all stakeholders.

However, the process is very time-consuming and costly. There are official regulations on how long the plan draft has to be made accessible to the public and how much time stakeholders are given to express their concerns in a written form etc. Often such a process takes years to be completed, which is even becoming more longsome due to the complicated laws and regulations issued in the recent years.

The most recent regional spatial plan of Cologne on flood protection aspect was approved by the regional council in 2006. The preventive flood protection spatial plan was initiated officially (Einleitungsbeschluss) in May 2004. In June, information materials were sent to 211 stakeholders who were involved in the process. They were supposed to submit their written comments and proposals within the following four months. But the deadline had to be extended to 20 December 2004 due to the heavy internal work load of different communities. Altogether 310 comments and proposals for changes were put forward. These comments and proposals were summarized and then sent to all stakeholders involved on 15 August 2005 with compromising recommendations (Ausgleichsvorschläge) by the regional government along with the invitation to the public hearing. The public hearing took place on 3, 4, and 7 November 2005. The objective of the public hearing was to find common denominators of the stakeholders. The results of the public hearing showed that stakeholders were able to achieve consensus among most of the proposals. 232 out of 310 proposals and comments have been accepted by all stakeholders. 78 of them could not be resolved. It was agreed on at the public hearing that the stakeholders and the respective regional spatial planning department should endeavour to reach consensus for the remaining differences. Finally the regional council had to decide as how to proceed about it. The decision of the regional council was issued on 31 March 2006 (Bleeker et al. 2006).

The decision-making process is a long and consensus-based one. In the mean time the administration has been slimmed down. There is a lack of personnel in implementing this democratic approach. "Democracy has touched its limits" (Interview 33, 25 January 2007).

The democratic election system seems to be a tricky factor which also has to be taken into consideration in practice. If the plan draft is submitted before the local elections, the local politicians who are also the regional council members are under pressure to give flood protection a greater priority. Considering the flood events in the last two decades, flood protection has gained more attention in the political agenda through media coverage. On the one hand spatial planning follows strict rules and administrative regulations; on the other hand, there is still informal practice which requires the personnel's sense for the window of opportunity and skill in enforcing their interests, since windows of opportunity is one of the keys to enforce flood protection measures.

Some actors perceive the long decision-making process as a disadvantage of the democratic system. They describe these political and administrative bodies as “babble unions” (Laberverein) which take long time to reach a decision:

“It gets very critical once a decision has to be made within a political body. There are endless discussions. And then there will always be one more board, one more appeal, one more legal process, one more judgment which extends the planning process again and again. And there are ever more people coming to express their opinions. This is something which makes things really difficult” (Interview 32, 26 October 2006).

Under these circumstances the centralistic system is perceived by some stakeholders to be more efficient and more adequate to flood management (Interview 32, 26 October 2006).

### **Conflict of Different Interests**

The most significant conflicts of interests expressed by interviewees are the conflicts between different stakeholders at local level. These conflicts are reflected in the consensus finding processes for technical flood protection measures such as dike construction and retention areas.

To protect the City of Cologne from flood events of 100 year reoccurrence, new dikes in the outskirt of the city have been planned (Der Oberstadtdirektor 1996). The plan of the construction of the new dikes and flood walls had to go through a plan-approval procedure (Planfeststellungsverfahren). Stakeholders such as the farmers union, conservationist organizations, and citizens' groups were heavily involved in this procedure through written documents expressing their opinions and public hearings. Also individual citizens could attend the public hearing and even used a lawsuit to enforce their objection against this project. It can be observed that the main conflicts are the interest of industries, conservationist, citizens groups, and the farmers' union as well as individuals.

For instance, in the planning process for the new flood protection wall in Cologne the location of the flood protection wall has to be planned in such a manner that the existing big trees could remain. But in reality, these trees had to be cut down in the end because the construction damaged their roots. Otherwise these trees could cause a huge damage, if they eventually fall due to their unstable roots. The decision to cut down the trees could only be made within a short process, because the construction had started and the damage to the trees has been made. The project manager concludes:

“In fact, one could have decided from the very beginning that these trees have to be cut down. But this opinion would not find any supporters. It wouldn't have worked out the other way. Now the damage to the trees has to be compensated. The compensation will be calculated. But that is all which has to be done to get the permission. It was in fact a short procedure. But if one had tried to cut the trees from the beginning, it would have been very difficult” (Interview 27, 18 August 2006).

The president of one of the citizens' groups added: "With the animals it is the same story. I was at the public hearing. The Greens [the interviewee refers to "Die Grünen", the German Green Party] always shout, 'the animals, the hedgehogs. These animals must have their exit' [in the flood wall]..." (Interview 27, 18 August 2006).

The long plan-approval procedure is seen by some stakeholders to be partially caused by the impediment of the conservationists who are perceived to have a strong voice in the decision-making process.

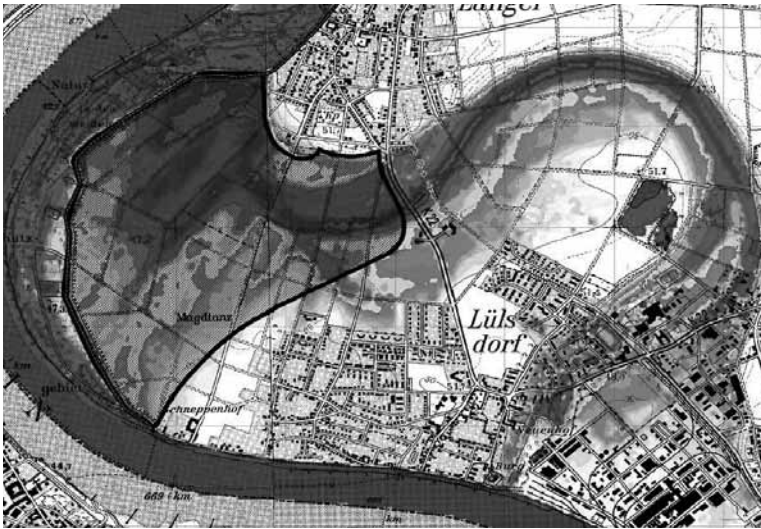
Some of the interviewees state that some individuals also held up the process, because they initiated lawsuits for different reasons. Examples are related to the changed landscape due to the construction. Interviewees named cases like obstruction of the river view through the flood wall or some individuals wanting to keep their path to the river which will cause high costs in construction (Interview 27, 18 August 2006).

However, the Conservationists' Union has quite a different perspective. The concern of the Conservationists' Union is to gain as much "natural" retention areas as possible. These retention areas should not be gated so that the flora-fauna habitat can be maintained in a natural state which allows the healthy development of the biotope. They advocate that the flood protection wall should be built as close as possible to the settlements. This will avoid further construction of the existing settlement and in the mean time leaves more space for the river and flora-fauna. The conservationists also regard the physical separation of the retention area from the settlement through flood wall construction as a problem. They argue that the flora behind the flood wall may or may not be able to adapt to this change, for they are not flooded on a regular basis any more. The biotope will have a different development than before. Especially the mammals which live along the river side will not be able to escape in case of flooding events due to the construction of the flood wall.

The interviewee of the Conservationists' Union Cologne complained about how little their concern is taken into consideration during the planning of the technical flood protection: the plan "has changed its course" in the process. At the beginning, the water management intended to build up the flood protection wall as far as possible from the river, so that more retention area could be maintained. But "the pressure from the farmers and the inhabitants led to the result ... that in the end the flood protection line lies very close to the River Rhine" (Interview 30, 21 September 2006).

The inhabitants are perceived to be very demanding. They do not want to have the flood wall "just in front of their windows" for instance, because they are afraid that the people taking walks along the Rhine on Sundays would "disturb their Sunday's peace", if the flood wall would be built up too close to their houses. Wealthy inhabitants are perceived to have more access to power which makes it easier for them to enforce their interests:

Map 7: Planned Retention Area



Source: Stadtentwässerungsbetriebe/Hochwasserschutzzentrum Köln  
(Flood Protection Centre Cologne 2005)

"That is a rather posh district where influential people live. Some of them are in the City Council [of Cologne] or at least they have easy access to the Council, so [they can enforce their interests]..." (Interview 30, 21 September 2006).

The Farmers' Union is also seen to have a very strong lobby and therefore enforces their interests easily. In the case of the relocation of the dike between Zündorf, Niederkassel, and Lülsdorf (see Map 7), the Farmers' Union in Cologne showed their strength in pushing their interests through. The conservationists support this plan, for they could regain an area for flora and fauna. However, this plan encountered strong opposition from the farmers. There were more than a dozen of farmers who initiated lawsuits against this relocation and they were supported by the agricultural chamber. The conservationists cannot expect any support from the local politicians, because they rather take the farmers' side in order not to lose their voters. The success of the plan would mean unemployment and this will have a considerable impact on local politics.

The option of buying the land from the farmers fails, because the farmers would only sell their lands at a very high price which the community is not willing to pay or is not able to afford. Private property is protected by law. Without the voluntary compromise of the owners of the land, only a long-lasting and complicated legal process could dispossess the owners under specific conditions.

In the end the plan had to be changed to meet the requirements of different stakeholders.

The interviewee of the Conservationists' Union in Cologne perceives certain powerlessness in enforcing their interests in terms of political support:

"In regard to conflicts between the development of settlements and the protection of field hamsters, politicians find the question laughable. The conservation of the nature is rather unimportant" (Interview 30, 21 September 2006).

Comparing to the farmers' unions the conservationists consider their lobby to be "weak". "There is no comparison between the lobby of the farmers' unions and the lobby of the conservationists. Our frustration is unimaginably high" (Interview 30, 21 September 2006).

The reason why the farmers' unions have such a strong lobby is understood to be the down-to-earth image of the farmers; in comparison to this, conservationists feel they are not taken seriously.

Conservationists perceive the farmers in Cologne to be too "stubborn":

"All other people have to react to the changes flexibly in the course of their career, but the farmers are very narrow-minded, they either see their cows, then they want to have green land, or I [farmer] try to sell my sugar beets as expensive as possible. Or I [farmer] don't know, maybe I [farmer] should grow barley or wheat, or corn as fodder. But it won't come into their minds that they also could earn their money with other jobs and they have to be flexible in life, this is not the case with the farmers" (Interview 30, 21 September 2006).

Farmers see their existence endangered through the technical measures and retention areas. It is more than "being flexible" in life and it is about losses of tradition and life style. In addition to this they think they contribute to landscape conservation without generating extra costs for the community (Interview 29, 13 September 2006).

The conflicting interests of the farmers and other stakeholders concentrate on land use. The areas identified as retention areas are often agricultural land. Once the land is identified for retention, there are double losses to the farmers to whom the land belongs. First, they risk losing their harvest through the flood events. Second, their land use is constrained. The expansion potential of farming activities and construction are ruled out. In the early days farms were often situated close to the Rhine. These farms were particularly affected due to the construction constraints in retention areas.

The constrain for construction consequently impacts the value of the real estate and banks where farmers take loans to finance their farming businesses, and also reduces their loans because of the value losses of the land.

The Farmers' Union argues that the identification of retention areas sometimes also leads to losses of agricultural land, because the conservationists use this chance to raise the value of the land for nature conservation. Agricultural lands are again reduced due to landscape planning and landscape development considerations.

Through technical flood protection measures such as the construction of flood walls, there is a double reduction of agricultural land. Generally, engineering flood protection measures are constructed on areas which have not been used for other construction activities, therefore it is the agricultural land which is used for flood protection constructions. These structural measures reduce farming land and in addition to it, the land is reduced again through the compensation for "altering nature" through these structural measures. According to the Landscape Conservation Law (*Landschaftsgesetz*) of North-Rhine Westphalia (2005), compensation (*Ausgleichsmaßnahme*) has to be made. The implementation of it largely affects the farmers, for compensation means to reforest some areas within agricultural land. Often the compensation for the altered nature is not practiced according to a one to one proportion based on the law, but rather one to 1.5 in practice. There is a lack of consensus on compensation calculations between conservationists and farmers. The lack of consensus on compensation for altering nature increased the tension between these stakeholders and consequently farmers tend to "fight for every square metre of land". This problem is encountered by another compensation procedure which shall reimburse a parcel of land to farmers. Usually, the City of Cologne provides lands for the reimbursement from its own property. By doing so, the farmers who own their own lands are not affected by such technical flood protection measures which are constructed on their lands in term of size of land.

However, while private ownership is protected, the tenants in no way enjoy such a remedy. Especially, in some parts of Cologne 70% of the farmers are tenants. These tenants have much less entitlement to protect their rights in flood protection issues comparing to those of land owners. The tenants are affected again if the land owners decide to sell their lands to the City of Cologne for flood protection purposes. In fact the land owners often belong to a hereditary community and are interested in selling their lands in order to share the money, for they do not make enough profit from the rent that they receive. In such a case the tenants lose their land and are deprived of their livelihood. The window of opportunity for flood protection is seen as a constraint to the development for farmers. Because the new retention areas are mostly identified directly after a flood event, local politicians are under pressure to take action to protect citizens. The argument that the collective interests should be given priority is so strong when the memory of the flood event is fresh that the decision is often made in favour of the interests of the community as such by limiting land use of the farmers (Interview 29, 13 September 2006).

"It does not always make sense to start a law suit, because it is weighted between individual interests and community interests. If the individual will not lose his livelihood, it is not very likely that the decision will be in favour of the farmers" (Interview 29, 13 September 2006).

In some cases farmers contend that they would have enough time to evacuate their horses from the retention area once a flood event occurs. Nevertheless, it is not allowed to build barns within the retention area.

At public hearings farmers often complain that flood protection which leads to the reduction of farming land and only contributes to the flood protection of other regions should not be their concern. The farmers say:



“Which arguments does the Municipal Government of Cologne have to carry out flood protection measure using our land for other cities? They have nothing to do with us. The communities in the upper reaches of the Rhine should do more. In Sieg, in Florienz, but not in front of my own door” (Interview 29, 13 September 2006).

This characteristic of farmers is described often as “small-minded”.

The tension between conservationists and farmers is strong. The political standing points and perspectives are different. However, there has been a change in recent years. Conservationists and farmers have found their common denominator. They defend their common interests against industrial and commercial land use. The conservationists also realize the value of the landscape maintenance through agricultural activities. There is a tendency that farmers and conservationists collaborate more and more (Interview 29, 13 September 2006).

However, farmers perceive their image to be conservative in the eyes of conservationists and they have different understanding for nature conservation than the conservationists. Conservationists “only see the compensation in favour of nature conservation but ignore the livelihood of the farmers. The farmers are bounded to their location and they need their land to produce. If conservationists strive for ever bigger compensation for altering nature through construction and try to convert agricultural land into a recreation area under conservation protection, the resistance of farmers can be very strong. They fear for losing their tradition and their life style as farmers: “The farm will decline and I cannot pass it to the next generation” (Interview 29, 13 September 2006).

In relation to the Farmers' Union the conflict of interests has a simple constellation: on the one hand, inhabitants blame the city government for not carrying out enough flood protection measures in the past and allowing construction in flood prone areas. This has put the city government under pressure to undertake flood protection measures. On the other hand, farmers fear for their existence and resist any of these actions. Conservationists try to do something good to the nature but often overlook farmers' livelihood and life style continuation.

On the whole it can be well observed in the regional spatial planning process that industries try to keep as much land as possible for construction to serve their expansion purposes; farmers fear for losses of their land and insist on their farming tradition; conservationists want to gain as much retention area as possible to achieve their ecological goal; individuals have their own concerns and pursue their rights. Most interestingly however, governmental agencies do not necessarily support the interests of the government, but rather the interests of the respective agencies. Therefore, the environmental protection agencies strongly advocate sustainable development and their interest are in line with the environmental NGOs.

### **Conflict between Different Agencies**

In general, the cooperation between the agencies in Cologne is perceived to be good. However, there seemed to be some conflicts between the local and national

agency such as the Federal Institute for Hydrology (BfG) and Flood Information Centre (Hochwassermeldedienst).

There seems to be a lack of communication between BfG and the Flood Information Centre and they see themselves as competitive agencies for flood forecast. One interviewee described the relationship between the local flood management and the other two agencies as a triangle relationship between a man and two women:

"This is an interesting relationship. It is like a triangle relationship of a man with two women. The women do not know anything about each other. (...) The BfG supports the local flood management in Cologne, but this displeases the Flood Information Centre, because the Flood Information Centre uses different rainfall and run-off models compared to that of the BfG. We are using the same model as BfG which is developed for us by BfG. As a result we can produce much more precise forecasts than an agency which has to provide 30 different forecasts. Officially we have to be in line with the forecasts of the Flood Information Centre. However, until now we could always argue that we had to do the forecast much earlier than the colleagues in Flood Information Centre. I have to admit that they have improved their work today. But we should talk to each other and agree on the same forecast once the water has reached a certain level so that we have the same voice. This was not always the case, for instance in 2001 and 2003" (Interview 26, 23 December 2005).

The reason for the lack of consensus is interpreted by the local flood management as the arrogance of the directorate of the Flood Information Centre. This "arrogance" leads to the belief that the Flood Information Centre can forecast the flood events in a very precise way which is technically impossible according to the opinion of the local management. The local management in Cologne highlights trust among the actors and stakeholders in flood management and therefore advocates for a flood forecast which is not as precise as the Flood Information Centre's but lies in a safe range to maintain trust. Due to these different approaches a conflict emerged (Interview 26, 23 December 2005).

This conflict reveals different considerations of different agencies. For the Flood Information Centre it is important to forecast the flood events using all technical supports as precise as possible, but for the local management the local conditions including the trust of the general public and media are important aspects which guarantee the success of flood management. Trust is seen to be paramount in local flood management. Based on these considerations different approaches are taken.

Among the local agencies conflicts are mainly caused by competition and question of authority. This issue will be analysed in the chapter E.2 "Flood risk communication".

### **Conflict Reconciliation and Representation of Interests**

Different interests are represented and lobbied through public participation and lawsuits. In fact, communication between different stakeholders greatly contributes to conflict reconciliation. The role of communication is emphasized in conflict

reconciliation and is seen to be the most important instrument to find consensus. This communication takes place in a horizontal direction and on a voluntary basis.

Given the tension between the Flood Information Centre and the Federal Institute for Hydrology due to their competitive roles in flood forecasting, the local flood management of Cologne took the initiative and arranged a meeting with the BfG and the Flood Information Centre to talk about the problems. This initiative reveals that discussion between actors is seen as an option to solve the problems. Higher authority is not involved before the agencies have tried to find their own solutions:

“First of all we speak to each other among ourselves. We don't want to go to the board of directors (with our problems). That would be the last step which could be taken. If it becomes necessary, we'll have to do it” (Interview 26, 23 December 2005).

As can be learned from this example, one is not relying on higher authorities to reconcile conflicts but rather takes his own initiative. Individual initiative is encouraged in German culture and likewise, individuals are given the opportunity to play their role in society.

Communication also takes place between agencies and NGOs as well as individual stakeholders. The Farmers' Union perceives the city government to be very supportive towards the agricultural sector. The government on the other hand endeavours to find consensus with farmers.

“It does not make any sense to do something against the will of each individual. It is more reasonable to consider everyone's interests. Therefore, the willingness for negotiation exists from the very beginning” (Interview 29, 13 September 2006). The city government not only provides the farmers with the information they require, but also works with the farmers to find a solution to the problems. Both sides emphasize the importance of “harmonious relationship”, especially because the farmers are bounded to their locations and the experience with the city government will impact the next generations. They believe in mutual understanding and consensus. Whenever the farmers need information or wish a meeting, the city government or the department which is in charge of flood protection is always ready to talk with them. And often they meet at the farmers' to gain a picture of the location to better understand the farmers' needs.

Apart from the public hearings, the farmers can take part in and have their say; they can also use legal instruments to lobby their interests if they are not wholly taken into consideration. Since the legal process is time consuming and costly, usually they just initiate the legal process and then ask for suspension. By doing so, they can postpone the plan-approval procedure and put the counterparts under pressure. The construction project will be more costly if it has to be interrupted by legal processes. Therefore, the farmers gain more potential to negotiate with their counterparts in an extra judicial negotiation process.

### **Risk Distribution**

According to the current Water Resources Act (WHG), constructions in flood-prone areas have to be compensated with retention volumes equal to the amount of water which is reduced through the construction. Construction can only be carried out if it does not have any negative impact for the people and communities located in upper and lower reaches (Bundesgesetzblatt 2005). Field interviews show that the stakeholders in Cologne are aware of the problem of risk distribution; especially the HSZ strongly advocates internalization of flood risk through creating retention volumes. The internalization of flood risk ensures justice and harmonious relationship amongst stakeholders in different river reaches. Also due to the consensus-based decision-making process risk distribution has caused much less tension and conflicts.

### **Public Participation**

Based on the field data public participation in Cologne is implemented mainly in information dissemination and planning process.

Actors perceived by the Flood Protection Centre in Cologne include individual citizens, firms, and restaurants which need consultation for flood protection measures and information on flood events and development, as well as governmental agencies both at local, interregional, and international levels. The HSZ emphasizes the importance of involvement of the general public and other respective agencies in terms of information, cooperation, and consultation. The information issue will be looked at in more details in chapter E.2 "Flood risk communication".

Regional planning, which is an essential instrument for preventive flood protection measures, also has an extensive programme to involve different stakeholders in order to voice their interests. Decision makers and stakeholders carry out a dialogue through written proposals and public hearings with mutual respect and are on an equal footing.

However, the problem caused by extensive stakeholder involvement is often an important reason for complaints about the slow decision-making process. This seems to be a general issue within the democratic and federal political system.

The case of the "Leybucht" in Ostfriesland the weekly newspaper "Die Zeit" reported on, showed parallel to the problem mentioned above. The coastal protection construction was supposed to be strengthened after the inundation in 1962. However, the effort to take into consideration of the conflicting interests of conservationists, fishermen, tourism industry, farmers, and the coastal protection agency resulted in a consensus finding process taking more than 40 years. The conservationists wanted to keep this bay as the last untouched bay along the North Sea coast and a space for the wild geese and avocets; fishermen wanted to keep a passage to the sea; tourism industry would like to have a romantic harbour; the farmers needed a sewage system for inland whereas the coastal protectors were in need of a retention area and an increase in the dike height (Grefe 2006: 29).

Also, the dike construction in Himmelgeist cannot be carried out due to the lawsuit of one single resident. This is a clear reflection of the German democratic principle. Individual's right is well protected (Everts 2005).

Field interviews show that in Cologne these stories are repeating themselves in the same way.

### **Sustainability Aspects**

In general, sustainable development is a well-established concept within the interviewees, though all seem to be aware of its challenge in implementation:

"If I mark the location as flood-prone area in the Regional Spatial Plan, then this will certainly be a kind of limitation for the development and land use of a chemical factory which is located in this place. But that is the very reason why this place has to be marked as flood prone. One should not only see the economic development, one should also see the damage potential in a flood prone area. Once a flood event occurs, the damage will be even greater" (Interview 26, 23 December 2005).

This statement demonstrates the determination of the Flood Management Agency in Cologne to cope with flood problems with a consistent preventive approach. However, the interviewee also sees the difficulty in implementing this approach, as big industries have their own lobbyists in Industry and Trade Union as well as in administration due to their great economic influence. The only possibility is regarded to be the "personal steadiness" of the flood managers who persist their flood protection goal whatever resistance they face.

Nevertheless, one can observe the change of the role of sustainability aspect. One interviewee explains: more emphasis is put into sustainable aspects today, for environment has a high priority in decision-making nowadays. Also, one has to admit that the birth rate in Germany is low; therefore conflicts between economy and ecology are not as strong as in other countries with a high birth rate. Due to the economic situation in the recent years many communities have heavy debt burden and therefore cannot generate new investments. No new industrial or commercial areas are planned. Also the shrinking of population eased the pressure on ecological conservation, for there are less people who want to build homes. Under such circumstances conservationists have good chances to lobby their interests (Interview 33, 25 January 2007).

### **1.3.c Synopsis**

#### **Central and Local**

China's economic reforms have resulted in a growing disconnection between the central and local governments. The economic reforms require decentralization; consequently the provincial and the sub-provincial units enjoy extensive autonomy. The intention of the central government often has been distorted by the time it penetrates the provinces (Yang 2005: 61). This structural weakness in the political and administrative system can be well observed in regard to flood management especially during non-emergency periods. The mismatch between policy and local

implementation resulted in “local protectionism” and construction of “secondary dikes”. As a consequence, the development in retention areas has been uncontrolled and the potential losses due to the uncontrolled economic development have been increasing rapidly. The construction of “secondary dikes” is a historical legacy of the “Great Leap Forward”, as well as a reaction to the requirement of the provincial and central government for economic growth. The Chinese saying describing the central local relationship explains this: “At the top they issue the policy, on the bottom we have our countermeasures”. This also explains why the policy shift of flood control to flood management faces a great challenge in its implementation. However, population pressure seems to be a strong argument why there exists the discrepancy between policy and implementation and why secondary dikes have been built to ease the pressure for housing and livelihood. This is a common perception amongst interviewed flood managers. The settlement and uncontrolled economic development within retention areas not only jeopardizes the people living in these areas and their livelihood, but also causes potential conflicts between stakeholders and therefore impairs social stability.

In Germany the subsidiary principle leaves the local communities to practice autonomous administration and therefore the community interests are well protected. The counter flow principle (Gegenstromprinzip) greatly contributes to the implementation of the policies and regulations through extensive involvement of different stakeholders. The resistance from the community is far less strong than in China, though communities also strive to gain more construction land to promote economic development. Certainly, it should not be ignored that the population development in Germany has a decreasing tendency. Also the lack of new investments due to the economic situation in the last years has eased the pressure on new construction land. Spatial planning as an important flood prevention instrument therefore has good conditions to regulate the land use in retention areas as well as construction in protected areas behind dikes.

### **The Issue of Conflict of Interests**

In Wuhan, China, the conflict between central and the local government is caused by principle of risk distribution: “State interests are superior to community interests that are superior to individual interests”. Due to this principle risk is distributed according to the criteria of economic importance and population density. Thus flood risk is externalized mainly to rural areas and areas of less economic significance to protect big cities and the urban elites. However, these less important areas have been experiencing rapid economic and population growth after the economic liberalization starting from the late 1970s. Consequently this conflict is amplified by the mismatch between policy and its implementation at local level as well as the legacy of the “Great Leap Forward”. One can say that the conflicts between stakeholders both at administrative and individual levels are preassigned through the risk distribution principle.

In Cologne, Germany, on the contrary, risk is distributed according to subsidiary and counter flow principles which entitle communities to represent and protect their interests. The interest of individuals, especially those of land owners, is largely protected by law and order.

In Wuhan, conflicts are mainly between farmers and flood risk management which always represents the will of the government. But in Cologne there are different interest groups such as nature conservationists, farmers' unions, citizens' groups and the flood risk management which does not always represent the interest of the local government. Therefore, conflict emerges very often between different governmental agencies as well as between the political and the administrative levels. The Cologne Flood Protection Agency, for instance, represents the interests of flood prevention and protection, whereas urban planning takes economic promotion of the city more into consideration. There is a check and balance in decision-making process to ensure that all interests are taken into consideration.

In China, the administration and the party politics are identical, thus the decision of the flood risk management is always in line with the politicians. Also different agencies all speak with the "same voice". When asked who else could be an interesting interview partner one interviewee told the researcher: "You don't need to talk to the other agencies, they won't tell you anything different".

In Cologne the democratic system allows the conflict reconciliation to take place in a participatory manner involving all stakeholders. Even among the agencies horizontal communication is seen to be the key word to resolve conflicts within the administration. The tension between stakeholders is far less fierce in Cologne, comparing it to the one in Wuhan. It is more a question of how the best option can be found and how different interests are best balanced.

However, the efficiency of the top-down decision-making process and the risk distribution principle are perceived by risk management agencies in Wuhan to be a great advantage of the "socialist system" despite of the conflicts. The problems caused are often overlooked. In Cologne due to the extensive involvement of stakeholders the long-lasting decision-making process is a common complaint amongst interviewees. Some of the interviewees wish for a more efficient decision-making process and more hierarchical structures.

Another feature of decision-making stands out: in Wuhan decision-making, both before and during flood events, is a political decision, because it involves flooding retention areas which are populated; in Cologne the decision as how retention areas are defined before flood events is a highly political process, but yet the decision-making during a flood event as which measures are to be taken is mainly technical.

Despite of all differences, flood risk managements in Wuhan and Cologne share some commonalities in conflict issues. In both cities there is competitive behaviour of different agencies. The competitive behaviour results in problems in cooperation and information sharing.

### **Technocratic Mentality**

While the Chinese risk managers in Wuhan highlight the objectivity of science for all decisions and show strong belief in technical solutions, the German interviewees in Cologne reveal far less trust in pure engineering measures, though this kind of mentality is first observed by Western scholars such as Ulrich Beck. It seems

that hierarchical culture tends to bureaucratize everything and the technocratic approach coincides with this tendency, therefore, the Chinese instrumentalize objectivity of science to justify their decision-making behaviour.

### **Public Participation**

Little has been done to involve the general public and stakeholders into decision-making processes in Wuhan. Stakeholders are not necessarily actors in decision-making processes. There are mainly two reasons for this: first, the agencies have a very different understanding of public participation in comparison to the Western conception. It is often understood to be obliging the general public and different stakeholders such as other governmental agencies to join the dike protection. Second, public participation as understood in Western democratic framework is perceived to be not in line with the traditional Chinese culture.

On the contrary, in Cologne public participation is the indispensable element of the democratic system. Every decision should be based on agreed criteria between individuals and society. The German sociologist Renn states: "Public participation" has become a fashionable word in decision-making. It is not only a normative goal of democracy but also a requirement for rational decision-making under uncertainty (Renn 1998a).

The interviewees see it as a matter of course and an integral part of the decision-making process. Though a pettifogging mentality is often criticized and seen to hamper the process. Nevertheless, consideration of public concerns and insights not only facilitates successful outcomes but also encourages consensus and trust (Irwin 1995: 68).

### **Sustainability Aspects**

It holds true that China has a big population which is a great challenge for the flood management, especially in adopting preventive measures such as spatial planning. It is also true that China has not reached the development standard of Western countries. However, there is evidence that the unbalanced priority to economic development sacrificing sustainability is not solely due to the "development stage" as the interviewed Chinese officials refer to. Lieberthal observes that "it is fair to say that China now has a greater environmental crisis than any other country in the history of the human race at a comparable stage of economic development" (Yang 2005: 53).

However, China has been firm on its right to development. Former Premier Li Peng stated in his speech at the Rio Summit in 1992: "For many developing countries, their primary task is to develop the economy and eliminate poverty". Jiang Zemin, then China's president, named economic development and poverty eradication as "a basic prerequisite for ensuring sustainable development". China is lacking the political will to follow sustainable strategy "because economic growth is crucial to the legitimacy of the CPC's [The Communist Party of China] rule after the collapse of communism as the ideological faith in China" (Yang 2005: 63).

The empirical data proved these observations to be true. Most of the interviews insist on the argument that sustainable flood management is not realistic for



China, because China still has to push its economic development forward before sustainability could be given priority. Population is perceived to be the greatest challenge to sustainable flood management. The main concern is to “feed” the people rather than to reach sustainability.

In Cologne, sustainability in flood management is understood as the nature oriented development of the flood-prone areas. Fauna and flora are given significant importance and its conservation is supported both by governmental environmental agencies as well as NGO conservationists. In Wuhan, however, these aspects are not yet taken into consideration. Chinese water management agencies advocate strongly the technical flood protection to ensure the economic development. Their mitigation strategy is in line with the political need for economic development. This is due to the hierarchical structure of the management and the intermingling of politics and management. Water management is not an independent entity from the political sphere, but rather an executive organ for it. Unlike in China, the German water management is entitled to make its own decisions and due to this independence it also often lobbies its own flood protection interests in terms of retention areas or construction permissions. This explains why in Cologne people at administrative levels often have different opinions than local politicians (see Chapter E.1.2).

Western scholars, such as Ulrich Beck, question the benefit of modernity and try to look into the issue of the limit of rationality. Beck states, with the commence of and within the risk society, the linear rise of rationality has reached its limit. This is understood as mechanization, bureaucratization, economization, and Verrechtlichung [this term shall express the meaning that action potentials in all societal areas within a modern society are defined and constrained by law, order, standardization, etc. Verrechtlichung is part of bureaucratization which goes along with social welfare and safety. One of the reasons for it is that more and more political decisions are not made at political level but rather made at legal level according to interpretation of law (Bundeszentrale für politische Bildung 2007)], which eventually end up with jams in the sense of general infarction of modernization in all possible manifestations and societal areas (Glaser 1997: 505). However, the Chinese still seem to stick to the idea of modernity which is to bring them prosperity and well-being.

### **The Decision-Making Dilemma**

Observing the decision-making principal, the processes, and the consequences, a salient difference between the conceptions in Wuhan and Cologne can be identified. In Western culture there is a classic dilemma which has been debated over by philosophers, thinkers as well as other intellectuals. This dilemma is summarized by André Comte-Sponville's question: if you had to condemn one innocent (or torture a child, as Dostoevsky frames it) to save humankind, should you do it? Both Kant and Comte-Sponville negate this option: “For if justice and righteousness perish, human life would no longer have any value in the world” (Kant 1887: 196). Comte-Sponville states: this is where utilitarianism reaches its limit. If justice were merely a contract of convenience, a maximization of the collective well-being of almost everyone, to sacrifice the few without their consent and even if they were perfectly innocent and defenceless. That, however, is just what justice forbids, or should

forbid. Rawls, drawing on Kant, is quite right in this respect: justice is worth more than well-being or efficiency, and is better than either, and must not be sacrificed to them, even for the happiness of the greatest number (Comte-Sponville 2000).

The current debate on whether the federal state of Germany should be allowed to shoot down a hijacked air plane by terrorists in order to ensure the security of the country again showed the persistence of the Kantian philosophical tradition (Seils 2008).

Confucianism which has left its deep imprint in Chinese culture advocates the contrary morality. For the sake of the happiness of majority it is taken for granted that interests of individuals should be sacrificed. Based on this fundamental difference of cultures, the decision-making principle, process, and consequences in Wuhan and in Germany are also entirely different.

#### **1.4. Perception of General Public by Risk Management Agencies**

##### **1.4.a Wuhan, China**

In Wuhan interviewees describe mainly two different reactions of the general public to flood management procedures. Before flood events the people are not always cooperative in case of relocation or removal of constructions within the retention area between the river and the embankment. In some cases people refuse to move out of these areas and in other cases people intentionally construct houses within an area which is supposed to be used as retention area in order to get compensation which will largely exceed the value of the construction. Especially in rural areas in Wuhan this is reported by interviewees to be a common practice of farmers: "'Growing houses' makes more money than growing crops" (Interview 1/5/8 2005).

This again reveals problems which emerge in the process of law and policy implementation. People develop informal strategy to cope with their difficulties.

However, during flood events the general public is actively involved in flood fighting. Interviewees see willingness and solicitousness of the people, because "the safety of the city is also their own safety" (Interview 1, 30 August 2005). "People's war" is the common expression to describe the participation of the general public in flood fighting both observed in Chinese media and field data.

"People's war" refers to the flood fighting scenario in the past flooding events in Wuhan as well as in all other regions in China. During the Great Flood of 1998, 6.7 million people participated in flood fighting along the Yangtze River in order to protect the dikes. It is a popular picture in Chinese media that an "ocean of people" is standing on the dike transporting sand bags. "The Great Wall of people" consisting of the general public and the army withstanding flood shall symbolize unbreakable strength. In fact, the term "people's war" origins from the times of war. Especially during the Japanese invasion "people's war" was a strategy of the CPC to mobilize the masses to fight against the Japanese army. It is obvious that flood fighting is perceived to bear an analogy to war.

In Wuhan the dike is monitored by different amounts of people according to the rise of the water level. During the flood period all private and state enterprises and units of state agencies are involved in flood protection:

“Whatever they are working on, they have to leave it aside to participate in flood protection. Whether they are doing business or working for the government, during the flood period they have to participate in flood protection” (Interview 25, 19 December 2006).

The dike protection largely relies on the monitoring of the dike by the general public. Each firm and each agency is assigned with a stretch of dike to monitor. In flood free periods a professional dike inspector is in charge of a stretch of three to four kilometres of dike. Once the water has reached the cautious level, other people apart from the inspectors are involved. Five persons are assigned to monitor the dike at cautious level every kilometre; this will be increased to 20 persons at warning level and 50 people at the guarantee level which is the most critical water level expected. Time intervals of dike inspection along the respective stretches are once in an hour at the lowest water level, once in half an hour at the middle level and 15 minutes at the highest level. Once the water level exceeds the highest expected level (29.73 metres), the dike has to be inspected constantly.

The participation of the general public in flood fighting is enforced by order and motivated by different activities. Mostly young staff members are chosen for dike inspection and protection, for they are physically strong and are considered to be more suitable for such a task. Participants are perceived to be understandable and willing, for “flood protection is about public safety and it is everyone’s duty”. To give a further incentive participants are awarded money and honoured as “heroes”. Food, visits, and even entertainment programmes are organized to convey appreciation to the participants. Especially after 1998’s Great Flood, even participation in dike inspection itself was seen to be a form of entertainment. “People sit there watching the flood and are fascinated” (Interview 25, 19 December 2006).

The participation of the general public in flood protection is highly moralized. The motivational activities are instruments to moralize and mobilize people’s participation. Heroism and “people’s war” have the clear message to see flood protection as a war against flood. Slogans such as “we swear to survive or perish with the dike” or “protect the dike with your lives!” engraved on the marble “Monument of Life and Death” along the Yangtze River stretch in the City of Wuhan manifests a strong military style of flood protection. Amongst the interviewees in Wuhan this belief that flood protection could be guaranteed by mass participation of dike protection is well pronounced. However, the concept of the “people’s war” or the strategy of the “ocean of people” has been challenged by some scholars who argue that this approach does not meet the requirements of societal and economic development any longer; the mobilization of a huge amount of human resources inevitably impacts on the functionality of societal and economic activities (Wen et al. 2002: 42).

### 1.4.b Cologne, Germany

#### Public Perception of Entitlement (Anspruchsdenken)

In Cologne public perception of entitlement is strongly pronounced which causes complaints of agency personnel involved in flood management.

"(...) the public perception of entitlement is very annoying. In Rodenkirchen, a quite rich district of the City of Cologne, the landlords just stand there and watch how the Fire Brigade lays sand bags. The voluntary Fire Brigade is also working there and they are not even paid for it. They, of course, are extremely unhappy about it. The landlords just make their comments and give their advice without doing anything themselves, this... it is a quite rich district and many wealthy people are living there" (Interview 28, 21 August 2006).

The interviewee interprets this behaviour of the inhabitants as a result of helplessness in emergency cases and the feeling of entitlement. On the one hand, the City of Cologne is optimally protected and there is usually no need for the citizens to deal with unexpected events; on the other hand, people assert their claim to protection measures because they believe that is the very reason why they pay taxes to the state.

The perception of entitlement also manifests in the construction behaviour of the inhabitants. Real estate close to the Rhine is very attractive to the landlords. To enjoy the beautiful scenery of the Rhine they want to construct their houses as close as possible to the river. People who are better off are perceived to be more insistent in their claims. They put themselves at risk, while at the mean time they claim their rights to be protected by the state. Paradoxically some of the inhabitants also refuse engineering flood protection which may impair the river view, whereas others want to have the flood wall or dike as high as possible to guarantee maximum safety. This heterogeneous and contradictory behaviour is observed by many interviewees.

The perception of entitlement reveals a typical feature of an individualistic society. However, the Farmers' Unions perceive great understanding of farmers for flood protection. Although they do not need any further engineered flood protection measure and these measures will take their land away, they still are not against flood protection in general. Also because they are farmers and are bound to the location, therefore they want to keep a "harmonious relationship with their neighbourhood" (Interview 29, 13 September 2006).

### 1.4.c Synopsis

The German Farmers' Unions in Cologne contend that they are being supportive to preventive flood protection, although the other actors blame them for being unwilling to offer their land for flood protection purposes. In Wuhan, the flood management agencies report that the farmers often have informal practices to hinder flood protection measures.

The significant difference between Wuhan and Cologne, however, is the perception of the flood management agencies on the attitudes of the general public. In Wuhan, the general public is perceived to be willing and solicitous for the participation in dike inspection and dike protection which are understood as the most important element of the flood protection. The general public participation is seen as indispensable for flood protection. It is highly moralized through heroism ideal and associated with the national heroes in the war against the Japanese invaders (1937-1945). On the contrary, the flood management agencies in Cologne perceive the general public to have a strong sense for entitlement and unwillingness to help during the flood events. Although this behaviour is addressed by many interviewees, it is not demoralized. One can observe that flood protection in China has a much wider political and moral dimension.

## **1.5 Human Nature Relationship**

### **1.5.a Wuhan, China**

The field data in Wuhan revealed diverse notions of human nature relationship among the interviewees. Almost all interviewees expressed their unified general understanding for human nature relationship:

“We must have a harmonious human nature relationship. We emphasize the harmonious coexistence of people and river. We should leave the river a space to flow” (Interview, 1/2/4/5/7/10/20/21/25 2005/2006).

However, the approaches differ as to how to regain and maintain the “harmonious” human nature relationship. The following statements are some examples:

“In everyday life we must protect our rivers by proper way of production. First, we must protect the environment around the river. We should stop land degradation and increase soil maintenance; second, we must protect the river bed and third, if we construct on rivers... we should not change the natural state of the rivers. But for the flood protection we can build some reservoirs or some hydro-power stations. ... But we should not damage the health of the rivers too much” (Interview 19, 8 December 2006).

“Giving river more space means to improve the quality of the dikes to a certain level and create more retention areas. This is the most obvious reflection of the harmonious relationship of man and nature. It is very simple” (Interview 25, 19 December 2006).

These statements have a clear message: harmony of man and nature or water should be achieved by providing water more space to flow and by environmental protection. But yet harmony with nature does not rule out engineered measures, on the contrary, engineering measures are seen to be indispensable for maintaining the harmony.

Some others emphasize the importance of science's contribution to the harmony with nature:

"We must look at the relationship between man and nature from a scientific point of view. It must be harmonious. In relation to flood protection, harmony means flood protection with scientific methods. For example, if the water level is 25 metres, we should arrange three shifts on duty [for dike inspection]. After the flood protection capacity has been increased, we won't need three shifts any more. Of course, we should not be too self-confident" (Interview 3, 2 September 2005).

"Harmony is very important and science shall deepen the harmony between man and nature" (Interview 11, 27 September 2005).

This shows again the strong rationalistic belief of Chinese water managers. Science is a universal device and ultimate solution to every problem. It also shows the clear focus of flood fighting ideology. Scientific arrangement for flood protection is understood as dike inspection with different shifts.

"We didn't pay enough attention to the relationship between constructions and the environment. Now we should pay more attention to the natural scenery. Then everything will look more natural" (Interview 8, 21 September 2005).

"We have not taken much into consideration the harmony of man and nature in terms of flood protection. The safety of Wuhan is ensured on the whole. After 1998, the state invested lots of money to build dikes. We have just experienced a big flood, so it won't come again within the next decades. Therefore, the environmental problem is the focus now. ... From the planning perspective, relocating the people in the old city district is the most important thing to create the harmonious ecological environment between man and water" (Interview 10, 26 September 2005).

Apart from the misunderstanding of flood risk probability of one of the above interviewees, both of the interviewees interpret harmony with water or nature as an aesthetic and "natural" appearance of the city. One can observe that the new dikes and flood walls in Wuhan are constructed in such a way which is not only functional to serve the purpose of the flood protection but also correspond to the specific Chinese understanding of nature. The area between dike and river is turned into an artificial park to provide people with entertainment facilities such as fitness training equipments etc. (see Picture 1). Nature has two fold manifestations in Chinese culture. Nature can on the one hand be something "untouched". In the mean time nature can also be an allegory of nature itself. A Chinese garden often has Bonsai or Taihu stones which are not nature itself but shall have the function to create an allegory and symbolize nature. The coexistence of these two concepts of nature often causes confusion as to what the Chinese concept of nature is. The researcher has found out that the interviewees in Wuhan do not seem to differentiate between these two concepts of nature. Consequently, the understanding of harmony of man and nature may cause the same confusion. There is also a pragmatic way of thinking:

"In the relationship between man and nature sometimes humans are the focus, sometimes nature is the focus. The considerations differ: if the conflict with nature

Picture 1: Dike Area in the City of Wuhan



Source: Shen (2005)

is small, the Confucianism is more useful, because it dictates the relationship between human beings and the relationship between people and the state. Taoism takes human nature relationship more into consideration. Usually, we begin to re-think the relationship between human and nature once the conflict is more tangible and fierce" (Interview 21, 11 December 2005).

Harmony with nature is not seen as a concept which requires consistency. The pragmatic approach tends to adapt to change and avails itself of different schools of thinkers such as Confucianism and Taoism.

Sceptics think the concept of harmony of man and nature is not viable for the near future:

"It is very difficult to realize the harmony of human and nature/water. This idea is good, but, first, it is not easy to change people's mentality, second, we must first develop engineering water management. Only after a certain level of engineered measures has been reached, we can think about water resource management. The minister of the Water Resources thinks that we have reached that level, but I personally hold the opinion that we are far from that level. Even the minister of Water Resources does not intend to implement the transition now. Within the next 10 or 20 years this transition won't take place. On top of it, this transition intends to use the flood as natural resources such as irrigation or hydropower. To do so, one needs the engineered construction to be the foundation for it" (Interview 4, 6 September 2005).

"Harmony with water or nature is a new slogan. But it is not realistic. ... In the end, dikes are the balance point between man and river in the course of the fighting against each other" (Interview 4, 6 September, 2005).

"Harmony between man and nature is too big a topic. To me the harmony between man and river is the safety of flood protection. ... It is to reduce the flood risk as much as possible. We cannot eliminate natural disasters, but as human beings we must use our capacity to reduce disasters. The harmony between man and water also means that we have to do everything to control it. If water comes, we try to control it by all means. Nature punishes human being; human being shall not wait for death. We shall fight with it" (Interview 5, 7 September 2005).

The sceptics have a distinguished affection for technical solutions in flood management and therefore a pronounced masculine approach to human nature relationship. Altering nature for the benefit of man is taken for granted as a proper behaviour of human. Defying nature as a Maoist ideology during the Chinese Cultural Revolution has not completely vanished. Especially at the local level many interviewees cited Mao's idea of conquering nature and fighting flood with engineered measures: "Endless is the joy to defy nature".

In relation to "secondary dikes" (Zidi) an interviewee states:

"In fact, the State should strengthen engineering protection. We should protect as much as we can and we are determined to exceed our limit to protect these areas, otherwise we'd have too much economic loss. For instance, there was a great economic loss during the flood event in 1954. The main reason for it was the **lack of engineering measures**. The loss in 1998 was small, because we could rely on engineering measures. Don't you see that all the high officials in our history are officials who are successful in flood management!?" (Interview 5, 7 December 2005)

This again shows a strong belief in engineering measures. Traditional flood management has not only forged the ideology of risk managers today but also become an integral part of Chinese civilization and culture. Even today, risk managers have kept the confidence in managing flood with engineering measures. They believe that the dikes and reservoirs would guarantee them a bright political career like Yu (also Dayu, meaning the Great Yu), the famous King, once had.

Dayu is a household name in China and the myth about how he coped with flood disasters has left its imprint in China's flood management approach. The official website of the Chinese Ministry of Water Resources published a series of articles on Chinese Water management history to celebrate the World Water Day. One article states:

The Great Yu is the symbol of the spirit of the Chinese nation. The significance of Great Yu's water management is a part and parcel of the long Chinese history and it is also the peak of our civilisation (Ministry of Water Resources 2007).

Dayu, the Great Yu, was the first successful flood manager in recorded history for water management, though this story should not be understood to be the equivalence of the biblical story of Noah's flood. Rather it is comparable with the



European myth of the creation of the world. In the time of Yao, the first Chinese ruler, the world was flooded. After a couple of failures in flood management Yao appointed Yu to cope with the flood problems. Yu dug channels to direct the water into rivers, so that the water finally flowed into the sea. The success of Yu made an agricultural society a reality, for the world becomes inhabitable for man. Thus it is the beginning of Chinese civilization like Mencius depicts:

The world was generated long ago; there is a time of order, and then a time of disorder. When it was the time of Yao, water flowed counter to its current and inundated the central states. Snakes and dragons lived in it. The people had nowhere to settle. Those in the low lands built nests and those on high, made cave dwellings. The Documents say, 'The deluge is a warning to me.' By 'deluge', it means 'water everywhere.' (Yao) had Yu control it. Yu excavated the earth and channelled it to the sea. He drove away the snakes and dragons, banishing them to the grassy marshland. The water moved along courses on the earth; these were the Jiang (Yangtze), Huai, He (Yellow River), and Han. The dangers and obstacles receded. Only then did people obtain level land to live on (Allan 1997: 40).

Yu's achievement is seen as the foundation for the livelihood of the Chinese people. His method is to channel water to the sea following the "way of water". Mencius elaborates the "way of water" as taking advantage of its natural tendency to flow downward and yield to obstacles. Thus, Yu controlled water by following water's natural inclination (Allan 1997: 40). However, today this myth is conferred with different meanings:

The management approach of the Great Yu reveals a vivid picture of how our ancestors **fought** [all bold letters in this citation were marked by the author of this thesis] with flood. It also reflects the **unyielding fighting** spirit of our people in the course of **conquering** nature. His fearless spirit of **fighting** flood and his great achievement of water governance has been praised and handed down over generations. This spirit provides people with courage to **fight** flood disasters (Ministry of Water Resources 2007).

Apparently this is a very masculine way of framing Yu's water control method. The words "fight" and "conquer" reveal an extremely strong tendency to claim an "enemy and I" relationship. Flood is seen as an enemy which has to be fought against. In fact, in modern Chinese language, the metaphor referring to flood as a monster is commonly used.

The Great Yu is an important symbolic figure in Chinese culture. He symbolizes human power to change nature and marks a turning point of human nature interaction from pure passive adaptation to active cultivation of nature. Yang states:

Confucianism emphasises the regulation and ordering of the non-human environment for the food of human society and has been dominant in traditional Chinese culture. Its influence is determined by the fact that China 'has long been at the mercy of natural disasters'. Efforts to temper the nature and model the landscape to make it suitable for human life date back to China's legendary first ruler, Yu the Great (Dayu), more than four millennia ago. Massive waterworks projects such as the Dujiangyan irrigation works built during the Qin dynasty of over two thousand years ago contribute to national pride (Yang 2005: 55).

More importantly, Yu is a model for later politicians for their water policy. As early as Spring-Autumn time (770-476 BC), Guanzhong states, good governance means the elimination of five disasters. Water disaster is the first one to be coped with. The radical [a radical is a semantic determinative of a Chinese character] of the Chinese character for “governance” (治) is “water”. In fact the character has two original meanings: according to the Shuowen Jiezi (说文解字), the first Chinese dictionary (100-121 AD), the character is the name of a river; the second meaning is “water management” (Gu 2003: 397). Then the character evolved and widened into today’s meaning “governance”. This is an indication for the paramount meaning of water management in political life.

Coupled with the belief that man can shape nature and control nature as well as the meaning of flood management for a political career, the eagerness of engineered flood measures among the flood managers seems to be a logical consequence. Dike is not only a functional protection measure, but also has monumental symbolic meaning for the politicians:

The Great Wall running thousands of miles and built on water has been constructed based on the ‘concept of harmony between man and water’, it has become a monument in the heart of the people living along the river (Guo 2007).

### 1.5.b Cologne, Germany

All interviewees in Cologne hold the opinion that human beings cannot conquer nature. A given humbleness towards the power of nature can be observed among most of the interviewees. The anthropogenic activities such as construction and settlement in flood prone areas are seen as the main cause for losses during a disastrous flood event. Natural disaster is conferred a strong notion of man-made disaster. Therefore passive and preventive flood management strategy is advocated:

“Nature does not belong to the human beings. We should treat nature in such a way that we can hand it over to the next generation as it was. ...Nature is uncontrollable. It is surely much better to give in [in front of nature] which means that we should give the river more room. We should not try to constrain the river, otherwise nature will strike back. Rivers will find their original river bed anyhow. People see flooding as a natural catastrophe. In fact, it is not at all a natural catastrophe; rather, human beings have created the potential for it” (Interview 26, 23 December 2005).

According to this statement the naturalness is taken out of the natural catastrophe. Also the aspect of sustainability is a part of the concept of harmonious relationship with nature. But yet, this approach is not always popular among stakeholders. Many of them would benefit from engineered measures. It would facilitate the construction sector and provide more construction land for industries. The stimulated economic development through engineering flood protection measures is very likely hailed by local politicians. As a result engineered measures are easier accepted by many stakeholders than non-structural measures.

Other engineered water projects are perceived to be detrimental to the human nature relationship. One interviewee contends that human beings have done big damage to nature and are not aware of it. Engineering measures such as the river training project in upper reach of the Rhine River increased the probability of flood events. In addition loss of retention area through dike construction once more facilitates the speed of the water flow as well as it heightens the water level. Human beings alter nature to gain more benefit and services of nature, but they are often blind to the consequences of their activities (Interview 26, 23 December 2005).

Loss of retention volume through dike construction has created more challenge to flood management, but there have been improvements. Instead of building dikes to protect industries and settlements inside the flood-prone areas, some of the areas are relocated and turned into retention areas again.

The Natural Conservation Union advocates for stricter regulation and spatial planning for flood prevention to enhance harmony of man and nature. Farming activities should be completely forbidden, because pollution could be triggered by flood due to the utilization of fertilizers and pesticides.

Interviewees observed changes in the attitudes of the stakeholders towards the human nature relationship. Earlier it was common that people think human beings can control and conquer nature – an attitude which has its root in Christian culture. But through the environmental movement, especially after the Greens have become a political party and increased their influence, a change of thinking has taken place:

“I think that we have understood [that dike construction is not the optimal solution]. At least it has penetrated the administration and agencies that we cannot continue to construct dikes. On the contrary, we have to remove some of them” (Interview 28, 21 August 2006).

One shall look for alternatives and try to be innovative. There is usually always an alternative if one looks for it as some of the interviewees believe.

One interviewee expressed a more pessimistic view about achieving the harmony between man and nature. Human beings are too ignorant to realize that man and nature are interdependent. If one practices capitalism, then at least they should do it properly. They have to know, if a flood event of 200 years of reoccurrence comes, the industry lying in flood prone areas will suffer an interruption of production which causes great losses. For this “irrational” behaviour the limitation of the political level and the competitive relation of governmental agencies are to be blamed.

Solidarity of the stakeholders of the entire river basin is seen to be a foundation of harmony of man and nature. Externalization of flood risks is very much criticized by many interviewees:

“Dike construction is not the best solution, because we just shift the problem to the Netherlands” (Interview 28, 21 August 2006).

Human beings are blamed for their stupidity of not learning from the past experience, even if there has always been flooding along the river Rhine. Nevertheless people continue their construction activities. A radical spatial plan is seen to be necessary:

"There are laws and regulations for spatial planning, but they are very slack and full of gaps. They are not forceful enough. I would say that so and so much space has to be left to the river on each side to allow the river to expand. If I am not willing to do so, then I have to be prepared that the river will take whatever it needs. Houses will be flooded" (Interview 32, 26 October 2006).

However, the interviewee of the Farmers' Union puts forward a different view:

"Human beings can shape nature in such a way so that nature serves human beings; this is a very popular view amongst farmers. ...But of course there are farmers who run their farms according to ecological principles. And no one should be judged because of this. If you ask me, I would say, nature should serve human being, but one can only gain this service if one runs its farm with sustainability" (Interview 29, 13 September 2006).

Overall, there is a consensus on a more sustainable and passive flood management to achieve a harmonious relationship between man and nature, although interviewees are also aware of the obstacles they are facing in implementing this approach.

Interestingly, climate change is another common feature mentioned in the context of human nature relationship. It is seen as yet another anthropogenic impact on nature. Interviewees believe it is also a result of the ignorance of human beings: "Human beings encroach upon nature without knowing what they are doing; this is a dangerous thing to do" (Interview 28, 21 August 2006).

### 1.5.c Synopsis

In Wuhan the understanding of human nature relationship especially concerning the question of how to achieve harmony between man and nature is very heterogeneous whereas in Cologne a homogeneous interpretation is detected. In China most of the interviewees seem to agree that the relationship between man and nature should be harmonious, however, a strong belief in engineered measures is evident. Some even believe that engineered measure shall serve to be the foundation for enhancing the human nature relationship. Science again is perceived to be an important device to achieve the harmony. In Cologne the consensus on a harmonious human nature relationship is clear. Almost all interviewees including flood protection agencies expressed their critical view about engineered measures. A more passive and compromising flood protection strategy which aims at prevention through spatial planning is strongly advocated. Apart from Farmers' Union, giving the river more space is a popular approach amongst interviewees. Some of them support more radical regulations about construction in flood-prone areas.

In Wuhan some of the interviewees are sceptical about the passive flood protection strategy. They believe this can only be implemented after engineering

measures have been saturated. Even those who seem to support a more preventive flood management such as the approach of giving the river more space see structural measures to be indispensable. Negative effects of engineered measures are not mentioned at all. Giving the river space to flow seems to be just a “slogan” which sounds modern and politically correct and there is an obvious inconsistency in the statements of the interviewees. In Cologne the interviewees are fully aware of the challenge of non-structural measures due to economic and political interests; however, they perceive it to be the only possibility to live in harmony with nature.

The Chinese interviewees showed more attachment to traditional Chinese flood management culture which is interpreted to be engineered by the interviewees. Mao's ideology of defying nature seems still to have some influence on especially local governmental officials. In Cologne a change has taken place. One has departed from the belief that man can conquer nature and put nature at his service to his pleasure. Especially through the political environmental movement and the past flood experiences one has started questioning the positivistic approach.

### 1.6 The Role of the Military (Excursus)

*In 1998, China experienced a special war and fought a battle in such a magnitude which one has rarely seen in the world history.*

*Millions upon millions of Chinese people had to suffer from the great flood. But yet, with invincible will and incomparable hardness the people fought against the enemies together and they neither fear toil nor suffer. With the inexhaustible fighting spirit they fought hand in hand against the flood and eventually captured a grand victory.*

*(The heading text of the TV documentary Juesheng (The Decisive Battle), China Central Television (CCTV), 1998 (Kramer 2003: 327))*

Flood is an enemy whom one has to fight. No one is more legitimized to fight the war against floods than the Chinese People's Liberation Army (the PLA). There is no doubt that the military in China plays a unique role during catastrophic flood events. This special role of the PLA is reflected in the perceptions of the flood management as well as the military itself.

The involvement of military forces was frequently mentioned by the interviewees of the flood management in Wuhan when they recalled the previous flood events, especially the great Flood in 1998. The military is perceived to be indispensable in flood fighting both in terms of quantity and quality. One interviewee said:

“One of the advantages we have in flood protection is that we can mobilize the military. Once there is a need, we can send thousands and millions of soldiers to protect dikes” (Interview 9, 22 September 2005).

Besides, the army can be sent to the most dangerous places and cope with the most dangerous situations when “normal” people fail. One interviewee who was in charge of the dike protection during the Great Flood in 1998 gave an example. A dike in the outskirt of Wuhan had a breach of 80 metres. None of the technical advisors in the field ventured to give any recommendations, since all believed that the dike could not be repaired and withstand the wave of the flood. However, a

division of the army was appointed to protect the dike. A ship which passed by was stopped and sunk in front of the breach so that the soldiers could stand on the ship to lay sand bags. Thus, they managed to protect the dike for an entire week until they were commanded to give up the dike to avoid casualty due to lasting heavy rain.

"Where there is a danger, there is the PLA; the soldiers are always there to protect the people" (Interview 8, 21 September 2005), said one interviewee. The army as representative of the system has the symbolic meaning of the ideal of self-sacrifice and heroism. The involvement of the army contributes to the reinforcement of these cultural values and legitimating the leading position of the Chinese communist party through defeating water, as the communist party is the legitimate military leader (Kramer 2003: 341).

The army has an identical self-image with other actors. An interviewee of the army said proudly:

"Flood protection is a historical and holy task which requires our loyalty and sacrifice. During the Great Flood in Wuhan, many soldiers stayed in the field and didn't go home more than one month. They didn't leave the front even when they were sick and having high fevers..." (Interview 22, 13 December 2006).

The role of the military during flood events is translated into heroism and altruism by the official media such as the CCTV. In turn, the public perception of the PLA is influenced.

Compared to the unquestionable positive perception of the military by the Chinese interviewees, the German Federal Armed Force seems to have a normal position like all other actors concerning the involvement in flood management during flood events. Interviewees in flood management believe that the involvement of the military could be a great help in case of catastrophic flood events, however, they doubt if the military could be mobilised efficiently.

The interviewee of the German Federal Armed Force stressed that the military involvement in flood management is not always unproblematic. The military is only allowed to be involved if all other capacity of civil resources has been exhausted so that "fair market competition" can be ensured. As long as civil society including private enterprises is able to cope with flood situation, the army should not be involved. It is also perceived that the army in Germany has a negative image due to its past during the Second World War.

## 2. Flood Risk Communication

In the last subchapter, flood risk management structure and problem dimensions in flood risk management in China and Germany are juxtaposed. These elements influence flood risk communication and vice versa. In the following chapter the interplay between flood risk perception and communication is observed in inter-agency communication and how communication affects cooperation; information exchange and dissemination among the general public and different interest

groups, e.g. environmentalists' or citizens' groups. Communication features are also reflected in how information impacts on administrative cooperation.

## **2.1 Inter-Agency Communication and Cooperation**

### **2.1.a Wuhan, China**

During flood events a hierarchical chain of command system proved to be efficient and functional in communicating with different agencies according to the interviewees: "During flood events, we do not need coordination. It is a command system; the higher authorities command the lower agencies" (Interview 3, 2 September 2005).

The local water management agency of Wuhan does not take any decision, but obey the orders issued by higher water authorities and implement the orders without questioning it. But yet, the orders are not always implemented smoothly. Especially when it comes to the decision as to flood retention areas, it occurs that provincial and local levels try to postpone the dike breach. They "use excuses such as that they still need more time to evacuate people, etc". But in general the interviewed local managers perceive this top-down approach during flood events to be efficient and effective. Interviewees highlighted the advantage of the hierarchical structure for communication and coordination during emergency management.

But yet the field data reveals that there is hardly any communication between different agencies beyond flood periods. In fact, the agencies do not find it necessary to communicate with each other, for they largely rely on the command system during the flood events. This again shows the focus of fighting flood in flood protection instead of strengthening preventive measures in Wuhan:

"During a severe flood event, all agencies and departments will get together and work together. The higher agencies and leaders coordinate the inter-agency cooperation. But if there is no flood, the agencies do not have much communication" (Interview 8, 21 September 2005).

"There is no communication between the police, the Fire Brigade or the army, because we work according to the chain of command, we do not need communication in our daily work. During flood events, everyone has to absolutely obey the higher authorities without questioning. The orders will be issued by the leaders" (Interview 6, 7 September 2005).

One of the reasons why horizontal communication beyond flood periods is not intensive lies in how actors perceive their relationship to the other agencies and the flood management as such. For instance:

"We are not interested in communicating with the department for dike construction and maintenance. We have our Environmental Law which we follow and implement. They have their own law to follow and implement" (Interview 11, 27 September 2005).

The task and competence of the agencies are perceived to be the implementation of respective regulations and law. An interdependence between flood management and environmental issues is not acknowledged:

"The focus of the Water Management Agency is flood protection. The focus of our work is to see if it is harmful to the environment. They make sure that dikes do not breach, we make sure that industries have a proper sewage system. ... According to the Environmental Law, our work is not related to flood protection" (Interview 11, 27 September 2005).

The common scope of duty all agencies share is perceived to be the participation in flood fighting and dike protection: "In the first place our involvement in flood event is to protect the dike like every other citizen in Wuhan" (Interview, 2005/2006).

However, some of the interviewees do see the lacking link between the agencies as a cooperation problem:

"We have some problems in coordination between different agencies. For instance, we should have assessed the impact of the dike construction first before it was built. The environmental agency has to react to whatever has happened passively. The cooperation is not as good as expected due to the independent duties" (Interview 11, 27 September 2005).

Another reason reported by the interviewees for the lack of inter-agency communication is the little leeway of the local agencies. One interviewee points out those local managers are not given much room to make decisions by themselves due to the organizational arrangement. Therefore they do not see the significance of communication with other agencies:

"All is decided by the government anyway" (Interview 9, 22 September 2005).

As a consequence, horizontal communication is very seldom whereas communication between lower and higher authorities is more frequent. The communication between lower and higher ranking agencies takes place in two forms: official documents and meetings. Official documents on flood management policy are issued and disseminated in a top-down structure. The local agencies shall "study the documents". These documents have the character of an issued order which is to be obeyed. This type of communication is one-sided and allows no discussion or discourse.

Even the communication in the form of a meeting does not leave much room for dialogue. A meeting in China is mostly a meeting for assigning tasks by the leaders. It is uncommon that participants of these meetings have chances to express their own views or discuss about issues:

"We also have meetings attended by different departments. But these meetings are held to listen to the leaders' ideas. Once the leaders have some new ideas, they will call for a meeting. There will be a speech by a leader and this speech will be read loudly by the leader. In fact, the speech is drafted by a group of assistants and the leader will just read it. We do not have any discussions at these meetings. ... There are advantages at these meetings though, because efficiency is ensured if there is no discussion.



Otherwise we can have endless discussions without coming to a conclusion and no problem can be solved without a conclusion" (Interview 18, 7 December 2006).

Guanbenwei is another feature revealed by interviewees which hinders the inter-agency communication. It is the way of thinking that agencies which have more technical focus such as environmental or meteorological departments are less important than the other governmental agencies. The interviewee of the meteorological department said:

"As a technical agency we often feel like step children of the government. Our opinions are often not taken into consideration" (Interview 13, 29 September 2005).

Guanbenwei, this way of thinking, values power the most. The higher the position they hold, the more weight is given to their opinion. This leads to communication difficulties between different agencies. The sixth assembly of the CPC pointed out that the Guanbenwei way of thinking has become a disastrous hazard which impairs the societal development (Zhang 2002). Nevertheless this is still a common practice in Wuhan as the field data shows. It can also be observed by the researcher herself during her field work.

On the one hand Chinese authorities emphasized the scientific/rationalistic approach; on the other hand, they are not interested in cooperation and communication with universities or the other scientific communities. The empirical data reflects this phenomenon in different cases: as the researcher came to the field and tried to establish the contacts with respective authorities, a municipality official recommended the researcher that it would be better not to mention that the researcher belongs to a university. He elaborates, "Universities will not be taken seriously by government officials, for they do not have enough weight to influence the governments". Similar experience in the field confirmed this argument. As the researcher contacted an official of the provincial agency for water resources in Hubei to ask for an interview meeting, the researcher was informed:

"We are not giving interviews to universities in general; we only talk to **official** media such as CCTV. Or a researcher has to hold an **official** introductory letter from the Ministry for Water Resources which is the superior authority of the provincial agency for water resources" (Telephone communication with the Flood Protection Headquarters of the Hubei Province on 19 December 2006).

Being "official" means being powerful. Academic community or technical departments do not possess the same power as the other governmental agencies; therefore their opinions are often not heard.

### 2.1.b Cologne, Germany

Inter-agency information exchange and communication take place both before and during flood events. The communication between agencies during a flood event takes place within the HSZ or Fire Brigade depending where the operational leadership and crisis management group (Einsatzleitung und Krisenstab) are located according to different water levels. All agencies have representatives within the group and the representatives maintain the communication with respective agencies.

During the flood events in 1993 many agencies realized that there exists a communication gap among the agencies in Cologne. Cooperation and coordination consequently faced a number of challenges. Especially the responsibility of each involved agency was not clearly identified, thus, conflicts between agencies due to the question of authorities hindered the flood management in 1993. As to the cooperating agencies communication seemed to be essential for successful coordination, working groups have been established after the flood event to improve the situation. These working groups consist of representatives of all the aid organizations and agencies to provide all actors a platform for information exchange and discussion.

There are two different working groups in Cologne: one is hosted by the Flood Protection Centre and the other one is hosted by the Fire Brigade of the City of Cologne. The first working group focuses on discussions and information exchange on all the measures taken starting at relatively low water level. These measures mount to about 5,000 items. Tasks and responsibilities are clarified at these monthly meetings.

The second working group works mainly on coordination during emergency period once extreme flood event occurs. This working group is hosted by the Fire Brigade and convenes on a monthly basis.

In fact the coordination of agencies starts with the preparation before flood events at the working group meetings. The Flood Protection Centre Cologne sees the coordination between different agencies involved in flood management as one of their most important roles. It is also integrated in their continuous preparation work for the next possible flood event. The meetings take place at the venue of HSZ or Fire Brigade depending on the host of the meeting. It can be observed at these monthly meetings (participatory observation during the field research, 2005/2006) that both working groups have detailed programmes and current issues to work on. Problems encountered by respective agencies and recommendations for improvements are discussed. Experiences of the previous flood events are exchanged. New regulations and their implications as well as new technology are presented for further discussion. These meetings are held in an informal way to allow broad discussion and information exchange between the agencies as well as establishment of personal contacts amongst the actors. Nonetheless, they are well organized and efficient.

The researcher can also observe the openness of the participants not only in the way they carry out their discussions, but also their attitudes towards external guests. The researcher herself could attend such a meeting twice without any formal procedure for permission by the organizer or the participants. For the researcher to be allowed to attend the meeting hosted by Fire Brigade, the head of the HSZ, to whom the researcher was in close contact with, made a phone call to the organizer of the Fire Brigade for his permission. The researcher was also invited to the meeting hosted by HSZ. The researcher noticed that there are often external participants such as Dutch counterparts or researchers from universities attending these monthly meetings. Thus, a broader communication with transboundary river basin actors and scientific communities is facilitated.

Interviewees believe that communication between agencies is essential for the success of flood management. The coordination between different agencies has improved due to the experience made during the flood event in 1993. It is a common feature of the statements of the interviewees that the coordination functions much better since they “talk more to each other”:

“In 1995 the coordination between the agencies worked out well. We managed to reduce half of the damage. It was the first time that the agencies involved in flood management sat together and worked **coordinated**. It went really well. Yes, I can say that. It is much better than before, as all the agencies were only responsible for themselves and worked without communicating with each other. The cooperation was very bad. The communication and information exchange is very important. Only then coordination becomes possible” (Interview 26, 23 December 2005).

Personal contacts established during the working group meetings also contribute to a better cooperation:

“We meet on a very, very regular basis. ... People get to know each other and established a closer personal contact. If something happens, we simply call each other” (Interview 32, 26 October 2006).

Personal relationship seems to encourage the actors to maintain working contacts and facilitate communication.

### 2.1.c Synopsis

In Wuhan the communication and cooperation between agencies are perceived to be efficient during a flood event. However, there is almost no communication between those agencies beyond flood periods. Although some interviewees demand more inter-agency communication to improve coordination, most of the agencies do not see any need for inter-agency communication outside flood events, for they trust and rely on the chain of command during the emergency management. Interdependence of flood management between different agencies seems not to be recognized.

On the contrary, the flood protection actors in Cologne identified many cooperation and coordination problems due to lack of communication between agencies during flood events, therefore they ascribe a paramount meaning to communication in improving and ensuring inter-agency cooperation. They believe that the inter-agency cooperation can only function well if the communication is guaranteed both before and during flood events. The agencies in Cologne also showed openness for discussion, debate, and discourse towards each other and towards communication with other actors such as the scientific community.

## 2.2 Information and Risk Awareness

### 2.2.a Wuhan, China

According to the China Flood Control Law, governments of different levels shall disseminate flood knowledge amongst citizens living in flood-prone areas and raise their flood risk awareness (Zhonghua Renmin Gongheguo Zhuxiling No. 88 1997). Nevertheless, no interviewees at local level have touched the topic of risk aware-

ness amongst the general public. Some interviewees of the local water agency mentioned information campaigns on drinking water quality, water saving strategies like a Water Day or Water Week organized by local water agencies. But no flood risk information campaign has been organized. It seems that water quality raises more concern than flood risk. This may be due to the general risk information policy in Wuhan. One interviewee reported that the flood forecast in 1998 was kept as top secret. Not even the meteorological department had access to the flood information (Interview 13, 29 September 2005).

In emergency cases like in 1998 only authorities in respective retention areas were informed about the evacuation plan in advance. The people who were to be evacuated from retention areas were only informed 48 hours beforehand to avoid "general panic".

Some interviewees think that a flood event is far less serious than water shortage and drought in Wuhan, especially in rural areas. Some even blame the media to embellish flood hazard:

"We took flood protection too seriously. We should reduce our fear of flood. 1999 the water level has reached 25 metres, everybody was so cautious. But now even if the water level reaches the same height, we don't realize it, because the media is not inflating it any more. The government is not making a big fuss over it either" (Interview 13, 29 September 2005).

The information policy towards the general public leads to the fact that most of the people are not aware of flood risk although they are involved in dike protection during severe flood events (Interview 23, 17 December 2006)

"After each flood event, people become more aware of the risk, but once water level drops, they forget about it very quickly. For them flood protection means three months in a year during the raining season to protect the dike" (Interview 23, 17 December 2006).

## **2.2.b Cologne, Germany**

### **Information Dissemination and Raising Risk Awareness of the Public**

In Cologne HSZ sees itself as a service agency which provides the inhabitants with information and assists them to take flood protection countermeasures at individual level.

Raising risk awareness as part of the integrated flood management is one of the most important aspects highlighted by HSZ.

According to the HSZ, the preparation for the next flood event includes preparation of the citizens and different agencies which are participating in flood management. The importance of information dissemination is emphasized and taken as an indispensable component of the preparation work.

In all districts in Cologne an event informing the citizens about flood risks and coping possibilities takes place each year. At this event the risk map for the City

of Cologne is introduced to the general public. The inhabitants can identify how they could be affected when flood events of different magnitudes occur. The Flood Protection Centre explains to the inhabitants which technical measures they can apply on an individual basis according to different water levels. The recommendations include information on the possibility of flood protection gate for individual houses; on whether pumping should be used or if one should rather allow water to run into the house to protect the building from being destroyed, etc.

The individual's responsibility is also anchored in the Water Resources Act. Each individual who could be affected by flood is obliged to take preventive measures by its own means to protect oneself from flooding and to reduce damage. Especially, the individuals are obliged to adapt their land use in such a way that potential damage of humans, environment, and private property should be avoided (Bundesgesetzblatt 2005). To sum up, HSZ informs individuals about their risk and in the mean time helps them to cope with it.

Citizens' groups in Cologne are also actively involved in flood protection. After the flood event in 1993, affected citizens started mobilizing others to take proactive actions for flood risk prevention. On the one hand they try to gain more support from the government, on the other hand they also contribute to risk communication amongst the inhabitants. Especially, through the cooperation between citizens' groups and the HSZ, flood risk information can be disseminated efficiently and many preventive measures have been carried out. These measures range from practical application of flood retrofitting methods such as safety measure for oil tanks, gas, and electricity to information campaigns for the inhabitants such as the dissemination of flood information leaflets.

Having the advantage of the indigenous knowledge of the local situation and the closeness to the inhabitants, citizens' groups can reach more people than governmental agencies in terms of information and warning. HSZ takes this as an advantage and provides the citizens groups with up-to-date flood forecasts, flood coping information and warning by personal contact via mobile phone during the flood event.

The demand of citizens' groups increased the work load of the HSZ at the beginning, but the close cooperation between the citizens' groups and the HSZ proved to be feasible. In the following flood event in 1995 damage and losses were considerably reduced. Especially, personal financial damage was low compared to the previous event in 1993.

To better inform the general public about flood forecast and warning as well as respective protection measures, a radio station is set up within the HSZ during a flood event. The station has its own electricity provider and telephone. The radio station provides the general public with competent information, for they can confirm their information with flood management experts in the HSZ and in the mean time the HSZ has the opportunity to speak to the public when it is necessary, e.g. in the case of dike breach.

The citizens' groups as well as other NGOs reported great willingness of the HSZ and the water management authority of Cologne to provide information and consultancy upon their requirement (Interview 27/29 2006).

### **Spatial Planning as Information and Communication Channel**

The planning process of the regional government Cologne is an important channel for flood risk information dissemination to local community governments. The plan-approval procedure (Planfeststellungsverfahren) as part of the technical planning for flood protection measures and spatial planning for preventive flood protection involves a large number of stakeholders including community governments.

Especially, the spatial planning process for preventive flood protection has been a long procedure with many meetings, public hearings, and negotiations, as one interviewee states:

"The fact alone that flood protection has become part of the regional plan and in that we have produced the draft, also because the procedure took a long time, the communities became aware of flood risk at all. Many [construction] plans of the communities are given up, because risk awareness has been raised. 'Oh, be careful, this is a location where we may encounter difficulties, let us rather take another location for construction.' Through the planning process alone, many intentions have been directed to the right track. Some applications for construction which would have been submitted for permission before are no longer submitted today. Even if there is still such an application, the communities mostly accept the refusal of the regional planning bureau with much less reluctance than before" (Interview 33, 25 January 2007).

The communities are less insistent in their construction intention in flood-prone areas and more willing to drop their plans due to the established risk awareness through the planning process. In some cases communities see no other alternatives for their construction intentions, but they are more willing to cooperate with the technical planning department of the regional government to find a solution for flood protection purposes.

The spatial plan department of the regional government of Cologne highlights the "signal function" of the preventive flood protection plan and views raising risk awareness to be a significant component of flood management.

On the whole, the flood management in Cologne implements an "offensive" information policy and strongly advocates risk awareness and risk communication. How to cope with the remaining risk despite of technical flood protection measures is on the top of the agenda of the HSZ. They believe that engineered flood protection measures could give people an illusion of safety and consequently the damage and losses would be even greater. Also dike breach scenarios are a frequent topic for discussion at internal meetings and conferences (participatory observation at internal meetings and Rhein-Konferenz).

Flood is a natural event and we cannot influence its onset as we cannot stop an earthquake or an avalanche from occurring. Therefore there will never be a total coverage of safety despite of ever improving flood protection measures (Düsterdiek 2005: 367-368).

This belief is common amongst the interviewees.

### **Perceived Communication Obstacles and Deficiency**

Regardless of the success of risk information policy in Cologne, interviewees perceived also obstacles and insufficiencies of risk communication. One of the interviewees believes that risk communication can be hampered by different perspectives of stakeholders. The interviewee of the Naturschutzbund Deutschland e.V. (NABU) Cologne, the representative of an environmental NGO, expresses his doubt about the potential for communication between different interests groups:

“... [The communication between the flood protection agency and the conservationists] would not be very successful I believe. The people in the flood protection agency are engineers who think that they must always develop a kind of technical solution. And flood risk can be controlled. But the conservationists advocate that possibly nothing should be altered within the wet land, while the engineers want to make sure that every inch of the wet land should contribute to the reduction of water level [through technical solutions]. These are completely contradictory opinions colliding with each other” (Interview 30, 21 September 2006).

In regard to the public risk awareness a certain media dependency can be observed. An interviewee said that the flood warning and forecast were not taken seriously by people in 1993 due to the lack of flood experience and trust towards the HSZ. Only after flood events have been covered frequently by the media, especially after the flood event in 2002 which impacted large areas of Europe, risk awareness increased amongst the general public and penetrated the political sphere (Interview 26, 23 December 2006).

But even after the flood events in 1993 and 1995 in Cologne, as well as the flood event in 2002 in the Eastern part of Germany, risk awareness is still lacking amongst the general public:

“My impression is that the people today are still not aware of the risk they are facing, although the risk map exists and one knows where and how high water level will be. Where I live, I am probably the only person who is aware of the fact that it could be flooded. People are not aware that they are living in the old flood plain. The first floor could possibly be flooded up to one metre high” (Interview 28, 21 August 2006).

The reason for the lack of risk awareness is seen to be in insufficient information and lost memory of previous flood events.

### **2.2.c Synopsis**

In Wuhan no interviewee mentioned the importance of informing the general public about the flood risk; whereas the flood management units in Cologne all emphasize the significance of public risk awareness. The HSZ views risk information

for the citizens as part of its preparation work for the next flood event. Therefore it not only informs the citizens about the flood risk by publishing the risk map for the City of Cologne, but also provides citizens with flood retrofitting consultancy. In addition, it cooperates with citizens' groups to improve risk information dissemination. In Wuhan the agencies do not seem to encourage the dissemination of risk information and sometimes even deny the public access to risk information in order not to arouse "disquietedness".

Whereas interviewees in Wuhan perceive the media to be embellishing flood risk, the interviewees in Cologne wish for more media coverage for risk awareness especially in "flood free" periods to maintain the collective memory.

Doubtlessly, flood managers in Cologne advocate an offensive information policy towards the general public to enable and encourage individuals to take their own responsibilities. In Wuhan the agencies see the individual responsibility in involvement in dike protection and flood fighting. Risk management is seen as the responsibility of the authorities and experts.

In Cologne uncertainty and remaining risks despite of all prevention and protection measures are highlighted to raise the risk awareness, whereas in Wuhan no such risk communication can be observed.

In addition to the information campaign initiated by the HSZ, regional spatial planning also contributes to risk communication among communities. The signal function of spatial planning is regarded as an important component of risk awareness.

## **2.3 Questioning of Authority**

### **2.3.a Wuhan, China**

In Wuhan, questioning of authority is not broached on, for the organizational structure is highly hierarchical:

"The leader shall distribute task and authority to different agencies and personnel and we just follow his instructions" (Interview 1/6, 2005).

In each agency there is a written definition of tasks. The task definition is put into a frame and displayed on the walls of every office. The researcher observed that the last item of the board is the same in every agency and it reads: "Other tasks: any tasks the leader assigns one to accomplish." On the one hand, there is a definition of tasks, but on the other hand the definition has great flexibility due to the last item. Based on a hierarchical structure of administration, authority personnel with authority are entitled to assign anyone to do anything and no discussion is allowed. Therefore there exists no questioning of authority amongst agencies.

### **2.3.b Cologne, Germany**

There were problems about overlapping authorities of different agencies in flood management during the flood events in 1993. The responsibilities and leadership of administrative agencies and aid organizations were not clear cut during the flood



event. The reason for it is seen to be a lack of flood experience and ongoing inter-agency competition. Also the municipal government of Cologne was blamed for not being in the position to hold the supervision of the leadership.

"The city government seemed not to be aware of its responsibility in flood protection in 1993" (Interview 32, 26 October 2006).

Especially after the aid organizations were involved in flood protection there was a lack of coordination and cooperation between these organizations and the Fire Brigade. They did not know how to complement each other's work.

Authority as to who should take the leadership in flood management during a flood event seems to be an unsettled problem. This is confirmed by different perceptions of leadership of different agencies and stakeholders. Citizens' groups recognize the authority of the Flood Protection Centre (HSZ) as in charge before, during, and after the flood periods. However, the federal army perceives the Fire Brigade to be holding the leadership. This is due to the different experiences and interactions of different stakeholders with the HSZ.

Officially the flood protection agency in Cologne does not have the authority to command other agencies. This is seen as one of the obstacles in flood management structure. "This arrangement is actually wrong. This is very clear. The problem is that this arrangement is a historical legacy. (...) Until a couple of years ago the Flood Protection Centre has been seen more like a coordination centre, but not only an information centre. This may be due to the flood events in 1993 and 1995. This position is even accepted by the other agencies" (Interview 26, 23 December 2006).

However, this is just an informal practice in flood management in Cologne. The director of the HSZ explains: "On the one hand, they all accept our role and it was also practiced during the flood events, actually we issued some kind of order. On the other hand, it is not officially announced that we have the authority. Maybe this has to be changed. But it has always been like this; no one volunteers to cede authority" (Interview 26, 23 December 2006).

This is seen as one of the greatest challenges in flood management in Cologne by the Flood Protection Centre. Once water levels reach 10.70 metres, responsibility is shifted to the Fire Brigade of the City of Cologne. It is argued that the shift of responsibility is a disruption and disturbance, especially when the situation is becoming more critical. At the water level of 10.70 metres the Flood Protection Centre will be flooded; therefore the command centre will have to be moved to the Fire Brigade. This is a physical relocation which will interrupt the work of the Flood Protection Centre. Additionally, "the Fire Brigade does not have the know-how in flood preventive measures, spatial planning, etc. It would be better if there would be a special work force for flood protection. This work force could be a link between the operation forces and the technical service agencies" (Interview 26, 23 December 2006).

However, the Fire Brigade argues that it is trained to cope with unexpected events which cannot be handled like routine work while the flood protection centre

is seen as not used to the “surprises”. The work style of the HSZ is described by the Fire Brigade as “chaotic”:

“In my view working in such a chaotic form is not feasible once a catastrophic event really occurs. One has to work like in military service. If the water level is under 10.60 metres, it might function more or less. It is obviously not an ideal condition to work in. It is more like voting in these bureaucratic agencies. There is a representative from each agency and they endeavour to find a consensus. But once they are in a situation, in which thousands of people are involved, the instruments HSZ has available will not function at all. To a certain point he [the head of HSZ] has to admit that from now on it is pure civil protection (Gefahrenabwehr), you have to take over the leadership, and we cannot cope with it anymore. Then the responsibility will be transferred from him to here” (Interview 28, 21 August 2006).

The tension between Fire Brigade and Flood Protection Centre roots in competitive competence thinking and different approaches of management. The Fire Brigade is more military-styled, whereas the HSZ has a more egalitarian approach. The HSZ believes that the Fire Brigade “does not want to have anything to do with the people”, whereas the HSZ pursues popularity and trust of the people. The Fire Brigade perceives the working style of the HSZ to be “typically bureaucratic” which is not efficient enough for emergency management. This difference is also reflected in the different attitudes towards the decision whether the radio station should be located inside the HSZ during a flood event. The Fire Brigade as well as the police do not like the idea of having a radio station located inside the Flood Protection Centre, for “they do not like to be observed by journalists who could report every mistake they have made”. But the HSZ insists on its information policy that openness to the general public and the media is essential to gain trust. The journalists are perceived to be instruments to disseminate information to the general public.

On the whole, the Flood Protection Centre as a coordination centre enjoys general acceptance among different agencies involved in flood management. This fact is due to the role the Flood Protection Centre played during the previous flood events especially in 1993 and 1995. Trust has been established during those experiences.

“[In the media] I am known as the pope of flood due to my role during the flood events in 1993, 1995, and 2001 etc. ...” (Interview 26, 23 December 2006).

Trust is also one of the strong arguments for why the role of the Flood Protection Centre as a coordination agency should be instrumentalized according to the HSZ. Trust of the other agencies was observed in the interviews and the meetings with the other agencies.

One can observe that this informal coordination structure is an exceptional case. In most of the other federal states it is the Fire Brigade which takes over the responsibility of the flood management. The interviewee of the HSZ admits that the Fire Brigade has advantages in managing and coordinating the flood management. But he also points out that it has a disadvantage due to its training back-

ground. Members of the Fire Brigade are usually trained to cope with fire but not flooding, therefore they lack expertise in managing floods. The interviewee of the HSZ highlights the special role of the HSZ in Cologne which is due to the personal contribution of the director. This is expressed by other interviewees as well.

The informal establishment of the position of the HSZ also impacts the perception of agencies towards the regional government. One can observe that the regional government is not present in the consideration of the agencies. Some even perceive this management level to be “completely unnecessary”:

“It is an extra head which no one needs. I cannot tell what they are doing. It is an intermediate level between the City of Cologne and the federal state. But it does not really have any concrete authority and therefore can be ignored. The regional government also has a crisis management group or something similar. However, this body does not make any decisions, nor does it implement anything. It is just there.” (Interview 32, 26 October 2006).

This reveals a general problem of the authorities. Beyond the local flood management, no unified leadership which has transboundary competence reaching further than one federal state is agreed on in emergency cases. This is perceived as a typical problem of the German “Föderalismus” which “hampers a centralistic operation style”. Questioning of authority, both at local levels and beyond, remains unsolved.

### 2.3.c Synopsis

In Wuhan the question of authority is not perceived as a problem. All tasks and competences are defined by higher authorities. Although the definition of tasks is not clear cut, the agencies seem to accept any tasks they are assigned to. In Cologne the competition for more authority between the agencies in emergency management seems to be an unsolved problem. Especially due to the broad recognition of the leading role of HSZ among agencies and the credibility gained amongst the general public, HSZ established a coordinating position for emergency management in the last flood events which it is not officially endowed with. Föderalismus is regarded as one of the greatest coordination problems between different management hierarchies such as federal state level and state level in Germany.

## F. Theoretical Analysis

The research results presented in chapter E have revealed the commonalities and differences in risk perception and communication features in Wuhan, China, and Cologne, Germany. From a historical and generic perspective it has been analysed why these differences emerge and how they are embedded in historical and cultural contexts by integrating data interpretation into the data presentation.

The empirical data covers a wide spectrum of characteristics of the flood management in Wuhan and Cologne. How can these risk management traits be structured and bundled by a common denominator, which can serve as a general benchmark in different cultural spaces? This requires a scientific theory which pro-

vides a specific pair of lenses through which patterns can be made visible. In the following chapter the research results will be further analysed by using an established scientific theory to deepen the understanding of the Chinese and German cultural contexts and to explain the differences in risk perception and communication. On this matter, no analytical model can be seen as extensive that it covers all aspects of the issue at hand. It is essential to be critical about each approach available to social science examining the risk phenomenon so that the improvement of theories could be achieved. Nevertheless, an integrative position is taken in the reflection of various concepts and approaches, namely that one should bear in mind that every endeavour to conceptualize risk and to address risk issues has made its contribution to understanding the phenomenon better and to cover more and more perspectives of it. It is rather like putting the puzzles together than one approach working against another. No perspective can be judged as better than the other, but each tries to find its own truth through its own perspectives. In the following chapter different approaches of addressing the risk issues from different perspectives of the observers will be illustrated and their implication for analysis will be broached.

## **1. Two Approaches of Risk Analysis**

The most prominent approaches applied in empirical risk perception studies are the psychometric approach and the approach from the cultural perspectives (Rippl 2002: 147; Plapp 2003: 21). According to Bradbury, the psychometric approach in risk perception studies, as developed by Slovic and his associates, has controversial implications for policy design as to which role the public shall play in the risk communication. It is criticized to “straddle technical and social paradigms uneasily” (Bradbury 1989: 384). Under the umbrella of the concept of risk as a social process, prominent cultural scholars such as Mary Douglas, Aaron Wildavsky, and Michael Thompson developed the cultural theory on risk which emphasized the conception of risk as a social construct. In the following chapter a brief introduction will be given to the psychometric approach, as it has often been applied in cross-cultural risk perception studies. The cultural approach as the analytical framework for this research will be elucidated in greater detail.

### **1.1 The Psychometric Paradigm**

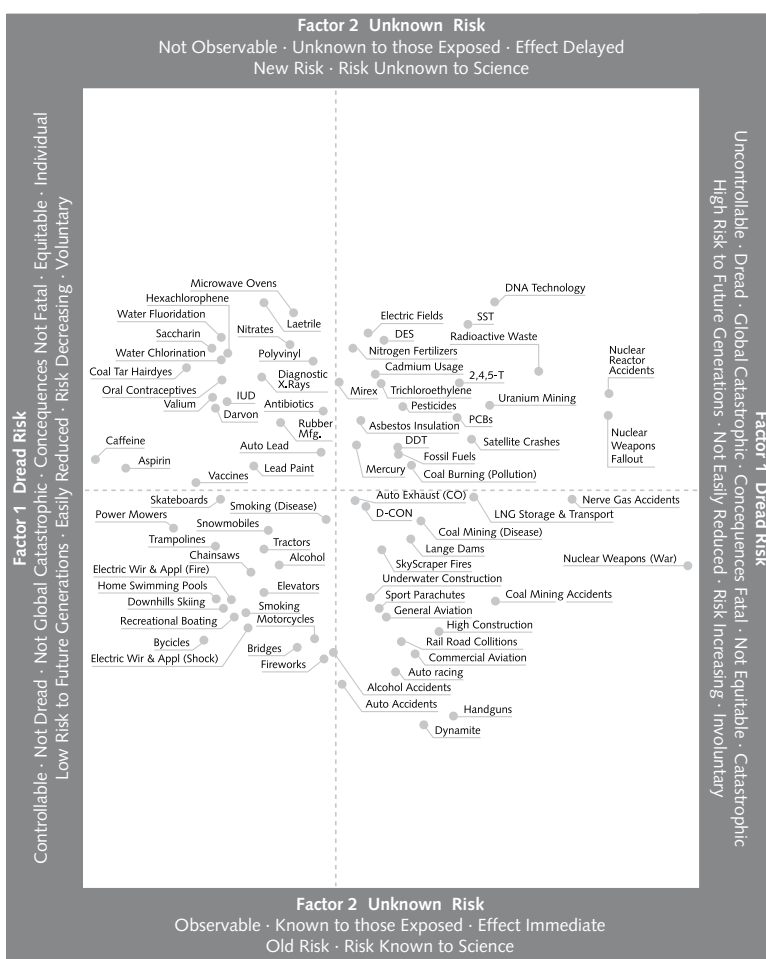
The psychometric paradigm originated from the pioneering effort of Starr to develop a method to identify the trade-off according to the public opinion between technological risks and their benefits. The research question targeted was “how safe is safe enough?”. His findings show that acceptability of risk from an activity is proportional to the third power of the benefits for it; risks of voluntary activities are roughly 1,000 times as acceptable as involuntary risks. To test the validity of the many assumptions in the revealed preferences approaches, Fischhoff, Slovic, Lichtenstein, and Read et al. conducted an analogous psychometric analysis. Later on many other studies were conducted within the psychometric paradigm (Slovic 2000a). These studies found out that perceived risk is quantifiable and predictable.

The concept of risk means different things to different people. Experts' judgement of risk is highly related to the annual fatalities whereas lay people judge

risk more according to other hazard characteristics such as catastrophic potential, threat to future generations, etc.

Studies of expressed preferences within the psychometric paradigm also revealed that people view current risk levels to be unacceptably high for most activities. Factors which influence the relationship between perceived risk, perceived

Figure 2: Location of 81 hazards on factors 1 and 2 derived from the interrelationships among 15 risk characteristics. Each factor is made up of a combination of characteristics, as indicated by the lower diagram.



Source: Slovic (2000a: 225). Printed with kind permission of Paul Slovic.

benefit, and risk acceptance include familiarity, control, catastrophic potential, equity, and level of knowledge (Slovic 2000a: 223-224).

The factor labelled "dread risk" (see Figure 2) is defined "at its high end by perceived lack of control, dread, catastrophic potential, fatal consequences and the inequitable distribution of risks and benefits" (Slovic 2000a: 225). Under this factor nuclear weapons and power score high on the characteristics that make up this factor. The factor "unknown risk" is defined "at its high end by hazards judged to be unobservable, unknown, new and delayed in their manifestation of harm." The risks of chemical technologies rank high within this category. Findings have shown that lay people's perceptions and attitudes are closely related to the position of a hazard within the type of factor space. Especially the factor "dread risk" seems to yield significant links to people's perception. The higher the score for the characteristics of the factor, the higher the perceived risk, consequently, the more people desire to reduce the current risk. However, the results on the experts' perception yielded contrary findings: their perception level is only related to the annual mortality (Slovic 2000a: 226). The results from these studies have been used for forecasting people's acceptance of and opposition to specific technologies. Nuclear power and nuclear weapons were frequent topics of the analysis within the psychometric paradigm. A consequence of the research is the attempt to educate people and improve people's intuition. However, risk perception research suggests that people's perceptions and attitudes are determined not only by the sort of one-dimensional statistics used in such tables, but also by the variety of quantitative and qualitative characteristics. People have a broader concept of risk than 'expected number of fatalities'. The most important message of the research, Slovic concludes, is that there is both wisdom and error in public perception. Lay people have a richer conceptualization of risk than the experts and their perception reflects legitimate concerns ignored in expert risk assessment. Slovic recommends a two-way process for risk communication and management. "Each side, expert and public, has something valid to contribute. Each side must respect the insights and intelligence of the other" (Slovic 2000a: 231).

Bradbury criticizes the psychometric paradigm for its contradictory statements and ambiguous policy implications as to risk management and risk communication. On the one hand, representatives of the psychometric paradigm contend that the "goal of risk communication should not be to diffuse public concerns and avoid action", on the other hand they indicate the goal of risk communication is to "produce an informed public that is involved, interested, reasonable, thoughtful, solution-oriented, and collaborative" (Bradbury 1989: 386-388).

Apart from the common criticism on the psychometric paradigm, such as the small size of the samples and the laboratory questionnaires, Mary Douglas adds the "most serious criticism": the respondents are faced with a limited list of risks that the researchers have defined. She argues, no one can guarantee that the spectrum of selected risks gives a fair view of the life choices an individual has to weigh (Douglas 1997).

However, the fruit of the risk perception study with psychometric approach is that one discovered another possibility of calculating risk apart from the measurement in natural science and technical domain (Kleinwellfonder 1996: 82).

## 1.2 In the Light of the Cultural Theories

Cultural scholars have developed their own risk concept which views risk as a social construct and process. The main theoretical foundation of observing risk through cultural lenses was laid by Douglas and Wildavsky. Thompson, Ellis, and Wildavsky contributed to the further development of cultural theories with their book "Cultural Theory" which spelled out the cultural theories in a more pronounced way. Since then, many cultural scholars added to the credit of the cultural theories on risk. In this chapter, the main statements of the cultural theories on risk analysis, as well as their prediction for risk perception, will be illustrated.

### 1.2.a Culture: An Ambitious and Ambiguous Concept

Culture is a concept which has many facets. In daily language culture can refer to literature, painting, architecture, and the traditional performing arts like theatre, opera, etc. as some of the Western belletrists describe as the "restrict view" of culture. The commonality of all these is that they are artefacts, which means they are human products. These products are different from those products with practical application such as a pair of shoes or a piece of furniture. Besides, these products require creative, intellectual, and artistic abilities. Both the production and the appreciation of these products are seen as a special gift of a certain group of people (Hansen 2003: 11-13).

Sometimes people also talk about culture as a specific lifestyle which includes personal traits such as humanity, tolerance, sensitivity, and *savoir-vivre*. These two understandings of culture both refer to a specific part of our societal life which is not functional and not practiced by every member of a society, but only by more 'cultivated people', thus, this concept of culture is not neutral but judgmental (Hansen 2003: 11-13).

Also, political entities and organizations try to find their own concepts of culture. The 1982 World Conference on Cultural Policies gave culture an anthropological frame which resulted in a definition widely used among international organizations today:

... culture should be regarded as the set of distinctive spiritual, material, intellectual and emotional features of a society or social group, and (...) encompasses, in addition to art and literature, lifestyles, ways of living together, value systems, traditions and beliefs" (UNESCO 2002: 18).

The less common usage of culture in daily life originated from the Latin word "colere" meaning "care for" or "look after" used in the context of agriculture (Schäfers 2000). Another meaning of "colere" means "worship". These two meanings of the Latin word reflect the differentiation between human beings and animals through agricultural activities and worshipping of gods. Only human beings have these abilities to change both their own nature and the nature outside their bodies through work (Hansen 2003: 14).

Cicero (106 BC-43 BC) introduced the concept of "cultura" referring to material and spiritual products and abilities (Schäfers 2000). A similar neutral concept

of culture we are also confronted with refers to customs, convention, manners, religion, etc.; in short, all characteristics of a group of people. Not only artefacts such as literature, but also artefacts with practical application are incorporated into this concept. The American expression "way of life" is a fitting description of it (Hansen 2003: 11-17).

There are still other attributes to the concept of culture in social science. Böhme states that cultures must have the function of symbolic power which provides a group or individuals with orientations in a world of open horizon and timelessness (Böhme 2006: 33). Culture produces competition for limited goods (knappe Güter) as well as resources of meaning and knowledge. Culture also produces inequality and aggravates instability and crisis which, on the other hand, shall be overcome by culture (Böhme 2006: 33). Culture has no other task than to enhance social order and avoid coincidence (Böhme 2006: 33).

On the whole, within the Western framework of culture there has never been a consensus about the concept of culture. Kroeber and Kluckhohn summarized 164 different definitions of culture (Kroeber and Kluckhohn 1952). A wide range of discussions have been raging over e.g. whether culture can be subject to objective scientific analysis or humanistic interpretation, or whether cross-cultural generalizations are possible (Rosaldo 1989).

However, it is vital to define culture in the context of a scientific research project, especially in order to strengthen validity of cross-cultural studies (Johnson 1991: 143). Since this research applies cultural theories as its theoretical and analytical framework, the definition of culture within the Cultural Theory as established by Thompson, Ellis, and Wildavsky will be adopted for this research.

### **1.2.b Cultural Theories and Their Approach to Risk Analysis**

Why do we need cultural lenses for risk issue? "Can we know the risks we face, now or in the future? No, we cannot; but yes, we must act as if we do" (Douglas and Wildavsky 1983: 1). The authors of "Risk and Culture" argue no single person can be informed about all risks, hence, no one can calculate what risks we are facing. (Douglas and Wildavsky 1983: 1). In fact, neither could they deal with all of the risks, even if the existence of these risks is known to them.

Psychology tries to explain people's attitude towards risk by categorizing people's personality. Some people are more risk taking whereas some others are more risk averse. But psychology fails to explain why the same people are more afraid of certain risks than they are of others. If the environment determines how risky a situation is, then one can ask why different people react differently in the same environment? Cultural Theory explains this phenomenon positing that the perception of risk is a social process. The selection of risks to be given priority depends on the way of life one chooses to support (Thompson et al. 1990: 62).

In addition, Douglas and Wildavsky contend, the disagreement about risk is a problem deep-seated and widespread in the Western world. Different people have different concerns about risks they are facing or not facing. The programmes to reduce risks are not convincingly feasible. Hence, "substantial disagreement



remains over what is risky, how risky it is, and what to do about it" (Douglas and Wildavsky 1983: 1).

It would be ideal to be able to put all risks in a ranking list, so that one would know which risks bring about most damage and in what order one should cope with them. Unfortunately, this is an unrealistically ambitious undertaking for the reason that risk is seen as a combination of knowledge about the future and consent about the most favourable possibilities. One can put the risk problems into perspective like the following (Douglas and Wildavsky 1983: 4-5):

Table 7: Four Problems of Risk

		Knowledge	
		Certain	Uncertain
Consent	Com- plete	Problem: Technical	Problem: Information
		Solution: Calculation	Solution: Research
	Con- tested	Problem: (World Conference on Natural Disaster Reduction) Agreement	Problem: Knowledge and Consent
		Solution: Coercion or Discussion	Solution: ?

Source: Douglas and Wildavsky (1983: 5)

In an ideal case both knowledge and consent are not questioned. When the problem is technical, the solution is calculation. If knowledge is certain but there is no consent, disagreement can be overcome by coercion or discussion. If there is a lack of information, the problem can be solved by research. However, the situation will become a dilemma, if one neither has certainty about knowledge, nor consent. In this case only social consent can enable to reduce the need for new knowledge and focus on a few subjects. The risk perception is therefore a social process. Social principles guide social behaviour and frame "judgement of what dangers should be most feared, what risks are worth taking, and who should be allowed to take them" (Douglas and Wildavsky 1983: 6).

Therefore, cultural theory of risk perception sets out to explain how community consensus confers moral meanings to natural dangers. Dangers are used as an instrument to draw public attention to certain objects of social criticism and are related to social blame (Douglas and Wildavsky 1983: 7). The guiding assumptions of cultural theory of risk perception are

that any form of society produces its own selected view of the natural environment, a view which influences its choice of dangers worth attention. Attribution of responsibility for natural disasters is a normal strategy for protecting a particular set of values belonging to a particular way of life. Consequently, research into perception based on a cultural model would try to discover what different characteristics of social life elicit different responses to danger (Douglas and Wildavsky 1983: 8).

Forms of social organizations determine which risks are taken and which are ignored according to its values. These values and beliefs make sense out of people's di-

verse behaviour patterns and positions. By the same token, changing risk selection and risk perception means altering social organization (Douglas and Wildavsky 1983: 9).

According to the cultural theory, the choices of risks are determined by social forms which have their own typical risk selection characteristics. "Common values lead to common fears (and, by implication, to a common agreement not to fear other things)" (Douglas and Wildavsky 1983: 8). A certain "way of life" fears the risks most which may endanger the basis of its world view and its social organizational form. Risk selection shall serve the purpose to strengthen one of these ways of life and weaken others. Cultural theory intends to look at "social norms or politics that are being attacked or defended" behind perceptions of physical risks (Plapp 2003: 38).

Douglas and Wildavsky criticized the explanation that wealthier societies put more emphasis on risk aversion because they can afford to be more cautious. They raise the question why rich people are not more afraid of economic disaster, crime, or war. Maslow's theory of stages of wants argues that an individual's political demands are material such as food and shelter if his perspective is narrow. At a higher level of economic stage the individual can afford the luxury of a social conscience. Once the "basic needs" are satisfied, well-educated people begin to devote themselves to public interests. However, as Douglas and Wildavsky show, psychological and historical explanations seem to refute this theory. In an affluent civilization the privileged are not necessarily concerned about the poor. Furthermore they argue, the empirical evidence of the last 100 years does not comply with Maslow's argument that public altruism comes to surface after material successes of industrial development, since the Western industrialized countries are rich enough to be considered being in this last "altruistic phase" (Douglas and Wildavsky 1983: 13-15).

Sjöberg tested Maslow's model on a hierarchy of needs. It was expected that people are less worried about remote risks before their most urgent needs have been met. But the model did not fit to their findings (Sjöberg et al. 2000).

Thus, cultural approaches pose the question of "why certain risks get selected from the range of dangers that always threaten" seem to be more feasible to explain risk perception (Douglas and Wildavsky 1983: 14).

### **Definition of Culture in Cultural Theory**

Instead of seeking a united definition of culture, Cultural Theory introduced three domains to explain the concept of culture: cultural biases, social relations, and way of life. "Cultural bias refers to shared values and beliefs. Social relations are defined as patterns of interpersonal relations. A way of life is a viable combination of social relations and cultural bias" (Thompson et al. 1990: 1-2).

The social relations and cultural bias are given the same priority, for the reason that they are reciprocal, interacting, and mutually reinforcing. If one adheres to a certain pattern of social relationship, one will also have a certain way of looking at the world. Likewise, a certain kind of world view legitimizes a corresponding type of social relations. In other words, every epistemology has a corresponding ontology. The

viability of a way of life is only ensured if a particular cultural bias and a particular pattern of social relation mutually support each other (Thompson et al. 1990: 1-2).

### **Objectives of the Theory**

Cultural theory sets out to explore

the different perceptual screens through which people interpret or make sense of their world and the social relations that make particular visions of reality seem more or less plausible (Thompson et al. 1990: xiii).

The question cultural theory intends to answer is not how different cultural types emerge, but how these cultural types sustain and change. The assumption of cultural theory is that preferences and ways of perceiving risk are generated through and, in turn, sustain those relations (Thompson et al. 1990: 2).

### **Social Relations**

One of the domains of the Cultural Theory is social relations. Social relations, according to Mary Douglas, can be captured by two dimensions of sociality: group and grid.

Group means the outside boundary that people have erected between themselves and the outside world. Grid means all the other social distinctions and delegations of authority that they use to limit how people behave to one another (Douglas and Wildavsky 1983: 138).

The higher the degree of externally imposed prescriptions is, the less of life content is negotiable (Thompson et al. 1990: 5).

The group dimension determines to which extent the individual's life is incorporated into the group and how it is sustained by group membership. If a person has the same residence, shares work, resource, and recreation, his group dimension is assigned a high rating. The higher the group dimension is, the more difficult to be admitted to the group and the clearer the boundaries between the group member and non-members (Thompson et al. 1990: 5).

The term of grid is comparable to the idea of "social regulation" in Durkheim's work "Suicide". Douglas explains, a highly regulated (or high-grid) social context is signified by "an explicit set of institutionalised classifications [that] keeps [individuals] apart and regulates their interactions" (Thompson et al. 1990: 6). How one should behave is clearly defined. The lower the grid is, the more room there is for individuals to negotiate their relationships with the others.

The focal point of grid-group analysis is social control. Individual choice is constricted in that he is bounded to group decisions or one has to follow certain rules of the group. "Social control is a form of power" (Thompson et al. 1990: 6). It is the form of power as to who is entitled to exercise power over others (Thompson et al. 1990: 6).

Different types of social relations emerge due to different combinations of degrees of group and grid. Mary Douglas identifies three combinations: hierarchy, individualism, and sectarianism (Douglas and Wildavsky 1983: 138-139). In "Cultural Theory" the authors added two more groups to complement the grid-group analysis: the fatalist and the hermit.

According to the Cultural Theory, strong group boundaries joined with little prescriptions produce egalitarian social relations (Thompson et al. 1990: 6). Egalitarian group or sectarian group, as Douglas and Wildavsky call it, has strong group identities which distinguish them from non-members (Douglas and Wildavsky 1983: 139).

The egalitarian group does not tolerate inequality in any form. It advocates equality as its main goal. Within the egalitarian social group the role of members is not clearly defined. The relationship between two group members is ambiguous. No individual is granted the power to exercise control over the others, therefore internal conflict is difficult to be resolved. Individuals can only exercise power over other group members by speaking in the name of the group. In order to resolve conflict, members often have to be excluded from the group (Thompson et al. 1990: 6). The difficulty of decision-making, the bargaining and the readiness to splinter off weaken the sustainability of the egalitarian group. Therefore the egalitarian group is always at the border of the society and not able to assume the power of a central organization (Douglas and Wildavsky 1983: 120).

Hierarchical social relations are characterized by strong group boundaries and binding prescriptions. Individuals in hierarchical groups are controlled by other members of the group and simultaneously they have to follow imposed social rules (Thompson et al. 1990: 6). The characteristic of hierarchy is that all parts are oriented towards the whole. A hierarchical relation is a relation between larger and smaller or like the author of *Homo Hierarchicus* puts it, it is a relation between "that which encompasses and that which is encompassed" (Douglas and Wildavsky 1983: 90).

In comparison with the egalitarian group, the hierarchical group has a wide range of instruments to resolve internal conflicts including "upgrading, shifting sideways, downgrading, resegregating, redefining". Inequality and authority are justified on the grounds that different roles for different people enable people to live together more harmoniously than other arrangements. Inequality is justified by the sake of the whole organism (Thompson et al. 1990: 6; Douglas and Wildavsky 1983: 180). Since hierarchy does not view equality as necessary, good or possible, it is not the aim of hierarchy to establish equality. Instead, inequality "is written into its constitution". Hierarchy attracts its members with stability and dignity which are supposed to be achieved through the encompassing relation between the whole and its parts (Douglas and Wildavsky 1983: 180).

The success of hierarchy is ensured by different strategies. For instance, it does not allow one member's personal glory to be distinguished from the collective honour. Likewise, no single member is forced to take blame. Collective responsibility makes roles anonymous. Decision-making is collectivized in such a way that it is not transparent and no one can be seen to making decisions.

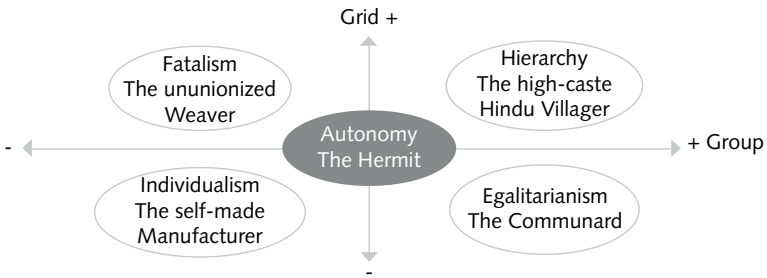
Hierarchy relies on control mechanisms. Information control is another important strategy of hierarchy. However, hierarchy could lose its control of information due to its strong censorship and result in constraints of individual initiative (Douglas and Wildavsky 1983).

An individualistic social context, also called market by Douglas and Wildavsky, does not bind individuals to any group incorporation or prescribed roles. The social relations depend on continuous negotiation between individuals. In such a social context individuals are relatively free from control by others; nevertheless they try to control the others (Thompson et al. 1990: 7).

Individualistic social group structure commits to social equality, but it is not as consistent as the egalitarianism. In a market system every citizen has the right to enter the market for exchange and to enjoy the immunities and protections which, in return, sustains the functionality of the market. However, temporary inequality due to the ups and downs of the market is accepted. The big promise of the market is individual success. The fundamental justification is faith in free exchange. Decisions should be made based on personal judgement rather than collective control (Dake 1992: 29).

When people are subject to binding prescriptions but excluded from group membership, they practice the fatalistic way of life. Along the grid dimension the fatalists are similar to hierarchies; their sphere of individual autonomy is restricted. Their choices as how to spend their time, with whom they associate, where to work and live, etc. are restricted. The difference between the fatalists and hierarchies is the group dimension. They are excluded from membership in the group which makes decisions that determine their life (Thompson et al. 1990: 7).

Figure 3: The Five Vignettes Mapped onto the Two Dimensions of Sociality



Source: Thompson et al. (1990: 8)

If an individual withdraws from all social involvements and refuses to control or manipulate others and at the same time if he escapes the social coerciveness to be controlled by others, he chooses the hermit way of life.

All these five social relations are illustrated in figure 3 with grid and group dimensions. Thompson et al. demonstrate five social relations with vivid examples. At one end of the scale are a high-caste Hindu villager and a member of a self-sufficient Thompson et al. demonstrate five social relations with vivid examples.

At one end of the scale are a high-caste Hindu villager and a member of a self-sufficient Western commune who both have a strong positive group context (see Figure 3). At the other end of the scale are a self-made Victorian manufacturer and a weaver who is employed by the manufacturer and does not belong to any union. It is prescriptions and grid dimension, which separate the Hindu villager from the Western communal and the mill owner from his employee. The high-caste Hindu villager and the mill worker both have positive grid contexts. They are restricted in their freedom through imposed social coerciveness. The self-made manufacturer and the self-sufficient communal both have negative grid contexts and see themselves to be free to act (Thompson et al. 1990: 7).

The individualist self-made manufacturer advocates success in material terms and competition. His moral justification is that he can only prosper if he serves the others due to the market mechanism. He believes that human skill, enterprise, and spirit of venture create a "positive-sum" game for both the manufacturers and the workers (Thompson et al. 1990: 8).

The mill worker finds himself on the receiving end of all this. He does not belong to any unions, but he is highly prescribed. He believes that he cannot do anything to change his life. His life is like a lottery. His environment, on which he has no influence, is responsible for both good and bad things happening to him. All depends on chance (Thompson et al. 1990: 8-9).

The high-caste Hindu enjoys many privileges such as access to land, water, etc. compared to his fellow villagers. His social coerciveness due to his high grid level does not impair his interests. On the contrary, these regulations serve him to manipulate the others. These regulations are "self imposed" to differentiate himself from the others and keep him up. Within such an environment all has been regulated and everything has its own place. The goal is to keep everything in its place (Thompson et al. 1990: 9).

The Western communal as an egalitarian rejects any form of inequality and coerciveness of the wider world. He separates himself from the outer world by a "wall of virtue" which protects those on the inside. The organizational problems due to the low grid but high group dimension are solved by fission. Fission is not viewed to be disastrous, since organizational refinement and market clearance are not their concern. "Their business is criticizing" (Thompson et al. 1990: 10).

Different from all four social relations, the hermit does not wish to manipulate the others; neither does he wish to be manipulated by the others. His choice is to escape from both group and grid dimensions. He aims to achieve autonomy: "a relaxed and unburdened self-sufficiency" (Thompson et al. 1990: 10).

To avoid misunderstanding, Mary Douglas stresses that the typology of cultures is derived from cultural biases. It is not like some of the critics assumed that communities are divided into egalitarian, individualist, or hierarchical groups. People do not form hierarchical, egalitarian, or individualist "groups" within a given society; rather, persons who do not belong to any "groups" as such share the same cultural bias (Douglas 1997: 128).

### **Cultural Biases**

Cultural biases are defined in Cultural Theory as shared values and beliefs. It is also called world views and cosmologies which correspond to different patterns of social relations (Dake 1991). "A cultural bias is a point of view, with its own framing assumptions and readily available solutions for standardized problems" (Douglas 1997: 128). Cultural biases are protected by using a perceptual screen to filter facts (Thompson et al. 1990: 22).

### **Ways of Life**

Culture, also called ways of life in Cultural Theory, is the viable combination of the cultural biases and social relations. It would not be a concern if values and beliefs caused social relations or social relations caused values and beliefs. Thompson et al. state that "values and social relations are mutually interdependent" (Thompson et al. 1990: 21). Ways of life are made viable by defining certain behaviours as worthy of praise and others as undesirable or even unthinkable. Individuals are supporting their way of life consciously or latently depending on their cultural awareness. These biases and relations cannot be mixed and matched arbitrarily, since the way of life can only be viable if certain biases support certain relations. Cultural biases help to justify and legitimate the social relations and social relations generate preferences and perceptions which in turn sustain those relations (Thompson et al. 1990: 2).

Cultural Theory claims that there are five ways of life which meet the requirement of viability. These five ways of life exist parallel to each other and are rivals, yet indispensable for each others survival. If one of them were distinguished, the others would lose their justification of existence due to lack of a target. However, this does not mean that all ways of life are equally represented within a single country and at a given point of time (Thompson et al. 1990: 4).

Following the classification of the typology the five ways of life, also called five cultural types, are hierarchy, egalitarianism, fatalism, individualism, and autonomy (Thompson et al. 1990: 3).

### **Human and Nature Concepts of Cultural Theory**

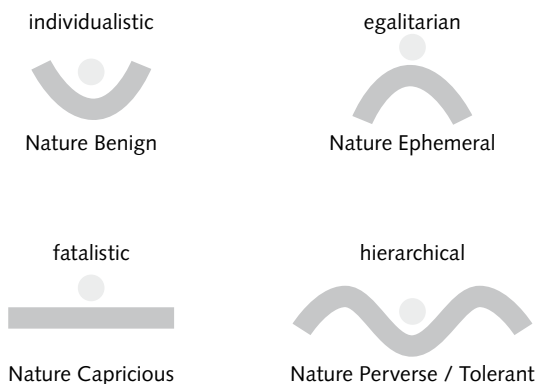
The development from primitive to modern society, especially the development of modern science, puts us in a belief that we can view nature in a morally neutral manner. For modernisation and science give us the possibility to explain phenomena formerly regarded as mysteries and see the world in an entirely different light. In a premodern society people politicized nature by inventing mysterious connections between moral meanings and natural disasters as well as by their selection among dangers. So do the moderns (Douglas and Wildavsky 1983: 35). Douglas et al. contend "each culture rests upon its own ideas of what ought to be normal or natural" (Douglas and Wildavsky 1983: 35). Nature is what the central establishment sees as natural. The belief that we as the moderns see nature through "neutral scientific lenses and laws" is much questioned by cultural scholars (Douglas and Wildavsky 1983: 48).

Thompson et al. state, ideas of nature, whether physical or human, are socially constructed. The ways of life individuals adhere to determine what is natural and unnatural. However, this does not mean the ideas of nature can be anything (Thompson et al. 1990: 25). Nature has to be conceived in such a way that makes the five ways of life viable (Thompson et al. 1990: 28). By the same token, the conception of human nature has to match the social relations (Thompson et al. 1990: 33).

The Cultural Theory introduced five myths of nature matching the five ways of life. The model of the nature concept is derived from the model developed by ecologists. These five myths of nature are simple models of ecosystem stability. Holling et al. and Thompson et al. contend the myths of nature are both true and false. They all represent part of reality (Holling et al. 2002: 10; Thompson et al. 1990: 26), but each of the myth is the only truth and reality for those whose way of life is based on that conception of nature (Thompson et al. 1990: 26).

Five myths of nature have been identified: Nature Benign, Nature Ephemeral, Nature Perverse/Tolerant, Nature Capricious, and Nature Resilient. These myths explain how nature works and the implication of the assumptions determines subsequent policies and actions (Holling 2002: 10). Nature Resilient belongs to the hermit's myth; however, it is not taken into account here due to the lack of involvement of the hermit in societal life. The four myths of nature can be illustrated by figure 4: According to the myth of Nature Benign, the world is in a state of equilibrium. When the ball that represents the state of nature is knocked, it always returns to the bottom of the basin (Thompson et al. 1990: 26). It imposes a static goal on a dynamic system (Holling 2002: 12). The subsequent policy of managing institutions can have a laissez-faire attitude. As long as one does "exuberant, individual things", a "hidden hand" will be guidance for him toward the best possible outcome (Thompson et al. 1990: 26-27).

Figure 4: The Four Primary Myths of Nature



Source: Thompson et al. (1990: 27)



According to the myth of Nature Benign, the world is in a state of equilibrium. When the ball that represents the state of nature is knocked, it always returns to the bottom of the basin (Thompson et al. 1990: 26). It imposes a static goal on a dynamic system (Holling 2002: 12). The subsequent policy of managing institutions can have a laissez-faire attitude. As long as one does "exuberant, individual things", a "hidden hand" will be guidance for him toward the best possible outcome (Thompson et al. 1990: 26-27).

Nature Ephemeral is the opposite of nature benign. It tells a story of the world as a very unstable and unforgiving place. Even the smallest jolt can bring the ball out the basin leading to the collapse of the current state. The policy implication would be precaution. Social activity is focused on maintaining the status quo. Only a decentralized system which has a minimal impact on nature is able to persist. "Small is beautiful", because the inevitable catastrophe of any policy can be kept localized (Holling 2002: 13; Thompson et al. 1990: 26).

Nature Perverse/Tolerant forgives most of the events but the ball can be hit over the threshold by an occasional knock. Managing institutions must regulate to avoid surprises (Thompson et al. 1990: 27). The exuberant behaviour should never go too far to keep the ball inside the basin. "Certainty and predictability, generated by experts, become the dominant moral concern" (Thompson et al. 1990: 26-27).

Nature Capricious world view sees the world as a random place. Institutions holding this view do not manage but cope with stochastic events. "Life is, and remains, a lottery" (Thompson et al. 1990: 27).

It is the institutions which supply people with their myths to direct their attention toward certain features of their environment and away from the others. Each myth belongs to one way of life: the skill-controlled cornucopia belongs to the individualist; nature tolerant/perverse belongs to the hierarchist; nature ephemeral belongs to the egalitarian; the lottery like cornucopia belongs to the fatalist. A particular way of life has a specific set of conviction of the world (Thompson et al. 1990: 28-29).

The fifth myth Nature Resilient belongs to the hermit whose strategy is withdrawal. The hermit pursues the oneness of man and nature as well as the unity of opposites. Whereas the other four myths have captured part of the reality and truth, the hermit's myth abandons the duality of man and nature and turns its attention to transformation of the world (Thompson et al. 1990: 29-31).

Like the models of physical nature justify the way of life, the conception of human nature fits in with how people wish to relate to each other. Social relations and conceptions of human nature cannot be mixed and matched (Thompson et al. 1990: 34).

A malleable characteristic is stressed by egalitarians. Egalitarians' conception of human nature tells that human beings are born good but corrupted by evil institutions. On the contrary, a non-coercive, egalitarian society can make human beings very good. The optimistic conception of human nature is essential to keep

egalitarian social relations viable and convince the egalitarian members to follow a high-group and low-grid mode to organize their life (Thompson et al. 1990: 34).

For individualists, human nature is as stable as the physical nature in their conception. Irrespective of what institutional settings are prevalent, human beings are and remain essentially self-seeking. Individuals only think of their own interests and pursue their own benefits. The subsequent best form of social organization is a competitive political system. This is not accepted by egalitarians and hierarchies, because it denies that individuals can be motivated by pursuing the common good for the collective (Thompson et al. 1990: 35).

Hierarchies postulate the belief that human beings are born sinful. However, this can be redeemed by good institutions. This conception of human nature justifies the way of life rich in institutional restraints:

It was the task of the higher powers of conscience and reason to regulate, discipline, and restrain the lower, baser passions and impulses, which, left to themselves, would escape control and wreak havoc (Thompson et al. 1990: 35).

Human nature and society is unpredictable for fatalists. People may be good and helping, but they can also be hostile. Fatalists never know how the others react to them, therefore they distrust the others. This justifies their exclusion from the other ways of life (Thompson et al. 1990: 35).

The hermit seems to have a contradictory conception of human nature. The belief in goodness of man becomes evident through the hermit's insistence that unlike the hierarchists and egalitarians no one needs to do anything to save the others. However, the hermit sees the ignorance of man as a kind of sinfulness. For instance, it is inevitable to eat living things even if one is a vegetarian (Thompson et al. 1990: 36).

### **Characteristics of Different Culture Types and Their Risk Portfolio**

Cultural theorists contend the perception of risk is a social process. Preferences for risk can be explained "by the function those preferences serve for an individual's way of life" (Thompson et al. 1990: 63).

The success of hierarchical institutions lies in the collectivizing responsibility. No single person is so outstanding that he could out-manoeuvre collective honour; likewise, no one is to be blamed for failure. "Collectivizing responsibility is done by making roles anonymous. Decision making should ideally be so collectivized that no one is seen to decide" (Douglas and Wildavsky 1983: 90-91). In hierarchies, goals are multiple and not clearly defined. This makes it easier to rationalize retrospectively the outcomes. Hierarchical structured institution maintains its functionality by avoiding "attempting to know too much about future consequences" (Douglas and Wildavsky 1983: 93). Information in a hierarchical system is strongly selected, hence it often easily misses some important points, is unable to perceive the unexpected and taken by surprise. Hierarchies do not seek risks deliberately, but they are not always aware of the risks they are facing due to their blind spots (Douglas and Wildavsky 1983: 93-94).

From the side of the individuals within a hierarchical system, they contribute to the sustainability of a hierarchical structure by subscribing to common values. The most important values are the organization and its long future, the traditions and rules (Douglas and Wildavsky 1983: 90-91).

Hierarchical society places higher value on maintenance of the bureaucratic organization than on individual survival. It is convinced of sacrificing the few for the good of the whole (Douglas and Wildavsky 1983: 101).

Hierarchists do not hesitate to set acceptable risks at high levels as long as the decisions are made by experts who are expected to do the right thing (Thompson et al. 1990: 64). However, risks of war are not acceptable to the hierarchists because the focus is placed on dangers of foreign relations. The judgement of the hierarchists about risks is questionable, since he cannot always tell if the risks are real or not due to its "bad intelligence" (Douglas and Wildavsky 1983: 188).

The opposite form of hierarchical organization is the individual market. Individuals' autonomy is the fundamental element to keep this system functioning. Every individual is given the same right to contract and withdraw from it on the basis of public acceptance. In contrast to the hierarchical organization, individual goals are distinct. No individual should be given the privilege to turn the free market into monopoly. The common values of free market organization are equality and self-help. This principle is accepted by everyone but people who cannot keep up with the others. Everyone is self-seeking and shares the value of the exchange system. The state is seen to be an instrument to oversee that fair play is secured and contract, competition as well as standard measures are protected and enforced. Personal success is highly appreciated (Douglas and Wildavsky 1983: 95-96).

The common fears led by common values would be the loss of resources in the market and anything endangering the exchange system. Regarding time, individualists do not live by history and tradition. Instead they are always short of time (Douglas and Wildavsky 1983: 96-101). Because the hierarchists and individualists

are both concerned to uphold the present social system and neither is able to envisage any different future, they can trust and mutually support each other in regard to environmental risk (Douglas and Wildavsky 1983: 100).

The individualists see risk as opportunity. If there would not be uncertainty or risk, there would not be personal reward and no scope for entrepreneurs. The free individualistic way of life fears state control, limitation to freedom and war which may interrupt their free market activity. The collapse of economy is the major fear of the individualists (Douglas and Wildavsky 1983: 188).

The sectarian/egalitarian way of life has the myth of nature ephemeral. The egalitarians are very careful to ensure the stability of the equilibrium between anthropogenic activities and nature, since they are more concerned about the world decline and environmental problems due to technological development. They strongly support human equality, democracy, and participation of citizens (Douglas and Wildavsky 1983: 188; Schwarz and Thompson 1990: 9).

The members of sectarian/egalitarian culture are concentrated on their internal politics and do not have "anything to say about society at large". They are small in size and autonomous but not necessarily averse to hierarchical structure. Members of these communities join them to avoid social commitment on a voluntary basis. They are critical about the other part of the human society which has a short distance to power. They do not speak up until they feel encroached upon by central authority. Some of them are hierarchists although hierarchical structure is a response to problems of scale. Douglas and Wildavsky contend, hierarchy is a solution voluntary organizations use to solve their problems of sustainability. Once the voluntariness of membership is reduced, the voluntary organization will change its character into hierarchy (Douglas and Wildavsky 1983: 103).

The risk portfolio of sectarian culture is different from individualistic and hierarchical cultures. Risk discourse often takes place among the closed sectarian communities. The sectarian culture's attitude towards risk is systematically incompatible with collectivism and individualism (Douglas and Wildavsky 1983: 102-103).

In general, sectarians are interested in bad news, because this is a sign for the corruption and pollution of the outside world and their criticism of the outside world are then justified. They are sensitive to risk with expected large-scale damages, though, like hierarchists, they also tend to ignore the long term and low probability risks. Risks are used as political instrument to prove the negative side of the outside world. Their aim is to denounce large organizations as such. Compared to hierarchical culture, sectarian culture is pessimistic and focuses on possible disaster. Because sectarians are against institutions, they rely on good human nature as the basis for good society. Since science has replaced God as the possibility to explain how the world shall function, sectarians use nature as a powerful instrument to maintain their way of life. They need enemies to structure the world into saints and sinners. The eminent difference between hierarchical and sectarian organizations lies in the attitude towards technology, for technology symbolizes worldliness such as social distinction, pursuit of wealth, labour division, and attributes which are criticized by sectarians (Douglas and Wildavsky 1983: 122-124).

Risk perception is classified by the principles of organizations. A certain form of organization will favour certain risk selection. The more hierarchical an organization is, the more it is interested in internal control. It gives very little attention to a message of catastrophe. Sectarians are, on the contrary, more concerned about the future, because they believe that the future is endangered and it is not sure that disaster can be averted. But they are convinced that the origins of disasters are oversized organization and new technology (Douglas and Wildavsky 1983: 126-127).

Since the hermit's strategy is withdrawal from societal life, it is very difficult for the other ways of life to impose risks on him. Therefore, the hermit is not the attention of risk discussion (Thompson et al. 1990: 64).

Each way of life sees risks through the lenses of their cultural biases. They pick up some risks which bring their rewards but inevitably ignore the others which are

Table 8: The Four Political Cultures

	Hierarchical	Egalitarian
Preferred way of organizing	Nested bounded group	Egalitarian bounded group
Certainty (myth of nature)	Nature perverse/ tolerant	Nature ephemeral
Rationality	Procedural	Critical
View of resources	Scarce	Depleting
Scope of knowledge	Almost complete and organized	Imperfect but holistic
Learning style	Anticipation	Trial without error
Social context	Positive group/ positive grid	Positive group/ negative grid
Desired systems properties	Controllability (through inherent orderliness)	Sustainability (through inherent fragility)
Ideal scale	Large	Small
Engineering aesthetic	High-tech virtuosity	Frugal and environmentally benign
Ideal of fairness	Equality before the law	Equality of result
Cultural bias	Ritualism and sacrifice	Fundamentalism/ millenarianism
Preferred economic theory	Bureaucratization through increasing transaction costs (O. Williamson)	'Buddhist' and 'thermodynamic' economics (E.F. Schumacher and N. Georgescu-Roegen)
Energy future	Middle of the road (technical fix)	Low growth (radical change now)
Perception of time	Balanced distinction between short and long term	Long term dominates short term
Preferred form of governance	Leviathan	Jeffersonian
Salient risks	Loss of control (i.e., of public trust)	Catastrophic, irreversible and inequitable developments
Model of consent	Hypothetical consent	Direct consent
Method for applying model of consent	Natural (or other ideal) standards	Expressed preferences
Risk-handling style	Rejection and absorption	Rejection and deflection
Latent strategy	Secure internal structure of authority	Survival of the collectivity
Commitment to institutions	Correct procedures and discriminated statuses are supported for own sake. <i>Loyalty</i>	Collective moral fervour and affirmation of shared opposition to outside world. <i>Voice</i>

Source: Schwarz and Thompson (1990: 66-67)

Individualistic	Fatalistic
Ego-focused network	Margins of organized patterns
Nature benign	Nature capricious
Substantive	Fatalistic
Abundant	Lottery
Sufficient and timely	Irrelevant
Trial and error	Luck
Negative group/ negative grid	Negative group/ positive grid
Exploitability (through inherent fluidity)	Capability (through inherent chaos)
Appropriate	-
Appropriate (as cheap and cheerful as possible)	-
Equality of opportunity	Not on this earth
Pragmatic materialism	Inconsistent eclecticism
Neo-Austrian: competition without equilibrium (F. Hayek, A. Alchian)	Marginalization through structural imbalance (neo-Marxist)
Business as usual	What you don't know ...
Short term dominates long term	Involuntary myopia
<i>Laissez-faire</i>	It doesn't matter who you vote for ...
Threats to the functioning of the market	-
Implicit consent	Non consent
Revealed preferences	-
Acceptance and deflection	Acceptance and absorption
Preservation of the individual's freedom to contract	Survival of individual
Only if profitable to the individual. If not, then <i>exit</i> .	-

picked up by the other ways of life. As a summary Schwarz and Thompson collected the traits and risk portfolios of the four ways of life in table 8.

### 1.2.c Constraints and Significance of Cultural Theory

Despite of the application potentials of the cultural theory in risk research related to different social contexts, the lack of empirical evidence through its authors or other researchers remains one of the frequent critiques on cultural theory. Thus, the empirical validity of the theory is challenged.

The empirical studies in risk research using cultural approaches are mostly of quantitative nature. The studies conducted by Dake (1991, 1992), Marris et al. (1998), Breton et al. (1996), Sjöberg (1998), and Rippl (2002) for instance have not yielded clear validity of the theory about the relationship between cultural biases and risk perception as the theory intended to predict (Plapp 2003: 47; Wiedermann and Eitzinger 2006: 7). Karl Dake and Aaron Wildavsky claim that they found a statistically significant correlation between the cultural biases and risk perception, similarly the study of Palmer confirms these findings (Palmer 1996: 722). However, John Adams has disputed the strength of these correlations. He argues that the methodology used in the research of Dake and Wildavsky is "founder in tautology", since they put the respondents into the categories of cultural theory and use the categories to account for their beliefs (Wilkinson 2001: 10). This shortcoming is also expressed by Boholm: "...since the conclusions are already contained in the premises, these 'predictions' can hardly be considered as proper hypotheses. What is to be proved is identical with the proof" (Boholm 1996: 71). Later studies applying the methodology of Dake and Wildavsky could not find such convincing results. This may be due to the different measures of public perception. Sjöberg concludes that "cultural theory explains only a minor share of the variance of perceived risk and it adds even less to what is explained by different approaches" (Wilkinson 2001: 10). Tansey contested this argument: "...few social theories could stand up to a testing regime that is imported directly from the natural sciences" (Tansey 2004a: 362).

In addition to the criticism about validity, Grendstad and Selle (2000) discovered through their empirical study that the myths of human nature and myths of physical nature as two aspects of the cultural biases or world views are not as consistent as cultural theory claims (Grendstad and Selle 2000: 27-37). They pointed out that the position of man within the nature myths is not clearly defined in cultural theory. During their study a respondent raised the question: "is man a part of nature or just an annoying factor?" (Grendstad and Selle 2000: 31).

A further criticism is that cultural theory distorts the social reality of risk perception by rigidly conforming it to the categories of cultural biases (Wilkinson 2001: 11). The relationship between individuals and the grid group structure is seen as stable to fulfil the purpose of the functionality of a certain cultural type. For instance people from hierarchical educational backgrounds tend to look for a hierarchical work environment etc.

Cultural theory is criticized for its simplistic typology which cannot cover the complex social context of contemporary societies. Also it is argued that cultural theory's four ways of life are too rigid, inflexible, and static, whereas ways of life can be pluralistic and dynamic. Empirical studies of Dake show that subjects of the surveys do feel belonging to diverse ways of life (Dake 1992; Renn 1992: 75).

Besides, Cultural theory cannot describe change. According to cultural theory, individuals commit themselves to a much too stable structure due to their cultural biases. Consequently, risk perception is rigid as well (Plapp 2003: 49). Boholm concludes that the social dynamics of risk perception are far more complex than the cultural model could provide. "Relativism" as represented by cultural theory viewing risk as a social construct is not sufficient to tackle risk problems (Boholm 1996: 74-79; Boholm 2003: 175).

The success of cultural theory, Sjöberg concludes, is "largely an example of the persuasive power of speculation" (Sjöberg 2000: 6).

Methodologically provoked questions include whether cultural bias is measured at individual level or organizational level. This may lead to difficulties in research design (Plapp 2003: 47). However, Rayner seems to understand cultural theory to be an approach which enquires the interpersonal relations. He criticized the "methodological individualism" which investigates social action by mounting up individual behaviour (Rayner 1992: 86). Dake argues that orienting dispositions guide the perception of risk both at the collective and individual levels (Dake 1991: 61-63). Other researchers such as Steg and Sievers believe that cultural theory can be applied at individual level (Steg and Sievers 2000). Different interpretations are possible here, since cultural theory does not provide a clear answer to it. Empirical studies have been carried out basically based on the understanding of researchers (Plapp 2003: 50).

Luhmann found deficiency in cultural theory in its explanatory power as why risk has become an important issue in societies and why hazard is now perceived as risks (Plapp 2003: 51).

Although cultural theory as partial perspective is inadequate for conceptualizing the complexity of cultural dynamics through which people negotiate the meaning of risks, Wilkinson concludes nevertheless that despite of all the empirical difficulties and the limitation of cultural theory, it still serves to be an indispensable mean of inquiry of cultural complexity. He refers to Max Weber for his reasoning:

All knowledge of cultural reality ... is always knowledge from particular points of view. When we require from the historian and social research worker as an elementary presupposition that they distinguish the important from the trivial and that he should have the necessary 'points of view' for this distinction, we mean that they must understand how to relate the events of the real world consciously or unconsciously to universal 'cultural values' and to select those relationships which are significant for us... To be sure, without the investigator's evaluative ideas, there would be no principle of selection of subject-matter and no meaningful knowledge of concrete reality (Wilkinson 2001: 16) (citing Weber 1949: 81-82).



Especially for perception research cultural theory offers a general research framework and a testable set of hypotheses regarding risk perceptions, belief systems, and social relations, since risk perception is an interpersonal experience based in moral commitments to particular ways of life (Dake 1992: 28). Furthermore, Renn states,

cultural analysis has demonstrated to the risk professionals that the concept of risk assessment as well as the rational behind it cannot claim universal validity and legitimising power among all groups and cultures. There are different world views that determine how different groups cope with the universal experience of potential outcomes of actions and events (Renn 1998b: 62).

Thus, this research uses the cultural approach as an analytical model to explore risk perception in different cultural settings and its relations to the cultural biases.

## 2. Cross-Cultural Risk Perception Studies

Over the last decades, there has been an increasing recognition of the significance of cross-cultural studies of risk perception, since little was known about the way in which the public in other countries understood risks. The most empirical studies in this area have been conducted in the United States followed by Europe. Only a few studies are available from Australasian countries (Boholm 1998: 137; Rohrmann and Chen 1999: 220; Rohrmann 1999). These cross-cultural risk perception studies aim to examine the way specific societal categories and groups perceive risks. These groups could be e.g. women as opposed to men; people of different educational or professional background, etc. At theoretical level two theories have been deployed: the psychometric paradigm and cultural theory. These researches aim to test the generality of results by deploying psychometric paradigm regarding the qualitative dimensions of risk perception and to investigate how risk is culturally constructed deploying cultural theory (Boholm 1998: 137).

Most of the cross-cultural comparative studies deploy the psychometric paradigm (Boholm 1998: 153). Only a few attempts have been made to test cultural theory. Boholm suggests the reason for it may be the challenges to translate cultural theory into a design for measuring data due to the ambiguity of the theory and its diverse interpretation potentials (Boholm 1998).

Among these studies Rohrmann (1994) applied cultural theory and investigated the commonalities and differences of risk perception between Germany, New Zealand, and Australia. He examined the difference of perception between "sub-groups" as defined to be "technical", "ecological", "monetarian", and "feminist" groups within one country, as well as between the three countries. The finding most relevant to cultural theory is that the differences between the sub-groups are stronger in Germany than in Australia, whereas the findings in Australia and New Zealand are similar. Yet, the study could not relate the four subgroups to the grid-group structure (Boholm 1998: 152-153).

Another comparative study was conducted by Rohrmann and Chen in 1999 comparing the risk perception between Chinese and Australians "utilizing psy-

chometric instruments" combined with a cultural analysis. The study showed that cross-cultural disparities are evident in variation in risk perception in China and Australia. The research results revealed strong influence of cultural context on risk evaluations, though the empirical basis gained so far (sampling focused on student and researcher groups) is not sufficient for generalization and a wide range of cultures needs to be examined to clarify the influence of cultural factors (Rohrmann and Chen 1999: 219). Similar studies include the investigation by A. D. Eisler and H. Eisler juxtaposing risk perceptions of German, Japanese, Swedish, and American students on global risks (Eisler and Eisler 2006: 109-115) and the study by Kleinhesselink and E. A. Rosa comparing Japanese and American students' risk perception (Kleinhesselink and Rosa 1991). It is worth mentioning that all these researches listed here are of quantitative nature.

In the endeavour of comparing risk perception within "Eastern" and "Western" cultures little is known about countries such as China. Keown's study in 1989 was one of the first attempts to compare the risk perception between Hongkongese and Americans. He based his study on psychometric paradigm and adopted the list of hazards developed by Slovic. The questionnaire used in this study was a replication of Slovic's previous study in 1979. Convenient sampling of university students to rate different risks is deployed. His findings showed that the difference of the risk perception of the Hongkong and American students is not radical, though some differences may be explained by cultural influences (Keown 1989: 401-405).

A recent study on risk perception comparison between Chinese and Americans was conducted by Duan. She examined how people's perception of environmental risk, preference in risk management, and perspectives of participatory decision processes vary in different social, cultural, and political systems using samples of university students (Duan 2005: ii). She applied a structural equation model (SEM) to explore the correlations of social factors such as social trust, social value, and risk experience and the relationships of social factors to risk perception and preference in risk management. Among her findings, the Chinese were more concerned about environmental risks. The Chinese believe that the environmental issues are more risky to health, to the environment, and to economic development than the Americans. Chinese participants are less likely to support the policies which require them to participate financially and prefer that the government takes actions to reduce risks. They are also more likely to support educational strategies to help people change behaviour to reduce environmental risks (Duan 2005: ii-iv).

Apart from these comparative studies between China and a Western country, there are a few other studies on risk perception in China. For instance the studies of Zhang (1993) and Lai and Tao (2003) examine the perception of environmental hazards in mainland China and Hongkong. Both of the studies applied the research method of Fischhoff et al. using psychometric paradigm combined with a cultural analysis informed by cultural theory. Their findings have only limited relevance to cultural theory (Lai and Tao 2003: 669-671; Zhang 1993: 509). Further quantitative research conducted by Xie, Wang, and Xu combined different models including cultural theory to analyse risk perception of the people in mainland China,

though cultural analysis in terms of cultural theory seemed not to be the focus of their analysis (Xie et al. 2003: 685-694).

The survey conducted by Wong and Zhao (2001) focused on flood victims' perception after a flood event in 1994 in Beijiing, China. This study provides one of the first insights into the perception of the people who have suffered a natural hazard (Wong and Zhao 2001: 190-201). However, this study has not deployed any theoretical framework. On the whole, still little is known about risk perception in China.

Although cultural approaches provide an enriched theoretical background for empirical risk perception studies (Cvetkovich 1991; Rayner 1992; Sjöberg 1997) and the cultural theory of Douglas and her colleagues has been applied to a broad spectrum of cross-cultural topics (Dake 1991: 78), only limited forms of cross-national research using cultural theory have been launched, thus, the full potential of the theory for cross-cultural research has not been tested (Caulkins 1999: 109). Especially in the domain of cross-cultural risk perception research it seems that only few studies have explored the potential of cultural theory with qualitative methods. China is one of the countries which have only received very little attention in risk research using cultural theory. Thus, the following discussion will offer a new dimension of qualitative risk analysis deploying the Cultural Theory as an analytical framework.

## **G. Discussion**

### **1. Link between Theory and Empiricism**

#### **1.1 Ways of Life: Social Relations and Cultural Biases**

According to the collected data, the hierarchical way of life, as described in cultural theory by Douglas and Thompson et al., dominates flood risk management in Wuhan, China. In contrast, a mixture of egalitarian, individualist, as well as hierarchical ways of life are characteristics of flood management institutions in Cologne, Germany. Even the interviewees of environmental agencies and NGOs in China did not show egalitarian characteristics as shown in previous studies (Rippl 2002). Rippl and her colleagues discovered through their survey that in general egalitarians show a much higher ecological risk perception than any other cultural types, whereas hierarchical cultural types show the lowest perception on ecological risk. At the same time, people with hierarchical orientation show the strongest perception for risk of disturbance of social order (Rippl 2002: 161).

Compared to the Chinese interviewees, the German actors showed a diverse mixture of cultural typological tendencies. Egalitarian, hierarchical, as well as individualist ways of life share their presence among the interviewees. These traits of different ways of life within the Chinese and German actors in flood risk management can be observed in the domains of social relations and cultural biases.

**Social relations** can be captured by grid and group typology which encompasses two dimensions of sociality. The Chinese flood risk management shows high grid and high group features. The group boundaries and binding prescriptions

of the flood risk management are clearly defined. The strong group dimension is best revealed through the researcher's difficulty to access the field research as a non-group member (see Chapter D.2.2). Central to the entire procedure of accessing the field is to be admitted to the group. The admission to the group required personal or official introduction of a Chinese governmental agency, since only a group member or an agency which is located within the social control mechanism can be guarantor for someone who is to be admitted to the group. Only then social control through group members can be ensured. This also explains why the provincial water management refused to accept the introductory letter from the United Nations University (UNU) as an international organization. As an independent research institution, UNU evades the social control of the Chinese governmental units, thus a researcher of UNU can only be admitted to the group through a group member either as a person or as an "internal" unit. Even the physical admittance of the researcher to the office buildings of the interviewees was to undergo a strict examination of the guards at the entrance. Also the request to interview the affected people in Dujiatai after the use of Dujiatai Retention Area in 2005 was refused. The official reason was that no one in the flood protection agency of Wuhan could spare the time to accompany the researcher to the affected area. Mr. D., who assisted to coordinate the field work of the researcher, told the researcher that the actual reason was that the flood protection agency was "worried about the people there speaking too freely". The urge for social control through group boundary (not allowing the researcher to access information which is only made available for group members) surfaces clearly.

In contrast, the group dimension proved to be low in Cologne, Germany. The access to the group was simple as shown through the access to the field and the integration into the Flood Protection Centre during the participatory observation (see Chapter D.2). No clear group boundaries can be identified. This seems to fit into the description for individualist group traits, since both egalitarian and hierarchical social relations dictate high group identities.

The grid dimension is reflected in many different aspects. Serving as a framework for the social coercion, the institutional arrangement of the flood risk management is stringently structured in a hierarchical style in China, but highly decentralized in Germany. Therefore high grid among Chinese interviewees and low grid among German interviewees can be identified. In Wuhan each agency level is assigned different tasks and power. The roles of the actors are prescribed according to their ranking in the hierarchy. Power is concentrated at the highest level of the hierarchy. Local actors hardly have any room to make decisions. They function solely as technical advisors and implementers. The agencies at the same level often do not communicate with each other, since the definitions of their roles and powers do not allow them to interfere with other agencies' business. Inter-agency conflicts are "mediated" by "leaders" who are assigned power over the lower levels. Between the agencies at different levels such as central and local communication flows in a top-down manner: the local agencies are to implement the orders of the higher authority and obey; at the same time, higher authorities expect the local agencies to report to them on local "facts". Communication between the higher and the lower agencies is understood as task assignment and issuing orders.

Interference with the affairs of higher levels in form of critique or discourse is not welcome and even carries the risks to be punished. These social rules are translated into behavioural codes such as “unquestioning obedience”, “self-sacrifice for bigger interests”, and “altruism”. In turn these values are praised and held high. At the same time protection of individual and local interests is seen to be “bargaining” with the state which represents the most superior interests of all and is therefore untouchable. Interests of individuals and communities have to be orientated towards the whole, the state’s interests. Like one of the interviewees stated: “If there would not be the big family (the state), the small family (communities and individuals) will never exist” (Interview 1, 30 August 2005). If one is not willing to sacrifice oneself, one becomes a social outcast and is punished. The case of Jianli County (see Chapter E.1.3) provides a vivid example of how in a high group social experience is strengthened. Altogether 60,000 people had to abandon their homes in order to protect the “bigger interests of more important areas” such as the City of Wuhan. As the Governor of the County and local people tried to resist the dike breaching operation ordered by higher flood protection agency, the response was enforcement through violent police force and punishment of the responsible persons as well as moral sanctions, which are the common instruments to resolve internal conflicts as described by Thompson et al. (see Chapter F.2.2.b). Even the journalist who was reporting on this event tried to persuade the local people to give up their resistance by reminding the people of the moral obligation (grid) and the values (cultural bias) praised by Chinese society: “For **the interests of all**, you shall **sacrifice** your own **small homes**. We are going to report your great sacrifice to all the Chinese people. The people will remember your sacrifice” (Chapter E.1.3.a).

It is clear how cultural bias and social relations support each other in this case. Rayner states:

The objective of considering grid and group simultaneously is not merely to describe patterns of solidarity rules and social classifications governing the allocation of roles. The fundamental purpose of grid/group analysis is to provide a framework, within which a cultural analyst may consistently relate differences in organizational structures to the strength of arguments that sustain them (Rayner 1992).

Hierarchical culture dictates people’s behavioural codes on the one hand; on the other hand, values as part of the cultural bias support the enforcement of these codes. By the same token, without social coerciveness values cannot be sustained as only few group members would follow the given societal rules.

The informal arrangement of the Governor of Hubei province as leader of the Yangtze River flood protection is another example of how cultural bias and social relations reinforce each other (see Chapter E.1.1.a).

However, one can raise the question: why do the urban elite deserve more protection than the rural poor? Why should people living in retention areas be sacrificed for the urban population but not vice versa? The concept of equality would be a non-starter to provide convincing explanation. Equality is not part of the programme of the hierarchy (see Chapter F.2.2.b). **Social injustice and inequality** are justified on the grounds that sacrifice of some is necessary to ensure the

survival of the whole. There is no wonder that the word *Daju* (see Chapter E.1.3.a), holistic thinking, belongs to the favourite vocabulary of the Chinese flood risk management. Equality and fairness as the most frequently used indicators to measure cultural bias in quantitative studies (Grendstad and Selle 2000: 32) also are distinguished mark in this qualitative study. The data shows that equality and fairness are not important criteria in China; instead, the survival of the whole is emphasised. At the same time values such as sacrifice, altruism, and morality are held high, thus, a highly collectivist group ideology of mutual aid and responsibility is well-revealed as asserted by Schwarz and Thompson (Schwarz and Thompson 1990).

In Cologne individuals, local communities, and local flood management agencies as well as NGOs are all heavily involved in the decision-making process. This reveals dominant egalitarian social relation traits. No agent is given more right to exercise power over the others and no strict prescription is imposed on particular agents. Negotiation between different agents takes place permanently which results in an extensive flood risk communication network both in horizontal and vertical dimensions. Equality as the most important value cherished by egalitarians and individualists is guaranteed by large-scale intensive public participation (see Chapter E.1.3.b).

In contrast to the distinctive features of hierarchical social relations and cultural biases in China, it is difficult to identify if the low grid traits both shared by egalitarian and individualist cultural types and reflected in the behaviour of the actors come from the egalitarian or individualist tendency. Furthermore, hierarchical thinking can also be observed especially among actors like fire brigade and the army, however, egalitarian thinking is not lacking among these actors either. The critique on cultural theories to be too rigid and simplistic seems to be affirmed by this finding (see Chapter E.2.2.c), as in China the fatalist type is not present among the German actors. The characteristics of the existing three cultural types cannot be assigned to groups with clear boundaries. As previous studies have shown, one cannot rule out that a single agent has traits of different cultural types at the same time (Renn 1992; Dake 1992).

Blame is another important indicator for different social relations which lead to different problem solving strategies (Douglas 1992). Douglas recommended seeing culture as essentially a dialogue that allocates praise and blame (Douglas 1997). Tansey stated that cultural theory asks indirect questions such as "At whom is the finger of blame being pointed? Who is being held accountable? What is being rejected and what is being defended in a particular collective social action?" to identify how a society is organized (Tansey 2004: 29).

In premodern Chinese society people believed that disasters occurred, because the emperor misbehaved. Natural disasters are signs of punishment by gods. As the mediator between the gods and human beings, the blame and responsibility as well as the mandate of mitigation rested with the emperor (Weggel 1997). Who is to be blamed in modern secular society or mixed society in which the explanation of god is not anymore satisfying to most people (although in rural China the blame may still rest with god)? Nature itself can serve to be a good objective to be blamed, because nature cannot defend itself and be called for answers. The

responsibility is then shifted conveniently to nature. Flood is seen as a monster and an enemy. As Douglas contends that an external enemy is the major blame of hierarchy (Douglas 1992: 6), the mitigation strategy is to fight with it like a Chinese idiom precisely describes: "If the enemy comes, we can fight them with our soldiers; if flood comes, we stop it with dikes".

This fighting spirit and the Western rationalistic ideology brought to China during the New Cultural Movement at the beginning of the 20th Century (Hu et al. 2005) reinforce each other. Thus, scientism has assumed an unshakable position in flood mitigation strategies. Baum observed that one of the characteristics of modern Chinese culture is the propensity to idealize science, to reify and universalize its precepts, thereby elevating it from a method of inquiry to the status of canonical dogma (Baum 1982: 1172). Scientific evidence is instrumentalized to justify the Chinese flood mitigation strategies (see Chapter E.1.3.a). Scientism, on the one hand, filled in the vacuum of Confucianism after its collapse in the late 19th and early 20th centuries; on the other hand, doctrinal orthodoxy enhances the political legitimacy of ruling elites (Baum 1982).

Fact and value dichotomy is convenient for those exponents of science that informs policy seeking clear and simple solutions to complex problems (Rayner 1992). In hierarchical culture a thing is either known to be true or false. A fact is a fact:

Hierarchy, both as a system of governance and a type of culture, assumes that the world is up to a point knowable, and that itself, the hierarchy is organized according to the principles which run the universe. Consequently, the consensus that upholds the political system upholds the authority of facts (Douglas 1992: 32).

Confucianism and Chinese communism clearly share a formalistic propensity to categorize. This propensity is a natural outgrowth of a cultural style that emphasizes psychological tension-reduction through the denial of ambivalence and doubt (Baum 1982: 1181). The strength and durability of Chinese Confucianist cultural traits is a result of their high degree of stylistic consonance with the ideology and political ethos of Chinese communism (Baum 1982: 1167). This is how they survived the passing of China's traditional social and political order (Baum 1982: 1180).

The other major blame factors are population, lack of financial capacity, and lack in "quality" of local officials and people. Population as the result of historical development in the past cannot be blamed. It is convenient to say that no sustainable strategies can be applied due to a huge population. The focus on problems caused by population distracts people from other issues at hand. Politicians can continue their business as usual without being questioned for their credibility. The lack of "quality" of people and local officials (see Chapter E.1.3.a) is more likely to be the reason for the failure of the implementation of the new water policy. However, it is another convenient justification for the failure of the policy implementation. All these constructed blames are strategies to draw off the attention from the other existing weaknesses within the hierarchical flood risk management system.

In Germany among the interviewees in Cologne the “föderalistische” system and the representatives of the economy, such as local politicians and big corporations, are blamed frequently. This appears to fit within the egalitarian type of blaming. As an opponent of the government and big business, the egalitarian’s task is to criticize these power structures (see Chapter F.2.2.b). However, surprisingly, not only environmental agencies and environmental NGOs show this egalitarian tendency, but also governmental agencies share this critique, likely to be result of individualism common in a low grid society like Germany. Low group allows the expression of individualistic values of originality and self-reliance.

**Information** is a further important instrument of the entire control mechanism (see Chapter F.2.2). Information in flood risk management in China is treated with great restriction as is revealed by the empirical data including field experience. Even the flood protection and emergency management plan belong to the category of confidential documents. Non-group members such as the researcher have little access to information. This field finding was confirmed by other researchers from Chinese universities (personal communication with Professor Fang of the Beijing Normal University). Within the group information is regulated according to the rankings within the hierarchy. The higher the ranking is, the more access to information one has. Flood development information has not even been made available for some of the technical departments. The general public is entirely excluded from evacuation planning until action has to be taken (see Chapter E.2.2). The casualty number during natural disasters has been kept as a state secret until 2005 [to improve the disaster management in China, the Chinese central government abolished the regulation about the casualty and made it accessible to the public in 2005] ([www.xinhuanet.com](http://www.xinhuanet.com) 2005). All these indicators show a strong information selection and reservation behaviour which is a typical trait of a hierarchical system. It serves the purpose to collectivize responsibilities in decision-making so that no individuals can be pinned down to answer for failures (see Chapter F.2.2.b). Social institutions construct their organizational cultures in the process of operation, that is, of decision-making. The different social and cultural environments in which policy actors operate will lead them to respond differently to decision-making situations (Schwarz and Thompson 1990: 68-69; Coyle 1997: 60).

Similarly, the discourse of individuals is constrained by the constitutive premises of the social environment they live in. While there is little distinction between individuals and their roles at low grid, the roles and statues of individuals at high grid are clearly defined. People’s behaviour is strongly prescribed as how to behave at different occasions. In China, interviewees always make sure that they are not criticizing but praising their own system in front of the external interviewers.

Apart from the hierarchical way of life no other ways of life can be clearly identified among China’s flood management actors. NGOs which usually represent the egalitarian way of life are not a common phenomenon in China. The only two NGOs involved in flood issues in Wuhan are either working closely with the government as in the case of the World Wildlife Fund (WWF), or they are fully under the government control. The head of the interviewed “non-governmental” NGO in Wuhan is a governmental official in the environmental agency of the Mu-



municipal Government of Wuhan. According to him, the NGO was set up as “the government saw the necessity”. Thus, the egalitarian way of life does not show any identifiable presence according to the field data. Neither does the fatalist way of life. The reason for this probably roots in the fact that most of the interviewees are governmental officials and only people of hierarchical way of life seek and are welcome to work in a governmental organization. However, the strong emphasis on economic growth indicates an increasing market-orientated individual way of life which seems to coexist cross-fertilizing with the hierarchical communist system, with regard to environmental risk as observed by Douglas (Douglas and Wildavsky 1983: 100) (see Chapter F.2.2.b).

The monocultural dominance of hierarchy within the flood risk management and other agencies involved may change over time as the individual way of life might gain strength with the economic development in China. This development requires further investigation and therefore is beyond the research objectives of this study. Moreover, despite of the government control of the NGOs, egalitarian concern about environmental risks can be observed in public discourse. In an article on the interdependency of the ecological systems Yu criticizes the purely engineered flood mitigation philosophy for its negative impact on environment and strongly advocates a more holistic approach taking into account the interdependency of the entire ecological systems in flood risk management. He especially points out the detrimental influence of dike construction and hydropower stations on river systems (Yu 2005). His critique provoked a debate among water managers. A proponent of opposing views, such as Zhang, a water engineer, argues:

Dike construction cannot be seen to have any negative impact on the ecological system, on the contrary, it protects the independent river systems, furthermore, it is an indispensable component of our civilisation” (Zhang 2005: 6).

He contends that the engineered measures to control river systems do not do any harm to rivers, rather, the existence of engineered constructions are a “powerful weapon to realise the harmony between man and nature” (Zhang 2005: 7). The controversial discourse taking place on public forums of the website of the Chinese Ministry for Water Resources (<http://www.mwr.gov.cn/>) reveals that on the one hand, the hierarchical way of water engineering is still very strongly presented among water managers; on the other hand, egalitarian concern is paving its way to make itself heard.

## 1.2. Conception of Human and Nature

According to cultural theory, hierarchical culture believes that man is born sinful to justify the imperative to rely on regulating institutions. This conception of human nature as part of the cultural bias seems to have some contradiction to one of the traditional views of the Chinese on this matter. Mencius, a Confucianism thinker, stated that man is born good and they can become better through “education”, “cultivation”, and “self-discipline” (Weggel 1997: 52). However, the Chinese Fajia, a philosophical school, advocating the regulations through the law, believes that humans are inherently bad. Legal regulations should be issued to control people (Franke and Trauzettel 1999). The field research in China seems to affirm the ob-

servation of the cultural theory and the thought of Fajia. The strict social control mechanism is a strong indicator for the underlying belief of bad human nature. This is shown in particular through blaming the lack of high quality of local official and people as the impediment in implementing flood protection policy. This seems to be another indicator for the belief that humans have shortcomings which have to be regulated by institutions (see Chapter E.1.3.a). However, the field research in China could not yield any direct evidence as how human nature is construed.

In Germany the tendency to believe that human beings are self-seeking and therefore do wrong things due to their "stupidity" and "greediness" (see Chapter E.1.5.b) is reflected in the statements of the interviewees. Even the interviewee with egalitarian traits did not reveal the belief that man is born good. An overall complaint of the interviewees is that people both referring to the general public and politicians tend to forget bad experience and are not in the position to learn lessons from the past, therefore they tend to repeat their mistakes and failures.

In regard to the conception of nature, the Chinese actors appear to believe that nature is tolerant, since they do not fear the consequences of the intervention in nature through engineered measures. At the same time they believe in human capability to control nature through science and they are confident to trust in expert judgement with "scientific methods" (see Chapter E). These features seem to be in line with the analysis of cultural theory on the conception of nature of a hierarchical type of culture. Besides, hierarchists believe that exuberant behaviour should not go too far so that the balance between man and nature is not disturbed. However, no obvious concern about offensive intervention into natural environment can be identified in China and seems to be acceptable to all the Chinese actors. This trait seems to reveal a coincidence with the individual and market orientated cultural type, which does not come as a surprise due to the recent economic development in China and the strong emphasis on progress through economic growth (E.1.3.a).

Compared to Chinese actors, the German interviewees again reveal more diverse conceptions of nature. Whereas all interviewees, particularly environmental agencies and NGOs, expressed the egalitarian tendency to believe that nature is ephemeral, the demand of some politicians and corporations for more construction sites and less regulations on building restrictions betrays their belief in individualist notion of nature being benign. A hierarchical attitude towards nature cannot be identified, however, it cannot be completely ruled out, for it might be hidden behind the individualistic behaviour. One may believe that nature can be tolerant to a certain extend, therefore it demands more flexibility of construction in flood plains, but this might be due to his belief that the limits of nature's tolerance have not yet been reached.

### 1.3. Risk Selection and Risk Discourse

#### 1.3.a Risk Selection

Flood risk as a single risk does not seem to fit into the cultural analysis of risk selection at the first sight. But yet, if flood risk is observed in a broader risk context, the risk selection becomes evident and inevitable. According to the empirical data, the major risks to be selected are flood events as risk, environmental risk, which is closed linked to flood mitigation strategies, and risk of constraints for economic development.

In Wuhan the focus and priority are clearly given to economic development. To ensure unconstrained economic development, engineered flood protection is chosen and practiced as the major mitigation strategy. At the same time the mitigation of environmental risks is compromised and largely ignored. There are several reasons for this: environmental risks are long term risks with future consequences. Hierarchical organization maintains its functionality by avoiding knowing too much about the future (Douglas and Wildavsky 1983: 93). Resources have to be allocated for dealing with the most urgent problems. "Limiting data, not expanding them, is their guide. Most possible alternatives and consequences are ignored" (Douglas and Wildavsky 1983: 93). Economic development plays such an important role in China that the credibility of the communist party is largely relying on it (Yang 2005), therefore, compromising economic growth is not considered to be an option. Under such circumstance, the entire attention is drawn to flood events as natural hazards which can have high negative impact, because the perceivers of risks are not individuals but institutions and organizations that are driven by organizational imperatives to select risks for management attention or to suppress them from view (Rayner 1992). Flood seen as a natural event serves as an external enemy and a convenient target which draws attention from the human system. By doing so, a complex issue which requires considerations both in social as well as political spheres is reduced to a war between mankind and nature (see Chapter E.1.6). Flood risk management, thus, becomes a technical problem and is depoliticized.

Moreover, flood risk can also be utilized as a device to strengthen social solidarity as Rayner posits: "Of all the things people can worry about, they will be inclined to select for particular attention those risks that help to reinforce the social solidarity of their institutions" (Rayner 1992: 91). Flood risk indeed has become a chance for these institutions. Cultural biases such as self-sacrifice and obedience are strengthened through allocating praise and blame. A natural catastrophe is conferred the meaning to be caused by nature when it is utilized to justify reductionist mitigation strategies. The reversion from risk to danger serves the very purpose. Pohl contends that one can distance oneself from danger much easier than from risk, because risk is always related to decisions. He also observes a great coalition of the natural scientists/technicians and politicians. They can prove their capacities by taking nature as their object to be altered and manipulated. The politicians can delegate their responsibilities to nature in case of great losses. Especially in the developing countries where decision-making is less transparent, it is an important strategy to define risk as fact and fate (Pohl 1998). His observation coincides with the findings of this research which also affirms Schwarz and Thompson's

assertion that one of the shrewdest political moves is to get the problem at hand labelled “technical” to avoid contending versions of the problem. Pohl argues this is also the very reason why hazard research from social science perspective is often affronted from two sides: the natural scientists want to exclude society as much as possible and the politicians who only take on the responsibilities which would contribute to their own benefits (Pohl 1998).

At the same time it is the leading institution which is praised to lead people “from victory to victory” [popular slogan of the Chinese Communism Party]. The emphasis on emergency management requires and therefore justifies a hierarchical chain of command which enables the human and material resources mobilization. Flood fighting calls for social solidarity. The success and good memory of these institutions are stressed and kept alive through ceremonies and rituals, at the same time values and societal rules are produced and consolidated (Böhme 2006; Douglas and Wildavsky 1983) (see Chapter F.2.2.b and Picture 2).

Picture 2: The People's Hall: Venue of the Ceremony to Praise the Chinese Military for their Achievement in Flood Fighting during the Great Flood 1998



Source: Xinhua News Agency (1998) 国家数字文化网

<[http://www.ndcnc.gov.cn/datalib/2002/NewPRCBackground/DL/DL-462775/NewPRCBackground/Pic/1/imageView/\\_\\_\\_end\\_key\\_\\_>](http://www.ndcnc.gov.cn/datalib/2002/NewPRCBackground/DL/DL-462775/NewPRCBackground/Pic/1/imageView/___end_key__>)

In Cologne, Germany, all the three major risks mentioned above are picked up by different agents. As all three cultural types seem to coexist, each agent representing his own way of life tries to draw the attention to his own risk priority. Environmental agencies and NGOs highlight environmental risks and advocate a more passive flood risk management which takes into account environmental interests, whereas big firms and local politicians are more in favour of an engineered flood risk management which ensures maximum land use. Equality and democracy are the values praised amongst the interviewees. Blames go to the “system” and the politicians. The managing agencies tend to keep bad experiences and lessons learned of the past alive. Among the management institutions exists a strong focus on possible disaster which is clearly an egalitarian trait.

### 1.3.b Risk Discourse

*Problem solving is a social activity. It is not the problem itself but the relationship between the problem and those who are engaged in solving it that we must try to understand. (Schwarz and Thompson 1990: 138-139)*

Sometimes those involved have the same understanding what the problem is, sometimes not. Sometimes one definition suffices, because all agree on it, or those who subscribe to that definition managed to get rid of the rest and become the dominant one. Before one formalizes risk assessment in technical terms, different perceptions and understandings have to be taken into account to shun the depoliticization of the risk (Schwarz and Thompson 1990). Douglas summarized three types of dialogues about risk in “any industrial society” (Douglas 1997: 129):

Hierarchy is based on government and administration. Its reasoning style is reductionist and it is concerned with measurability, since it requires objective bases which justify the decisions it makes. Hierarchy prefers a risk research vocabulary that can be formalized without being politicized. Information is strictly controlled which may lead to attenuation of risks. Whereas these traits can be clearly observed in Wuhan, the German interviewees did not reveal any strong propensity to formalizing flood risk.

Although characteristics of the individualistic way of life can be identified in Germany, the perception that keeping risk issues within the technical domain to minimize risks, as Douglas posits, is not prevalent among the risk managers in Cologne.

Douglas asserts that the radical critics (called egalitarian by Thompson and Wildavsky) use the context of risk as a convenient arena for their dialogue. They contend that risks have been concealed and the public misled. Egalitarians are accused of amplifying risks. None of these described traits can be identified among the Chinese interviewees. In contrast, the German interviewees showed a strong inclination of criticizing their system as such and stressing risks. Again, this was not only observed among environmental agencies and NGOs but also among governmental agencies. However, some of the interviewees felt accused of amplifying flood and environmental risks (see Chapter E).

A three-sided policy struggle is expected with fatalists assuming a neutral position; however, one of the discourses dominates the rest (Douglas 1997: 129-130). This proves to be true in both China and Germany, although the egalitarian way of life can only be observed in public discourse instead of among the interviewed agents in China. The dominant way of life is squarely the hierarchical cultural type alongside the individual tendency. In Germany, egalitarian way of life has a strong position among the agents, yet, characteristics of individualist way of life are claimed to be dominant among politicians and enterprises by the interviewees.

It is worth to note that high risk is accepted by hierarchists when decisions are made by experts who are expected to do the right thing. This is especially true in the case of China during the Great Flood 1998 as Wen Jiabao, the Chinese Prime Minister, assisted by technical experts had to decide if the Jingjiang retention area shall be used or not. Consequently, the style of consensus is highly hypothetical. It is assumed that the decisions made by experts are acceptable for all.

In contrast, decision makers are being held responsible in a country like Germany. Pohl contends:

... In our society the 'anger of God' is no longer an acceptable explanation [for catastrophe], however such an explanation is needed to be the punching bag, therefore it is just too convenient to grab the decisions and decision-makers. By doing so the political dimension is reached (Pohl 1998: 160).

Thus, natural events become natural hazard as soon as people are involved. They become risk, if we have the freedom to make decisions (Pohl 1998: 163). As a consequence, public participation as an important instrument to take into account the risk discourse of all stakeholders is widely practiced in Cologne, Germany.

Compared to Germany, participation in flood management is not yet practiced in China as the field research revealed. The social question here is "not whether and how to let the so-called 'outsiders' in, but of whether it is sane and feasible to keep the 'insiders' (the risk bearers) out" to achieve efficiency (Bradbury 1989: 390). Thus, the depoliticization of flood risk in China becomes the logical consequence of the decision makers excluding the general public and local communities from the decision making process.

#### 1.4 Synopsis

Cultural theories have been developed in the light of technological utilization and nuclear accidents. The prediction and observation have been made to analyse the political nature of the problems caused by technological risks in industrial societies. This study deployed cultural theories not only to a post industrial country like Germany but also a transitional country such as China in the area of risk of natural disasters such as flood. The empirical findings seem to largely fit into the cultural model of risk analysis. The risk predictions of different cultural types were affirmed. This has the implication for future research that the cultural model can also be applied to natural disaster research despite of its original departure for technological assessment and risk issues.

However, it has been a big challenge to clearly differentiate between the traits shared by two cultural types as which traits belong to which cultural types. This seems to affirm the critiques the grid-group typology has received for being too simplistic. It could not completely capture the complexity of the ways of life in reality.

A more critical point revealed by the findings is that some institutions have egalitarian cultural biases but individualist group definition as in the case of the Flood Protection Centre in Cologne. This means that cultural biases are not matching the social relations they supposedly sustain. Consequently, the assertion of the cultural theories that cultural biases and social relations have to match each other is not consistent in these cases.

Overall, cultural analysis with Douglas' grid-group typology provided a useful pair of lenses to structure the empirical findings of this study, although the data cannot be categorized stringently. Nevertheless, one can clearly identify the dominant way of life among the other ways of life existing parallel to each other.

## **2. Generalization and Transferability**

Can the research results be generalized and transferred to other regions within Germany and China, and even to other countries? As discussed above, the applicability of the cultural theories in China is affirmed by this study. Also previous studies (see Chapter F) deploying cultural theories suggest that cultural theories can be applied both in industrial and developing/transitional countries. In the following single aspects will be discussed in the context of empirical findings.

In terms of institutional arrangements, China has a nationwide unified organizational form which lays the foundation for the generalization of the findings, although the geographical, demographical, as well as economic and social determinants are far from uniform in China due to great regional disparities (Wang et al. 2002a). In Germany, the regional disparity may not be as big as in China, however, the decentralized organization and the subsidiary principles of the flood risk management leads to the fact that each federal state issues its own laws and regulations for flood management. Deviances in management policies and implementation between the federal states are inevitable. This appears to be a constraint for the generalization. But yet, the aspects investigated in this study including spatial planning, decision-making process, and conflict of interests and reconciliation (Chapter E.1.2.b, E.1.3.b) follow federal spatial plan and the fundamental principles of a democratic political system which applies across the entire country. These frameworks make the generalisation of the findings possible, whereupon the findings about the mutual perception of different stakeholders (Chapter E.1.4.b) may differ from region to region due to each region's specific institutional and social context. In China the institutional arrangement of flood management and the orientation of the local and regional units as parts toward the state as a whole oversee all organizational principles at lower levels. Thus, transferability of the findings seems to be unproblematic. Even the perception of different stakeholders is heavily influenced by the overseeing principles.

The human nature relationship may more distinctively be embedded in space; therefore it is questionable about its transferability to other regions both in China and in Germany.

In regard to risk communication style, information policy, and question of authority, the findings in China can be generalized due to its stringent hierarchical structure. In Germany, however, it can be differing from region to region, since these aspects do not comply with the general principles and overruling regulations which are valid for all the German federal states due to communal autonomy.

### 3. Limitation of the Research

Limitations of the application of the cultural theories have been discussed in chapter F.1. Another constraint of utilizing theory for an empirical study is that whatever theories are applied, they can only capture part of the truth, as Rayner states: "risk analysts of different scientific disciplines grasp a different part of the beast and characterise the whole by the parts" (Rayner 1992: 94). The broad scope of sociological perspectives and the inclusion of social experience of risk close the gap that is overlooked by the other perspectives on risk. However, each analysis is limited by the paradigm which is chosen to be the analytical framework. Moreover, the complex reality offers almost any perspective. This leaves social actors enough space to choose the perspectives which best serve their interests and ignore the other perspectives which are conflicting with their interests (Renn 1992: 72). The question remains, is a theory which covers all aspects of risk possible? If yes, can it be operationalized? These questions have to remain unanswered here.

The limitation of methods in the framework of this research lies in validity of data, sampling, and research subjects.

Validity of data was ensured through both "within-method triangulation" and "inter-method triangulation" (Seipel and Rieker 2003) in this research. Different methods such as semi-structured interviewing, participatory observation, and informal interviewing were applied. During the interviews, other information through observation of the interaction between actors and their environment was collected to affirm the data generated by conducting interviews. Internal documents of the interviewed agencies and literature served to be another possibility of triangulation of data. However, sampling was a great challenge in China due to the limited field access (see Chapter D.2.2) and it led to some constraints in data collection, therefore, triangulation of data could not be ideally carried out.

Closely linked to the data triangulation is the limitation of research subjects. This study focused on the perception and communication of the flood managers and experts. However, as the findings show, the affected people and vulnerable social groups, especially the rural settlements within the retention areas, deserve more attention than this research could provide both due to the time constraint of a PhD work and the restricted field access (see Chapter D.2.2 and Chapter F.1.2).

The field experience also shows that the Chinese interviewees tend to give rigid answers during the interviews probably due to their propensity towards the



cognitive formalism [Cognitive formalism connotes a propensity to perceive and interpret the world of natural and social events in terms of patterned configurations of proximate phenomena] (Baum 1982: 1168). This has the implication for the future research that a combination of qualitative research and standardized questionnaires may serve well within the Chinese cultural context.

## H. Conclusion

庄子与惠子游于濠梁之上。庄子曰：“儻鱼出游从容，是鱼之乐也。”

惠子曰：“子非鱼，安知鱼之乐？”

庄子曰：“子非我，安知我不知鱼之乐？”

惠子曰：“我非子，固不知之矣；子固非鱼也，子之不知鱼之乐，全矣。”

庄子曰：“请循其本。子曰‘汝安知鱼之乐’云者，既已知吾知之而问我，我知之濠上也。”

- 庄子·秋水

*Zhuangzi and Huizi walked on the bridge over Hao River.*

*Zhuangzi: "The fish are swimming leisurely. They are happy."*

*Huizi: "You are not a fish, how do you know that the fish are happy!?"*

*Zhuangzi: "You are not me, how do you know that I do not know that the fish are happy!?"*

*Huizi: "I am not you, surely I do not know about your perception. However, you are surely not a fish; therefore you do not know if the fish are happy. This is a matter of course."*

*Zhuangzi: "Let us go back to the root. You said 'how do you know that the fish are happy', this means that you know that I know. Well, I just learned it on this bridge."*

*(Zhuangzi (369 B.C.-286 B.C.), Qiushui)*

Are the fish happy? One can say that fish are not happy, but neither are they unhappy. Fish are beyond the notion of happiness. It is the human who confers the meaning of happiness to the fish. The conception of happiness is a human/social construct. So is risk. Risk is not something just 'out there', rather it is a concept construed by human beings. This research is one of the first attempts to penetrate Chinese and German flood management practices to investigate how flood risk is construed and communicated within the social processes in different cultural contexts. The research results have shown both similarities and differences. In this chapter, the research results will be summarized to answer the research questions raised at the beginning of the research:

1. How do different actors involved in flood management in China and Germany perceive flood risk?
2. How is the perception of these actors embedded in their respective cultures?
3. How is flood risk communicated among these actors and to the general public?
4. Which cultural features are reflected in flood risk communication in China and Germany?

In doing so, similarities and differences in risk perception and communication will be illustrated and the role of culture elucidated.

### **1. Flood Risk Perception and Its Cultural Context**

In Wuhan flood risk is viewed as a physically given attribute and perceived mainly as a technical problem. Risk is objectivized and depoliticized. Consequently, mitigation strategies are engineered and hazard-led which have a strong focus on emergency and crisis management. These characteristics are clearly reflected in the large-scale engineered measures carried out in the City of Wuhan through dike construction and the corresponding hierarchical institutional arrangement, which ensures a military styled flood fighting management in crisis situations (Chapter C.3.1 and Chapter E.1.1.a).

In Cologne the flood risk management ideology seems to have evolved over time. Especially after the flood in Elbe river basin in 2002 a rethinking process concerning efficiency and benefits of technical flood mitigation was initiated. This process reduced the confidence in technical flood management, consequently flood managers and experts began to explore the potential of an integrated approach combining structural and non-structural measures. A change from engineered measures to a more integrated approach has taken place over the last decade. Flood risk is no longer perceived to be solely a technical problem, but rather seen as a social process which balances different interests through sophisticated and time consuming negotiations amongst stakeholders representing different and often conflicting interests (Chapter E.1.3.b). A broad range of mitigation measures is now practiced including structural measures, such as extended construction of flood walls, mobile flood walls, and an improved drainage system. Non-structural measures include information dissemination, flood insurance, educational efforts to improve people's coping capacity, as well as spatial planning.

Especially the significance of spatial planning as a prevention tool has been recognized and enhanced by the Federal Spatial Plan of 2003 in Germany. A more passive mitigation paradigm allowing the river more space to flow by creating more retention area and giving back the space rivers need, has become a leitmotif of flood management in Germany. This shows that a rethinking process on the harmony of man and nature is under way. Spatial planning is seen as a powerful instrument to implement this new integrated approach. However, the implementation of the retention policy is not without challenges. The actors from the political and economical sectors see it as a constraint for economic development due to

limited land use potential and fear of the consequence of shrinking labour market which could have negative impact on voters. Spatial planners as well as NGOs feel impelled to compromise their desired retention plan. Nevertheless, spatial planning not only largely contributes to flood prevention but also has a “signal function” which enhances risk communication amongst stakeholders (Chapter E.1.2.b, Chapter E.1.3.b, and Chapter E.2.2.b).

In contrast, spatial planning in Wuhan, similar to other flood mitigation strategies, has a dominant technical focus to ensure the economic expansion through structural measures. Although human settlements and economic activities within retention areas have been rapidly increasing, retention areas are utilized according to technical principles to efficiently allocate flood water. In addition, flood protection largely relies on using gated and controlled retention areas. Thus, conflicts emerge during flood events as to which retention area has to be used to release the pressure on big cities such as Wuhan. Since the compensation law for flooding retention areas has not yet been well developed, the people living within retention areas are facing the loss of their livelihoods and homes in case of flooding.

Due to the Chinese cultural and political context, decision-making is based on the principles of “state’s interests are superior to community interests that are superior to individual interests”. This principle gives little room for public participation and sees the people as part of the state whose survival determines the survival of each individual and communities; therefore, the interests of individuals and local communities have to be sacrificed for the survival of the state. This leads to vehement conflicts between local communities and higher flood management units as the case of the county Jianli has shown (Chapter E.1.3.a) and risk redistribution from big cities to less developed areas. This decision-making style is deeply rooted in the hierarchical Chinese culture and justified and reinforced by cultural values.

At the core of these conflicts lie settlement, population, and economic development within the retention areas. This is not only a historical legacy of the “Great Leap Forward Movement” in the 1950s and 1960s, but also a result of the mismatch of the central government’s policy and local implementation due to clashing goals of economic development and sustainable water management. “Local protectionism”, as one of the consequences, leads to uncontrolled development within retention areas, which in turn increases the conflict potential in the case of utilisation of these retention areas. Risk distribution through externalizing flood risk from the urban and economically highly developed areas to rural or less developed areas leads to inevitable clashes between these stakeholders.

Compared to the top-down approach in Wuhan, decision-making in regard to flood management in Cologne is based on democratic participatory principles. All stakeholders are involved in the decision-making process and consensus is reached through dialogue and negotiation amongst relevant stakeholders. Efforts are made to accommodate for the interests of all stakeholders represented and taken into account equally. Most importantly, flood risk is not externalized to other regions without the consensus of the population in those regions. The advantage of this participatory approach is stakeholder satisfaction and therefore smooth implementation of flood management decisions. A disadvantage pointed out by the

interviewees is the complicated and time-consuming bureaucratic process which requires heavy allocation of human resources. As a consequence, some of the protection measures cannot be implemented and thus are not in place in case of flooding events before the decision has been finally authorized. Democracy seems to have touched its limit as said by one of the interviewees.

As shown in chapter E.1.3.a, conflict reconciliation in Wuhan both within management units and among stakeholders is a hierarchical top-down approach. It ensures on the one hand the efficiency of the decision-making and implementation in emergency cases, on the other hand, it misses the opportunity to amend the blind spots and correct the mistakes which could be pointed out by other stakeholders. In some cases, the conflicts due to this decision-making approach greatly impair social stability as the Chinese government has already realised.

In contrast, in Cologne, conflicts are reconciled through dialogue and negotiation with other stakeholders. Individual and community interests are well represented and protected by the German legal system and the institutional arrangements. In the later case, for example, through the strong representation of community representatives in the regional council, which takes the final decision in unsolved conflict cases (Chapter E.1.3.b).

The cultural perceptions of the human nature relationship in Wuhan and Cologne seem to explain the different approaches of the flood managements in these cities. In Wuhan, influenced by traditional Chinese water management paradigm and fuelled by the Western rationalistic concept, the belief that man can conquer nature is deep-rooted amongst the flood managers. Especially the Maoist/communist ideology coinciding with Confucianism, the most dominant traditional philosophical school, strengthens this belief even more (Chapter E.1.5.a). Engineered flood protection measures are not only viewed as vital to flood management, but also taken as a foundation or even a "weapon" for a harmonious human nature relationship.

In Cologne, all interviewees agree that the harmony of the human nature relationship is essential for the sustainable development of human society. Only more passive flood management strategies can ensure such harmony. This is an indicator for the departure from the belief that man can put nature at his service to his pleasure.

In both Wuhan and Cologne, engineered flood protection measures are implemented. In both cases, a rethinking of flood management has taken place. However, the rethinking process in Wuhan is still at the beginning and the new ideas of flood management have not yet caused tangible change in the flood mitigation strategies.

As research results have shown (Chapter E), the difference in flood risk perception in Wuhan and Cologne is deeply embedded in its political and cultural contexts. The selection of risks to be dealt with and its mitigation strategies reflect the way of life each society sustains. Flood management in Wuhan, taken as a specimen for the hierarchical cultural context, advocates engineered and hazard-led

technical flood mitigation strategies to justify its hierarchical institutional organizations which require high social coerciveness to be sustained. By the same token, the dominant Chinese cultural biases of human nature conception, the values of societal solidarity, and sacrifice support the hierarchical social relations.

In contrast, the flood management in Cologne dominantly represents the individualist and egalitarian way of life. The decentralized organization and democratic, participatory approach reflecting strong low group and low grid traits emphasize the paramount meaning of equality as the most important value of individual and egalitarian ways of life. Management strategies are more passive and cautious due to the egalitarian human nature conception.

## **2. Flood Risk Communication and Its Cultural Context**

Based on the hierarchical social relations in Wuhan, risk communication has strong top-down dominance. Horizontal inter-agency communication is rare, especially in flood-free periods. Vertical communication during emergency management between lower and higher agencies functions in a chain of command style. Risk communication is perceived to be efficient in emergency cases; however, the interdependence of agencies' work for flood prevention measures between two flooding events is largely ignored.

In Cologne, risk communication between flood agencies is emphasized and to ensure the smooth cooperation and conflict reconciliation between these agencies. Yet, the question of authority rises due to unclear hierarchies of agencies and the German Föderalismus.

As in regard to flood risk communication between flood management and the general public, risk information in Wuhan is selected and reserved for dissemination. Only higher ranking agencies and officials have access to important information. The general public is largely excluded from the information flow. Risk awareness of the general public is not encouraged to avoid "disquietedness" among the general public.

In contrast, flood management in Cologne stresses the importance of risk information dissemination, in particular amongst the general public. Actions are taken to enhance risk awareness and public education in terms of flood retrofitting measures. Risk communication takes place in diverse forms including information dissemination, awareness raising activities, and communication through public involvement in developing flood management measures and spatial planning process.

The differences in risk communication between Wuhan and Cologne lie in different risk discourse styles of the dominant cultures. The hierarchical way of life as in Wuhan sees risk management as a state issue. This finds its echo in the traditional view of flood management in China. Therefore it is the experts who shall be in charge of the management and information. In Cologne, the individualistic and egalitarian way of life encourages individuals' self-responsibility. In addition, egalitarians tend to amplify risk and to use risk as a political tool to sustain its way of life by weakening the other ways of life through criticism.

### 3. Final Remarks: "...residing in rivers and lakes forgetting each other"

This research identified the commonalities and differences in flood risk perception and communication between Wuhan, China, and Cologne, Germany, and analysed their embedment in cultures. Are the practices of such different cultural settings transferable? If yes, who should learn from whom and what? These questions seem to be trivial, yet, the answers can be controversial.

Doubtlessly, the integrated flood mitigation approach is widely accepted and advocated by international communities. Yet, as the research has shown, the implementation of such an approach depends on fundamental values and beliefs of a society as well as the social relations each society prefers.

Especially viewing risk as a social process requires extensive public participation which is one of the most important categories for good governance according to the democratic principles. It enhances policy efficiency and legitimacy, when citizens and other institutions have a chance to influence how rules are formulated and implemented (Van Ginkel et al. 2001: 18). However, countries such as China have completely different value systems and world views. It appears that a political and cultural change is needed to adopt the Western democracy-based management approach. Yet, any such change can only take place ideally from within. If the purpose of culture research is to find out features of certain existing cultures and adapt or formulate one's own policy accordingly to work with but not against this culture, it is beneficial to improve hazard management. However, the intention to change or form a new risk culture through a culture study is doomed to fail, for any cultural change takes place in a very long-term. And organizational culture in particular is very resistant to change (Johnson 1991: 144).

In addition, the desirability of Western modernity in countries like China is questionable. Although Western modernity is in the process of successfully projecting its self-image upon the rest of the world, it manifests limits in radically different societies (Deuchars 2004: 203). It removes from the story the richness of cultural diversity and space and place specificity (Deuchars 2004: 205). Deuchars contends:

All known societies do order their world to confront the dangers perceived there, however, and so to privilege one form of risk management as being universally superior is a form of conceit (Deuchars 2004: 203).

Yet, the existence of commonalities across national and cultural borders can serve as the key to transferability of different practice and thinking. The Chinese Yin-Yang principle as an essential part of the Chinese traditional cultural heritage is based on a pluralistic approach. It encompasses both active and passive approaches which seem to have found echo in the Western rethinking process about flood management. Balance and stability, according to this principle, can only be reached by combining both passive (non-structural) and active (engineered) measures. The best flood mitigation strategy as proposed by Jia Rang about two thousand years ago to give river space to flow originates from this tradition.

Chinese Taoist thinking represents the wisdom of the hermit way of life which superimposes with the egalitarian caution. The new water policy in China recognizes the strength of the passive approach. Even if the implementation of the new water policy is still facing a great challenge, however, the development towards a more pluralistic approach allowing and encouraging different cultural types to coexist finds its echo in the thinking of Western scholars.

All world views such as the approach of the conservationists or free market models are correct in the sense of being partially tested and part of reality (Holling 2002: 3). Yet each of the views is only part of the reality. For instance, ecologists limit their understanding and propose inadequate actions by ignoring the realities of human behaviour, organizational structure, and institutional arrangements that mediate the relationships between people and nature (Holling 2002: 5). Integrated world views are advocated, since the process of developing policies and investments for sustainability requires a world view that encompasses ecological with economic with institutional with evolutionary theory. The aim is to overcome disconnects due to limitations of each field (Holling 2002: 5).

Cultural theorists Thompson and Schwarz also advocate pluralism of cultures and contend that blind spots can only be avoided by taking into account all viewpoints of different cultural biases:

A nation in which ways of life are nicely balanced (or, at least, never entirely excluded) is less prone to being surprised and will have a wider repertoire to draw from in responding to novel situations" (Thompson et al. 1990: 96; Schwarz and Thompson 1990: 151).

Checks and balances, space for lateral thinking, pluralism in innovation, caution and regulation are all prerequisites for the management of flood risks (Dixit 2003: 177).

The link between ancient Chinese wisdom and the novel Western (re)thinking appears to be a key to facilitate political and cultural change. The uniqueness of Chinese civilization is not only the existence of a hierarchical culture which has been well-established and functional for millennia, but also the richness and diversity of thinking. Truly, the functionality of the Chinese society relies on values of social solidarity and sacrifice based on Confucianism tradition; yet, Chinese thinkers such as Zhuangzi advocate other alternatives:

...it was better if the fish would be residing in rivers and lakes forgetting each other instead of ventilating each other with one's saliva... (Chen 1983).

Despite of all the differences in current flood mitigation practice between China and Germany, the commonalities in thinking, whether new or old, are the strong link which serves to be the common ground for experience exchange and mutual learning.

**List of Boxes**

Box 1: List of Actors in Flood Risk Management	16
Box 2: List of Organizations in Flood Risk Management	17

**List of Charts**

Chart 1: Administrative Concept of the City of Wuhan	19
Chart 2: Organization for Flood Control and Disaster Relief in China	38
Chart 3: Organizational Features of Flood Management in China	42
Chart 4: Organization Chart of the Crisis Management Group	46

**List of Figures**

Figure 1: Cycle of Disaster Management	15
Figure 2: Location of 81 Hazards.	118
Figure 3: The Five Vignettes Mapped onto the Two Dimensions of Sociality	126
Figure 4: The Four Primary Myths of Nature	129

**List of Maps**

Map 1: Position of the Changjiang River Basin in China	18
Map 2: Gross Domestic Product of the Changjiang River Basin	20
Map 3: Rhine Catchments	21
Map 4: Structure of the City Area of Cologne	22
Map 5: Engineered Measures in the City of Wuhan	25
Map 6: Flood Protection in Wuhan	50
Map 7: Planned Retention Area	79

**List of Pictures**

Picture 1: Dike Area in the City of Wuhan	96
Picture 2: The People's Hall	149

**List of Tables**

Table 1: Overview of the Five Freshwater Flood Events with Most People Killed, Jan. 1975 - June 2002	2
Table 2: Statistics of the Water Levels above 27.30 Metres Measured in Wuhanguan Water Station between 1865 and 2003	23
Table 3: Water Levels above Nine Metres since 1816	24
Table 4: Statistics of the Cities which Have Reached National Standard for Flood Protection	27
Table 5: Retention Areas of Yangtze River Catchments	39
Table 6: Population Development and Land Use in Wuhan	48
Table 7: Four Problems of Risk	122
Table 8: The Four Political Cultures	134



## References

- Alexander, D. (2000): *Confronting Catastrophe. New Perspectives on Natural Disasters*. Oxford University Press, New York.
- Allan, S. (1997): *The Way of Water and Sprouts of Virtue*. State University of New York Press, New York.
- Banse, G.; Bechmann, G. (1998a): *Eine Einführung in den Band von G. Banse, Brandenburgische Technische Universität Cottbus, und G. Bechmann, ITAS*. <<http://www.itas.fzk.de/home.htm>>, 5 November 2007.
- Banse, G.; Bechmann, G. (1998b): *Interdisziplinäre Risikoforschung. Eine Bibliographie*. Westdeutscher Verlag, Opladen.
- Baum, R. (1982): Science and culture in contemporary China: the roots of retarded modernization. In: *Asian Survey*. vol. 22, no. 12, pp. 1166-1186.
- BBR (2000): Raumordnungsbericht 2000. In: Lutter, H. (Ed.): *Bundesamt für Bauwesen und Raumordnung*. Bonn
- Bechmann, G. (Ed.) (1993): *Risiko als Schlüsselkategorie der Gesellschaftstheorie*. Westdeutscher Verlag, Opladen.
- Beck, U. (1986): *Risikogesellschaft. Auf dem Weg in eine andere Moderne*. Suhrkamp, Frankfurt.
- Bernard, H. R. (2006): *Research Methods in Anthropology. Qualitative and Quantitative Approaches*. Altamira press, Lanham, New York, Toronto, Oxford.
- Bezirksregierung Köln (2006a): *Beteiligte an dem Verfahren. Sachlicher Teilabschnitt "Vorbeugender Hochwasserschutz", Teil 1. Regionen Köln, Bonn/ Rhein-Sieg und Wassereinzugsgebiet der Erft*. Dezernat 54.
- Bezirksregierung Köln (2006b): *Regionalplan für den Regierungsbezirk Köln*. Dezernat 61.
- Bleeker; Sommerfeldt; Ulbrich (2006): *Vorlage für die 6. Sitzung des Regionalrates am 23. Juni 2006*. Dezernat 62.
- Böhme, H. (2006): Der Ball der Göttin. In: *Die Zeit*. 10 August, p. 33.
- Bogardi, J. J. (2004): *Hazards, Risk and Vulnerability: A New Look on the Flood Plains*. Paper for the International Workshop and Symposium "Water Hazard and Risk Management". Tsukuba City and Tokyo, Japan, 20-23 January.
- Boholm, Å. (1996): Risk perception and social anthropology: critique of cultural theory. In: *Ethnos*. vol. 61, no. 1-2, pp. 64-84.
- Boholm, Å. (1998): Comparative studies of risk perception: a review of twenty years of research. In: *Journal of Risk Research*. vol. 1, pp. 135-163.

- Boholm, Å. (2003): The cultural nature of risk: can there be an anthropology of uncertainty? In: *Ethnos*. vol. 68, no. 2, pp. 159-178.
- Boxer, B. (2001): Contradictions and challenges in China's water policy development. In: *Water International*. vol. 26, no. 3, pp. 335-341.
- Bradbury, J. A. (1989): The policy implications of differing concepts of risk. In: *Science, Technology, & Human Values*. vol. 14, no. 4, pp. 380-399.
- Bundesgesetzblatt 26 (03.05.2005): Gesetz zur Verbesserung des vorbeugenden Hochwasserschutzes.
- Bundeszentrale für politische Bildung (2005): *Das Politiklexikon*. <[http://www.bpb.de/popup/popup\\_lemmata.html?guid=3H53IP](http://www.bpb.de/popup/popup_lemmata.html?guid=3H53IP)>, 22 January 2009.
- Bundeszentrale für politische Bildung (2007): *Das Politiklexikon*. <[http://www.bpb.de/wissen/H75VXG,0,0,Begriffe\\_nachschlagen.html](http://www.bpb.de/wissen/H75VXG,0,0,Begriffe_nachschlagen.html)>, 9 October 2007.
- Burton, I.; Kates, R. W.; White, G. F. (1993): *The Environment as Hazard*. The Guilford Press, New York, London.
- Caulkins, D. D. (1999): Is Mary Douglas's grid/group analysis useful for cross-cultural research? In: *Cross-Cultural Research*. vol. 33, no. 1, pp. 108-128.
- Chen, G. (1983): 庄子今注今释 (*Zhuangzi Jinzhu Jinshi*) (*Translation and Interpretation of Zhuangzi*). 中华书局 (Zhonghua Shuju). Beijing.
- Cheng, X. (2006): Recent progress in flood management in China. In: *Irrigation and Drainage. Managing Water for Sustainable Agriculture*. vol. 55, pp. 75-82.
- Cheng, X.; Shang, Q. (2005): 中国防洪与管理 (*Zhongguo Fanghong yu Guanli*) (*Flood Control and Management in China*). 中国水利水电出版社 (Zhongguo Shuili Shuidian Chubanshe). Beijing.
- Cheng, X.; Wu, Y.; Wang, Y. (2004): 洪水管理新理念与防洪安全保障体系的研究 (*Hongshui Guanli Xinlinian yu Fanghong Baozhang Tixi de Yanjiu*) (*On the New Concepts of Flood Management and Flood Security System*). 中国水利水电出版社 (Zhongguo Shuili Shuidian Chubanshe). Beijing.
- Chengshi Guihuaju (2003): *Flood Protection in Wuhan*. Wuhan, Chengshi Guihuaju.
- China Daily (2007): Save our rivers. In: *China Daily*. 4 July 2007. p. 10.
- China Water Resources News (2007): *Recommendations to the redefinition of the retention areas along the Yangtze River*. <<http://www.chinawater.com.cn/cwrn/cwrn.htm>>, 10 September 2006.
- Comte-Sponville, A. (2000): *Le Bonheur, désespérément*. Editions Pleins Feux, Nantes.

- Coyle, D. J. (1997): A Cultural Theory of Organizations. In: Ellis, R. J.; Thompson, M. (Eds.): *Culture Matters: Essays in Honour of Aaron Wildavsky*. Westview Press, Boulder, Colorado. pp. 57-78.
- Cutter, S. L. (2005): *The Geography of Social Vulnerability: Race, Class, and Catastrophe*. <<http://understandingkatrina.ssrc.org/Cutter/>>, 8 September 2006.
- Cvetkovich, G. E. T. C. (1991): Special issue: risk and culture. In: *Journal of Cross-Cultural Psychology*.
- Dake, K. (1991): Orienting dispositions in the perception of risk. An analysis of contemporary worldviews and cultural biases. In: *Journal of Cross-cultural Psychology*. vol. 22, no. 1, pp. 61-82.
- Dake, K. (1992): Myths of nature: culture and the social construction of risk. In: *Journal of Social Issues*. vol. 48, no. 4, pp. 21-37.
- Der Oberstadtdirektor (1996): *Hochwasserschutzkonzept Köln*. Stadt Köln.
- Deuchars, R. (2004): *The International Political Economy of Risk. Rationalism, Calculation and Power*. Ashgate Publishing Limited, Hampshire and Burlington.
- Deutscher Wetterdienst (1996-2007): *Mittelwerte der Periode 1961 bis 1990*. <[http://www.dwd.de/de/FundE/Klima/KLIS/daten/online/nat/index\\_mittelwerte.htm](http://www.dwd.de/de/FundE/Klima/KLIS/daten/online/nat/index_mittelwerte.htm)>, 21 December 2007.
- Dixit, A. (2003): Floods and vulnerability: need to rethink flood management. In: *Natural Hazards*. vol. 28, pp. 155-179.
- DKKV (2003): *Hochwasservorsorge in Deutschland. Lernen aus der Katastrophe 2002 im Elbegebiet. Lessons learned*. DKKV, Bonn.
- Dongxihu Government (2007): *Regional Features of Dongxihu*. <[http://www.dxh.gov.cn/publish/dxhqrmzf/zjdxh/dxhgk/dlwz/ptp\\_ContentList.html](http://www.dxh.gov.cn/publish/dxhqrmzf/zjdxh/dxhgk/dlwz/ptp_ContentList.html)>, 10 August 2007.
- Douglas, M. (1992): *Risk and Blame*. Routledge, New York.
- Douglas, M. (1997): The Depoliticisation of Risk. In: Ellis, R. J.; Thompson, M. (Eds.): *Culture Matters: Essays in Honour of Aaron Wildavsky*. Westview Press, Boulder, Colorado. pp. 121-132.
- Douglas, M.; Wildavsky, A. (1983): *Risk and Culture*. University of California Press. Berkeley, Los Angeles, London.
- Duan, H. (2005): *Social Process of Environmental Risk Perception, Preferences of Risk Management and Public Participation in Decision Making: A Cross-Cultural Study between the United States and China*. The Ohio State University, Graduate Program in Natural Resources, Ohio.

- Düsterdiek, B. (2005): Wichtige Aufgabe für Kommunen. Vorbeugender Hochwasserschutz. In: *Stadt und Gemeinde*. no. 10, pp. 367-368.
- Editorial Department of the Shangwu Yingshuguan (1984): 辞源 (*Ci Yuan*) (*Etymological Dictionary*). 商务印书馆 (Shangwu Yinshuguan). HongKong.
- Eisler, A. D.; Eisler, H. (2006): The Cognitive Representation of Global Risks: Empirical Studies. In: Anmann, W.; Dannemann, S.; Vulliet, L. (Eds.): *Risk 21. Coping With Risks Due To Natural Hazards in the 21st Century*. Taylor & Francis Group, London. pp. 109-116.
- Everts, A. (2005): Deichbau kommt nicht voran. In: *Westdeutsche Zeitung Düsseldorf*. 14 November, p. 3.
- Federal Emergency Management Agency (2008): *Traditional Emergency Management Policy and the Disaster Cycle*. <<http://www.fema.gov/about/index.shtm>>, 24 March 2008.
- Few, R. (2003): Flooding, vulnerability and coping strategies: local responses to a global threat. In: *Progress in Development Studies*. vol. 3, no. 43, pp. 43-58.
- Finger, E. (2007): Gesichter der Vernunft. In: *Die Zeit*. 25 January, p. 45.
- Flick, U. (2002): *Qualitative Sozialforschung. Eine Einführung*. Rowohlt Taschenbuch Verlag GmbH, Reinbek bei Hamburg.
- Flood Protection Centre Cologne (Hochwasserschutzzentrum) (2005): *Hochwassermanagement in Köln*. Presentation at Flood Protection Centre Cologne, Germany. 12 December.
- Franke, H.; Trauzettel, R. (1999): *Das chinesische Kaiserreich*. Fischer Taschenbuch Verlag, Frankfurt.
- Geenen, E. M. (2008): Katastrophenvorsorge - Katastrophenmanagement. In: Felgentreff, C.; Glade, T. (Eds.): *Naturrisiken und Sozialkatastrophen*. Spektrum Akademischer Verlag, Berlin and Heidelberg, pp. 225-239.
- Geipel, R.; Härta, R.; Pohl, J. (1997): Risiken im Mittelrheinischen Becken. In: *Deutsche IDNDR-Reihe*. no. 4. Deutsches IDNDR-Komitee für Katastrophenvorbeugung e.V., Bonn.
- Glaser, H. (1997): *Deutsche Kultur*. Carl Hanser Verlag, Bonn.
- Gorden, C. (Ed.) (1980): *Power/Knowledge. Selected Interviews and Other Writings 1972-1977*. Pearson Educated Limited, Essex.
- Grefe, C. (2006): Darf es noch ein bisschen mehr sein? In: *Die Zeit*. 27 July, p. 29.
- Grendstad, G.; Selle, P. (2000): Cultural myths of human and physical nature: integrated or separated. In: *Risk Analysis*. vol. 20, no. 1, pp. 27-39.
- Gu, Y. (2003): 汉字源流字典 (*Hanzi yuanliu zidian*) (*Dictionary of the Origins of the Chinese Characters*), 华夏出版社 (Huanxia Chubanshe), Beijing.

- Guo, J. (2007): 湖北长江堤防：十年建设 百年丰碑 (*Hubei Changjiang Difang: Shinian Jianshe Bainianfengbei*) (*Dike construction along the Yangtze River in Hubei Province: Ten years of construction, hundred years of monument*). <[http://news.xinhuanet.com/newscenter/2007-08/29/content\\_6626051.htm](http://news.xinhuanet.com/newscenter/2007-08/29/content_6626051.htm)>, 10 January 2008.
- GV. NRW. S. 568 (21 July 2000): *Gesetz zur Sicherung des Naturhaushalts und zur Entwicklung der Landschaft* (*Landschaftsgesetz - LG*). 21 July 2000.
- Hansen, K. P. (2003): *Kultur und Kulturwissenschaft. Eine Einführung*. A. Francke Verlag, Tübingen and Basel.
- Heijmans, A. (2001): 'Vulnerability': A Matter of Perception. International Work-Conference on 'Vulnerability in Disaster Theory and Practice'. Wageningen.
- Hermann-Pillath, C. (2000): Chinesische Identität und langfristiger sozioökonomischer Wandel. In: Hermann-Pillath, C.; Lackner, M. (Eds.): *Länderbericht China. Politik, Wirtschaft und Gesellschaft im chinesischen Kulturraum*. Bundeszentrale für politische Bildung, Bonn. pp. 58-76.
- Holling, C. S.; Gunderson, L. H. ; Ludwig, D. (2002): In Quest of a Theory of Adaptive Change. In: Gunderson, L. H.; Holling, C. S. (Eds.): *Panarchy. Understanding Transformations in Human and Natural Systems*. Island Press, Washington, Covelo, London. pp. 3-24.
- Hu, Z.; Silang, A.; Qionгда (2005): 中国文化地理概述 (*Zhongguo Wenhua Dili Gaishu*) (*Introduction to the Chinese cultural geography*). 北京大学出版社 (Beijing Daxue Chubanshe), Beijing.
- IKSR (2005): *The Catchment Area of the Rhine*. <<http://www.iksr.org/index.php?id=372>>, 30 October 2009.
- IKSR (2007): *Karte: Einzugsgebiet*. <<http://www.iksr.org/>>, 30 October 2009.
- IPCC (2007): *Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Report on Climate Change.
- Irwin, A. (1995): *Citizen Science: A Study of People, Expertise and Sustainable Development*. Routledge, London.
- Jansky, L. (2002): River Danube: Needs for Integrated River Basin Management. In: Jansky, L.; Nakayama, M.; Uitto, J. I. (Eds.): *Lakes and Reservoirs as International Water Systems. Towards World Lake Vision*. United Nations University, Tokyo. pp. 55-68.
- Johnson, B. B. (1991): Risk and culture research. Some cautions. In: *Journal of Cross-Cultural Psychology*. vol. 22, no. 1, pp. 141-149.
- Jonkman, S. N. (2005): Global perspectives on loss of human life caused by floods. In: *Natural Hazards*. vol. 34, pp. 151-175.

- Kahn, J.; Yardley, J. (2007): *As China Roars, Pollution Reaches Deadly Extremes*. <<http://www.nytimes.com/2007/08/26/world/asia/26china.html>>, 15 October 2008.
- Kant, I. (1887): *The Philosophy of Law: An Exposition of the Fundamental Principles of Jurisprudence as the Science of Right*. T & T Clark, Edinburgh.
- Kelle, U.; Kluge, S. (1999): *Vom Einzelfall zum Typus*. Leske + Budrich, Opladen.
- Keown, C. F. (1989): Risk perception of Hong Kongese vs. Americans. In: *Risk Analysis*. vol. 9, no. 3, pp. 401-405.
- Kleinhesselink, R.; Rosa, E. (1991): Cognitive representation of risk perceptions. A comparison of Japan and the United States. In: *Journal of Cross-Cultural Psychology*. vol. 22, no. 1, pp. 11-28.
- Kleinwelfonder, B. (1996): *Der Risikodiskurs. Zur gesellschaftlichen Inszenierung von Risiko*. Westdeutscher Verlag, Opladen.
- Kramer, S. (2003): Kultur der Katastrophen und die Katastrophen der Kultur. Die chinesische Fernsehdokumentation Juesheng. In: Groh, D.; Kempe, M.; Mauelshagen, F. (Eds.): *Naturkatastrophen. Beiträge zu ihrer Deutung, Wahrnehmung und Darstellung in Text und Bild von der Antike bis ins 20. Jahrhundert*. Gunter Narr Verlag, Konstanz. pp. 327-344.
- Krasovskaia, I.; Gottschalk, L.; Berg, H.; Mcerlain, A.; Ngu, D.; Geissler, T. R. (2006): Combating Flooding Together. In: Schumann, A.; Pahlow, M. (Eds.): *Reducing the Vulnerability of Societies to Water Related Risks at the Basin Scale*. IAHS Press, Oxfordshire.
- Kroeber, A.; Kluckhohn, C. (1952): *Culture: A Critical Review of Concepts and Definitions*. Vintage Books, New York.
- Kron, W. (2003): Hochwasserrisiko und Überschwemmungsvorsorge in Flussauen. In: Karl, H.; Pohl, J. (Eds.): *Raumorientiertes Risikomanagement in Technik und Umwelt. Katastrophenvorsorge durch Raumplanung*. Akademie für Raumforschung und Landesplanung, Hannover. pp. 79-101.
- Kunreuther, H.; Slovic, P. (1996): Science, values, and risk. In: *Annals of the American Academy of Political and Social Science*. vol. 545, pp. 116-125.
- Lai, J.; Tao, J. (2003): Perception of environmental hazards in Hong Kong Chinese. In: *Risk Analysis*. vol. 23, no. 4, pp. 669-684.
- Lebel, L.; Bach, T. S.; Garden, P.; Bui, V. H.; Subsin, N.; Le, A. T.; Nguyen, T. P. V. (2008): Risk Reduction or Redistribution? Flood Management in the Mekong Region (unpublished).

- Lebel, L.; Nikitina, E.; Kotov, V.; Manuta, J. (2006a): Assessing Institutionalised Capacities and Practices to Reduce the Risks of Flood Disaster. In: Birkmann, J. (Ed.): *Measuring Vulnerability to Natural Hazards. Towards Disaster Resilient Societies*. United Nations University Press, Tokyo, New York, Paris. pp. 359-379.
- Lebel, L.; Nikitina, E.; Manuta, J. (2006b): Flood disaster risk management in Asia: an institutional and political perspective. In: *Science and Culture*. vol. 72. pp. 2-9.
- Li, J. (Ed.) (1999): 中国江河防洪丛书-总论卷 (*Zhongguo Jianghe Fanghong Congshu Zonglunjuan*) (*Series of River Flood Protection Studies-The Synopsis*). 中国水利水电出版社 (Zhongguo Shuili Shuidian Chubanshe), Beijing.
- Liu, W. (1998): 悲壮的弃守 (Beizhuang de Qishou) (The Sad and Glorious abandonment). In: Liu, W. (Ed.): 世纪洪水 (*Shiji Hongshui*) (*Flood of the Century*). 漓江出版社 (Lijiang Chubanshe), Lijiang.
- Lu, Y. (1998): 治水治国 (Zhishui Zhiguo) (Water Governance and State Governance). In: Liu, W. (Ed.): 世纪洪水 (*Shiji Hongshui*) (*Flood of the Century*). 漓江出版社 (Lijiang Chubanshe), Lijiang. pp. 389-341.
- Luhmann, N. (1993): *Risk: A Sociological Theory*. Walter de Gruyter, Berlin, New York.
- McDaniels, T. L.; Gregory, R. (1991): A framework for structuring cross-cultural research in risk and decision making. In: *Journal of Cross-Cultural Psychology*. vol. 22, no. 1, pp. 103-128.
- Ministry of Water Resources (2007): 大禹治水在巴蜀 (*Dayu Zhishui zai Bashu*) (*The Great Yu Manages Floods in Bashu*). <<http://www.cws.net.cn/zt/06waterday/newsview.asp?CWSN>>, 10 August 2007.
- Municipality of the City of Wuhan (2004): 武汉市洪水调度预案简述 (*Wuhanshi Hongshui Diaodu Yuan Jianshu*) (*Synopsis of flood control plan of the City of Wuhan*).
- Needham, J.; Wang, L.; Lu, G.-D. (1971): *Science and Civilisation in China*. Cambridge at University Press, London.
- Neuhoff (1994): Organisation des Hochwasserschutzes. In: *Feuerwehrmann*.
- Office of the State Council (2006): 关于加强蓄滞洪区建设与管理的若干意见 (*Guan-yu Jiaqiang Xuzhihongqu Jianshe yu Guanli de ruogan Yijian*) (*Notification of "Some Recommendations on Strengthening the Development and Management of Retention Areas"*). Office of the State Council.
- Oxford English Dictionary (2007): *Oxford English Dictionary*. <[http://dictionary.oed.com/cgi/entry/50207290?query\\_type=word&queryword=risk&first=1&max\\_to\\_show=10&sort\\_type=alpha&result\\_place=1&search\\_id=rDGz-eXYv8H-2215&hilite=50207290](http://dictionary.oed.com/cgi/entry/50207290?query_type=word&queryword=risk&first=1&max_to_show=10&sort_type=alpha&result_place=1&search_id=rDGz-eXYv8H-2215&hilite=50207290)>, 10 September 2007.

- Palmer, C. G. S. (1996): Risk perception: an empirical study of the relationship between worldview and the risk construct. In: *Risk Analysis*. vol. 16, no. 5, pp. 717-723.
- Pfaffenbach, C. (2006): Verfahren der qualitativen Textaufbereitung und Textinterpretation. In: Gebhardt, H.; Glaser, R.; Radtke, U.; Reuber, P. (Eds.): *Geographie. Physische Geographie und Humangeographie*. Spektrum Akademischer Verlag, Heidelberg. pp. 164-181.
- Pfeil, J. (2000): Maßnahmen des Katastrophenschutzes und Reaktionen der Bürger in Hochwassergebieten. Am Beispiel von Bonn und Köln. In: Glass, W. (Ed.): *Deutsches Komitee für Katastrophenvorsorge e.V. (DKKV)*.
- Plapp, T. (2003): *Wahrnehmung von Risiken aus Naturkatastrophen. Eine empirische Untersuchung in sechs gefährdeten Gebieten Süd- und Westdeutschlands*. Ph.D. dissertation. Universität Friedericiana zu Karlsruhe, Fakultät für Wirtschaftswissenschaften.
- Pohl, J. (1998): Die Wahrnehmung von Naturrisiken in der "Risikogesellschaft". In: Heinritz, G.; Wiessner, R.; Winiger, M. (Eds.): *Nachhaltigkeit als Leitbild der Umwelt- und Raumentwicklung in Europa*. 51. Deutscher Geographentag Bonn 1997. Franz Steiner Verlag, Stuttgart. pp. 153-163.
- Pohl, J. (2002): Hochwasser und Hochwassermanagement am Rhein. In: *Geographische Rundschau*. vol. H 3211, pp. 25-30.
- Pohl, J. (2003): Risikomanagement in Stromtälern. In: Karl, H.; Pohl, J. (Eds.): *Raumorientiertes Risikomanagement in Technik und Umwelt. Katastrophenvorsorge durch Raumplanung*. Akademie für Raumforschung und Landesplanung, Hannover. pp. 196-218.
- Rayner, S. (1992): Cultural Theory and Risk Analysis. In: Krismky, S.; Golding D. (Eds.): *Social Theories of Risk*. Praeger Publishers, Westport. pp. 83-116.
- Renn, O. (1992): Concepts of Risk: A classification. In: Krismky, S.; Golding D. (Eds.): *Social Theories of Risk*. Praeger Publishers, Westport. pp. 54-79
- Renn, O. (1998a): The role of risk communication and public dialogue for improving risk management. In: *Risk Decision and Policy*. vol. 3, no. 1, pp. 5-30.
- Renn, O. (1998b): Three decades of risk research: accomplishments and new challenges. In: *Journal of Risk Research*. vol. 1, no. 1, pp. 49-71.
- Research Group of Rentention Areas (2006): 关于杜家台分蓄洪区管理问题的讨论 (*Guanyu Dujiatai Fenxuhongqu Guanli Wenti de Taolun*) (*Discussion on Management Problems in Dujiatai Retantion Areas*). Han River Management Agency, Wuhan.
- Rippl, S. (2002): Cultural theory and risk perception: a proposal for a better measurement. In: *Journal of Risk Research*. vol. 5, no. 2, pp. 147-165.



- Rohrmann, B. (1999): Risk perception research. Review and documentation. In: *Arbeiten zur Risiko-Kommunikation*, vol. 69.
- Rohrmann, B.; Chen, H. (1999): Risk perception in China and Australia. In: *Journal of Risk Research*. vol. 2, no. 3, pp. 219-241.
- Rosaldo, R. (1989): *Culture and Truth: The Remaking of Social Analysis*. Beacon Press, Boston.
- Schäfers, B. (2000): *Grundbegriffe der Soziologie*. Opladen, Augsburg.
- Schwarz, M.; Thompson, M. (1990): *Divided We Stand. Redefining Politics, Technology and Social Choice*. University of Pennsylvania press, Pennsylvania.
- Seiffert, H. (2003): *Einführung in die Wissenschaftstheorie 1*. C. H. Beck'sche Verlagsbuchhandlung, München.
- Seils, C. (2008): *Terrorismusbekämpfung ist keine Kriegsführung*. <<http://www.zeit.de/online/2008/42/bundeswehrgrundgesetz?page=all>>, 26 January 2009.
- Seipel, C.; Rieker, P. (2003): *Integrative Sozialforschung. Konzepte und Methoden der qualitativen und quantitativen empirischen Forschung*. Juventa Verlag, München.
- Shi, P.; Wang, J. (Eds.) (2003): *Atlas of Natural Disaster Sytem of China*. Science Press, Beijing.
- Sjöberg, L. (1997): Explaining risk perception: an empirical evaluation of cultural theory. In: *Risk Decision and Policy*. vol. 2, pp. 113-130.
- Sjöberg, L. (2000): Factors in risk perception. In: *Risk Analysis*. vol. 20, no. 1, pp. 1-11.
- Sjöberg, L.; Kolarova, D.; Rucai, A. A.; Bernström, M. L. (2000): Risk perception in Bulgaria and Romania. In: *Cross-cultural Risk Perception. A survey of Empirical Studies*. vol. 13, pp. 145-184.
- Slovic, P. (2000a): Perception of Risk. In: Slovic, P. (Ed.) *The Perception of Risk*. Earthscan, London and Sterling. pp. 220-231.
- Slovic, P. (2000b): Trust, Emotion, Sex, Politics and Science: Surveying the Risk-assessment Battlefield. In: Slovic, P. (Ed.): *The Perception of Risk*. Earthscan, London and Sterling. pp. 390-412.
- Song, Y. (1985): *四书五经 (Sishu Wujing) (Confucius teachings)*, 中国书店 (Zhongguo Shudian), Beijing.
- Stadt Köln (2005): *Verfahrensanweisung über die Gefahrenabwehr bei einem Großschadensereignis*. Berufsfeuerwehr, Amt für Feuerschutz & Rettungsdienst und Bevölkerungsschutz.

- Stadt Köln (2006a): Kölner statistische Nachrichten. *Statistisches Jahrbuch Köln 2005*. Köln.
- Stadt Köln (2006b): *Taschenplan Hochwassereinsatz*. Stadtentwässerungsbetrieb.
- Stefanovic, I. L. (2003): The contribution of philosophy to hazards assessment and decision making. In: *Natural Hazards*. vol. 28, pp. 229-247.
- Steg, L.; Sievers, I. (2000): Cultural theory and individual perceptions of environmental risks. In: *Environment and Behavior*. vol. 32, no. 2, pp. 250-269.
- Swedish Rescue Service Agency (2008): *Disaster Management*. <[http://www.raddningsverket.se/templates/SRSA\\_Page\\_\\_\\_\\_\\_21030.aspx](http://www.raddningsverket.se/templates/SRSA_Page_____21030.aspx)>, 24 March 2008.
- Tan, X.; Wang, Y.; Zhou, K. (2005): 中国灌溉与防洪史 (*Zhongguo Guangai yu Fanghongshi*) (*History of Irrigation and Flood Control in China*), 中国水利水电出版社 (Zhongguo Shuili Shuidian Chubanshe), Beijing.
- Tansey, J. (2004a): 'If all you have is a hammer.' A response to Sjöberg. In: *Journal of Risk Research*. vol. 7, no. 3, pp. 361-363.
- Tansey, J. (2004b): Risk as politics, culture as power. In: *Journal of Risk Research*. vol. 7, no. 1, pp. 17-32.
- The Chamber of Commerce and Industry in Cologne (2007): *Cologne Economic Region 2007. Statistical overview*. Cologne, The Chamber of Commerce and Industry in Cologne.
- The European Parliament and the Council of the European Union (2000): The EU water framework directive. In: *Official Journal of European Communities*. vol. L 327, no. 1, pp. 1-72.
- Thompson, M.; Ellis, R.; Wildavsky, A. (1990): *Cultural Theory*. Westview Press, Boulder, US., Oxford, UK.
- Thywissen, K. (2006): Components of Risk. *SOURCE* No. 2/2006. UNU-EHS, Bonn.
- Tierney, K. J. (1999): Toward a critical sociology of risk. In: *Sociological Forum*. vol. 14, no. 2, pp. 215-242.
- Tierney, K. J.; Lindell, M. K.; Perry, R. W. (2001): *Facing the Unexpected. Disaster Preparedness and Response in the United States*. Joseph Henry Press, Washington D.C.
- Unabhängige Kommission der Sächsischen Staatsregierung (2002): *Flutkatastrophe 2002*. Sächsische Staatsregierung.
- UNESCO (2002): *Universal Declaration on Cultural Diversity*. Paris, UNESCO.

- Van Ginkel, H.; Court, J.; Barrett, B. (2001): Human Development: Trends, Challenges and Priorities. In: Van Ginkel, H.; Thakur, R. (Eds.): *Embracing the Millenium. Perspectives and Challenges for the United Nations and the International Community*. United Nations University Press, Tokyo. pp. 11-29.
- Wang, H.; Deng, S.; Guan, Y.; Zhu, E.; Lu, X.; Li, D.; Wang, D.; Zhang, S.; Zhang, G.; Zhang, H.; Pang, J.; Yang, X.; Zhao, G.; Yao, J.; Xu, Z.; Xu, S. (2002a): 水利生存发展 (Shuili Shengcun Fazhan) (Water resource, Livelihood and Development). In: Zhu, E.; Zhao, G. (Eds.): 中国水利发展战略研究 (Zhongguo Shuili Fazhan Zhanlue Yanjiu) (Study on Chinese Water Management Strategy). 中国水利水电出版社 (Zhongguo Shuilishuidian Chubanshe), Beijing.
- Wang, H.; Deng, S.; Guan, Y.; Zhu, E.; Lu, X.; Li, D.; Wang, D.; Zhang, S.; Zhang, G.; Zhang, H.; Pang, J.; Yang, X.; Zhao, G.; Yao, J.; Xu, Z.; Xu, S. (2002b): 防洪抗旱减灾 (Fanghong Kanghan Jianzai) (Flood Protection, Draught Relief and Disaster Reduction). In: Zhu, E.; Zhao, G. (Eds.): 中国水利发展战略研究 (Zhongguo Shuili Fazhan Zhanlue Yanjiu) (Study on Chinese Water Management Strategy). 中国水利水电出版社 (Zhongguo Shuilishuidian Chubanshe), Beijing.
- Wang, J. (1999): 非工程性防洪措施 (Feigongchengxing Fanghong Cuoshi) (Non-structural Flood Protection Measures). In: Li, J. (Ed.): 中国江河防洪丛书-总论卷 (Zhongguo Jianghe Fanghong Congshu Zonglunjuan) (Series of River Flood Protection Studies-The Synopsis). 中国水利水电出版社 (Zhongguo Shuili Shuidian Chubanshe), Beijing. pp. 312-348.
- Wang, R. (2002): *Hochwasserschutzplanung am Mittleren Yangtze. Hintergründe, Vergleich und neue Lösungsansätze*. Cuvillier Verlag, Göttingen.
- Wang, T. (1999): 防洪非工程性措施 (Fanghong Feigongchengxing Cuoshi) (Structural Flood Protection Measures). In: Li, J. (Ed.): 中国江河防洪丛书-总论卷 (Zhongguo Jianghe Fanghong Congshu Zonglunjuan) (Series of River Flood Protection Studies-The Synopsis). 中国水利水电出版社 (Zhongguo Shuili Shuidian Chubanshe), Beijing. pp. 226-311.
- Wang, Z. (1999): Emergency Response and Relief Efforts of the Government of China in 1998 Floods. In: *International Workshop on Natural Disaster Management*. Beijing. pp. 31-38.
- Wang, Z. (2005): *Flood Management of Yangtze River*. Presentation at the Urban Training Programme of the United Nations University Institute for Environment and Human Security. Bad Neuenahr. 22 November.
- Weggel, O. (1994): *China*. Verlag C.H. Beck München, München.
- Weggel, O. (1997): *China im Aufbruch. Konfuzianismus und politische Zukunft*. Verlag C. H. Beck München, München.

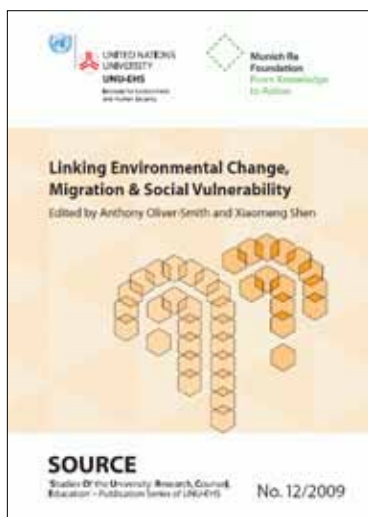
- Wen, F.; Hong, Q.; Tan, P. (2002): 长江流域防洪减灾对策研究 (Changjiang Liuyu Fanghong Jianzai Duice Yanjiu) (Research on the Flood Control and Disaster Mitigation Strategy in the Changjiang River Basin). In: Xu, Q.; Dai, D. (Eds.): 中国防洪减灾对策研究 (Zhongguo Fanghong Jianzai Duice Yanjiu) (Research on the Flood Control and Disaster Mitigation Strategy in China). 中国水利水电出版社 (Zhongguo Shuili Shuidian Chubanshe), Beijing. pp. 29-52.
- Wiedermann, P. M.; Eitzinger, C. (2006): Risikowahrnehmung und Gender. In: *Arbeiten zur Risiko-Kommunikation*. vol. 93.
- Wilkinson, I. (2001): Social theories of risk perception: at once indispensable and insufficient. In: *Current Sociology*. vol. 49, no. 1, pp. 1-22.
- Winter, R. (2003): Cultural Studies. In: Flick, U.; von Kardorff, E. (Eds.): *Qualitative Forschung. Ein Handbuch*. Rowohlt Taschenbuchverlag GmbH, Reinbek bei Hamburg. pp. 204-213.
- Wisner, B.; Blaikie, P.; Cannon, T.; Davis, I. (2004): *At Risk*. Routledge, London, and New York.
- Wittfogel, K. A. (1955): Developmental Aspects of Hydraulic Societies. In: Steward, J. H.; Adams, R. M.; Collier, D.; Palerm, A.; Wittvogel, K. A.; Beals, R. L. (Eds.): *Irrigation Civilizations: A Comparative Study. A Symposium on Method and Result in Cross-cultural Regularities*. Pan American Union, Washington D.C..
- Wong, K.; Zhao, X. (2001): Living with floods: victims' perceptions in Beijing, Guandong, China. In: *Area*. vol. 33, no. 2, pp. 190-201.
- World Conference on Natural Disaster Reduction (1994): Yokohama Message. <[http://www.reliefweb.int/ocha\\_ol/programs/idndr/yokohama/message.html](http://www.reliefweb.int/ocha_ol/programs/idndr/yokohama/message.html)>, 5 December 2007.
- Wuhan Shuiwuju (2004): 城市防洪 (Chengshi Fanghong) (Urban Flood Protection). <<http://www.whwater.gov.cn/whwater/info/listArticle.jsp?artColumn=03020601>>, 29 October 2007.
- Wuhanshi Tongjiju (The Office for Statistics Wuhan) (2006): 武汉市情 (Wuhan Shiqing) (Statistical Facts of Wuhan). <<http://www.whhj.gov.cn/documents/whsq2007/index.htm>>, 25 October 2007.
- www.gov.cn (2006): 中国政府网对水利部官员访谈 (Zhongguo Zhengfuwang dui Shuilibu guanyuan Fangtan) (Interview with the Officer of the Ministry of Water Resources by the Journalist of the Homepage of the Chinese Government). <www.GOV.cn>, 17 November 2006.
- www.xinhuanet.com (2005): 邹铭：自然灾害中的死亡人数不再是秘密 (Zouming: Ziran Zaihai zhong de Siwang Renshu buzai shi Mimi) (The Casualty Statistic Due to Natural Disasters is no longer Confidential). <[http://news.xinhuanet.com/video/2005-09/22/content\\_3525830.htm](http://news.xinhuanet.com/video/2005-09/22/content_3525830.htm)>, 25 April 2007.

- Xie, X.; Wang, M.; Xu, L. (2003): What risks are Chinese people concerned about? In: *Risk Analysis*. vol. 23, no. 4, pp. 685-695.
- Xu, Z.; Xu, G.; Rao, H.; Mao, Z.; Zhao, M. (2003): 城市防洪 (Chengshi Fanghong) (Urban Flood Protection). In Xu, Z.; Xu, G. (Eds.): 长江志 (Changjiang Zhi (Annals of Changjiang)). 中国大百科全书出版社 (Zhongguo Dabaike Quanshu Chubanshe), Beijing. pp. 366-398.
- Yang, J. (2005): Environmental politics with Chinese characteristics. In: *The Australasian Journal of Human Security*. vol. 1, no. 1, pp. 53-70.
- Yu, M. (2005): 生态系统整体性与河流伦理 (Shengtai Xitong Zhengtixing yu Heliu Lunli) (The interdependency of the ecological system and river ethics). In: 水利发展研究 (Shuili Fazhan Yanjiu) (Water Resources Development Research). vol. 6, pp. 8-11.
- Zhang, B. (2005): 关于河流生态伦理问题的探讨 - 对“生态系统整体性与河流伦理”一文的不同看法 (Guanyu Heliu Shengtai Lunli Wenti de Tanta - Dui “Shengtai Xitong Zhengtixing yu Heliu Lunli” Yiwen de Butong Kanfa) (Discussion on river ecology ethics - comments on “The Interdependency of the Ecological System and River Ethics”). In: 水利发展研究 (Shuili Fazhan Yanjiu) (Water Resources Development Research). vol. 2, pp. 4-9.
- Zhang, J. (1992): Environmental hazards in the Chinese public's eyes. In: *Risk Analysis*. vol. 13, no. 5, pp. 509-513.
- Zhang, X. (2002): 官本位解析 (Guanbenwei Jiexi) (An analysis of the self-importance of bureaucrats), In: 人民日报 (Renmin Ribao) (People's Daily). Beijing. 17 January 2002. p. 3.
- Zwick, M. M. (2006): Risk as Perceived and Evaluated by the General Public. In: Anmann, W.; Dannenmann, S.; Vulliet, L. (Eds.): *Risk 21. Coping With Risks Due to Natural Hazards in the 21st century*. Taylor & Francis/Balkema, London.
- Zhonghu Renmin Gongheguo Zhuxiling No. 28 (28 August 2004): 中华人民共和国土地管理法 (Zhonghua Renmin Gongheguo Tudi Guanli Fa) (Land Use Law of People's Republic of China). 28 August 2004. Zhonghua Renmin Gongheguo Zhuxiling No. 88 (29 August 1997): 中华人民共和国防洪法 (Zhonghua Renmin Gongheguo Fanghongfa) (China Flood Control Law). 29 August 1997.

**Acronyms**

BBR	Bundesamt für Bauwesen und Raumordnung
BfG	Bundesanstalt für Gewässerkunde (Federal Institute for Hydrology)
CFCDRH	City/County Flood Control and Drought Relief Headquarters
CPC	The Communist Party of China
CWRC	Changjiang Water Resources Commission
DKKV	Deutsches Komitee für Katastrophenvorsorge e. V. (German Committee for Disaster Reduction)
EHS	Institute for Environment and Human Security
EU	The European Union
FSHG	Gesetz über den Feuerschutz und die Hilfeleistung (The Law for Fire Protection and Assistance)
GDP	Gross Domestic Product
HSZ	Hochwasserschutzzentrale (Flood Protection Centre)
IPCC	Intergovernmental Panel on Climate Change
MWR	Ministry of Water Resources
NABU	Naturschutzbund Deutschland e.V.
NGO	Non-Governmental Organization
OED	Oxford English Dictionary
PFCDRH	Provincial Flood Control and Drought Relief Headquarters
PLA	People's Liberation Army
SFCDRH	State Flood Control and Drought Relief Headquarters
UNDRO	United Nations Disaster Relief Organization
UNEP	United Nations Environment Programme
UNU	United Nations University
UTP	Urban Training Programme
WHG	Wasserhaushaltsgesetz (Water Resources Act)
WWF	World Wildlife Fund
YFCH	Yangtze Flood Control Headquarters





**SOURCE: Studies Of the University: Research, Counsel, Education.**

A series aiming at students, scholars, and professionals seeking more details and in depth background information.



**InterSecTions: International, interdisciplinary (in)Security Connections.**

A series providing short, thought-provoking articles and monographs.



The background of the cover is a grayscale photograph of a river scene. In the foreground, a metal truss bridge spans the water. In the background, a city skyline is visible, featuring several tall, pointed church spires and other buildings. The water is calm, reflecting the sky and the bridge.

## **Flood Risk Perception and Communication within Risk Management in Different Cultural Contexts**

A Comparative Case Study between Wuhan, China, and Cologne, Germany

by **Xiaomeng Shen**

*Preparedness, early warning, and emergency management all contribute to flood risk mitigation and are closely linked to risk perception and communication. Risk perception and communication of decision-makers considerably influence their approach to risk mitigation strategies and therefore have a great impact on institutional coping capacity and/or vulnerability.*

*This PhD dissertation investigates flood risk perception and communication amongst key institutional stakeholders involved in flood risk management in the different cultural settings of China and Germany. Using qualitative social research methods, this study aims at: first, understanding the discrepancies of risk perceptions between different actors; second, identifying flood risk communication features among flood risk management organizational units and between risk management and the general public; third, comparing the perception and communication characteristics in different cultural contexts; and finally, analysing how differences are embedded in culture and exploring the potential of cross cultural transferability of good practices and its implementation with consideration of cultural diversity.*

**Xiaomeng Shen** earned her PhD in Geography at the University of Bonn, Germany, while conducting her research within the structure of UNU-EHS.

UNU-EHS  
UN Campus  
Hermann-Ehlers-Str. 10  
53113 Bonn, Germany

ISBN: 978-3-939923-38-1  
ISSN: 2077-737X