



Flood risk management in Hamburg - the example of an urban water course

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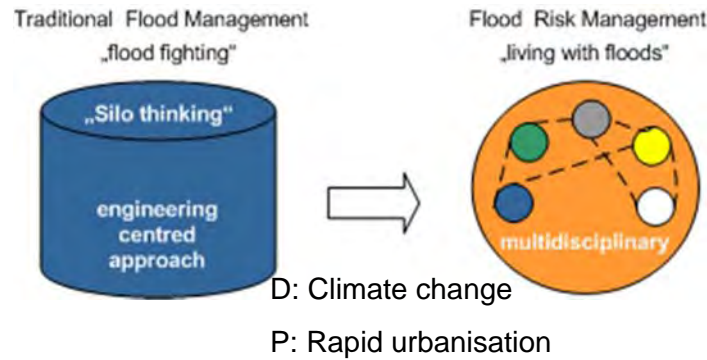
Hamburg, 15th, June, 2011



Contents



- Intro
- SAWA-HH Governance Approach
- Implementation of the governance approach in the SAWA Project at the Wandse Catchment Area, Germany
- Lessons learned so far and conclusions



How to involve stakeholders?

(Flood Directive, EC 2007/60)

1. *preliminary risk assessment*
2. *flood hazard and risk map*

3. *flood risk management plan (FRMP)*

Due – end of 2015

Governance is a process

Definition: *the process of decision-making and the process by which decisions are implemented (UN – Economic and social commission of Asia and the Pacific)*

- *It is about how authorities, institutions and social organizations interact with citizens when making decisions*

Good Governance

stands for

- *multifaceted decision making process where the societal goals are pursued with the interactions of all the interested actors in all specific fields of development*
- *and in which ethical and democratic issues are respected, such as responsibility, accountability, transparency, equity, and fairness*

What says the Flood Directive EC 2007/60

(Article 10 (1)) : Member States shall make available to the public the preliminary flood risk assessment, the flood hazard maps, the flood risk maps and the flood risk management plans.

(Article 10 (2)) : Member States shall encourage **active involvement** of interested parties in the production, review and updating of the flood risk management.

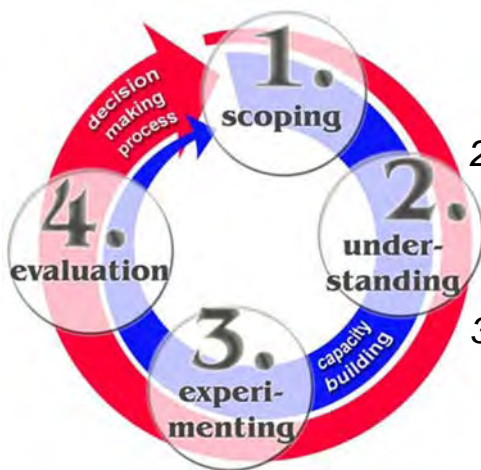
Open Question in the context of FRMP

What are efficient ways of public and stakeholder participation in the planning procedure?

What is the appropriate method to quantify the efficiency and effectiveness of the mitigation measures?

What are adaptations of the administrative and legal system necessary?

SAWA- HH, MARE Approach- Bottom up governance strategy for development of a Flood Risk Management Plan:



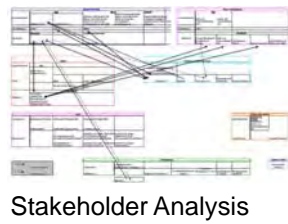
Adapted from Ashley
et al, 2008)

1. *Scoping- Selection of Members, Ties, Trust, Raising awareness, Drivers, Development of shared vision and assessment of the problem*
2. *Understanding&Envisioning – Toolbox of adaptation (NSM) measures, Development of shared vision of where to get to*
3. *Experimenting- Formulate options of adaptive flood risk management by NSM, Integrate them to scenarios of integrative planning*
4. *Evaluation- Evaluate effectiveness of responses, Evaluate conflicts and find ways of minimizing them, Consensus Finding*

1. Scoping



Social Competences



Stakeholder Analysis

2. Understanding & Envisioning



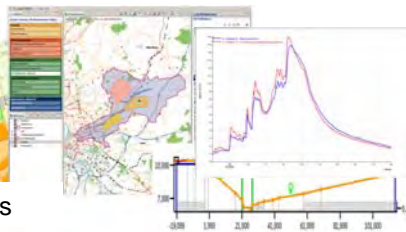
Understanding risk



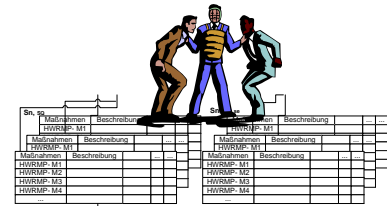
3. Experimenting



Developing planning options

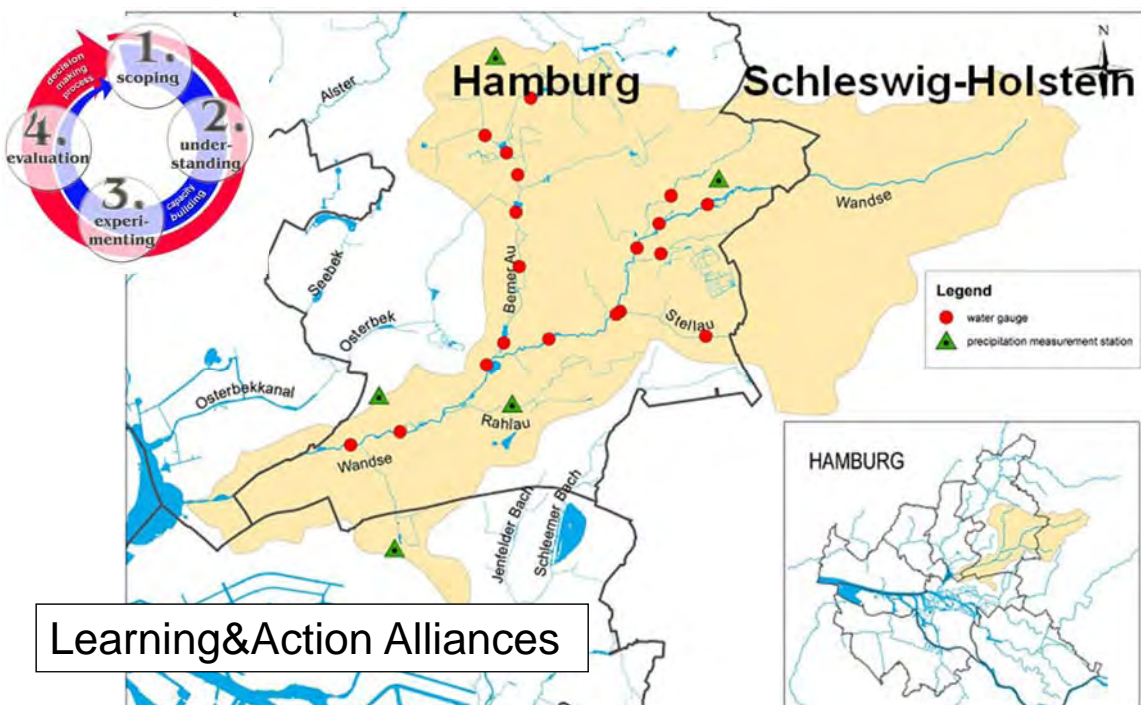


4. Evaluation



Flood Risk Management Plan

Wandse Catchment Area- Hamburg (~88 km², 21,5 km)



Learning&Action Alliances

→ Objective: development of a **flood risk management plan** (EU Flood Directive, 2007)

Upper catchment- nature protection area



mid catchment- mixed urban typology



(here: highly urbanised are of Rahlstedt centre)

Loower catchment- highly urbanised, industry



Leadership:

→ Formal leader: responsible authority LSBG (legitimacy- high)

Structure:

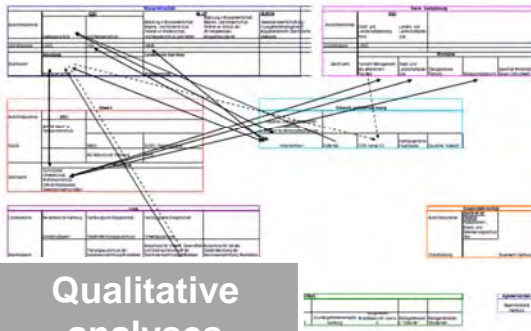
- **Kick of meeting (constitution)**
 - Increasing profile of the LAAs
 - Raising awareness among decision makers/ politicians
- **Series of workshops** (12-14 Working sessions), once a month/ 2months, 2 h each
 - Working sessions following the phases of the governance approach
 - Core part of the LAAs
- **One site visits**
 - Assessing the criticality of the system on site
 - Embedded into the phases of the governance approach
- **Online participation**
 - Scoping the expertise of the participants
 - Consensus finding process

1. Scoping:

- Stakeholder analysis (selection and characterisation of key stakeholder groups and their interactions)
- Building social competences
- Confronting with flood risk and raising awareness
- Understanding the system drivers and pressures, sensitivity, response

1

Methods:



Objective: Development of shared vision of the problem (Flood Risk)

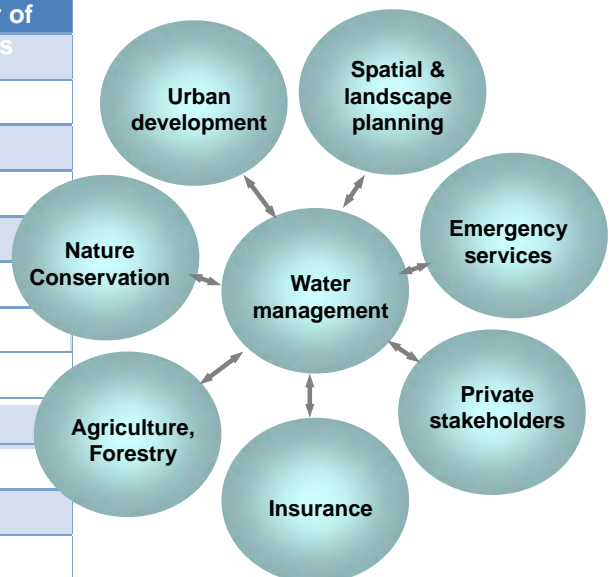
→ Stakeholder analysis

Method: snowballing, direct contacts

→ LAA configuration / per numbers of stakeholder groups

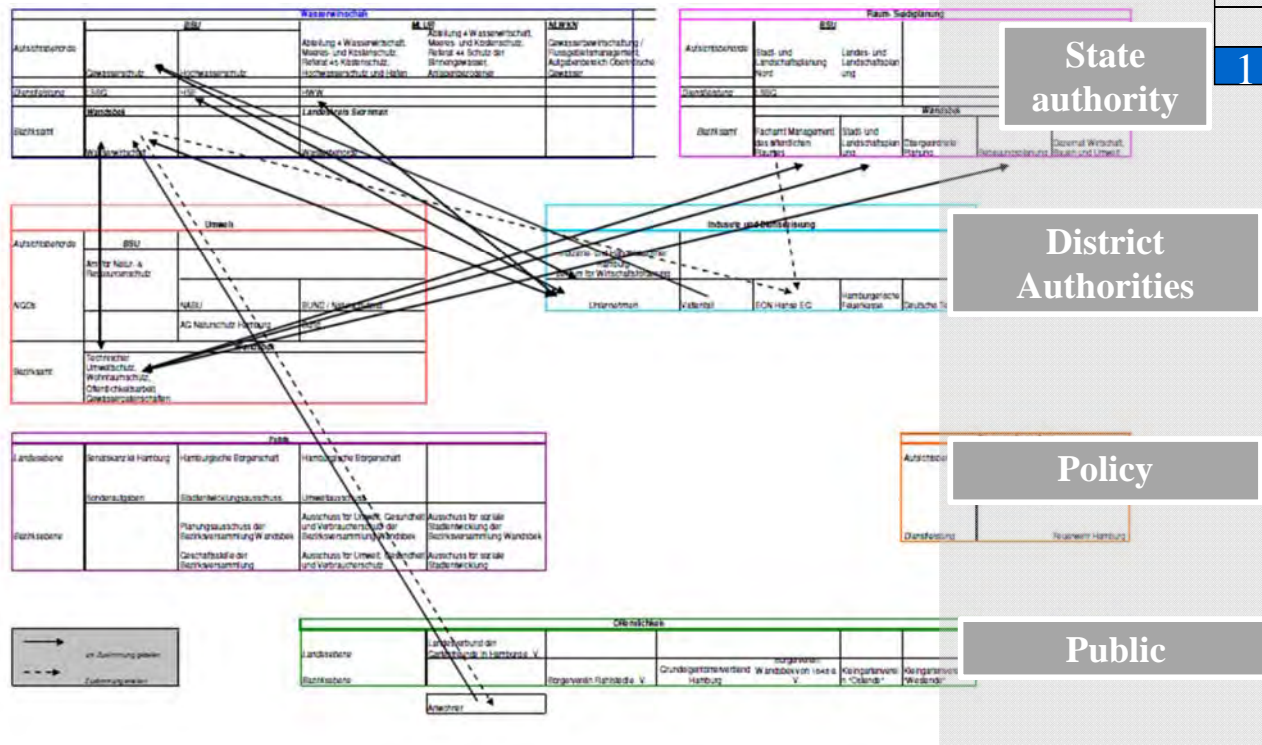
1

Categories of Stakeholders	Nr of Pts
Strategic flood and drainage management	4
Implementation and maintenance	3
Urban development	3
Agriculture	0
Public transportation infrastructure	0
Urban and landscape design	1
Environmental protection and nature conservation	1
Emergency services	1
Politicians	2
NGOs	2
Public interest groups	2
Economy and Industry	1
Research	4

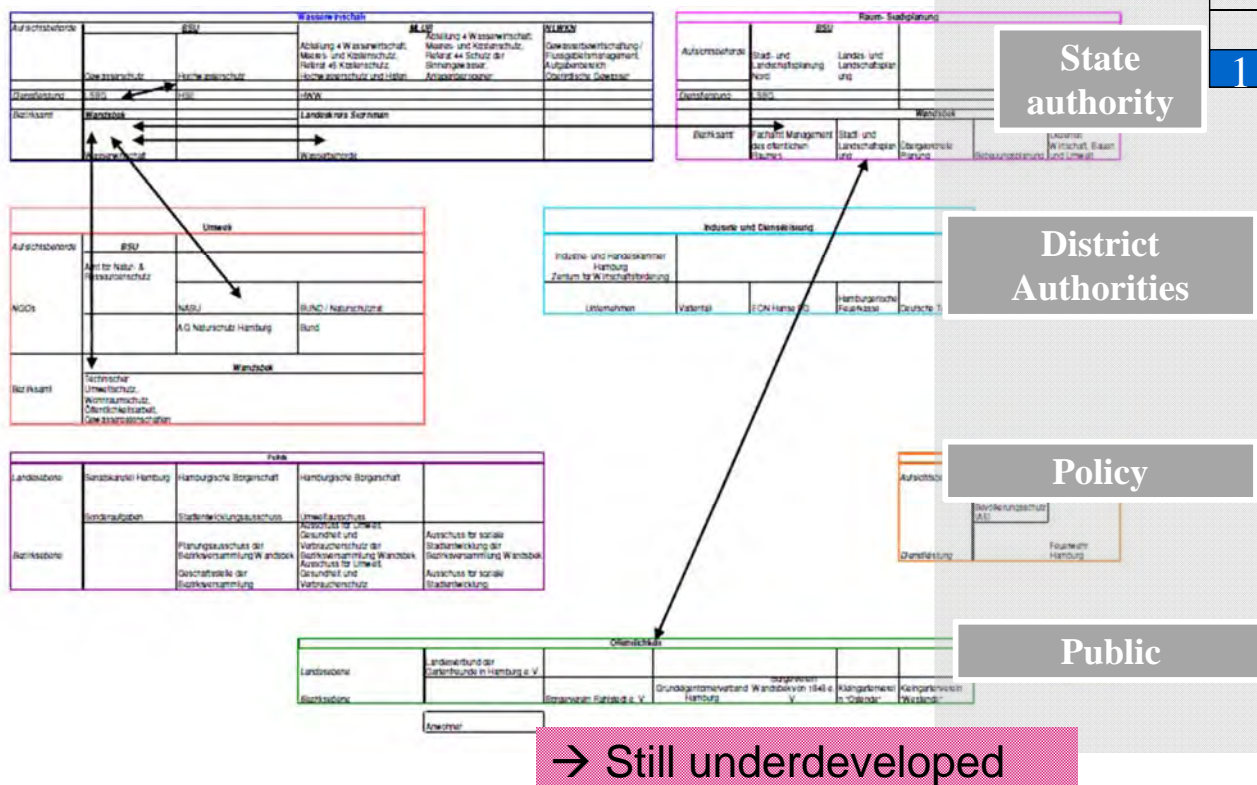


(source: LAWA, 2010)

Existing Links and Ties of LAA-members: Approval - Relationship



Existing Links and Ties of LAA-members: Participatory Planning



→ Still underdeveloped

→ Social Games – (Balloons and Colours)

→ Group work



1

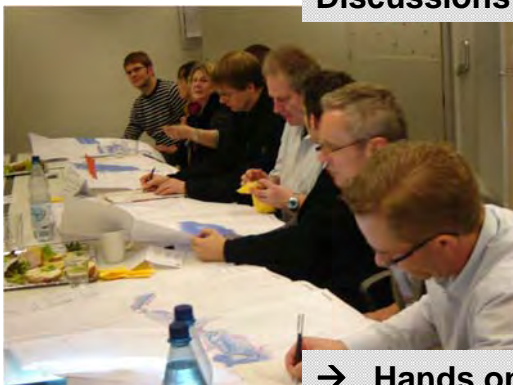
→ Flip Charts and Discussions



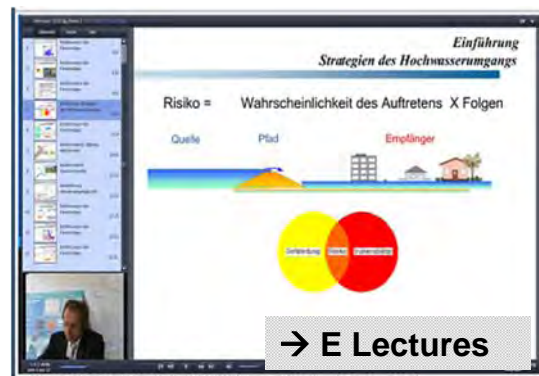
→ Learning Language of Risk



→ Lecture & Discussions



→ „Hands on“

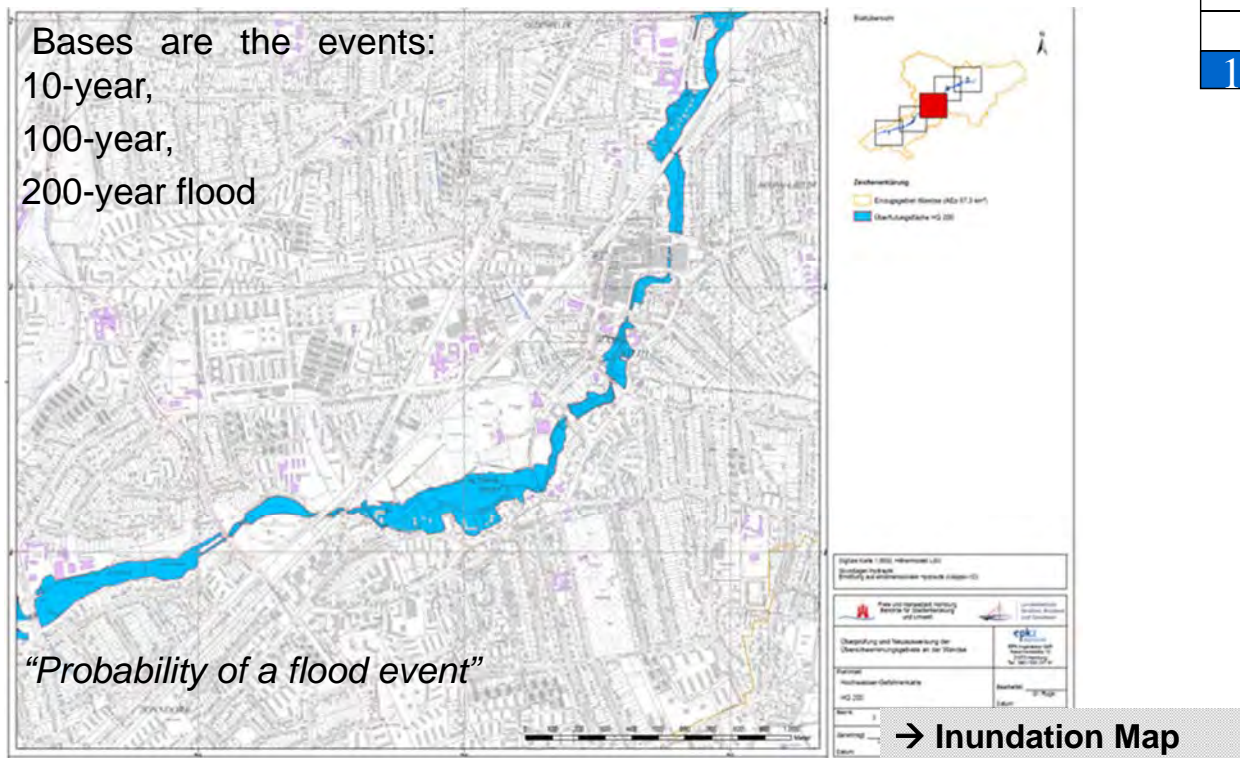


→ E Lectures

1

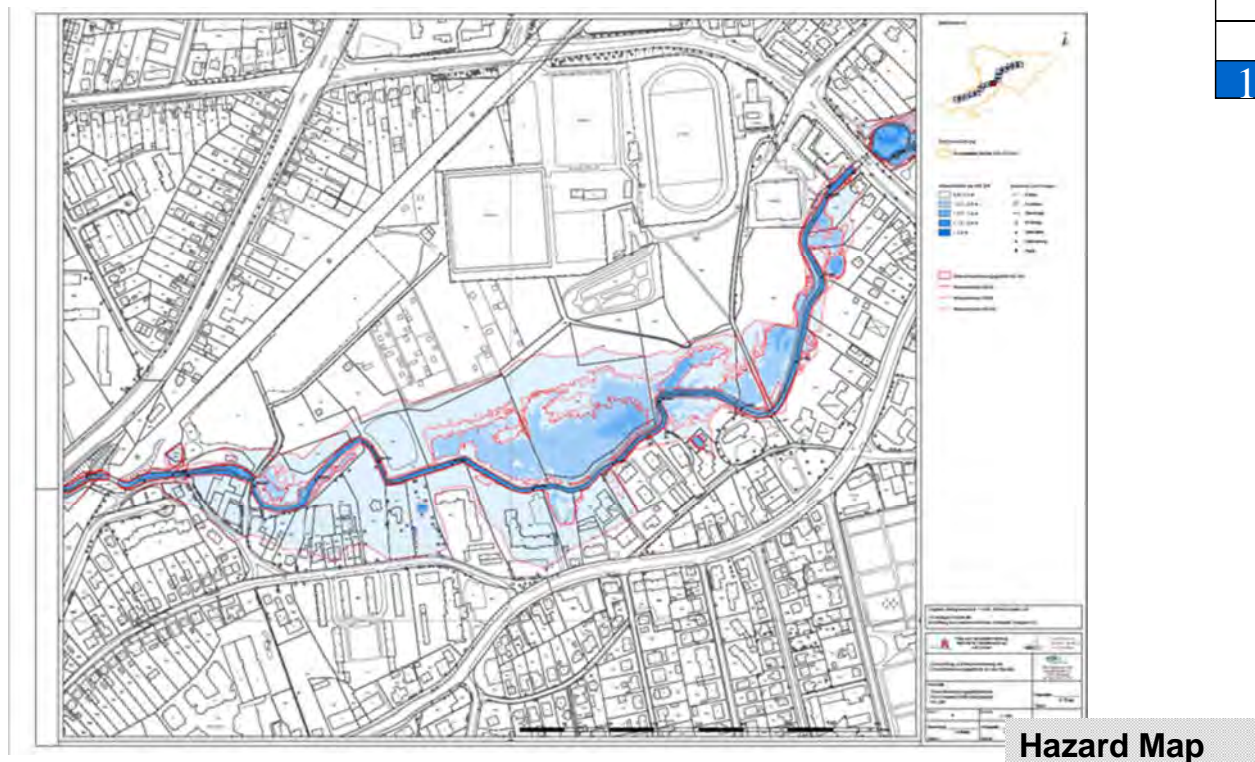
Risk analysis

Bases are the events:
10-year,
100-year,
200-year flood



1

→ Presentation of Flood Hazard Maps



1



→ Flood Animation Studio



Road show

“Risk is not only probability”

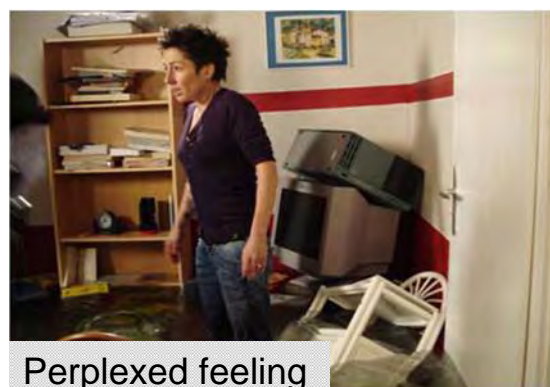
- Confronting stakeholders with the “real” situation of flood
- Demonstration of unstructured reactions in case of a flood event without previously undertaken protection measures



Flood Animation Box

Flood Cylinders

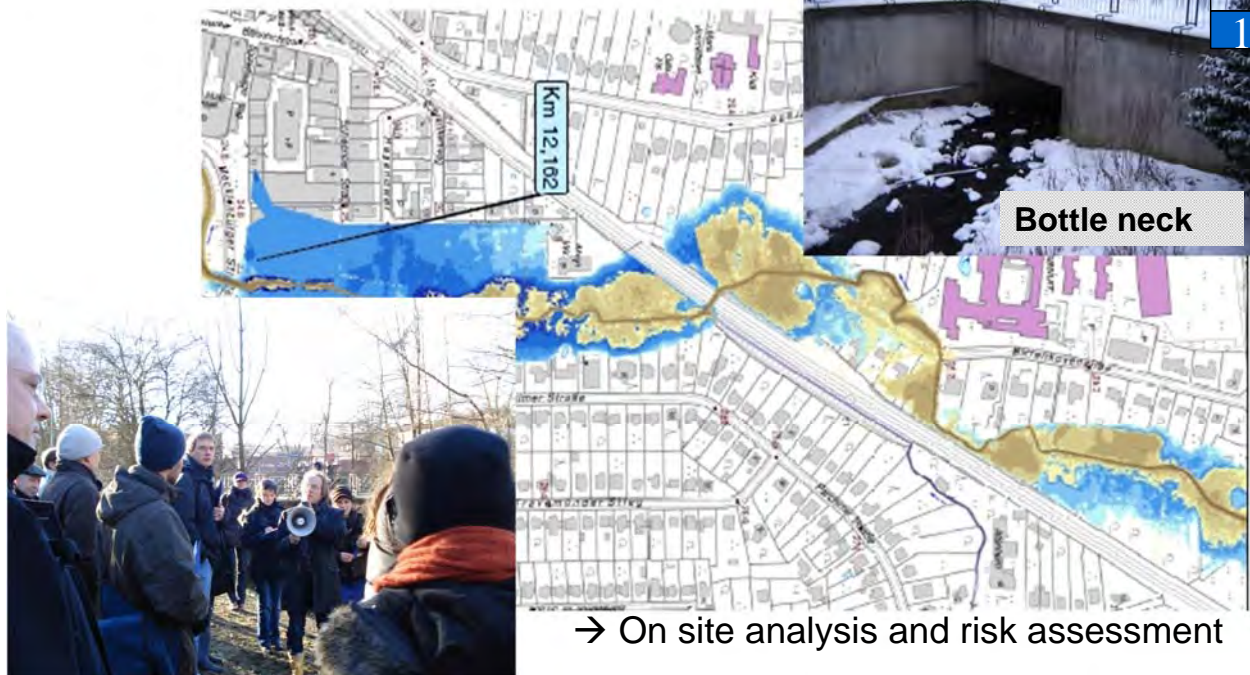
Multimedia& Flood Maps



Perplexed feeling

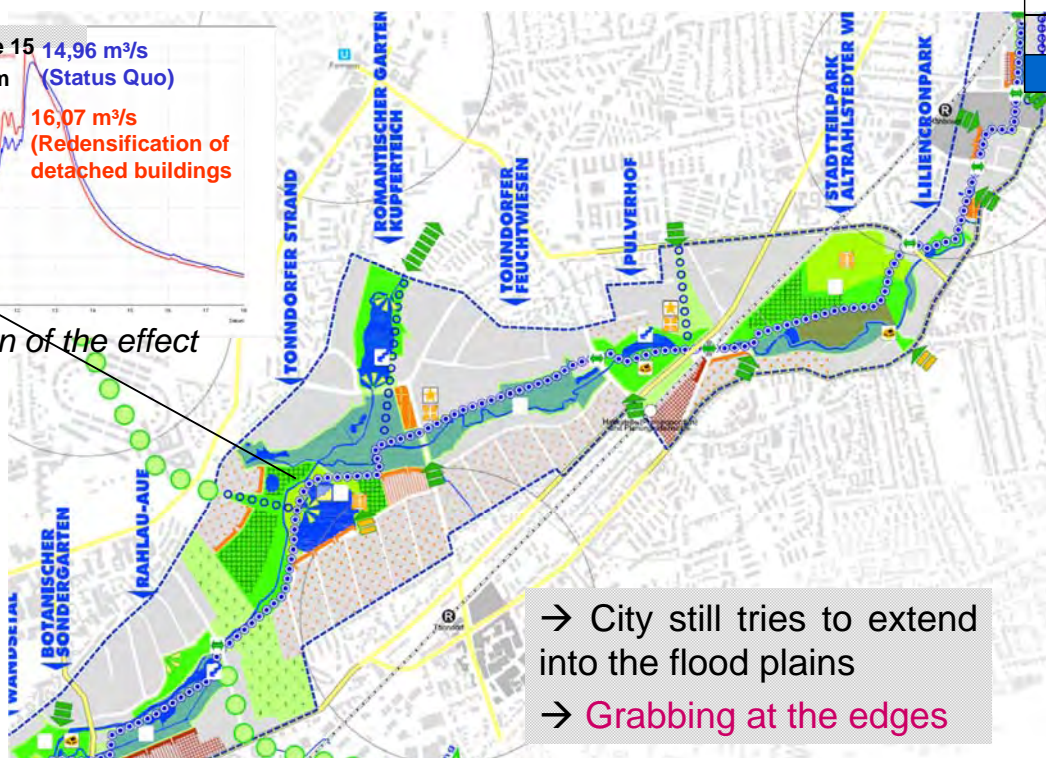
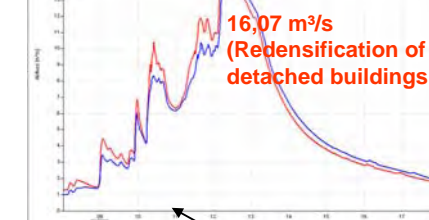


Understanding the sensitivity of the system:



→ Future projections: Urban Planning Projection

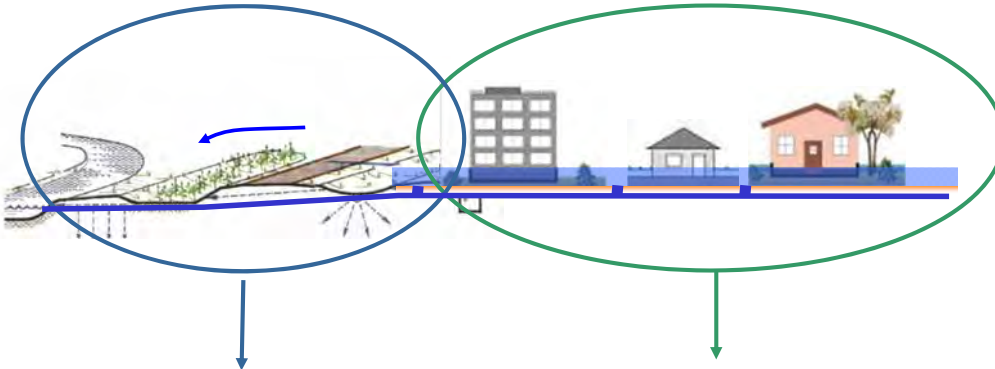
NA-Node: Wandse 15 14,96 m³/s
(Status Quo)
Station: 7.1680 Km



Risk= **probability**
Source/Pathway

X

consequence
Pathway/Receptor



Flood Probability Reduction Measures (FPRM)

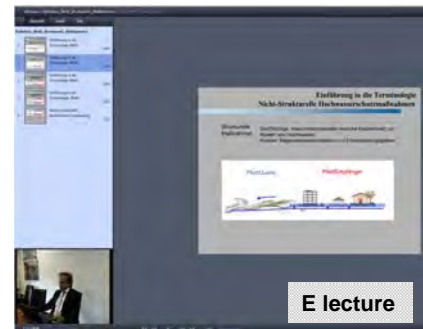
Flood Resilience Measures (FRm)



Lectures



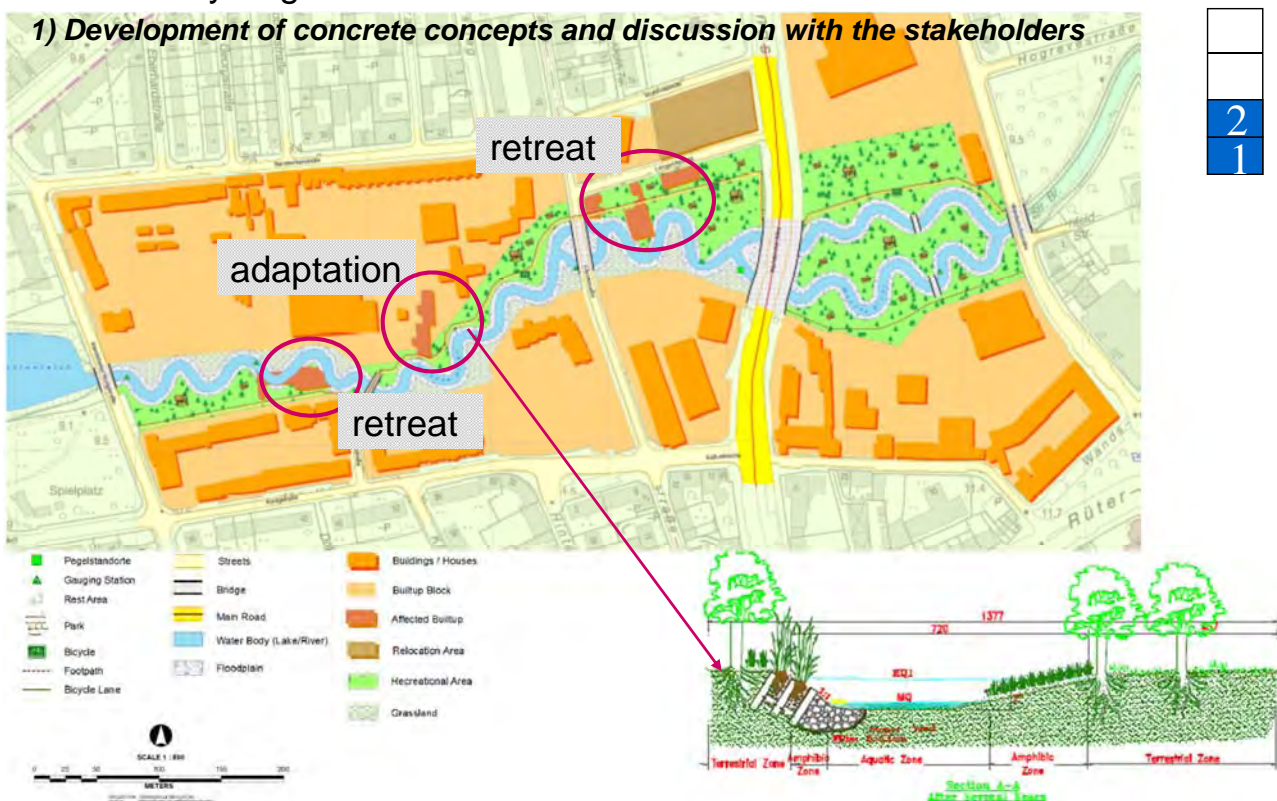
Group Work



E lecture

Conflicts/ synergies with the measures of WFD

1) Development of concrete concepts and discussion with the stakeholders



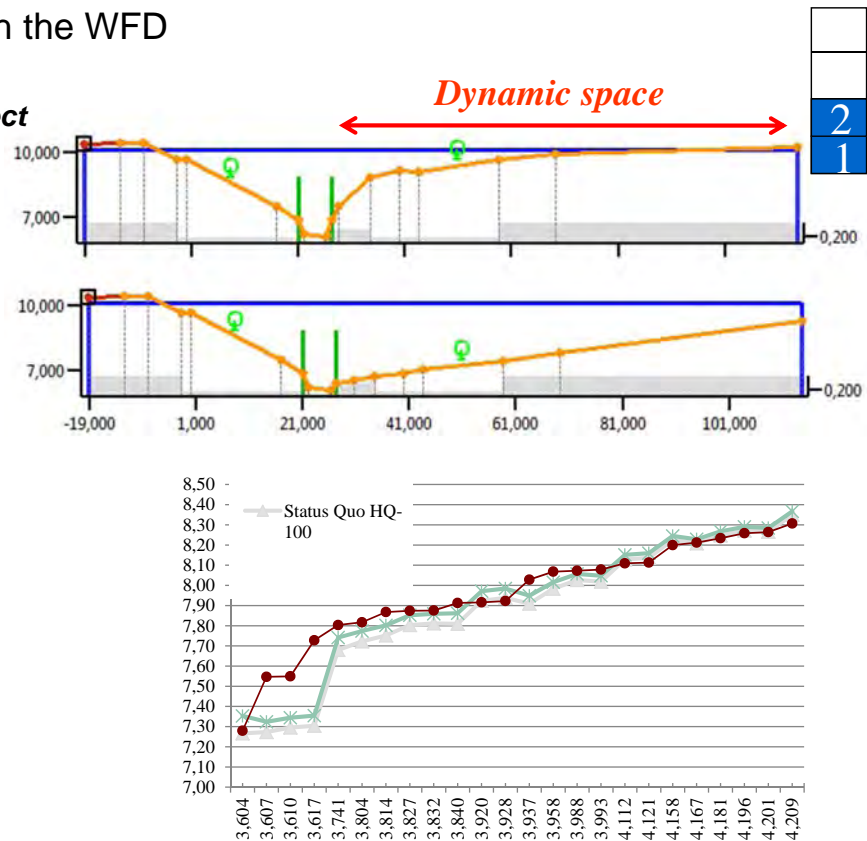
Conflicts/ synergies with the WFD

2) Quantification of the effect

Status Quo

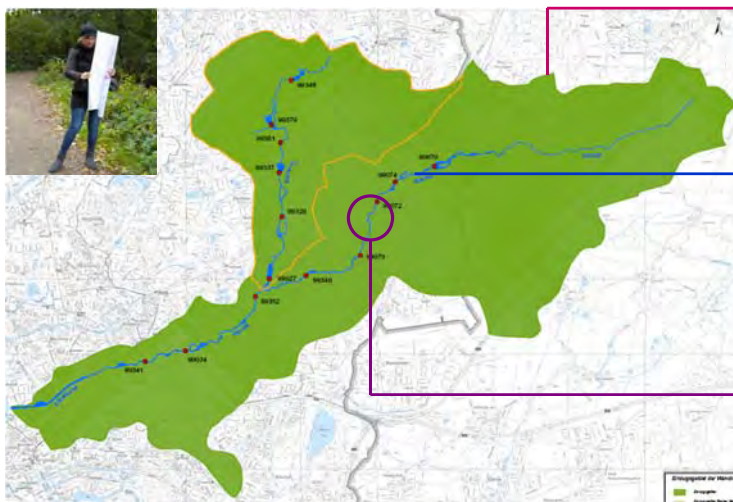
Natural Restoration

Hydraulic Proof
- energy gradeline



2
1

Towards Flood Risk Management Plan



Catchment

✓ Indication of flood prone area in the development plans

Water course

✓ Regular maintenance of the water course

Local scale



3
2
1

Developing FRMP- Options :

Option 1:

Sn, sq	Maßnahmen	Beschreibung	...
	HWRMP- M1		
	HWRMP- M1		
	HWRMP- M1		
	HWRMP- M1		
	HWRMP- M1		
	HWRMP- M1		
	HWRMP- M1		
	HWRMP- M1		
	HWRMP- M1		
	HWRMP- M1		



Option n:

Sn, kw, se	Maßnahmen	Beschreibung	...
	HWRMP- M1		
	HWRMP- M1		
	HWRMP- M1		
	HWRMP- M1		
	HWRMP- M1		
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	HWRMP- M1		
	HWRMP- M1		
	HWRMP- M1		
	HWRMP- M1		



Discussions

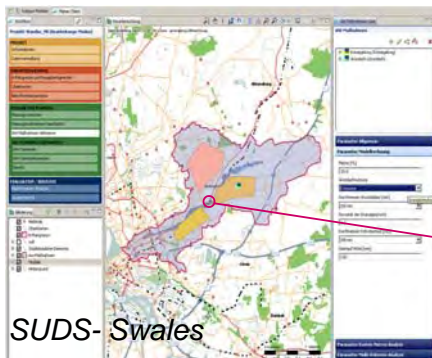


Online participation

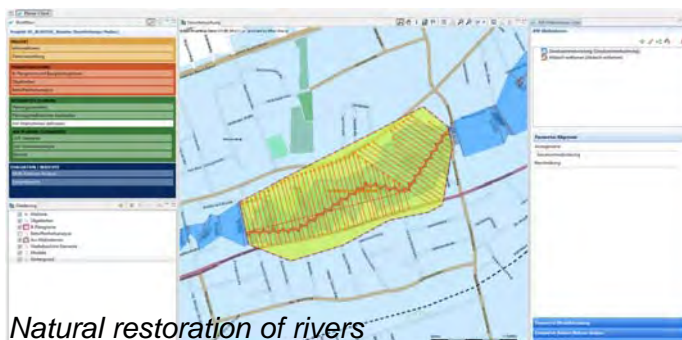
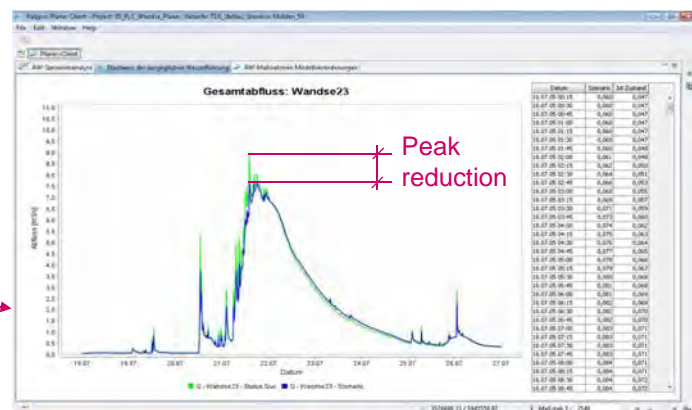
Implementation of the concept

Quantification of the effect:

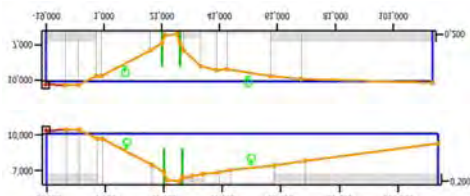
Kalypso Planer Client:



SUDS- Swales

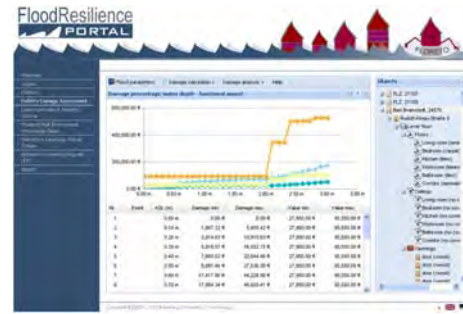
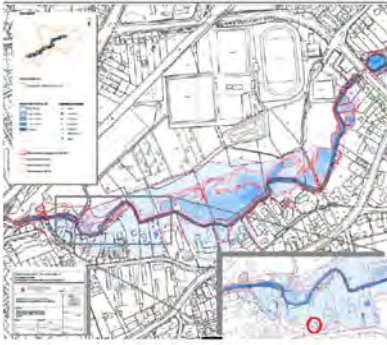


Natural restoration of rivers



Quantification of the effect:

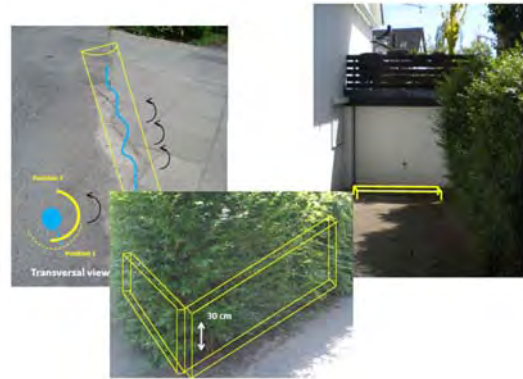
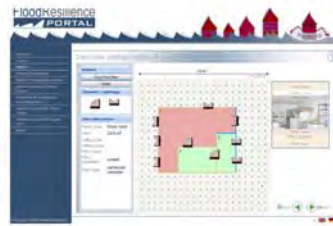
Kalypso FLORETO:



Damage assessment



Flood Resilience Measures



Analysed measures

→ The measures should be summarised and prioritised based on their:

- Efficiency in achieving the objective set by the Stakeholders before developing the FRMP
- Possibilities for implementation
- Cost effectiveness
- Synergies with other objectives (e.g. directives)

→ Responsibilities are to be set for all adopted measures and the time frame for their implementation given

→ Harmonisation with WFD important!

Consensus finding:



Conflict Matrix:

Categories of Stakeholders	Option1	Option n
Strategic flood and drainage management		
Implementation and maintenance		
Urban development		
Agriculture		
Public transportation infrastructure		
Urban and landscape design		
Environmental protection and nature conservation		
Emergency services		
Politicians		
NGOs		
Public interest groups		
Economy and Industry		
Research		



Flood Risk Management Plan

Handlungsbereich:	Empfohlene Maßnahmen:
Reduktion bestehender Risiken im Hochwasserrisikogebiet	
Natürlicher Wasserrückhalt	<ul style="list-style-type: none"> ✓ Gewässerrenaturierung (1.) ✓ SUDS-Mulden (2., 5. und 6.) ✓ SUDS-Gründächer (3. und 7.) ✓ SUDS-Entsiegelung (4.) ✓ Durchgängigkeit an der Mühlenstraße schaffen (8.) ✓ Vorlandabsenkung
Reduktion bestehender Risiken im Hochwasserrisikogebiet	
Technischer Hochwasserschutz	✓ Gewässerunterhaltung

Project status:

~ 2 years

Ziel Hochwasserrisikomanagement-Plan	
	Testen & Bewerten
	12. Sitzung – Entwicklung von Planungsvarianten des adaptiven Hochwasserrisikomanagements – 21. Juni 2011
	Problemösung & Experimentieren
	11. Sitzung – Entwicklung von Planungsvarianten des adaptiven Hochwasserrisikomanagements
	19. April 2011
	9 und 10. Sitzung – Diskussion über die Schutzszenarien des adaptiven Hochwasserrisikomanagements
	22. Februar 2011 und 09. März 2011
	8. Sitzung – Partizipation am Planungs- und Entscheidungsprozess
	08. Dezember 2010
	Verständnis & Wissensbildung
	7. Sitzung – Partizipation am Planungs- und Entscheidungsprozess
	20. Oktober 2010
	6. Sitzung - Nicht strukturelle Maßnahmen
	31. August 2010
	5. Sitzung - WRRL & HWRL Maßnahmen: Synergien
	22. Juni 2010
	Scoping
	4. Sitzung - Risikoerschätzung: Zukunftsentwicklung
	21. April 2010
	3. Sitzung - Feldbegehung: Aktuelles Risiko an der Wandse
	04. März 2010
	2. Sitzung - Risiko, Karten und deren Bedeutung
	19. Januar 2010
	1. Sitzung - Wir lernen uns kennen
	01. Dezember 2009
	LAA - Kickoff
	05. Oktober 2009
Start	

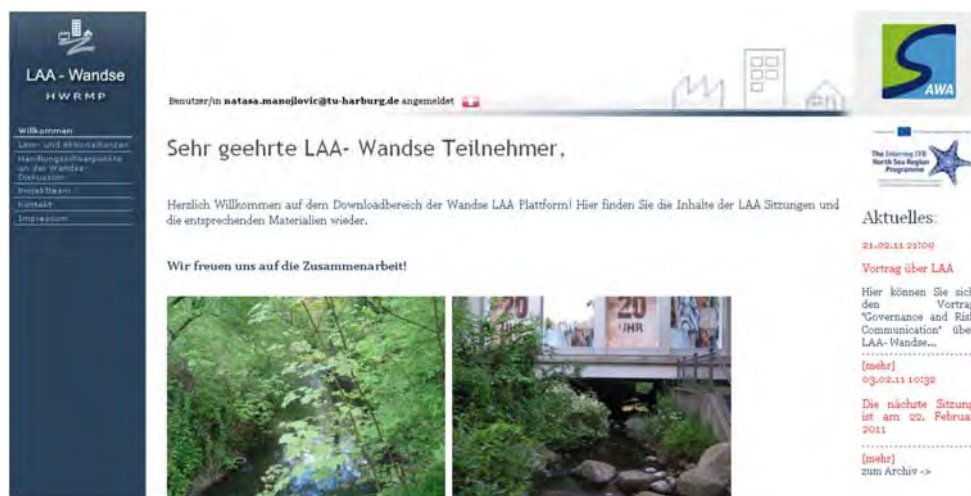
- Good understanding of the system is crucial (hazard and risk maps have to be available, drivers&pressures assessed)
- Delivering facts important (such as quantification of the effect of pressures&drivers, NSM)
- The sessions have to be inviting for participants especially in the initial phase
- Dare to try something new

Also:

- Time and resources intensive process
- Involves a range of tools and methods (social, hydrodynamic, learning) and needs interdisciplinary teams

Still resolving/ Open issues:

- How to include the issue of Climate Change into the planning?
- Workshops vs. Online participation
- How to manage the evaluation process?
- How to integrate the planning on the local level into FRMP of the river Elbe?



The screenshot shows the homepage of the LAA - Wandse HWRMP website. The header includes the AWA logo and the TUHH logo. The main content area features a welcome message in German, a list of links on the left, and a section titled 'Aktuelles' (Latest) on the right. The 'Aktuelles' section includes a date '23.02.11 10:30' and a link to a presentation 'Vortrag über LAA'. Below this, there is a date '03.02.11 10:30' and a link to the next session 'Die nächste Sitzung ist am 02. Februar 2011'. The bottom of the page has a link to the archive 'zum Archiv <-'. There are also two photographs of the Wandse river area.

<http://laa-wandse.wb.tu-harburg.de/>

Inventory of the best practices of Non Structural Measures

FPRM	Type of measure	Description	Scale
Sustainable Drainage Systems (SUDS)	Source Control		2
	green roofs	vegetated roofs that reduce the volume and rate of runoff and remove pollution	1
	rainwater re-use	involves the collection and storage of rainwater on site and its use as a substitute for mains water, for example in watering gardens or for flushing toilets	Allotment scale
	permeable pavements	through porous pavement rain water directly infiltrates into the subsoil. Here it can be stored in an underground reservoir before slowly percolating into deeper parts of the underground.	
	infiltration techniques		
	filter trenches	shallow, excavated trench filled with permeable material to create an underground reservoir	
	filter drains	similar to filter trenches through which a perforated pipe runs. This facilitates the storage, filtering and some infiltration of water passing from the source to the discharge point.	Allotment scale
	filter strips	vegetated areas of gently sloping ground designed to drain water evenly off impermeable areas and to filter out silt & other particulates	
	soakaways	sub-surface structures that infiltrate runoff	
	detention structures		
	swales	grassed depressions which lead surface water overland from the drained surface to a storage or discharge system may in combination with filter drains permit infiltration.	
	bioretention area	depressed landscaping area that is allowed to collect runoff so it percolates through the soil below the area into an underdrain, thereby promoting pollutant removal	
	detention basin	designed to hold back storm runoff for a few hours and to allow the settlement of solids. They are dry outside of storm periods. In combination with filter drains permit infiltration.	Intermediate
	ponds & wetlands	areas of permanent water, designed to accommodate considerable variations in water levels during storms, thereby enhancing flood-storage capacity. They can be fed by swales, filter drains or piped systems, and the use of inlet and outlet sumps will enhance performance by trapping silt and preventing clogging of the outlet.	

Flood Resilience Measures

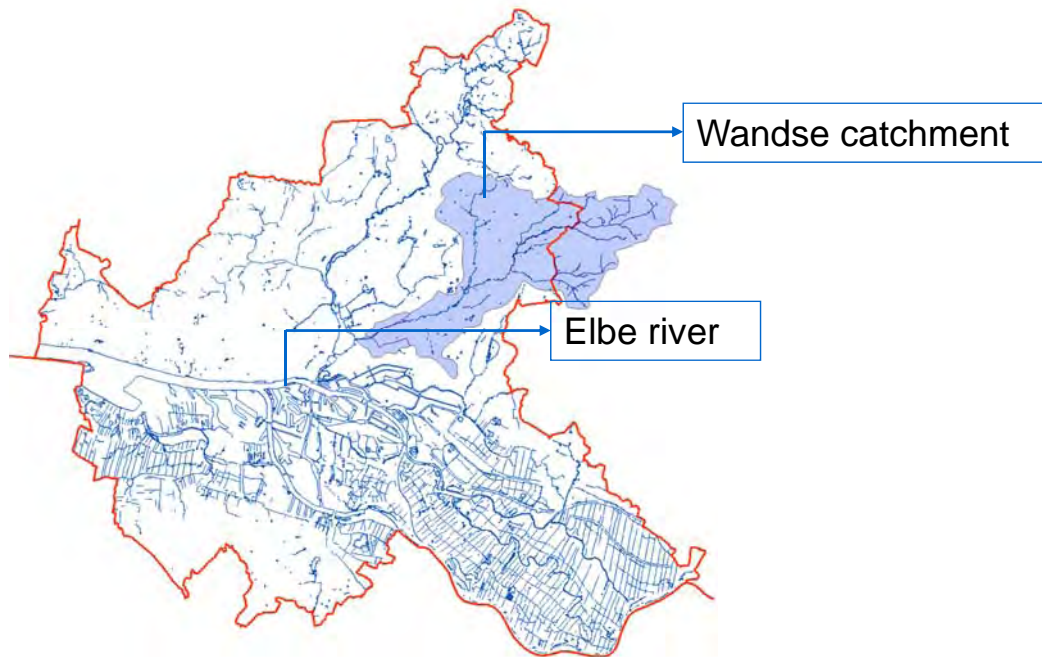
Integration of risk awareness, preparedness, hazard response and recovery to a safety chain - the 4A's (Ashley et al, 2007)

Not a fixed set of tangible measures but a process of transfer

Consequences for the engineer and how to implement this strategy?

FRM	Type of measure	NS Responses	Effect
Capacity building of human resources	Information		
	Inundation Maps		
	Flood Risk maps		
	Info material (brochures)	Emergent	Stakeholders perform effectively
A1: Awareness of flood risk	Education - Communication		
	Face-to-face learning		
	Web-based learning	Emergent	
	Training		
Land use control	Spatial Planning		
	Flood risk adapted land use		
	Building regulations	Emergent	Adaptation of land use to flood risk
	Building codes		
A2: Avoidance of the risk where possible	Zoning ordinances		
	Flood Resistant buildings		
	Wet-proofing	Emergent	Minimization of exposure
	Floatable buildings		
Flood preparedness	Dry-proofing		
	Cascading flood compartment		
	Erosion resistant dikes	Emergent	
	System of inner abatement lines		
A3: Alleviation of the effects of the flood	Financial Preparedness		
	Insurance of residual risk	Emergent	
	Reserve funds		
	Emergency Response:		
Contingency measures	Evacuation and rescue plans	Traditional	
	Hazard forc. & warning service		
	Control emergency operations	Traditional	
	Providence of emergency response staff	Traditional	Support of recovery
A4: Assistance in the event of difficulties	Emergency infrastructure		
	Allocation of temporary containment structures (dismountable flood barriers, sandbags, pumps)	Traditional	
	Telecommunications network		
	Transportat. & evacuation facilities		
	Recovery:		
	Disaster recovery plans	Emergent	

Planning level



Governance- Requirements

Objectives:	
Phase	Development of the shared vision of the problem
Scoping	<ul style="list-style-type: none"> → Stakeholder analysis (selection and characterisation of key stakeholder groups and their interactions) → Building social competences → Confronting with flood risk and raising awareness → Understanding the system drivers and pressures, sensitivity, response

Methods and Tools
<ul style="list-style-type: none"> → Guidance Document for Stakeholder Analysis → Concepts and Tools for raising of risk awareness → Social Learning methods → Methods and tools for quantification of effects caused by drivers&pressures → Methods and tool for assessment of the criticality of the system

Material
<ul style="list-style-type: none"> → Flood Hazard& Risk Maps → Projections of future development– Climate Change → Projections of future development- Urbanisation scenarios → On site assessment of the existing flood risk

Objectives:	
Phase	Development of the shared vision of where to get to
Understanding and Envisioning	<ul style="list-style-type: none"> → Inventory of the adaptive measures and their interactions with the existing plans (e.g WFD) → Knowledge acquisition through (active) learning
2	
1	

Methods and Tools
<ul style="list-style-type: none"> → Tools for quantification of the effect of the WFD Measures → Methods and tools for delivering knowledge

Material
<ul style="list-style-type: none"> → Inventory of the best practice of adaptive measures (NSM) → Existing plans in the area (e.g. Measures of WFD)

Objectives:	
Phase	Development of options for FRMP
Experimenting	<ul style="list-style-type: none"> → Development of a toolbox of possible measures for flood risk mitigation for the studied area → Development of alternatives by combining the single measures into strategies considering and weighting interests of different stakeholder groups → Quantification of their efficiency
3	
2	
1	

Methods and Tools
<ul style="list-style-type: none"> → Decision support tools for quantification of the effect of NSM

Material
<ul style="list-style-type: none"> → Maps with all focus areas where the action is needed

Objectives:	
Phase	Development of options for FRMP
Testing & Evaluation	→ Identification and discussion on conflicts caused by different interests of stakeholder groups in the Wandse catchment
	→ Iterative improvement of the final concept to its final state

Methods and Tools
→ Development of Assessment Matrix for MCA
→ Methods & Tools for participation in the assessment of conflicts

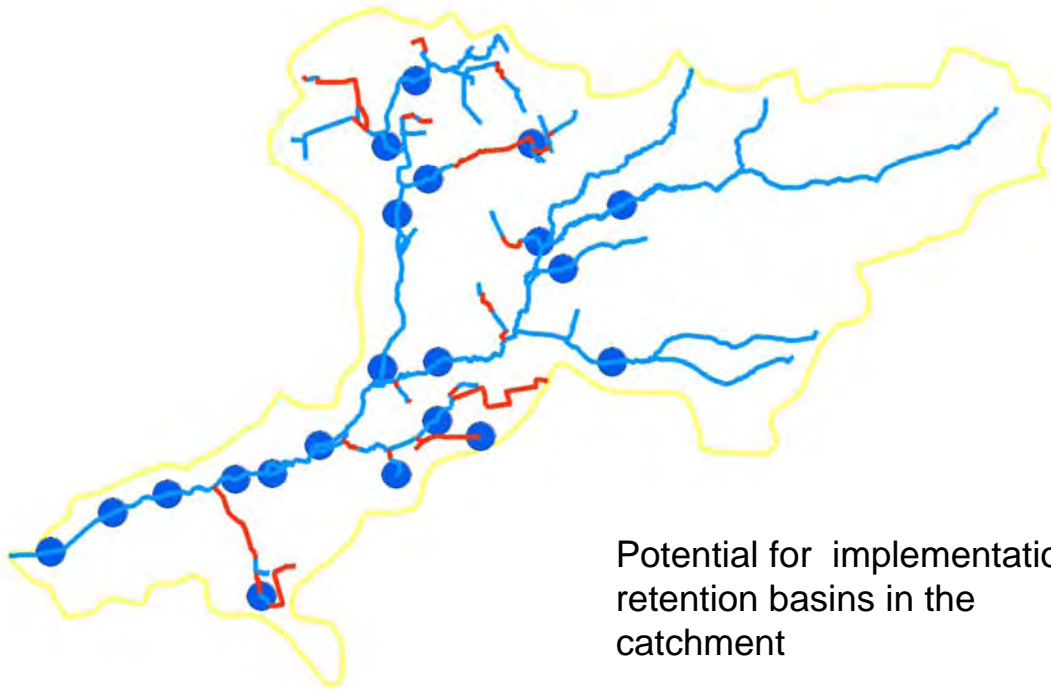
Material
→ Different options of FRMP

The governance process in sustainable flood management faces the main problems summarised as:

- (1) *ambiguities of goals,*
 - (2) *unclear means and guidelines to achieve them and*
 - (3) *lack or distributed power to carry out the governance process*
- (Newig, 2008),*

Catchment level

3
2
1



Potential for implementation of retention basins in the catchment

“Experimenting”: Towards Flood Risk Management Plan

3
2
1

1) Maps (spatial distribution of suggested measures)



2) Tables with measures and descriptions (e.g. responsibilities)

Handlungsbereich:	Empfohlene Maßnahmen:
Reduktion bestehender Risiken im Hochwasserrisikogebiet	
Natürlicher Wasserrückhalt	<ul style="list-style-type: none"> ✓ Gewässerrenaturierung (1.) ✓ SUDS-Mulden (2., 5. und 6.) ✓ SUDS-Gründächer (3. und 7.) ✓ SUDS-Entsiegelung (4.) ✓ Durchgängigkeit an der Mühlenstraße schaffen (8.) ✓ Vorlandabsenkung
Reduktion bestehender Risiken im Hochwasserrisikogebiet	
Technischer Hochwasserschutz	<ul style="list-style-type: none"> ✓ Gewässerunterhaltung

- Good understanding of the system is crucial (hazard and risk maps have to be available, drivers&pressures assessed)
- Delivering facts important (such as quantification of the effect of pressures&drivers, NSM)
- The sessions have to be inviting for participants especially in the initial phase
- Dare to try something new

But:

- Time and resources intensive process
- Involves a range of tools and methods (social, hydrodynamic, learning) and needs interdisciplinary teams

Still resolving:

- How to include the issue of Climate Change into the planning?
- Workshops vs. Online participation
- How to manage the evaluation process? Who is conducting it?

Legacy of the LAA

Climate Adaptation Masteplan ?

- Good understanding of the system is crucial (hazard and risk maps have to be available, drivers&pressures assessed)
- Delivering facts important (such as quantification of the effect of pressures&drivers, NSM)
- The sessions have to be inviting for participants especially in the initial phase
- Dare to try something new

Also:

- Time and resources intensive process
- Involves a range of tools and methods (social, hydrodynamic, learning) and needs interdisciplinary teams

Still resolving:

- How to include the issue of Climate Change into the planning?
- Workshops vs. Online participation
- How detailed we should get when developing FRMP?
- How to manage the evaluation process? Who is conducting it?

Keeping in mind:

- Governance in flood risk management planning is still an emergence, the presented SAWA/MARE approach is a pilot study