

# Coping with Flood Risks and Climate Change in China: Brainstorming Roundtable on Sharing European Flood Management Experiences and Lessons Learned

## NFG-TNC Report Berlin 2014

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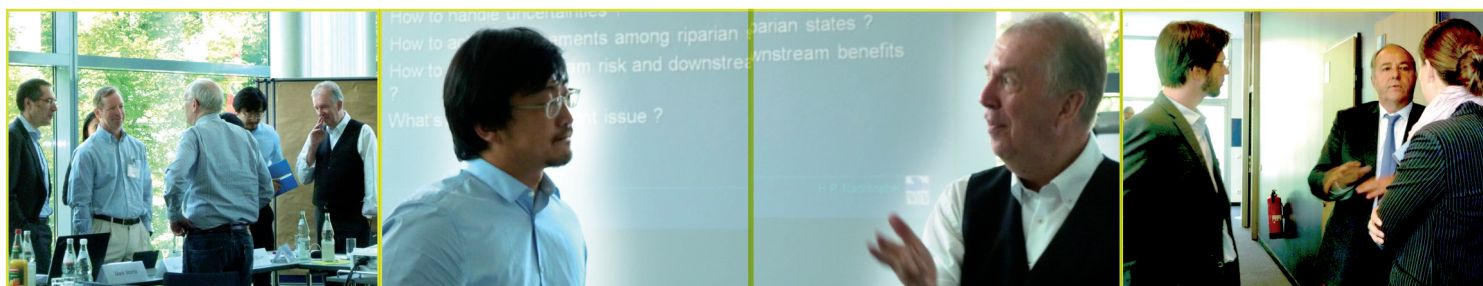
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# Foreword by the Organisers



Chinese stakeholders have shown increasing interest in flood risk management that goes beyond infrastructural changes, such as dams and levees, and integrating these with non-structural approaches. A joint roundtable organised by the NFG Research Group “Asian Perceptions of the EU” at Freie Universität Berlin, along with The Nature Conservancy Europe (TNC), brought together European experts to “share European flood management experiences and lessons learned”. Thirty selected participants, including some of the most prominent experts on flood risk management in Europe, members of universities, think tanks and river commissions identified best practices, case studies and ideas. Their Chinese counterparts presented a needs assessment for flood risk management and solutions for climate change induced flood risk, particularly along the Yangtze river.

Flood risk management in China and how European experiences can inform Chinese policy-makers is a core area of interest for the two organising partners. TNC as a non-governmental organisation aims to directly inform decision-makers in China by providing case studies of flood risk management Europe. The NFG’s more academic perspective is interested in the process of the transfer and exchange of best practices in flood risk management between the EU and China.<sup>1</sup>

A core finding of the workshop was that there already is a wealth of experience in the EU and in European countries. While Chinese decision-makers are often aware of international best practices, implementation within China has so far been lacking. Hence besides the sharing of European experiences, the goal of the meeting was to offer a networking opportunity. Experts interested in working together with Chinese counterparts on flood risk management were provided a brainstorming platform for new joint EU-China initiatives. Please find hereby the report which provides a summary of the key themes which emerged from the roundtable.

We thank the distinguished participants for joining us for this inspiring roundtable and for enriching it with thought-provoking discussions. The roundtable was made possible by the generous funding of the UPS Foundation and the German Ministry of Education and Research.<sup>2</sup>

This report opens up a vivid debate about what Europe and China can learn from each other on flood management by bridging academic analysis and policy applicability.



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<sup>1</sup> As an online resource, detailed information on the research agenda of the NFG “Asian Perceptions of the EU”, publications in the form of Working and Policy Papers series, as well as a comprehensive bibliography providing access to the latest research on the case countries (China and India) is available on the group’s website, [www.asianperceptions.eu](http://www.asianperceptions.eu).

<sup>2</sup> We would like to thank the organisational team of the NFG, Olivia Gippner, Eva Schröder, Garima Mohan, Anja Lutz, and Katharina Arseven, along with Alina Ragge and Johanna Günther. From the TNC team, our thanks go to Danning Li and Hajna Mendlik.



## Discussion Highlights - Executive Summary

**The EU Floods Directive combines regulatory approaches with flexibility:** countries are steered towards delivering basic flood risk management solutions, but are not forced to use specific tools and methods in their development. The flexibility of combining top-down with bottom-up approaches strongly resonates with constraints of central vs. provincial decision-making in China.

**Integrated Flood Management as the way forward:** flood management is a multi-objective problem. Problems of electricity, environment, and hydro-power surrounding the Yangtze River have to be solved in an integrated way, combining structural (e.g. dams and levees) and non-structural (e.g. flood detention areas) measures.

**Cooperation is needed to build the institutional base for Integrated Flood Management:** between water agencies, river basin commissions, national governments, state agencies, local governments and user associations.

**Flood risk management strategies as part of spatial planning strategies:** the increasing frequency of flood events can originate from climate change as well as from human interventions in the water cycle. Integrating spatial planning can prevent land use changes such as increasing urbanisation to cause more frequent floods as well as an increase in exposure of human properties to hazardous events.

**Necessity for reliable and shared data for system-wide flood risk analysis:** tools and convincing data for decision-making have to be developed to allow for system-wide analysis (e.g. asset management use; impact assessment). Best practices and the development of new solutions can be shared through collaborative research (joint EU-China research programmes), communication and sharing of solutions and needs (e.g. Flood Risk Management Community of Practice).

**Floods cannot be avoided:** while floods cannot and will not be prevented with absolute certainty, decision-makers have to answer the question of “how safe is safe enough?” New approaches are characterized by concepts of Integrated Flood Management, such as “Living with Water” and “Room for the River”, which aim to reduce and manage impacts on people and society. Climate change can be a window of opportunity for flood risk management as it allows planning for the future.

## 1. Introduction of the Roundtable

The closed roundtable “Coping with Flood Risks and Climate Change in China: Sharing European Flood Management Experiences and Lessons Learned” was based on short impulse statements and an open, off-the-record discussion to identify best practices, case studies and ideas. Prior to the meeting, three questions were identified to guide the discussions. A one-day programme was developed and each invitee was asked to prepare a 2-page input paper around those topics:

- The Dam Operation and Flood Control Department in China has not yet adopted ‘climate change’ as a factor for its risk management strategy, given the knowledge gap in climate change research in China. What are the relations between flood risk and climate change in China and what are the challenges of existing approaches?
- As China is moving away from a “heavy dam responsibility”, suggestions for alternative options need to undergo careful analysis. An example: when water is released from dams to make room for flood storage, there might also be reduced production of hydropower. Increasing flood detention areas downstream might provide greater hydropower and water supply available from the dam. However, potential correlations and possible ways to strike a balance between those factors and to reduce flood risk need to be studied carefully. What was the pathway to advanced flood risk management in the European Union? And how does the integrated approach strike the balance between these factors?
- Policy-making on disaster resilience in China brings together a complex net of stakeholders with diverse and often competing priorities. For instance, when a residential area is restored as Flood Detention Area (FDA), it is necessary to consider opportunity costs for policy-making and design compensation, resettlement and public communication plans accordingly. What are the recommendations to policy-makers in China and areas for EU-China cooperation on policy-making and implementation issues?



## 2. Background

In Chinese history, Da Yu (Yu the Great) is generally believed to having been the first one who managed to harness the floods of the Yellow River in the century 2200 – 2100 BC. In the mythological stories, he adopted new methods such as digging canals and deepening existing channels instead of constructing dikes and dams, the efforts by his predecessor Gun. Times have changed. Today, the demographic situation and development status around the big rivers of China are dramatically different. China has heavily relied on structural approaches for the protection of civilians in the last decade. Dams and levees have successfully prevented tremendous loss of life in the big river basins. Meanwhile, other effects on environmental, social and economic aspects of the structural approach have also been realised. Structural approaches to flood risk management based on floodways and reservoirs have shown negative environmental, social and economic consequences – which are intensified by climate change. As China is moving away from its flood control strategy of “heavy dam responsibility”, alternative options developed and tested abroad have been analysed carefully by Chinese policy-makers. While floods cannot and will not be prevented with absolute certainty, decision-makers have to answer the question of “how safe is safe enough?” Based on the experience of major floods in populated areas surrounding international rivers such as the Rhine and the Danube, European countries have gradually adopted non-structural approaches, such as early warning systems, into their overall strategies. Policy-makers have started to promote the idea of managing floods rather than controlling them. What lessons can China draw from the European pathway towards integrated flood

risk management? How does the Integrated Flood Management (IFM) approach strike the balance between various risk factors, such as exposure and hazard? And finally, policy-making on disaster resilience in China brings together a complex network of stakeholders with diverse and often competing priorities. What lessons from the EU could be useful for China, as the EU, similar to China, is a multilevel entity: at the very least, decisions involve stakeholders from the European Union, member states and their respective river commissions.

### Case Study: The first Flood Detention Area (FDA) in China in 1954

The Chinese government had already identified flood detention areas (FDA) in the Yangtze River basin as a policy solution in the 1950s. When the Jingjiang FDA was first (and for the only time) flooded in 1954 (return period 100 years), the water levels in the Yangtze River dropped by 76 cm. The Jingjiang FDA successfully reduced the water running into Dongting Lake and released the pressure to the Jingjiang River Levee. However, many FDAs in China face severe constraints between water management requirements and a rapidly growing population. Many of the remaining FDAs do not have sufficient infrastructure ready in case a flood hits. Therefore, dams and levees are most commonly used for flood control in China.

*Source: TU Delft, 2003*

## 3. European Experiences in Flood Risk Management

Core issues discussed related to the European experience were concepts and cases of flood risk management, such as integrated approaches and the lessons from the Rhine and Danube river basins. The EU Floods Directive served as core instrument to advance the European Union’s approach based on long-term planning, integration into spatial planning approaches and flood protection rather than flood management. Different river basins and countries thus provide different lessons for Chinese decision-makers.

### 3.1 Pathways to Advanced Flood Risk Management in the European Union

The pathways to flood risk management in the European Union have been driven by a combination of European legislation (i.e. the Water Framework Directive; the Floods Directive), national governance approaches and the development of computing (which underpins the ability to analyze flood risk, both in real time and in advance).

Whilst the Floods Directive defines steps that each European country should achieve (e.g. flood risk maps) by certain deadlines, the Directive does not prescribe how they should be achieved. Different governance models and historic and cultural traditions in the various EU countries mean that different tools, methods and solutions have been applied in different countries and regions. The availability of data and infrastructure for monitoring, collecting and analyzing data also

varies from country to country, hence different approaches and levels of complexity of flood risk management exist across Europe. These differences will progressively, but will not disappear completely given the cultural and governance factors involved.

In addition, there has been a paradigm shift within the European flood community that fighting against water, as practised by the Dutch for many centuries, is not effective anymore. The new approach in that respect is characterized by concepts of integrated flood management, such as “Living with Water” and “Room for the River” among others, which recognise the fact that floods cannot be prevented, but that impacts on people and society should be reduced and managed. In the EU Flood Directive also recognises that in fact human activities and economic development (land use) contribute to the occurrence and the adverse impacts of floods.

### 3.2 The EU Floods Directive

In 2007, the Floods Directive (Directive 2007/60/EC), which established a framework in the field of water policy at the catchment scale, was passed in the EU parliament and became effective in most member states in 2011. The Directive’s goals are to reduce the adverse consequences from floods for human health, the environment, cultural heritage and economic activity associated with floods. The concrete tasks deriving from the Directive are to establish a basin-wide framework for the assessment and management of flood risks based on flood hazard maps, risk maps and flood risk management plans, involving the public at all stages.



Flood hazard maps cover the geographical areas which could be flooded according to the following scenarios: 1) floods with a low probability, or extreme event scenarios; 2) floods with a medium probability (likely return period  $\geq 100$  years); 3) floods with a high probability. All plans (flood risk assessment, flood hazard maps and flood risk maps, flood risk management plan(s)) are reviewed and updated respectively by 22 December 2018, 2019 and 2021 and every six years thereafter.

The benefits of the EU policy are that it demands a coherent basin wide approach, addresses economic, social and ecological goals, suggests non-structural measures and natural water storage, requires public participation and considers the full risk cycle. The European policy can thus serve as an example for China demonstrating how different aspects of flood risk can be addressed by combining structural and non-structural measures. Meanwhile, there remain inconsistencies in the existing policy: there are no statements about scenarios (except the 100-years flood), no agreed procedures for risk assessment, how to handle uncertainties, how to achieve agreements among riparian states, or to trade off upstream risk and downstream benefits, while addressing issues of sediments.

Nevertheless, non-structural approaches, such as using natural flood plains and wetlands to store water during floods, are emphasised by the Directive. In combination with structural approaches, they are considered to maximise benefits from flood prevention while reducing environmental impacts of traditional approaches in Europe.

In summary, the Floods Directive provides a framework and principles but does not tell the member states how to implement specific aspects. This approach provides flexibility and avoids bogging down countries and regions with methods imposed from above.



### 3.3 The “Basin Approach”

Much of the discussion during the roundtable focused on the appropriate level of decision-making. Institutionalised with the EU Floods Directive, the European Union has embraced the basin approach for its decision-making. There is an underlying assumption that flood management has to take place at the basin level, however, there are also other options: for instance, a flood risk insurance at the level of households and enterprises would lead to different decision-making.

The question of the degree of decentralisation has been determined by the EU’s identity as a multilevel governance system, which has led to an automatic decentralisation of risk management. On the local level, especially in terms of awareness building and working with communities, a lot can be done to reach community acceptance for preventive flood risk measures. There is also a danger for excessive decentralisation, depending on the system of governance: for instance, the idea of big society – which means reliance on volunteers and community organisations to support public activities – following the 2014 floods in the UK, was criticised as a way to evade what are traditionally government responsibilities. Thus the question of who is paying and who is responsible for flood risk measures makes the decision of decentralisation vs. centralisation one of resources and strategy as well.

#### Case Study: Rhine River Management Commission

The Rhine River Management Commission was initiated by the Netherlands after several serious accidents had occurred on the Rhine river between 1950-1980. The first corner stone was a political agreement signed in 1986 setting strict regulations for factories to restore water quality in the area. As one of the European rivers subject to high authoritative complexity – shared between eight countries – and as one of the first examples of river basin management, the institutional set-up of the International Commission for the Protection of the Rhine (ICPR) and the actual activities and regulations set by the commission can provide interesting lessons for Chinese policy-making, focusing on water quality and environment issues.

The institutional set up of the ICPR tries to overcome the challenges imposed by the high authoritative complexity of the decision-making process and tries to maintain a working form of cooperation between the partner countries. The decision-making power lies within the Plenary Assembly which holds its annual meetings together with the Rhine Coordination Committee. Under the Plenary Assembly stands the Strategy Group that connects the four expert working groups dealing with the technical questions in the fields of floods, water quality and emissions, ecology and micropollutants. On the working level the delegations of the contracted parties operate via representatives sent by Germany, European Union, France, Luxemburg, Netherlands, Switzerland and other riparian countries. The Commission has laid down a regulative framework across a wide scope recognising the equal importance and necessity of taking an integrated approach to handle quality, ecology and flood issues. Examples include reduction in chemical substances and action plans on floods, implementation of retention areas. For instance, statistics support the success of pollution control, as the 50-70% reduction in the polluting inputs targeted for the time period of 1985-1995 had all been met already by 1994. More importantly, the 50% target set for industrial sources of pollution has almost fully been achieved and reduction of priority substances has seen a considerable decrease of 70-100%. One of the biggest successes is the cooperation built between the involved countries at the simple level of measuring and monitoring, e.g.: Swiss activities aimed at improving water quality provide benefits for the Netherlands.

Source: Rhine River Management Commission Koblenz, <http://www.iksr.org>, 2014

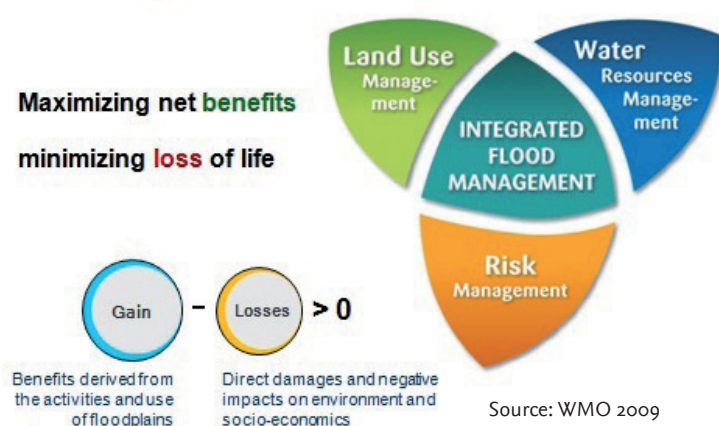
### 3.4 Integrated Flood Management

One of the core approaches for European rivers is Integrated Flood Management (IFM): The overall objective of IFM is to create a local community that can protect itself with an optimal set of measures (both short- and long-term, structural and non-structural) balancing the gains derived from the activities and use of floodplains: agriculture, transportation, urban development, recreational use; with the losses through direct damages and mid- to long-term impacts on environment and socio-economics. IFM aims at maximising net benefits to ensure livelihood security, poverty alleviation and managing vulnerability, minimising loss of life, in particular through end-to-end Flood Forecasting and Warning (FF&W) Systems and preparedness planning for extreme events.

IFM is built around several core principles combining risk management, managing the water cycle as a whole (which means considering not only the river, but also the river basin and the interactions between the two), adopting a multi-hazard approach going beyond floods, integrating land and water management (river basin as a planning unit), adopting the best mix of interdisciplinary strategies (not only seeing it as an engineering problem) and finally ensuring a participatory approach, which seeks all stakeholders' participation.<sup>4</sup> Net benefits are calculated as the difference between the benefits derived from the activities and use of flood plains on the one hand and the direct damages and negative impacts on the environment and socio-economics on the other.

The approach of Integrated Flood Management has been put on the official agenda of the European Union (the IFM approach was endorsed and recognised as a requirement when developing EU policy through the "Council conclusions on Integrated Flood Management within the European Union" in 2011) and other international organisations, such as the World Meteorological Association or the Global Water Partnership. The approach has already been tested in several cases, for instance in the Bodrog River Basin, Slovakia and Hungary and yielded positive results. The GWP website systematically collects case studies from all over the world implementing tools of IFM and Integrated Water Resources Management approaches.<sup>5</sup>

#### What's 'Integrated' in Flood Management?



<sup>4</sup> World Meteorological Organization, 2009; *Integrated Flood Management Concept Paper*

<sup>5</sup> Global Water Partnership, "Integrated Water Resources Management Case Studies", <http://www.gwp.org/en/ToolBox/CASE-STUDIES/>

### 4. Lessons for Chinese Flood Management Policy

Moving beyond the core characteristics of European flood management, two of the roundtable sessions were dedicated to identifying the policies and practices that could be applicable to flood management in China. The OECD's report on the Seine River provides a comprehensive show case illustrating the key issues and problems of flood risk management, which serves as a good example for these issues in China, too.

#### 4.1 What is the Role of Spatial Planning in Flood Management?

An approach that has already been developed in Europe is that of coordinating spatial planning with flood management plans. Land use, urbanisation and the development of industrial zones, can all seriously affect water resource conditions, both in terms of quantity and quality.

#### Case study: Seine River, France

According to the OECD in the Paris region, the main issue for flood management (damage from the 100-year flood estimated at 30 billion euros) is not climate change impact but increasing urban development in flood-prone areas for the past 50 years and the interdependence of critical infrastructures. Spatial planning, notably allowing urban expansion within high flood-risk areas has increased risk exposure of the people and assets and generates long-term increases in economic losses.

The Seine territory is managed by an overly complex authoritative system, where decision-making procedures lie on different administrative levels fragmented in institutional and territorial terms. Particularly, there is a lack of efficiency with regards to cooperation and synergy between the different administrative levels: national, regional, departmental, municipal and metropolitan. As a consequence the flawed authoritative system has been unable to maintain an efficient dis

among stakeholders, to date there has been no coherent leadership or common objectives for flood risk management.

Recommendations to the Paris region lie with governance structures: to ensure the appropriate linkage between local, basin and national level, to involve all stakeholders and to create effective gateways with related public policies (environment, green-economy, well-being, water management, regional planning). For resilience, the priority is to reinforce the risk culture of citizens, decision-makers and companies. For financial measures, the OECD reports points out the importance of the French insurance regime which could be adapted in order to develop incentives. A 2015-2020 master plan for flood prevention is currently being implemented, based on the EU flood directive and on the OECD report.

Source: EPTB Seine Grands Lacs, 2013



“In France, the concept of flood risk and crisis management is still not a widely and fully adopted policy, however, one of the main strengths of France’s river basin management undeniably lies within its procedural expertise in the fields of complex systems integrated management, post-normal sciences, participatory processes and adaptive management”

The increasing frequency of flood events can originate from climate change as well as from human interventions in the water cycle. Modified land use changes such as increasing urbanisation and channelisation of rivers have resulted in more frequent floods as well as an increase in exposure of human properties to hazardous events in Europe. Similarly, enclosing tideland for cultivation has had profound and long-standing impact on flood risks in the Yangtze River basin in the past hundreds of years. Now the rapid urbanisation in Chinese cities means that they compete for land resource with rivers. Many previously defined detention areas want to “remove the title” so they have less limitation on development and land use changes.

In particular, in the field of spatial planning and land use, there are powerful parallels between China and the EU: Land use management plans are of importance when rapid urbanisation, population growth and economic development are occurring at the same time. Some of China’s biggest opportunities lie in undertaking non-structural measures, such as: awareness-building to increase community resilience; preventing inappropriate activities occurring in the floodplains through the adaptation of land-use zoning recognising flood risk; and improvement of forecasting and early warning systems. Meanwhile, making these non-structural measures economically viable requires careful calculation and planning.

This could be achieved through the creation of a national framework that includes integrated flood risk management, but, at the same time, still allows provinces to develop individual mitigation plans and tools, recognising the need for setting minimum national levels of protection. Planning needs to adequately respect the envi-

ronmental, legal and economic setting – and to reflect the impacts of climate change.

## 4.2 What are the Administrative Challenges?

During the roundtable there was agreement that flood risk management is a broad topic and only one part of it relates to water and rivers alone. The ultimate objective of flood management should thus be to harmonise the requirements of the whole river system. The institutional nature of flood risk management adds a further layer of complexity. One expert illustrated that even in a small country like Austria there are multiple forecasting systems due to the different stakeholders. The multitude of stakeholders involved creates coordination issues and increases the cost of cooperation. After years of effort, Europe has set up river basin management plans by river commissions and developed the EU Flood Directive as the guideline to coordinate requests from different regions upon different aspects.

It was discussed that many ministries are involved in flood management decision-making in China and there seems to be a lack of cooperation and coordination between them. The implementation of policies is sometimes also problematic due to conflicting interests. It was suggested that the productive approach should be taken to bring different practitioners (working on financial, engineering, spatial planning, sediment issues, etc.) together to specifically work on the development of coordination and collaboration mechanisms.

### Case Study: Netherlands

The Ministry of Infrastructure and the Environment is the Dutch Ministry responsible for Transport, Aviation, Housing, Public works, Spatial planning, Land management, Forestry, Water and the Environment. The Ministry was created in 2010 following the merger of the former Ministry of Transport, Public Works and Water Management and Ministry of Housing, Spatial Planning and the Environment, acknowledging that these sectors are tightly related to flood and water management.

a different agenda. Cooperation between all levels of Chinese decision-making has not become a conscious effort yet. Hence, negotiation is needed between regional and national interests, and local political views have to be integrated into the national agenda. It was emphasised during the workshop that “for successful negotiation you need some room for flexibility, and you need to have something to give away”.

“There is no need to convince people about integrated approach, you need to motivate them and to enable them to do it. Be clear who is responsible for what.”

## 4.3 Where Should the Decision be Made?

Some of the experts argued that the ideal form of governance for flood risk management would be a balanced combination of top-down and bottom-up methods. The situation in China is very unique: while decision-making is highly top-down, at the same time implementation is often not followed through at the local authority level (provinces). The experts who have been engaging with water issues in China for a long time believed that the ministries fully understand the role of river management. However, the problem lies in the authority competition between river basin commissions and the provinces. On the one hand, national interests are not properly translated into local interests due to top-down decision-making. On the other hand, the provinces obey the rules only superficially and may actually adopt

### Case Study: Coordination under the EU Flood Directive

The EU Flood Directive, like Chinese flood strategies, focuses on flood management at the river basin level. However, the responsibility in principle is with the member countries themselves, whereas in China the River Basin Commissions have specific responsibilities and mandate in coordination with the relevant government administration in the basin (provinces and cities). Nevertheless, the EU Flood Directive explicitly mentions the need for cooperation between riparian countries and the need to address cross-border issues like flooding, water shortage and water quality.



## 4.4 What are the Most Important Factors when Communicating to the Government and the Public?

It is pivotal for decision-making in China to communicate complex research results showing that natural and integrated approaches can strike the balance between important aspects of river basin management. Awareness of “Chinese characteristics” of policy-making and agenda setting becomes a prerequisite when considering an integrated approach based on experiences from Europe.

It was emphasized during the roundtable that the scale of population pressures in China forces decision-makers to weigh considerable trade-offs when trying to implement initiatives such as “Room for the River”. Another key aspect to be taken into consideration is economic valuation. Any plan without carefully integrating local development requirements would not be sustainable in the long run. The Eastern European countries along the Danube River share a similar development history as China – and provide a set of interesting lessons.<sup>6</sup>

Several experts made the case that flood risk management actually is key for all the different sectors competing for water - industry and environment services. Additionally, a beneficial side of floods and flood management has been known for a long time, for instance for agricultural uses. Benefits from flooding will gain in importance in future flood management strategies and can also be addressed more explicitly when promoting flood risk management approaches.

It was also mentioned that tools and convincing data for decision-making are very important. The gaps in data and modelling in China are obvious, which requires all stakeholders to cooperate with each other on data collection and sharing. In the end, the presence or the extent of an experimental culture in China will determine whether different approaches can be identified and developed – or whether a path dependency based on traditional approaches will dominate policy outcomes.

### Case Study: Pathway to Cooperation on Flood Risk Management in the Rhine River Basin

Different countries and rivers have different pathways to achieve integrated flood risk management. For instance, the UK and the Netherlands initially integrated management from a non-flood perspective. The Rhine Commission was founded in order to analyse the pollution of the Rhine by Germany, France, Luxemburg, the Netherlands and Switzerland in 1950. Now ICPR’s focal point is the “sustainable development of the Rhine, its alluvial areas and the good state of all waters in the watershed”. Another interesting case for China is how the EU handled its rivers after World War II and what happened in the 90s, which brought a transformation to flood management and to river basin management. Focusing on these periods (50s, 60s, 90s), policy-makers can identify the main drivers and the reasons behind these policy changes, particularly the important role that environmental movements have played in the 90s.

<sup>6</sup> Unfortunately, the Danube River Commission was not available for the workshop. But coordination by the riparian countries presents another interesting case for Chinese flood managers. The workshop organisers can be contacted for further information, if needed.

“It is very uncertain to measure the uncertainty of a flood occurring, rather prepare for it and do the refinement later.”

The workshop also discussed the difficulties of communicating flood prevention measures, effects on land use and compensation structures with the public, which are expected to remain a long-term challenge. Citizens should be involved at all necessary steps impacting their immediate environment; however, it is also very difficult to translate theoretical risks into what they mean for people’s daily life. Therefore it is not enough to simply communicate the risk but it is necessary to pass on the logic behind flood management policy-making itself.

## 4.5 How to Adopt Risk Management Strategies?

Decision-makers coming from an engineering background may intend to underestimate risk management and instead focus on disaster prevention. However, risk management is about finding a balance between an acceptable level of uncertainty, minimising losses and maximising the benefits for all stakeholders. A good risk management model thus is able to handle uncertainty from the aspects of human loss and benefits.

The Netherlands is famous for its programme “Room of the River” – the concept of designating a very small additional room for rivers. Local flood protection managers have understood the benefits of the programme, but it is always difficult to convince decision-makers. Climate change can be a means for discussing this issue in a more sensible way. Some Chinese decision-makers have not yet fully adopted the concept of climate change or have not taken it as a priority.

The different dimensions of flood management start overlapping at the local level including flood control, economic development and environmental

### Case Study: Estimating the Impact of Climate Change on Flood Risk in the UK

First a “do-nothing scenario” projected for a specified time scale is set to estimate the present value risk (50-100 years). In this case there is no risk of mitigation and maintenance. Then risk changes over time are calculated looking at the reduction in risk and the costs and benefits of mitigation. Costs and benefits during the assessment include loss of habitat, habitat creation, business distraction, etc. Based on projections for climate change, impacts for over 50 years under different emission scenarios are developed. But the question arises: which climate change scenario should be used for economic valuation?

services. Risk management can already be incorporated into the local planning - good pilots at the local level could provide sufficient information for decision-makers. But final decisions are at the government level for which safety issues need to be considered.

### Case Study: Sharing Flood Risk Management Experiences in Europe

A key factor in the development of flood risk management techniques across Europe has been the sharing of good practice in support of compliance with the Floods Directive. Regional pilots have been undertaken. The ‘Working Group Flood’ oversees implementation on a national basis, promoting the exchange of good practice. An established forum for the exchange of good practice is also the FLOODrisk Conference series. It arose originally from the EU funded FLOODsite project ([www.floodsite.net](http://www.floodsite.net)) which was a large EC-funded integrated research project addressing flood risk analysis and management aimed at supporting implementation of the Floods Directive. A recent addition to these mechanisms for sharing practice and experience in flood risk management has been the establishment of an “International Flood Risk Community of Practice”.

“We cannot talk about flood risk management without taking several steps back to consider all the aspects including social impact, economic evaluation, land use, environmental service”.

## 4.5 How can Economic, Social and Environmental Impacts be Accounted for?

One of the main underlying problems is that of valuing the costs of flood risk management, natural degradation or protection is assessed from an economic perspective. However, the net benefits decrease due to the discount rate in the long turn so they cannot reflect the environmental value. Thus, it is a challenge to value flood management plans economically, environmentally and socially, carefully choosing weights to reflect the trade-offs between the different aspects, then integrating them for implementation. A Cost/Benefit Analysis (CBA) is recommended as the most important tool. The experts emphasised two key points for CBA:

- 1) *Flood risk should be treated as a multi-objective problem, optimising the costs as well as maximising social, environmental and economic benefits;*
- 2) *It is crucial to start collecting data systematically in order to have sufficient data for analysis.*

In the past, China, has strongly relied on structural measures to control floods. The major challenge is the transition to embracing management tools beyond relying solely on control. A milestone in this regard was the National Flood Management Strategy prepared by the Ministry of Water Resources in 2005. Policy-makers, spatial planners and scientists will, in addition, need to recognise and quantify both losses and benefits that result from flooding. An important step towards measuring benefits/losses and evaluating mitigation measures is the inclusion of ecosystem services (as done by the study The Economics of Ecosystems and Biodiversity (TEEB) – thus considering both environmental and socio-economic perspectives.

### Case Study: UK Flood Risk Cost-Benefit Analysis

Using scenarios, present day risk is calculated based on what damages are associated with different flood events, to make assumptions on how extreme events will influence their environment. Ecosystem values are calculated into cost/benefit analysis (CBA) through a priority scoring system in the UK. The employed multi-criteria analysis places higher emphasis on the economics than on environmental impacts.

## 4.6 Summary of Recommendations

It has been clearly understood that Integrated Flood Management requires the involvement of all stakeholders. Cooperation between ministries and various institutions from national level to local level is the necessary institutional base for an integrated approach. The breakthrough point of flood management lies in different areas in different cases. For example, climate change can add a long-term point of view into the management plan. Flood risk management with the support of CBA is a powerful tool when calculating economic, social and environmental impacts of a management plan. When setting the weights of different factors one needs to carefully take China’s unique characteristics into consideration. Data collection and sharing are very important for decision-making. Pilots at the local level can also provide convincing results of the potential management plan. Finally, the decision requires consensus between different stakeholders and a balanced negotiation to address both national interests and local development needs.

## 5 Channels of EU-China Interaction on Flood Risk Management

In light of the European experience in integrated flood management, there is room for cooperation between China and Europe. Until now, interest from the Chinese side has been moderate, as Chinese big rivers are dammed completely and installations such as the Three-Gorges Dam allow for controlling water flow in one of the biggest rivers, the Yangtze River. However, the question of how to deal with flood risk management in smaller rivers and rain run-off, which still presents a major problem in China, becomes the most important issue for EU-China cooperation.

As indicated above, there are a number of areas where learning of good practice is needed, particularly in non-infrastructure management measures. Specific areas include vulnerability assessments in terms of socio-economic hazards and risks, and transitioning from hazard to proportionate risk management. A common challenge to both China and Europe is the integration of flood risk assessment into spatial planning for urban and regional development. Exchanges between the EU and China on flood management issues could be very useful and fruitful for both sides. They could be a part of the current China-Europe water platform (led by Denmark on the EU side; with the Netherlands as co-lead on flood issues). But how can this exchange work, what are the possible fits, what kind of communication processes can get the right partners and people involved?



The participants agreed that at the EU-China policy and academic level of cooperation on water already a lot has been done, including strategic knowledge exchanges. The main goals of bilateral relations are usually two-fold:

- To develop an understanding of each other's expertise and demands by mutual exchanges and communication.
- To organise seminars on issues of shared interest involving public, national, and regional authorities, private companies, researchers and NGOs.

Overall, at a central level and among the leading experts in China, there is an understanding of the usefulness of European experiences of flood risk management. This can be seen in jointly authored publications by Chinese and European experts, such as “Flood Risk Management: A Strategic Approach”<sup>7</sup>. The knowledge exchange process between China and the EU, facilitated largely by the EU-China RBMP<sup>8</sup>, resulted for example in the No. 1 Water Policy Document of China drawing lessons from European experiences, particularly in the European Water Framework Directive and EU Flood Directive. The greatest opportunities, however, particularly for the development and deployment of European flood management technologies, lie in applications at the local level.

Thus, China and Europe have robust cooperation and knowledge sharing on water management, spread through a number of initiatives, bilateral cooperation projects and direct exchanges between institutes and universities. These include, for example, the previous EU-China River Basin Management Programme and the current EU-

China Water Platform; the EU-China Strategic Research and Innovation Agenda; EU Chamber of Commerce – Water Working Group; the Global Water Partnership, among others, as well as an array of bilateral cooperation programmes and twinning programmes between basin authorities and sister cities. Specifically to flood risk at the EU-China level, there is the China Europe Water Platform – Flood Risk Management Co-lead and the EU-China Disaster Risk Management Project. On a bilateral level, European countries cooperate with provinces and municipalities in China, for instance French partnerships with Hai He and a Mou between Beijing water authority, river basin institution of Seine Grands Lacs and International office for water; for the Netherlands Huai He partnership, “Room for the River”; Danube and Rhine Commissions with their respective Chinese counterparts. There is also a great amount of academic exchange and cooperation on water sciences, both independently created from and supported by EU programmes.

Exchange between major EU and Chinese programmes could be better leveraged through the creation of new and the improvement of existing institutions. Clearly mandated and sustainably financed knowledge hubs could greatly contribute to a more effective expansion of European expertise and technologies in China. Such institutions could provide mechanisms to better catalogue demands for technical and policy support from Chinese authorities and link to networks of European experts and service providers with suitable technologies and expertise to meet those demands. The China Europe Water Platform is one such mechanism to do this – but as it stands now it is only partially suited for this role as it is not imbued with the core-financing or staffing to provide this type of structural support to run the network. Better mechanisms on the Chinese side to invite expert consultation from Europeans would facilitate greater flow of expertise to China (several exist, but these are difficult to access for most Europeans).

<sup>7</sup> <http://www.adb.org/sites/default/files/pub/2013/flood-risk-management.pdf>, ADB, 2013.

<sup>8</sup> *EU China River Basin Management Programme 2006-2012*, [http://eeas.europa.eu/delegations/china/documents/eu\\_china/development\\_cooperation/rbmp\\_6083\\_20120627.pdf](http://eeas.europa.eu/delegations/china/documents/eu_china/development_cooperation/rbmp_6083_20120627.pdf), EEAS, 2012.

### Recommendations to Policy Makers on EU-China Cooperation

**1. The Science-Policy Interface is always an issue for increased cooperation:** The different languages (between policy-makers and scientists), time scales and agendas can make it difficult to align solutions (science, tools, methods) with policy demands.

**2. Create an approach for flood risk management that is flexible and which can evolve:** Such an approach allows for initial collection of basic data, but then has the structure for longer term refinement and increased complexity as finance allows more detailed data collection and improvements in science allow refinement of the analysis methods. The fundamentals of system-wide analysis need to be considered carefully though, so that key functions (e.g. asset management use; impact assessments) can always be achieved.

**3. Participate in the sharing of good practice and the development of new solutions:** Through collaborative research (joint EU research programmes), communication (FLOOD risk conference series) and sharing of solutions and needs (e.g. Flood Risk Management Community of Practice) to connect Chinese demands with European best practices through better bridging institutions.

## 6. The Organisers

### The NFG “Asian Perceptions of the EU”

The NFG “Asian Perceptions of the EU” analyses the diffusion of policies and norms in coping with global challenges between Europe and Asian countries, particularly China and India. Its research work builds upon extensive interviews conducted to understand China’s needs and demands, the unique experience the EU has to offer, and the channels of interaction through which practices are translated from one context to the other ([www.asianperceptions.eu](http://www.asianperceptions.eu)). Europe has undergone a process of developing integrated river management and flood risk approaches over the past decades. Given the similarity of populated river basin areas between China and Europe, European experience may provide valuable insights into the transformation of policies and regulations, as well as the use of novel scientific approaches and policy implementation.

The NFG publishes its results in its own Working Paper and Policy Paper series and provides information and findings on EU-Asia security relations on its knowledge portal [www.asianperceptions.eu](http://www.asianperceptions.eu).



### The Nature Conservancy (TNC)

The Nature Conservancy has been working on freshwater conservation in China for approximately eight years. TNC is working with partners to protect and restore the environmental condition and the associated social and economic benefits of Yangtze’s most critical stretches and ecosystems, through finding more sustainable methods of flood control, hydropower operations, and enhancing the conservation capacity and effectiveness by ensuring environmental flows and management designed to protect areas with high environmental value.

TNC believes that the “heavy dam responsibility” model in China should be revised in the context of meeting the many competing needs of China and climate change. TNC aims to work with key stakeholders such as Three Gorges Project Corporation and government partners to significantly improve flood risk management in China.

This joint workshop serves as an incubator for TNC’s upcoming international conference on flood risks and sustainable hydropower with key stakeholders and partners, providing a platform for European experts to introduce “European experiences” to policy-makers in China.

### The TNC China Yangtze River Report

TNC is finalising research of a statistical model for flood risk under climate change conditions at the upstream and midstream of Yangtze River. The research aims to provide the methodology and the baseline for the Ministry of Water Resources and to review flood risk management policies in China and their ability to address both flood risk and environmental objectives. A pilot will be conducted in the respective areas to test the statistical model and the results will be presented. The integrated approach of flood risk management and meeting other needs will be proposed based on the research. The approach is expected to generate funds from excess electricity produced by the optimised dam operations which are then to be transferred to downstream conservation and flood control efforts. Additionally, the environmental flow resulting from new management approaches will mimic natural water cycles, optimising dam efficiency and minimising the ecological impact on downstream habitats.





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