Assessment of potential adverse consequences of future floods (Article 4-d):
The Swiss approach

Working Group F
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Content

1. Introduction, Objectives
2. Preliminary flood risk maps
3. Detailed maps
Article 4 asks for a preliminary flood risk assessment

a) River basin map
b) Description of historic floods
c) Description of significant historic floods which might occur again
d) Assessment of the potential adverse consequences of future floods
Objective of the flood directive is the establishment of flood management plans

To establish a plan I must know

1. What can be affected? (extend)
2. What is the impact? (magnitude / intensity)
3. What are the consequences? (vulnerability)
4. What can be done? (measures)
5. Which safety can we afford? (economy)

The sequence is of importance

What can be done depends on the physical parameters of the event. Economic justification depends on the consequences and the probability of the event.
Maps are an **information tool** indicating:
- **WHAT** (Hazard and Risk parameters)
- **WHERE** (Geographic extend)

The information is coming from:
- The hazard analysis
- The analysis of vulnerability

The difference between preliminary and final is in the scale and the degree of details elaborated!
Different maps for different uses

Spatial Planning

Hazard Maps

Planning of Protective Measures

Design Values

Hazard Assessment

Intervention Maps

Risk Maps

Intensity Maps

Emergency Planning

Planning of Local Measures

Budgeting and Insurance Planning

Preliminary maps
How to proceed?

Going from general to detail

1. Basin wide analysis
2. Overview, preliminary or indicative maps
3. Detailed risk assessment
4. Hazard Maps

Although the main focus is on the hazard analysis we must keep an eye on vulnerability of the affected areas, since if there are no consequences, no details are necessary.
Preliminary assessment or indicative flood maps: **Purpose**

- frame for detailed evaluation
- quick recognition of possible conflicts
- overview on existing risks
- priority setting for detailed planning
- **RAISING AWARENESS**
Preliminary assessment or indicative flood maps: Content

Obligatory
• type of hazard
• limits of possibly affected area (extreme event)
• settlements and important sensible objects

Desirable
• extend of historic floods
• indications on frequency and intensity (depth)

Scale: 1:100’000 until 1:25’000
Extreme event

Definition:
The extreme event exceeds substantially the 100 years flood or the highest observed flood.

There is no specific probability assigned, since depending on data and methods the results may vary considerable. As very rough figure 150% of the 100 years flood may be applied, however this may depend on the type of the river, the available information on historic floods and other meteorologic, hydrologic or hydraulic characteristics.
Extreme event: Why?

• gives the frame for detailed evaluation and optimization
• causes the maximum damage and the highest risk for life and measures are the most urgent
• serves for control of effectiveness of protection measures and determination of residual risk
• identify safe places which are safe since even in an extreme event
Preliminary assessment or indicative flood maps: Methods

Depending on available data and on the needs of the later detailed analysis

**Absolute Minimum**
- Mapping of historical events
- Regional hydrology
- Topographic analysis with GIS data

**Desirable:**
- Mapping of geomorphologic indicators and features
- Hydrologic and meteorological analysis
- Hydraulic analysis
Example: Indicative map Canton Aargau (CH)

Flooding possible

Flooding probable
Example of hazard and risk (vulnerability) map (Saxonia, Germany)

Hazard map showing different flooding depth

Vulnerability map showing average damage per unit area and sensible objects
Detailed maps

Depending on the type of information and the users

- Land use planning
- Flood hazard maps
- Hazard analysis
- Flood emergency maps
- Flood Risk maps
- Hydrographs for design events
- Flood management planning
- Forecasting and warning
- Investment and insurance planning
- Construction and rehabilitation
- Emergency/rescue planning

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Different types of maps for different purposes

For Planning:

Basic information  spatial distribution of parameters
  • Flood event maps
  • Flood hazard maps (depth, velocity, etc.)
  • Vulnerability maps (exposed values)

For Realisation:

Result of the planning process leading to action:
  • Flood emergency maps
  • Flood zoning maps for land use planning
  • Flood defence projects planned measures
Detailed maps

Hazard map Canton Aargau showing flooding depth for different return periods

- detailed assessment of flood depth
- return period: 30, 100, 1000yr
- water depth in 0.25m / 0.5m steps
- scale 1:5000
- high topographic accuracy 10cm
Example: Hazard map for spatial planning Canton Nidwalden

**Land use planning**
- red: no new constructions allowed
- blue: constructions allowed with restrictions
- yellow: informations for the land-owners
Example: Emergency map Canton Graubünden

from planning to action
Conclusions

• Preliminary flood risk maps are the first step to a risk management plan showing where we have conflicts but also where we have potential retention areas.

• Preliminary flood risk maps are needed for strategic planning and priority setting

• Preliminary flood risk maps transfer information to politics and general public. The content must be restricted to the essentials to be easily understood.
Conclusions

• Preliminary flood risk maps should be established rapidly. The necessary details can be elaborated in the later phases.

• Preliminary flood risk maps should focus on the hazard. Vulnerability is necessary but only in a general way.

• The information included in the preliminary flood map is elaborated by specialists in the process of hazard and risk analysis. This is a continuous process. The maximum of knowledge is needed when planning the measures.
more informations:

www.bafu.admin.ch