

## Example plans and policies

<p><b>Title:</b>  <b>Bavarian policies for integrating climate change in water management with a focus on flood protection</b></p>							
<p><b>Keywords:</b>  Climate change; Catchment Flood Management Plan; river floods; natural flood retention; infrastructural flood protection; precautionary flood protection</p>							
<p><b>Governance level:</b>  National; regional; local</p>							
<p><b>Messages in the ESPACE strategy to which the plan or policy applies:</b></p>	1. X	2.	3. X	4. X	5.	6.	7. X
	8. X	9. X	10. X	11. X	12.	13. X	14.
<p><b>Sentences linking the plan/policy to relevant strategy messages:</b></p> <p>1. The Bavarian policies developed by LfU contains risk management processes in sustainability appraisals and strategic environmental assessments which can be implemented in Flood Management Plans at a regional level (e.g. flood action plan “HAP” for the river Main).</p> <p>3. The Bavarian policies developed by LfU supports change management processes and risk management processes as a core part of flood management.</p> <p>4. The Bavarian policies developed by LfU demonstrates that, within the planning and decision making process, several organisations must work effectively together.</p> <p>7. Defining increasing vulnerabilities and options for adaptation measures are the main aims of the strategy developed by LfU.</p> <p>8. The Bavarian policies developed by LfU is a highly efficient tool to select optimised measures following a multi-objective approach including the three components of sustainability.</p> <p>9. In the Bavarian policies developed by LfU the level of adaptation is determined by climate change factors.</p> <p>10. The Bavarian policies developed by LfU enables a reliable definition of the limits of infrastructural flood protection taking climate change into account and the self protection measures that should be undertaken by the private sector.</p> <p>11. The system in the Bavarian policies developed by LfU enables the development of long-term solutions by giving concrete decision support on the basis of cost-benefit analyses and shows clearly vulnerable areas and assets on a mapped basis (80 year planning horizon).</p>							

13. The guidance in the Bavarian policies developed by LfU supports political decisions and strategic measures with long lasting influence and is therefore based on the principle of precaution and not on responses to extreme events that have been experienced.

**Overview:** Within the policies and plans for Bavaria the aspects of climate change impacts have not been considered adequately until the beginning of the ESPACE project. The Bavarian Water Resources Administration has worked to develop the concept of how to integrate climate change related issues into Bavarian policies and plans. The Bavarian Environment Agency (LfU) approach has a special focus on the quantification of climate change effects at the river basin level.

**Description/Example policies:**

In Germany, spatial planning is the responsibility of the German Länder (states). At the top, there is the State Development Programme (Landesentwicklungsprogramm LEP) followed by the regional plans for the 19 planning areas in Bavaria. The guiding principle of these plans is the development and preservation of equal and healthy living and working conditions in all parts of the state. Within this context, the implementation of the principle of sustainability at the regional level is done by the regional plans (RP), which concretise the fundamentals of the LEP focussed on the respective region and take into account the regional requirements, interests and particularities for the regions in Bavaria.

Regional Plans (Regionalpläne) and the LEP should be regarded as a single entity when it comes to sustainable regional development in Bavaria.

The two plans mentioned above are the basis for all sectoral planning (masterplans). In water resources management there are additional strategic programmes and river catchment plans. One important part of these plans is flood protection which is developed and executed in flood management plans (Hochwasseraktionspläne). This fulfils in advance the requirements of the new EU Floods Directive.

In general, the fundamental strategy for these plans in Bavaria is the Integrated Flood Risk Management approach (3 pillar strategy). The underlying principle is to take into account all feasible options concerning:

- 1) natural retention within the river catchment and the valleys
- 2) infrastructural flood protection (structural and non-structural measures)
- 3) additional precautionary measures by the affected groups and people.

Within the policies and plans mentioned above the aspects of climate change impacts have not been considered adequately until now. Against this background, the Bavarian Water Resources Administration has taken the opportunity to develop a concept for how to integrate climate change related issues into these policies and plans in the frame of ESPACE. As ESPACE is a project within the Interreg IIIB NWE programme, the Bavarian activities are focussed on the Main River catchment (17,500 km<sup>2</sup>) which is a tributary of the Rhine River.

For the Main River a flood action plan (HAP Main) exists. However the Main River HAP does not incorporate climate change aspects. One of the most important objectives in ESPACE was to develop and provide climate change related information so that it is now possible to revise the HAP-Main and make it climate change proof. Against this background, the Bavarian Environment Agency (LfU) focuses especially 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.

Providing this information to the affected people, decision makers and other stakeholders is a main prerequisite for raising awareness concerning adaptation to climate change. Besides implementing climate change in strategic plans it was another main interest to do this on the operational level. For this purpose, the sub-catchment of the Main, the catchment of the River “Fränkische Saale” (2,765 km<sup>2</sup>) was chosen for a case study. This is the first pilot project in Germany aimed at developing a new approach for planning and decision making for flood related issues taking climate change into account.

One of the most important results of the incorporation of water related climate change effects into strategic and operational planning is the development of a tool for deriving so called climate change factors. These factors quantify the impacts of climate change on regional water budgets and especially on hydrological extremes (e.g. floods, droughts etc.).

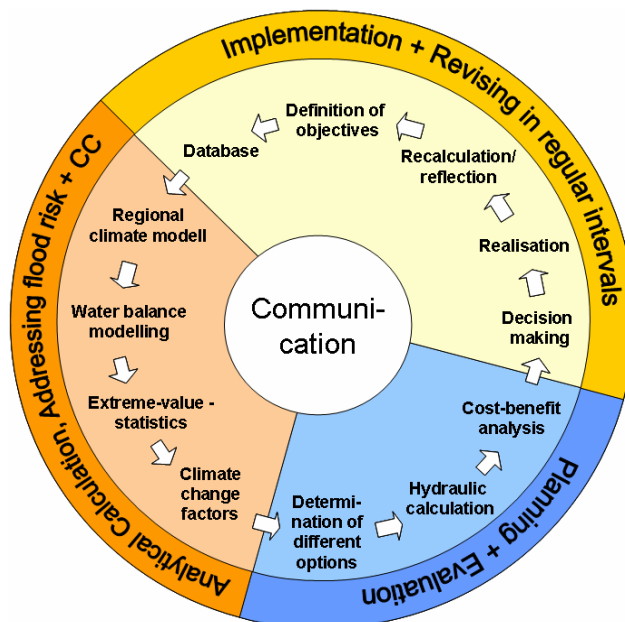
Another main outcome is the holistic planning approach which shows planners and decision makers all the necessary steps needed to get optimized adaptation to climate change (see Diagram 1 “climate-proof planning circle” below). This relies heavily on the analytical calculation of quantified hydrological data.

The steps towards optimized adaptation have to be embedded in a comprehensive all-encompassing communication strategy using adequate tools which were developed and tested in the frame of the case study.

The Bavarian Environment Agency (LfU) is progressing towards integrating climate change into all processes of spatial planning in the long term, concerning water related issues like flood management, water scarcity etc. Against this background, the Bavarian Environment Agency (LfU) approach is a holistic one and has a special focus on the quantification of climate change effects on the water basin level.

The following diagram shows the “climate-proof planning circle” for flood protection measures taking climate change into account:

**Diagram 1 The “climate-proof planning circle” for flood protection measures taking climate change into account**



The Bavarian policies developed by LfU within the ESPACE project include the following steps which should be implemented in the planning process:

1. Compiling a database including all the information necessary for step 2 and 3 (modelling and processing, analysis of possible solutions)
2. Processing – Modelling and analysing the impacts of climate change: Climate and water balance modelling, extreme value statistics, derivation of climate change factors, hydraulic calculations, physical, economic, ecological and socio-cultural impacts.
3. Analysis of potential options: Recommendations for best practice in flood management activities taking climate change into account based on the results of modelling and analysing the physical, economic and socio-cultural impacts of climate change including cost-benefit analyses
4. Concerning recommendations for a comprehensive all-encompassing communication strategy we established two important points for effective communication: First, the dialogue is only successful when it is possible to induce strong signal effects which highly exceed the normal information "noise". Secondly, the dialogue must induce a "stereo-effect" by communicating the facts in different ways and modified forms.

**Author:**

Belau, Morscheid, Schmidtke  
Bavarian Environment Agency (LfU)

**Further information:**

- “Was tun bei Hochwasser?  
HochwasserAktionsplan Main”  
( What action to take in a flood situation –  
the flood action plan for the river Main)  
Regierungen von Unter-, Mittel- und  
Oberfranken, November 2006
- Documentation of the ESPACE-workshop  
on vulnerability and climate change,  
(Würzburg)  
LfU, October 2004
- A quick scan of spatial measures and  
instruments for flood risk reduction in  
selected EU countries  
Ministry of Transport, Public Works and  
Water Management  
Directorate-General of Public Works and  
Water Management and RIZA Institute for  
Inland Water Management and Waste  
Water Treatment
- Das EU-Projekt ESPACE:  
Berücksichtigung des Klimawandels in  
der flussgebietsbezogenen Planung  
(Taking climate change into account in  
river catchment related planning)  
Belau, Kleinhans, Weber, 2006
- „Hochwasserschutzplanung und

	<p>Klimawandel: Die Fallstudie Fränkische Saale im Rahmen des EU-Vorhabens SPACE“ (Flood mitigation planning and climate change: The case study „Fränkische Saale“ in the framework of the EU-Project SPACE) Kleinhans, 2006</p> <ul style="list-style-type: none"><li>• “Climate Change: Impacts and adaptation - A short view on activities and strategies on the national level in Germany” Belau, 2006</li><li>• “SPACE Decision Making Framework and Tools” Halcrow-Report and EA, February 2006</li><li>• Climate Change and Floods in Bavaria exemplified by the case-study Fränkische Saale – a short overview, Belau, Korck, April 2007</li></ul>
--	--