

Case studies

Title: “Fränkische Saale”: Investigation of climate change impacts and adequate adaptation measures							
Keywords: Flood protection plan; climate change; climate change factors; damage potential calculation; cost-benefit analysis; communication strategy							
Audience: Environment agencies; regional and local water managers and flood risk management professionals.							
Messages in the ESPACE strategy to which the case study applies:	1. X	2.	3. X	4. X	5.	6.X	7. X
	8. X	9.	10.X	11. X	12.	13.	14. X
Sentences linking the case study to relevant strategy messages:							
<p>1. The case study of “Fränkische Saale” shows how to integrate climate change related issues into river catchment related spatial planning, making adaptation a core objective.</p> <p>3. The aims of the 3A’s and the 4th A – Action and Reflection - are realised in the communication process used by LfU in the Fränkische Saale case study, especially in the stakeholder dialogues; risk management is an important part of the case study.</p> <p>4. Various representatives and organisations involved in spatial planning (e.g. water management agency, local authorities, etc.) worked together on the Fränkische Saale case study, supplemented by stakeholder dialogues.</p> <p>6. Complex models and calculations were used in the Fränkische Saale case study to evaluate all kinds of vulnerabilities and adaptation options, which were then communicated to spatial planners at local and regional level.</p> <p>7. Damage potential calculations are a key part of cost-benefit analyses and risk assessment in the river catchment for the Fränkische Saale case study.</p> <p>8. Cost-benefit analyses in the Fränkische Saale case study provide reliable information for decision making on a high rational level.</p> <p>10. Information on the impacts of climate change, acceptable practical adaptation measures and on residual risks in the Fränkische Saale case study has been delivered to communities and the private sector (e.g. stakeholder dialogues and a web-based information platform).</p> <p>11. Maps of vulnerable areas provide the basis for sustainable spatial planning in the Fränkische Saale case study.</p> <p>14. The Fränkische Saale case study enables the revision of the HAP (flood action plan) for the river Main taking climate change into account.</p>							



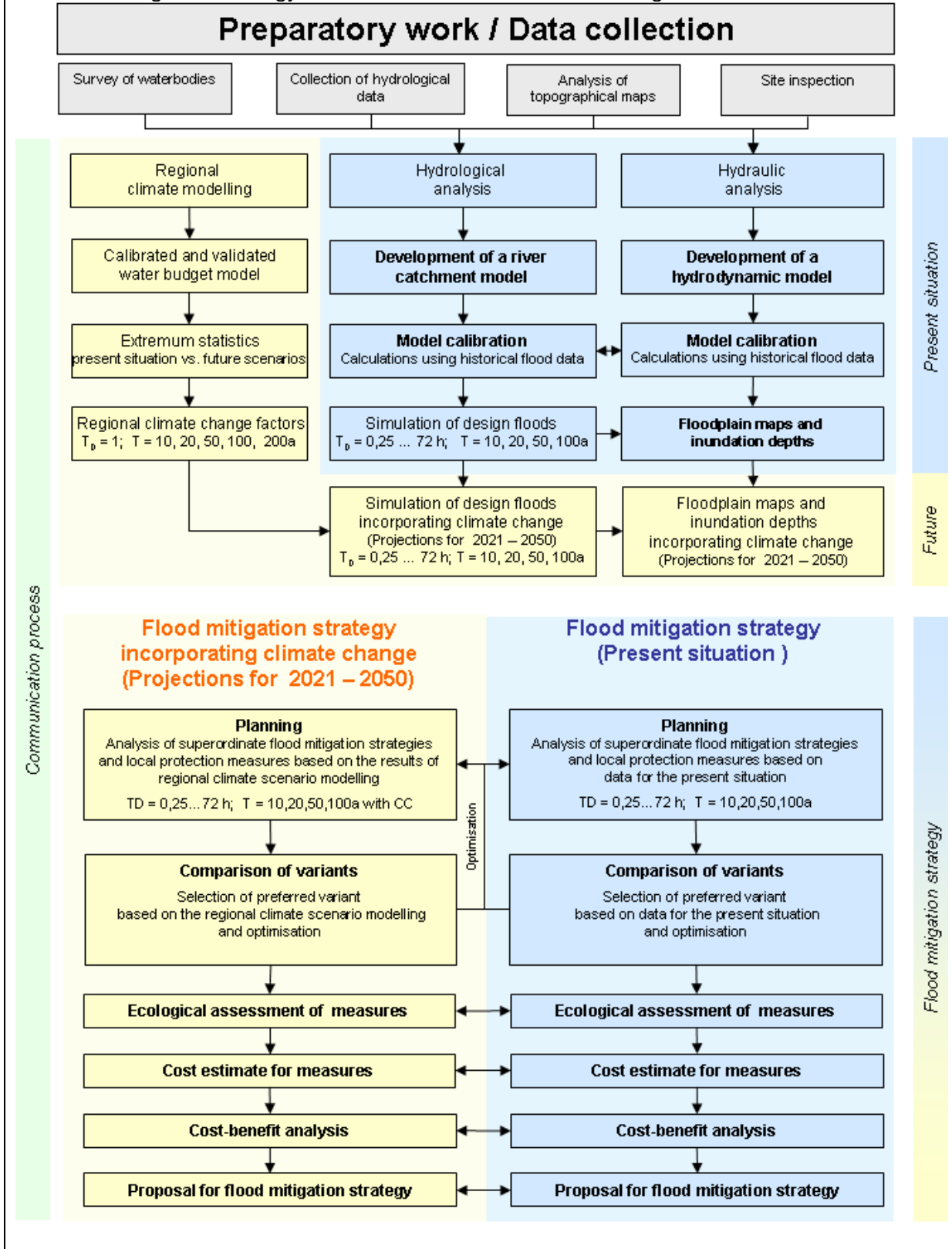
<p>Elements of 'Guidance' to which the case study applies:</p> <p>The complete LfU guidance was developed and put into practice in the frame of the case study Fränkische Saale. Therefore all elements of the guidance apply to the case study.</p>	<p>'Tool' to which the case study applies:</p> <p>All tools which are described in Tools ("Tools for modelling the impacts of climate change and the consequences on the economy") were put into practice and tested in the frame of the case study Fränkische Saale.</p>
<p>Overview:</p> <p>The case study "Fränkische Saale" - Planning today for the climate of tomorrow: Investigation of climate change impacts and adaptation measures against increasing floods. For the catchment of the river Fränkische Saale all of the LfU policies, guidance and tools were applied: Regional climate modelling, water balance modelling, extreme value statistics, hydraulic calculation, estimation of climatic factors, cost-benefit calculation and analysis of alternative measurements. In addition, communication instruments were developed and used in stakeholder dialogues to raise awareness and change behaviour.</p> <p>This is the first pilot project in Germany aimed at developing a new approach for planning and decision making taking climate change into account.</p>	
<p>Photo/diagram/map:</p>  <p>Figure 1: One of 274 flood maps for the area of the case study The darker the blue, the higher the probability of flooding.</p>	 <p>Figure 2: The first stakeholder meeting in Bad Kissingen resulted in strong public interest</p>

Diagram 3 Flow chart of the concept for planning process in the case study – Development of a flood mitigation strategy both with and without climate change.



Description:

Within the river basin of the Fränkische Saale, many people still remember the extreme damage caused by the winter flood in 2003 and expected an improvement in flood protection.

In addition, today's climate researchers predict increasing severe flood events as a consequence of climate change. This is also indicated by the studies carried out for the Main River basin. The ESPACE activities in the River Main basin, especially the work done in the river basin of the Fränkische Saale, show the way towards dealing with this alarming development.

To improve flood protection within the Fränkische Saale river basin, the local water management agency at Bad Kissingen has been examining various planning and design options, e.g. the building of retention reservoirs. The effects of climate change were taken into account within the scope of the ESPACE project. Against this background, the Bavarian Environment Agency (LfU) has been analysing the climate change impacts on water resources in the case study area according to the approach which is described in the LfU guidance using the specific tools.

Within the project, a regional climate model, a water balance model, extreme value statistics and hydraulic calculations were combined to enable the description of the anticipated influence of climate change on the land use, infrastructure and private property in the river basin of the Fränkische Saale, focusing on the quantification of climate change effects on the water basin level. This holistic strategy considers:

- the physical impacts
- the social impacts and
- the economic impacts.

As a result, regional flood maps with high resolution show the increasing flood risk as a consequence of climate change. They also build the basis for the analysis of concrete protection measurements, backed up by cost-benefit calculations of the different options.

Raising Awareness, Decision Support System and self-precaution measures: Those who are well-informed can support measurements and protect themselves better

Future floods will occur more frequently and be more severe. Therefore, it makes sense to adapt to the new situation today and take precautions. This does not only apply to the government and local authorities, but to each and every individual.

Individuals can only make specific, purposeful provisions if they know what the potential flood risk is. To this end, the website "Climate Change and flood protection" provides the necessary information for the area of the Fränkische Saale: www.klimaprojekt-espace.bayern.de. It explains important facts about climate change and the flood situation and describes the planned protective measures. Maps showing flood areas and flood depths based on new climate change related calculations help to make better flood risk assessments possible.

Communication strategy and public action

In general, the focus of the Bavarian Environment Agency's communication strategy was the communication process with stakeholders, especially through:

- Implementation of a website offering (detailed spatial) flood protection information

and possible precautionary measures. This includes maps of inundation areas in the catchment of the Fränkische Saale, at a scale between 1:2,500 and 1:5,000

- Information meetings with the stakeholders in the case study area Fränkische Saale delivered information about costs and benefits of measurements.

Final remark

How can societies adapt to the consequences of global change? This question is gaining importance both at EU level and at global level given the alarming trends that are being observed. The Bavarian participation based on the case study “Fränkische Saale” tries to give the analytical basis for the answer to this critical question in the field of flood protection. Within the national context, this project analyses the challenges that climate change poses to flood water management in the southern part of Germany.

The case study “Fränkische Saale” is an ideal example of how to deal with the challenges of climate change and how to develop comprehensive options and strategies in a transnational context. It was greatly enriched by the transnational cooperation within the ESPACE project.

<p>Author:</p> <p>Belau, Morscheid, Schmidtke Bavarian Environment Agency (LfU)</p>	<p>Further information:</p> <ul style="list-style-type: none"> • „Hochwasserschutzplanung und Klimawandel: Die Fallstudie Fränkische Saale im Rahmen des EU-Vorhabens ESPACE“ (Flood mitigation planning and climate change: The case study „Fränkische Saale“ in the framework of the EU-Project ESPACE) Kleinhans, 2006 • Das EU-Projekt ESPACE: Berücksichtigung des Klimawandels in der flussgebietsbezogenen Planung (The EU-Project ESPACE, taking climate change into account in river catchment based planning) Belau, Kleinhans, Weber, 2006 • „Documentation of the first stakeholder dialog in Bad Kissingen“ Neumann, Belau, February 2006 • „Modellierung des Wasserhaushalts des Mittleren und Unteren Mains mit Focus Fränkische Saale“ (water budget model for the river basin lower Main with focus on the Fränkische Saale) Consultant Willems, October 2005 • „NA-Simulation der Fränkischen Saale unter Berücksichtigung von klimaänderungsbedingten Variationen
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	<p>des KOSTRA- Bemessungsniederschlags“ (Precipitation-discharge simulation of the Fränkische Saale taking into account climate change related variations of the KOSTRA-design-precipitation) Consultant Hydrotec and LfU, December 2005</p> <ul style="list-style-type: none">• “Ergänzung Schadenspotentialermittlung Fränkische Saale” (Supplementary document on the determination of damage potential in for the river “Fränkische Saale”) Consultant Hydrotec and LfU, March 2007• Climate Change and Floods in Bavaria exemplified by the case-study Fränkische Saale – a short overview, Belau, Korck, April 2007
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