Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Bundesamt für Umwelt BAFU
Office fédéral de l'environnement OFEV
Ufficio federale dell'ambiente UFAM
Uffizi federal d'ambient UFAM
Federal Office for the Environment FOEN

EXCIMAP

Flood mapping in Europe

EXCIMAP

UNECE workshop on transboundary flood risk management

Geneva, 22-23 April 2009

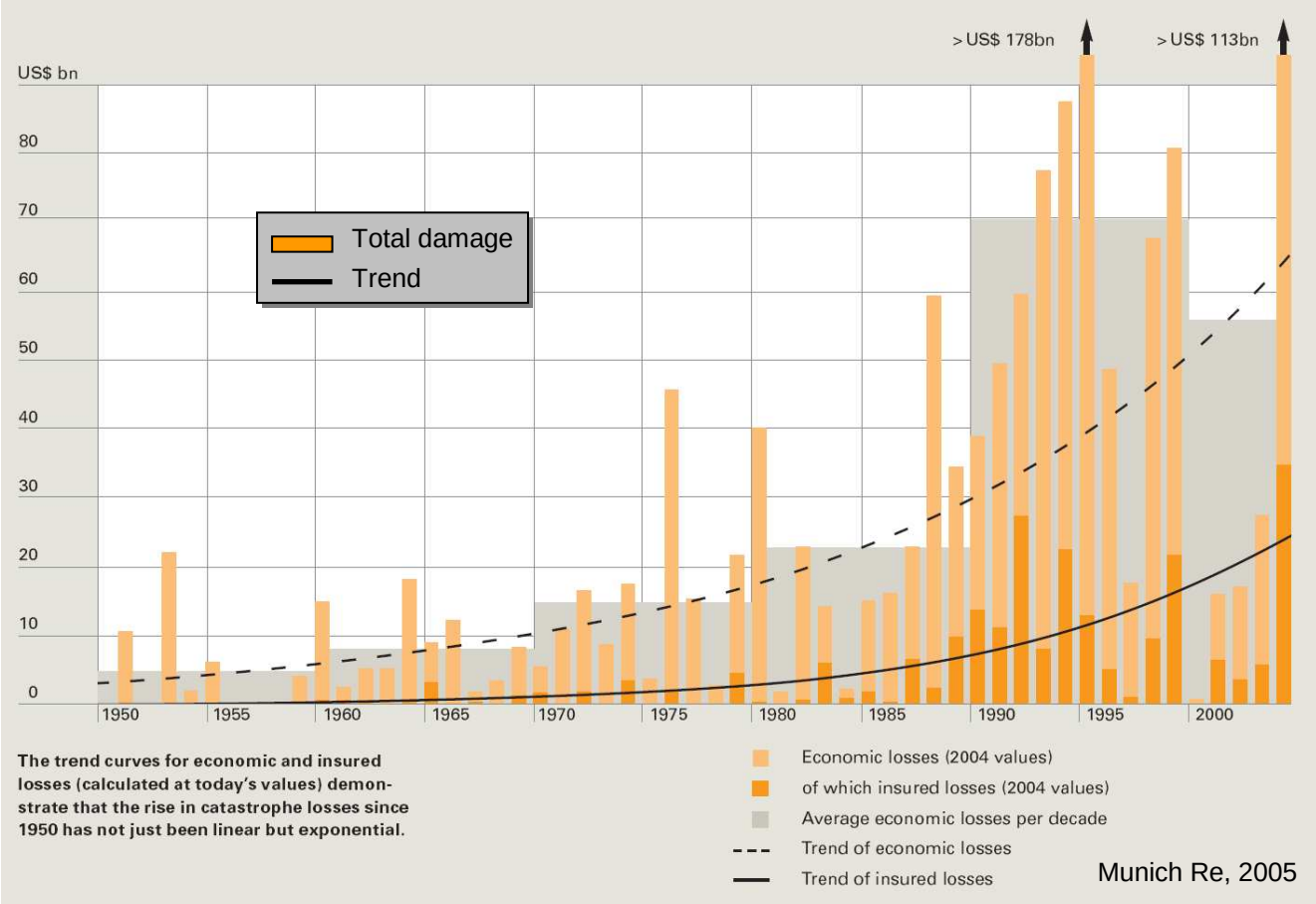
Roberto Loat

Contents

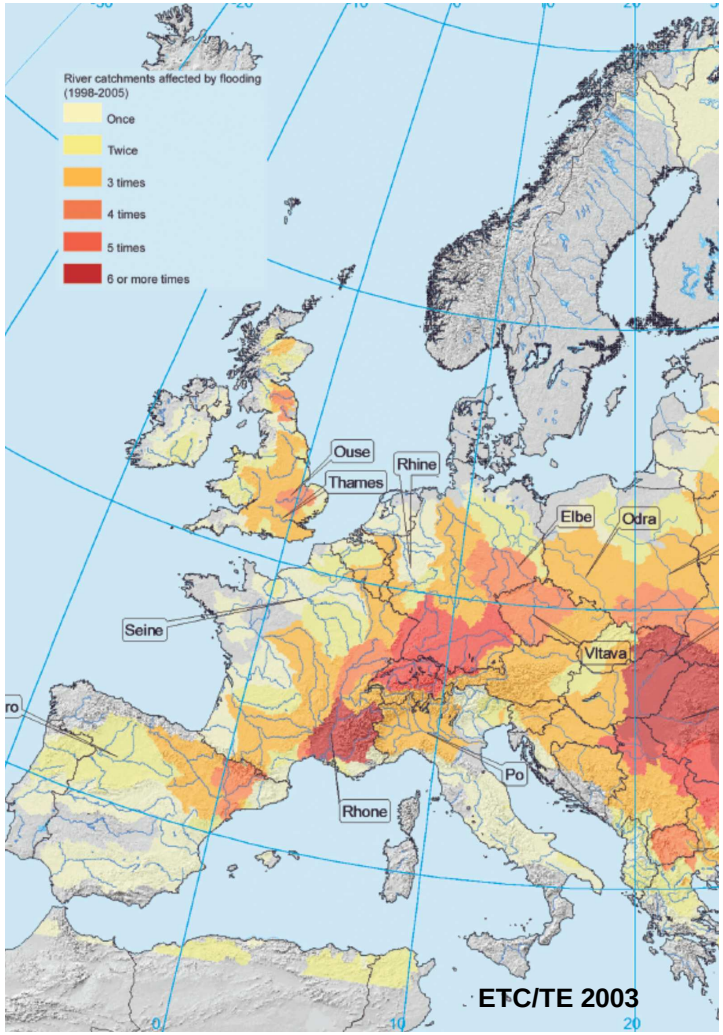
- Background: natural hazards
- EXCIMAP: Flood mapping in Europe
- Good practices: examples of hazard / risk maps
- Conclusions

Increasing economic loss

Natural disasters: global economic loss



Floods in Europe



River catchments affected by flooding (1998-2002)

- 100 major floods
- 25 billion Euro damage
- 700 fatalities

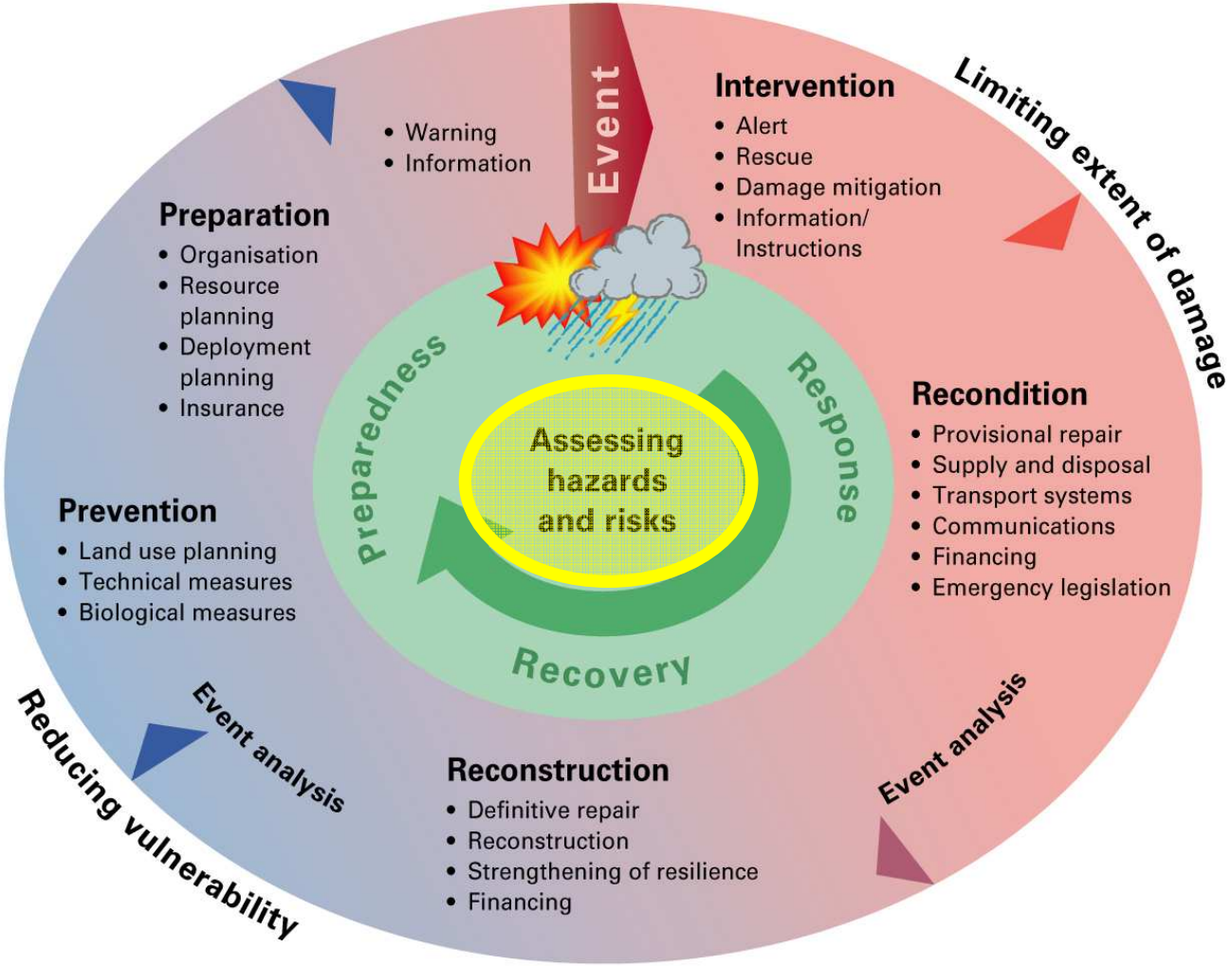
EEA 2004

2002: heavy floods in Europe

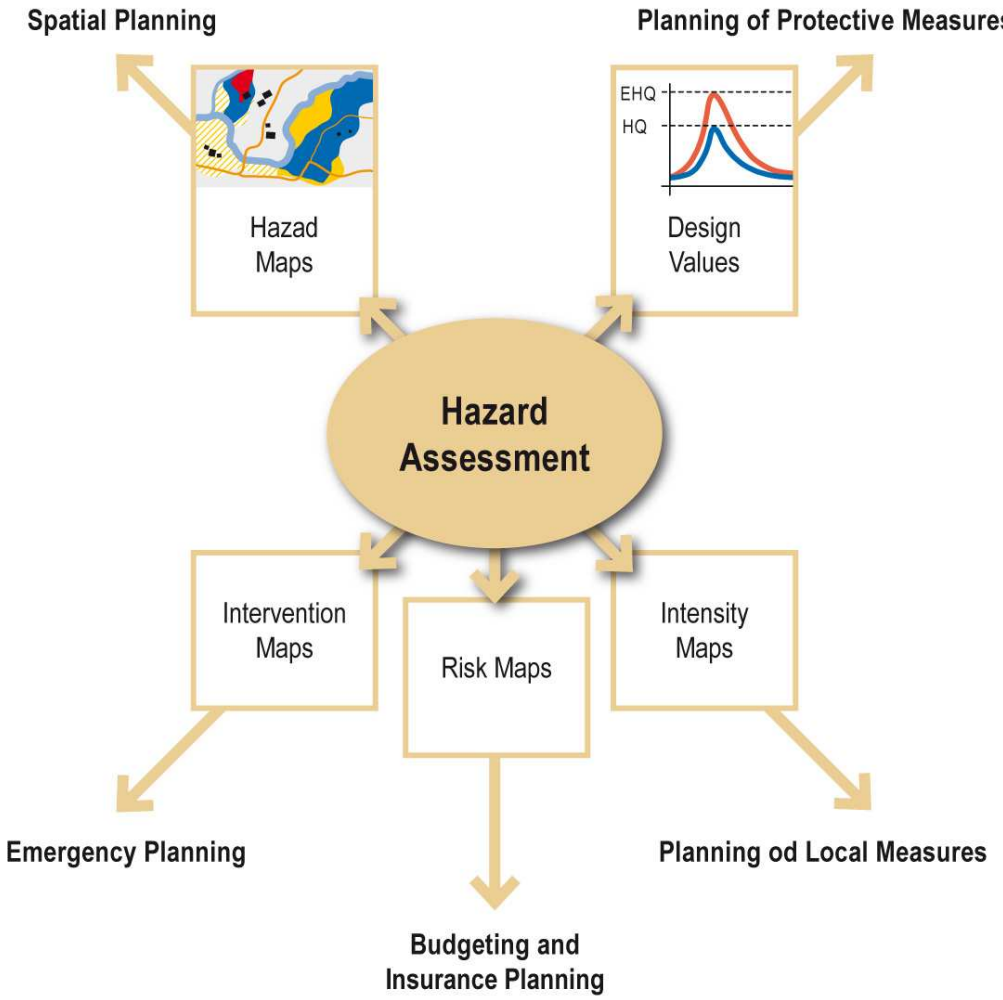
Elbe 2002

➔ Water Directors of the European Union EU agreed on initiatives in the field of flood **prevention** and **mitigation**

Strategy: integrated risk management



Different maps for different uses



Contents

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- Good practices: examples of hazard / risk maps
- Conclusions

History

In 2005, the Water Directors of the European Union have acknowledged

- **A common need** in Europe to carry out flood mapping
- **Many experiences and know-how** about flood mapping in Europe

EXCIMAP

Decision to gather existing experiences and know-how in Europe into a

European e**x**change **ci**rcle on flood **map**ping – **EXCIMAP**

Organisation

40 representatives:

- 24 European countries, International hydrological commissions, EU projects, European organisations, other interested stakeholders

Co-pilots:

- Ministère de l'écologie et du développement durable (France)
- Federal office for the Environment (Switzerland)

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RÉPUBLIQUE FRANÇAISE

MINISTÈRE
DE L'ÉCOLOGIE
ET DU
DÉVELOPPEMENT DURABLE

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
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Swiss Confederation

Bundesamt für Umwelt BAFU
Office fédéral de l'environnement OFEV
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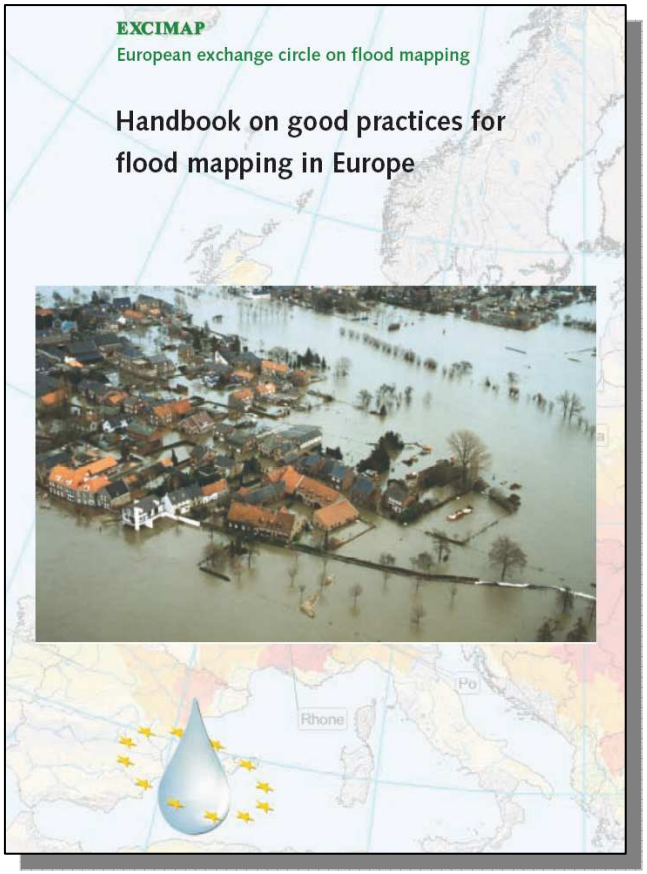
Federal Office for the Environment FOEN

Objectives

- To **review the current practices** in flood mapping in Europe
- To **identify the knowledge and good practices** that can be shared
- To **write a guide** on good practices on flood mapping

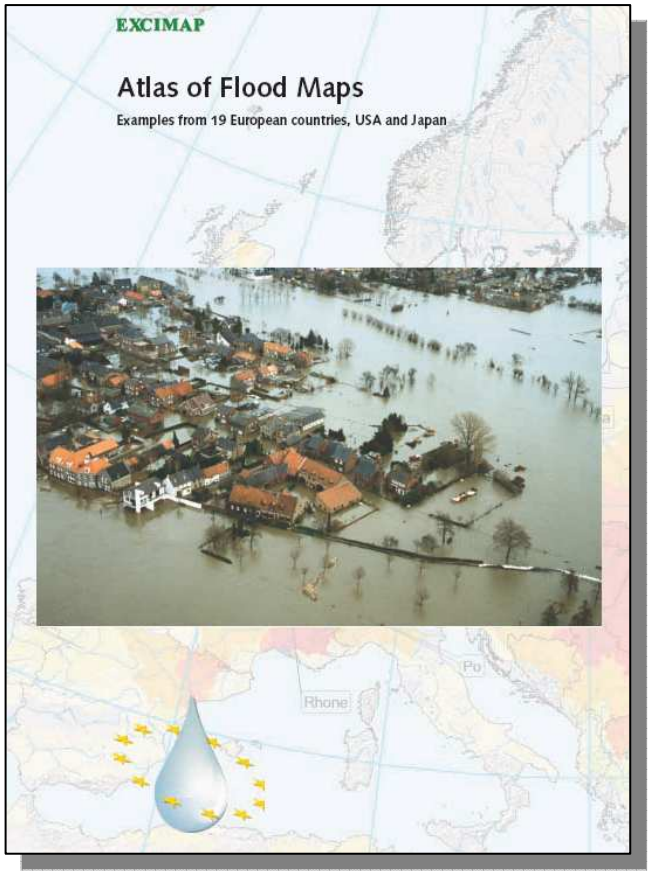
2007: Handbook on good practices



4 main chapters

- **Use of flood maps**: What purposes for which users?
  - various users = various needs
- **Flood hazard maps / flood risk maps**: What do they show?
  - types of maps and contents
- Flood **mapping process:**
  - Practices, models, databases, presentation
- Flood **maps dissemination:**
  - Format, end-users

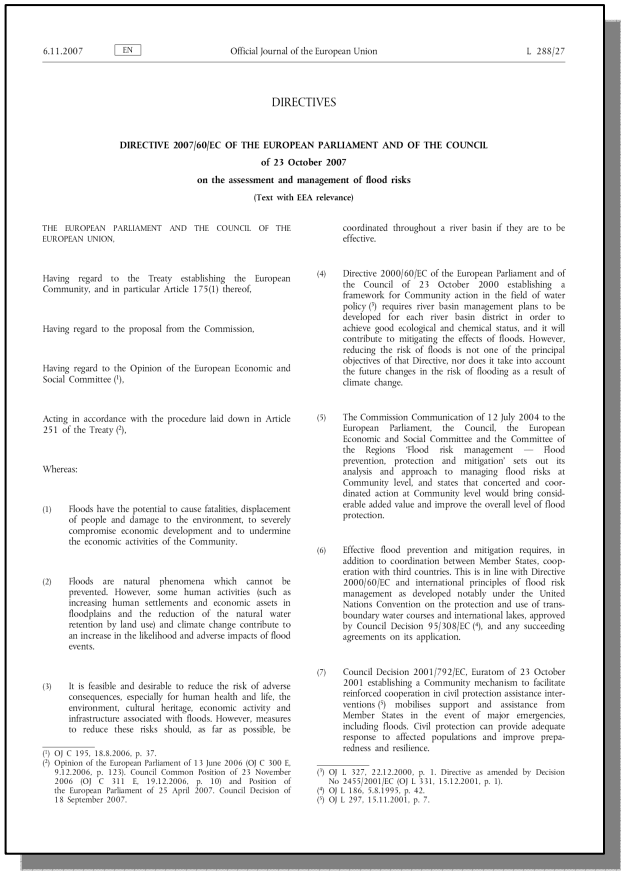
2007: Atlas of flood maps in Europe



- Consists of **examples** of national practices (19 European countries, USA and Japan)
- Plus additional **specific chapters** on:
  - transboundary flood mapping
  - flood maps for insurance
  - emergency maps

The European Flood Directive EFD

27 October 2007



6.11.2007 EN Official Journal of the European Union L 288/27

DIRECTIVES

DIRECTIVE 2007/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 23 October 2007
on the assessment and management of flood risks
(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 175(1) thereof,

Having regard to the proposal from the Commission,

Having regard to the Opinion of the European Economic and Social Committee [1],

Acting in accordance with the procedure laid down in Article 251 of the Treaty [2],

Whereas:

(1) Floods have the potential to cause fatalities, displacement of people and damage to the environment, to severely compromise economic development and to undermine the economic activities of the Community.

(2) Floods are natural phenomena which cannot be prevented. However, some human activities (such as increasing human settlements and economic assets in floodplains and the reduction of the natural water retention by land use) and climate change contribute to an increase in the likelihood and adverse impacts of flood events.

(3) It is feasible and desirable to reduce the risk of adverse consequences, especially for human health and life, the environment, cultural heritage, economic activity and infrastructure associated with floods. However, measures to reduce these risks should, as far as possible, be coordinated throughout a river basin if they are to be effective.

(4) Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy [3] requires river basin management plans to be developed for each river basin district in order to achieve good ecological and chemical status, and it will contribute to mitigating the effects of floods. However, reducing the risk of floods is not one of the principal objectives of that Directive, nor does it take into account the future changes in the risk of flooding as a result of climate change.

(5) The Commission Communication of 12 July 2004 to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'Flood risk management — Flood prevention, protection and mitigation' sets out its analysis and approach to managing flood risks at Community level, and states that concerted and coordinated action at Community level would bring considerable added value and improve the overall level of flood protection.

(6) Effective flood prevention and mitigation requires, in addition to coordination between Member States, cooperation with third countries. This is in line with Directive 2000/60/EC and international principles of flood risk management as developed notably under the United Nations Convention on the protection and use of transboundary water courses and international lakes, approved by Council Decision 95/308/EC [4], and any succeeding agreements on its application.

(7) Council Decision 2001/792/EC, Euratom of 23 October 2001 establishing a Community mechanism to facilitate reinforced cooperation in civil protection assistance interventions [5] mobilises support and assistance from Member States in the event of major emergencies, including floods. Civil protection can provide adequate response to affected populations and improve preparedness and resilience.

[1] OJ C 195, 18.8.2006, p. 37.
[2] Opinion of the European Parliament of 13 June 2006 (OJ C 300 E, 9.12.2006, p. 123), Council Common Position of 23 November 2006 (OJ C 311 E, 19.12.2006, p. 10) and Position of the European Parliament of 25 April 2007. Council Decision of 18 September 2007.
[3] OJ L 327, 22.12.2000, p. 1. Directive as amended by Decision No 2455/2001/EC (OJ L 331, 15.12.2001, p. 1).
[4] OJ L 186, 5.8.1995, p. 42.
[5] OJ L 297, 15.11.2001, p. 7.

Requirements of the Directive:

1. Preliminary flood risk assessment (2011)
2. Flood hazard maps and flood risk maps (2013)
3. *Flood risk management plans (2015)*

Contents

- Background: natural hazards
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1. Preliminary flood risk assessment

- undertaken for **each river basin** district
- **identify** those areas where a **potential flood risk** exists

And for those areas:

- prepare flood **hazard maps and flood risk maps**
- establish **flood risk management plans**

Preliminary flood risk assessment

Flood plain maps / Hazard index maps

Figure 4-59 Flood map of the Tisza river basin

- first rough assessment
- potential flood extent
- return period: **1/100 yr**
  1/1000 yr
- scale **1:500'000** (1:50'00)
- national view
- easy to read

Hungary / Tisza river

Preliminary flood risk assessment

Flood plain maps / Hazard index maps

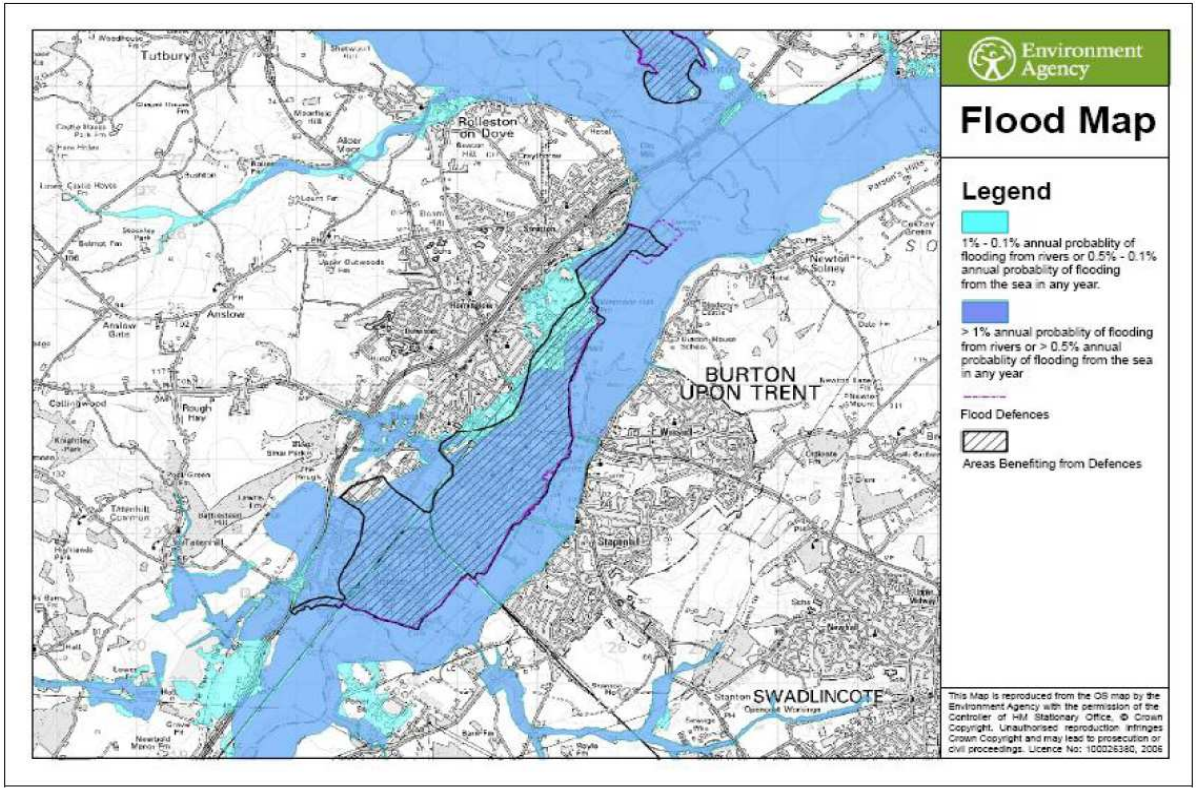


Figure 4-25 Example of flood map with indication of area benefiting from defence works

- first rough assessment
- potential flood extent
- return period: **1/100 yr**
  1/1000 yr
- Internet up to **1:20'000**
- areas benefiting from flood defence in a 1% flood
- easy to read

Great Britain

2.a Flood hazard maps

according to scenarios of floods with:

- **high probability**, where appropriate
- **medium probability** (likely return period ≥ 100 years)
- low probability or **extreme event** scenarios

For each scenario:

- the **flood extent**
- **water depths** or water level
- flow velocity or the relevant water flow (where appropriate)

Flood hazard maps

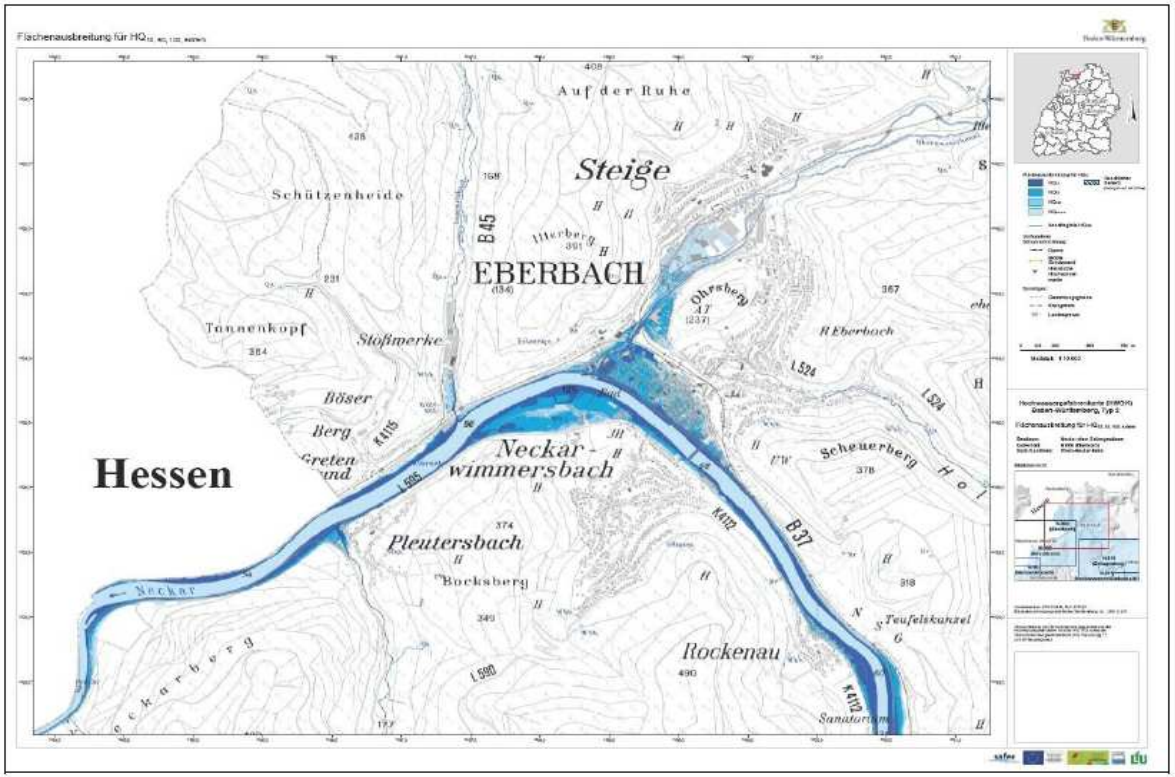


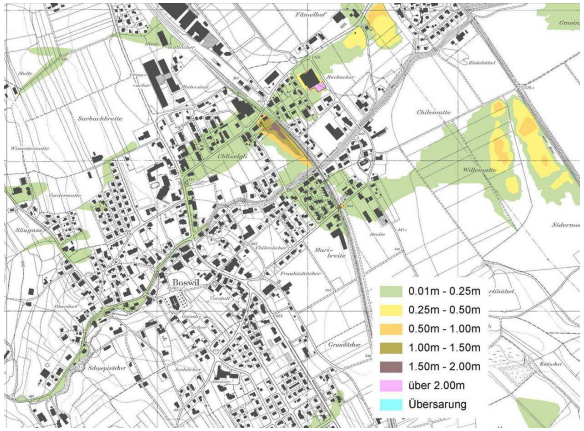
Figure 4-42 Example of a flood extension map from Baden-Wurttemberg (Neckar)

- detailed assessment of flood extension
- return period: **1/10 yr**
  1/50 yr
  1/100 yr
  1/1000 yr
- scale **1:10'000**

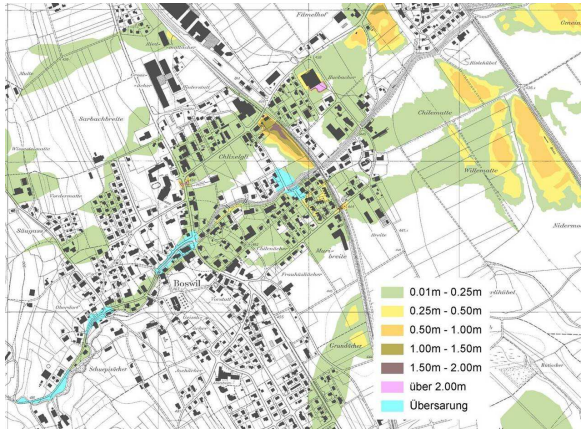
Baden-Württemberg

Flood intensity maps

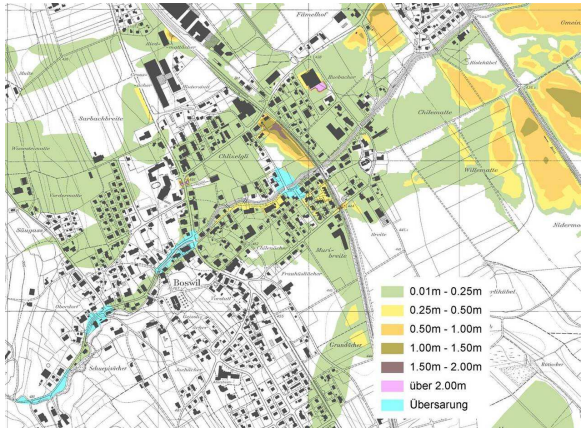
R=30



R=100



R=1000



- 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**

0.01m - 0.25m
0.25m - 0.50m
0.50m - 1.00m
1.00m - 1.50m
1.50m - 2.00m
über 2.00m

Flood propagation maps

flood depth

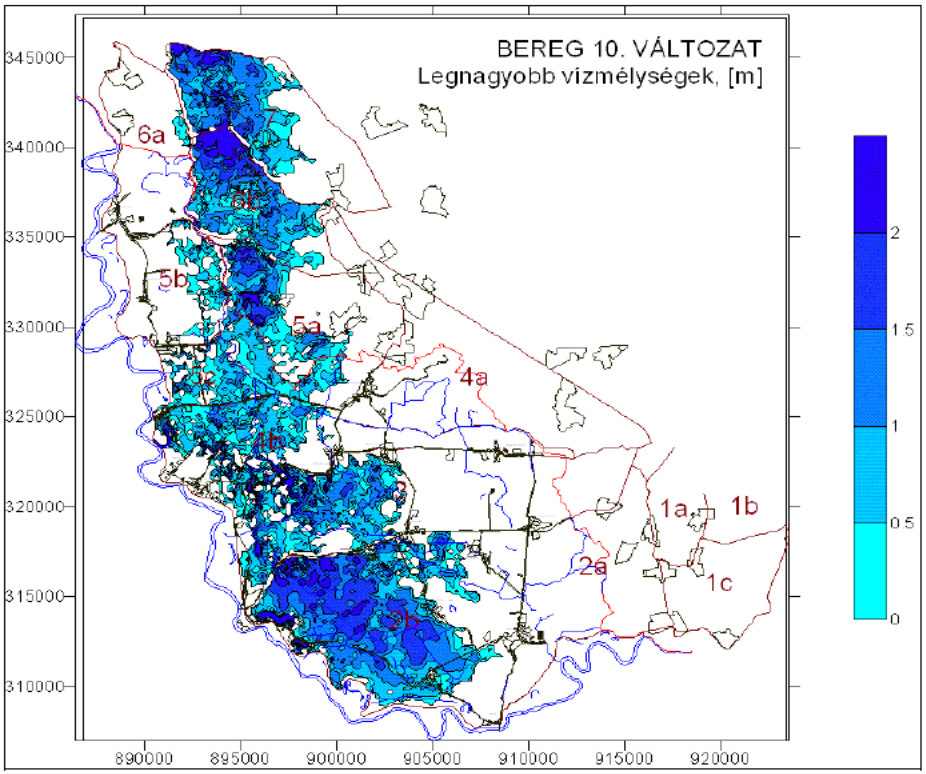


Figure 4-62 Bereg flood area, River Tisza right bank, flood depth (m)

propagation time

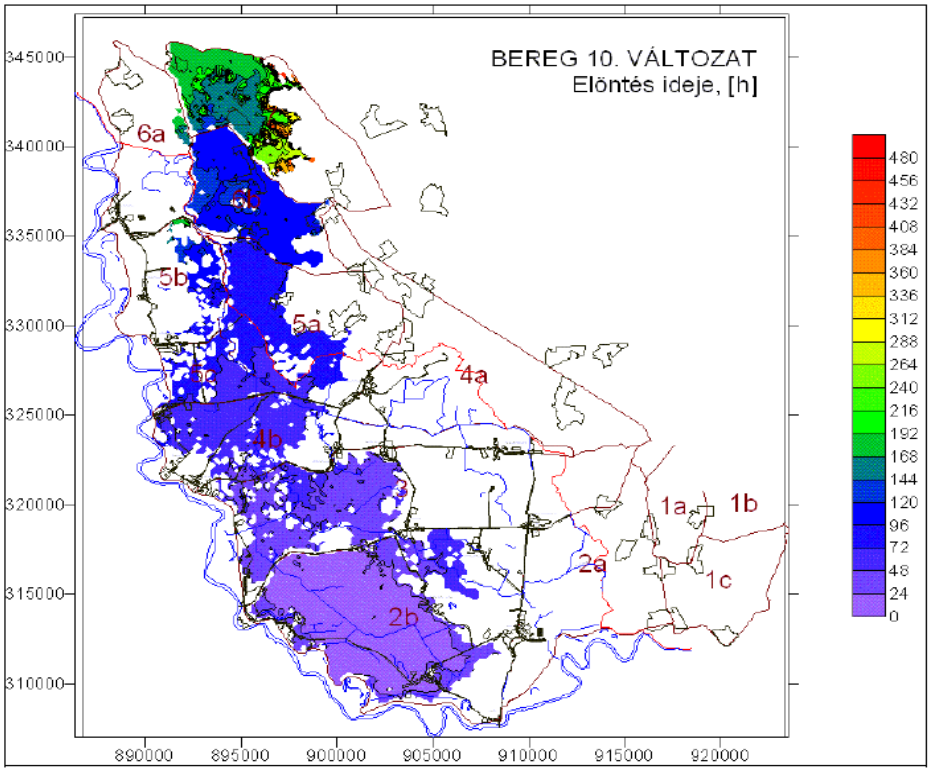
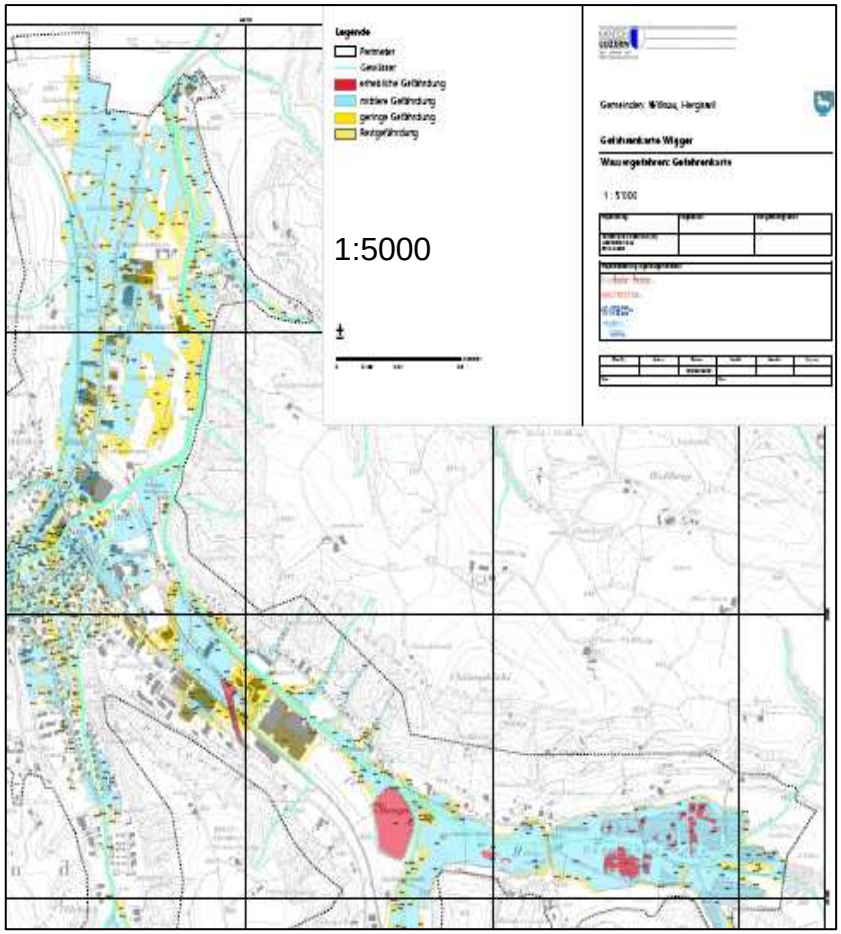
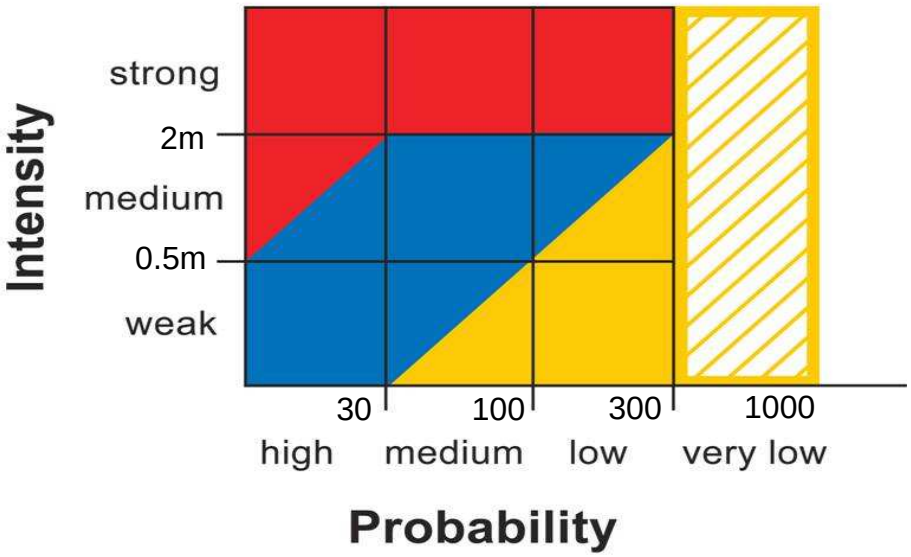


Figure 4-63 Bereg flood area, River Tisza right bank, propagation of inundation (hours)

Hungary

Flood hazard zoning maps





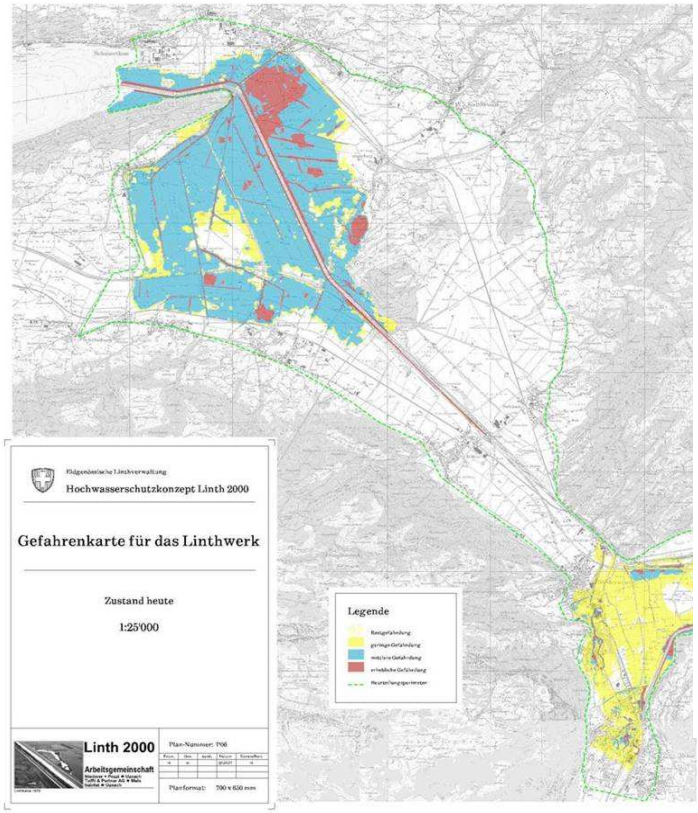
Land use planning

- no new constructions allowed
- constructions allowed with restrictions
- information for the land-owners

Switzerland

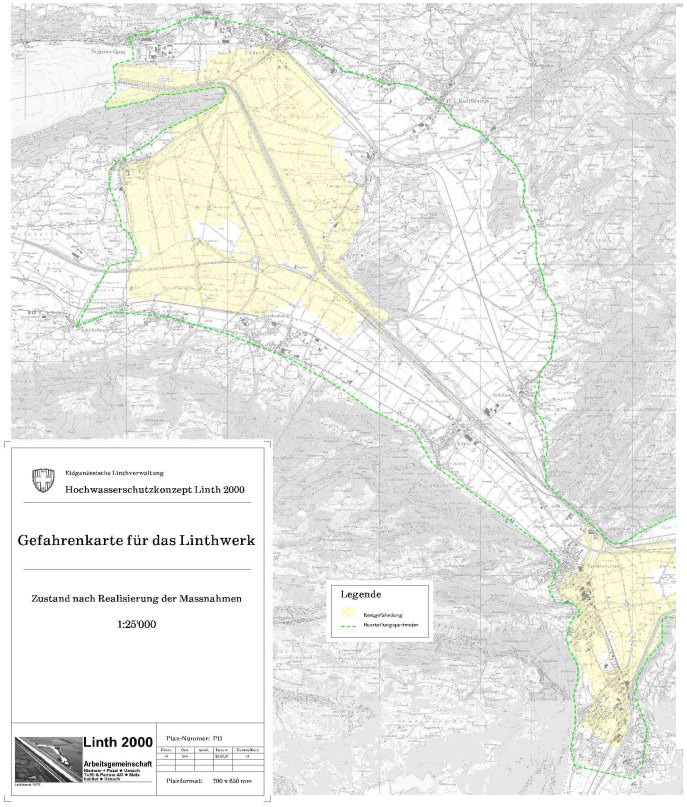
Flood hazard zoning maps

Map before measures



Technical and non technical measures

Hazard map after measures



Switzerland

2.b Flood risk maps

shall show the potential adverse consequences associated with the flood scenarios and expressed in terms of:

- the indicative **number of inhabitants** potentially affected
- **type of economic activity** of the area potentially affected
- installations which might cause **accidental pollution**
- other information which the Member State considers useful

Flood risk maps

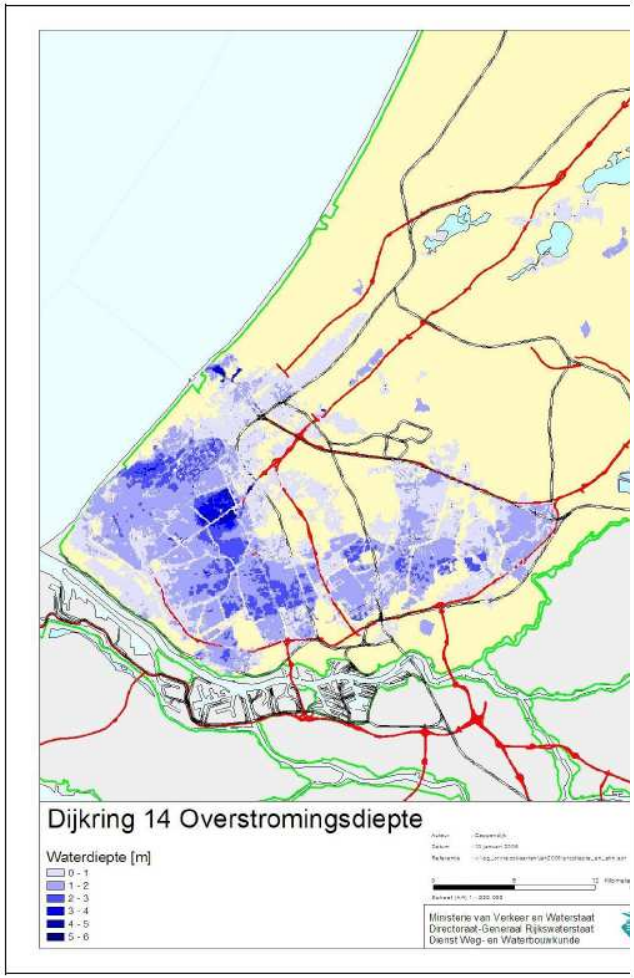


Figure 4-79 Example of maximum flood inundation depth caused by sea flooding in the Netherlands

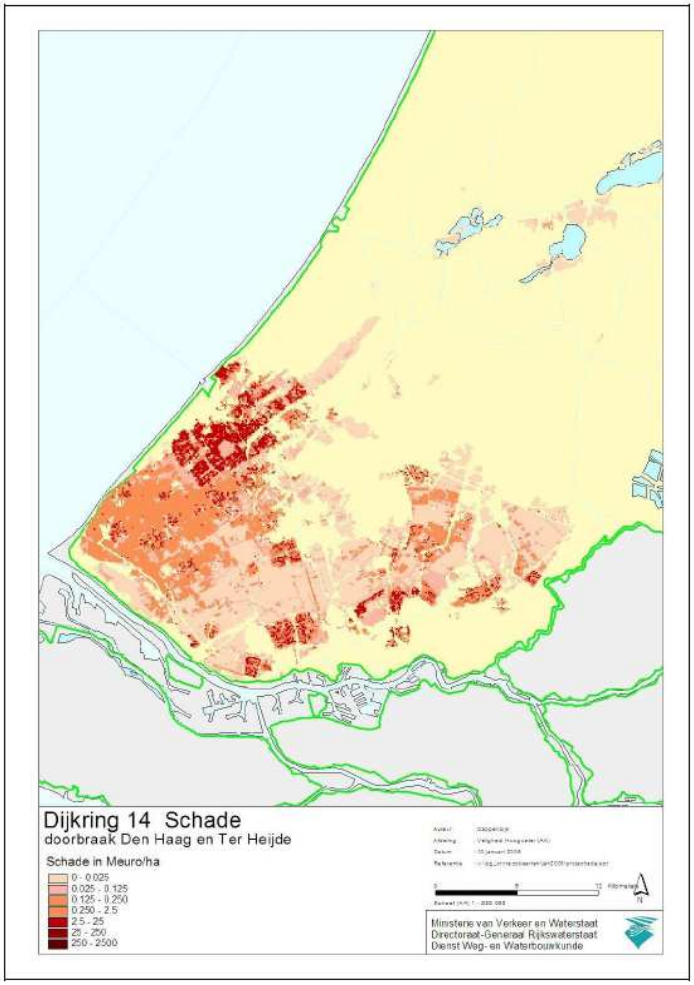


Figure 4-80 Potential flood damage resulting from flood depth and land use

- potential damage in milions € / ha
- scale 1:200'000

The Netherlands

Flood risk maps

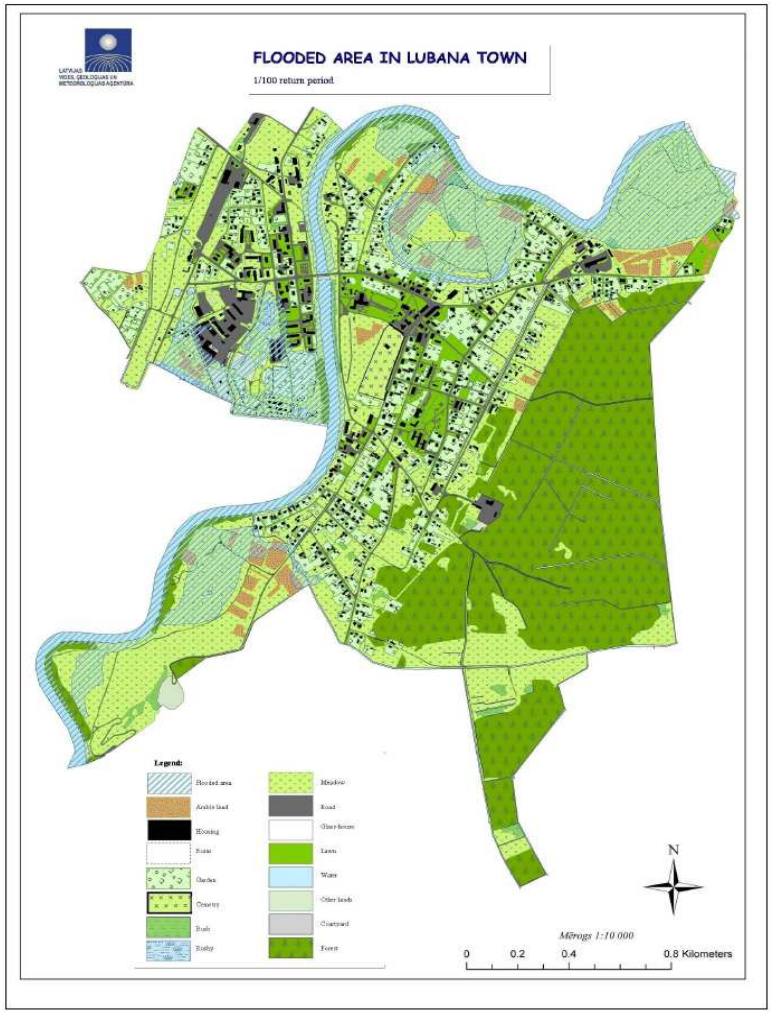


Figure 4-73 Flooded area (diagonal blue lines) for the city of Lubana for a return period of 100 years

- assets at risk for 1/100 yr flood
- damage qualitative
- scale 1:10'000

Latvia

Flood risk maps

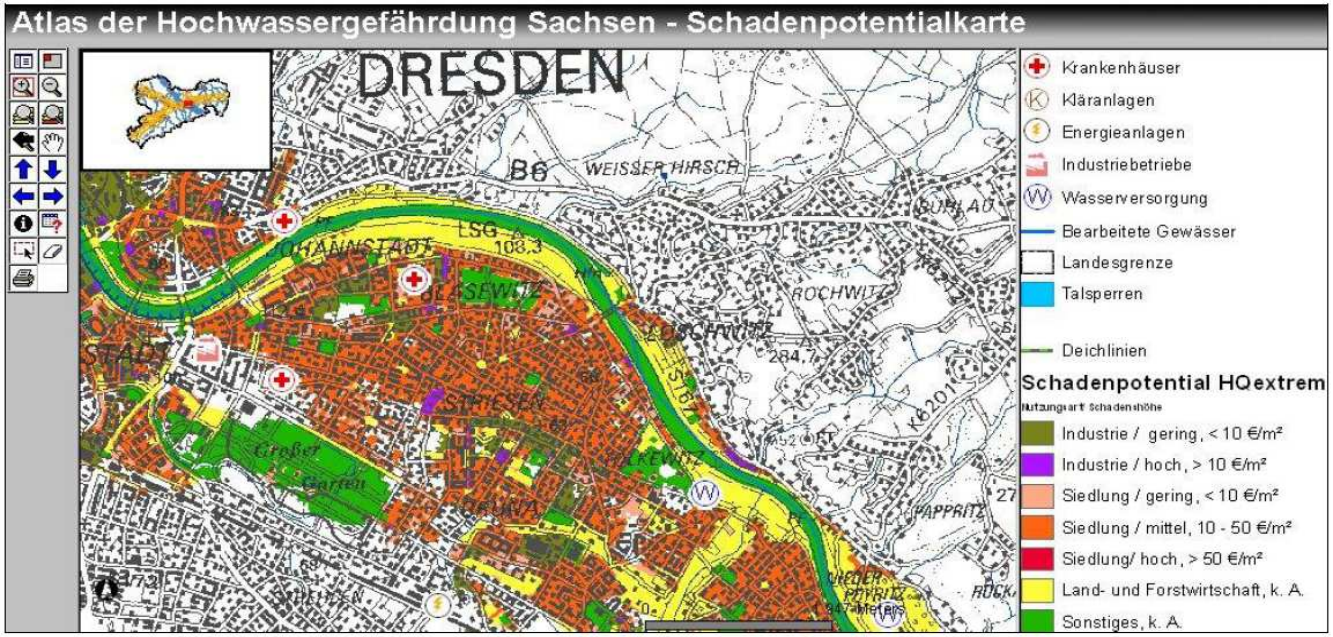


Figure 4-57 Flood damage map of the region of Dresden

- assets at risk for a extreme event
- potential damage €/m2

Saxony

Other kind of maps

Emergency maps

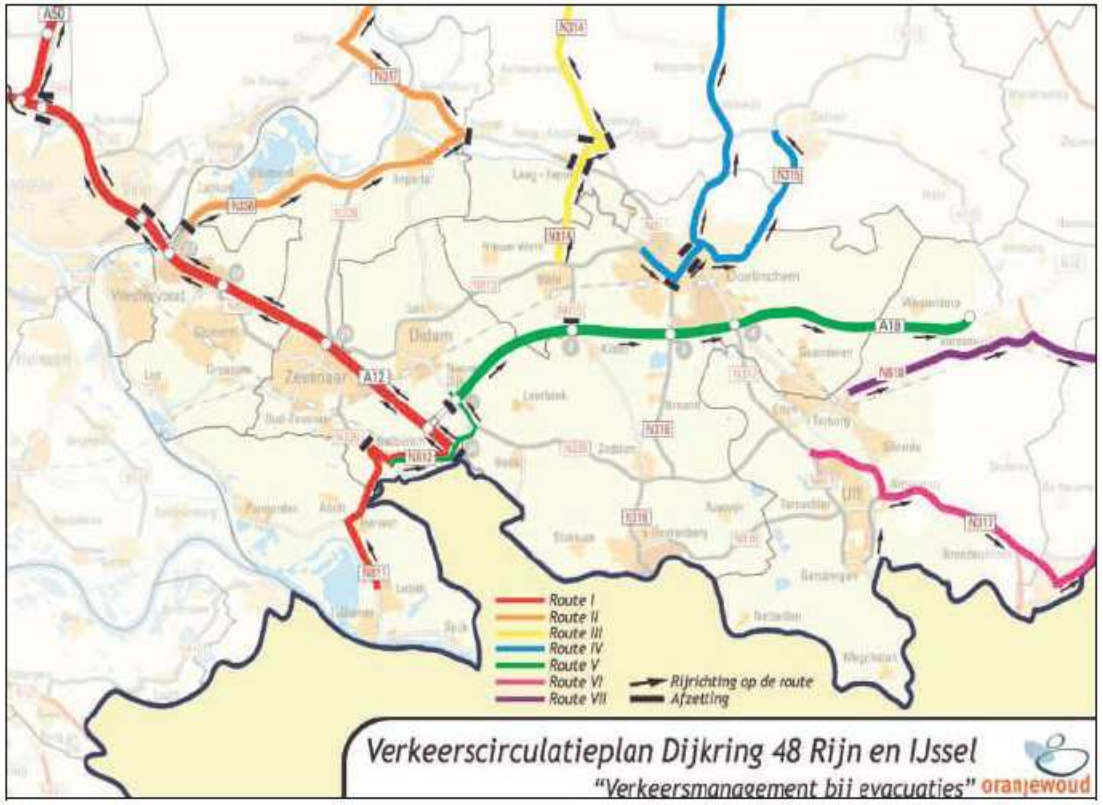


Figure 7-5 Example of an evacuation map for the Netherlands with indication of obstructions and lane direction and closed entrances and exits

- evacuations routes
- lane direction
- closed entrances / exits

The Netherlands

Emergency maps

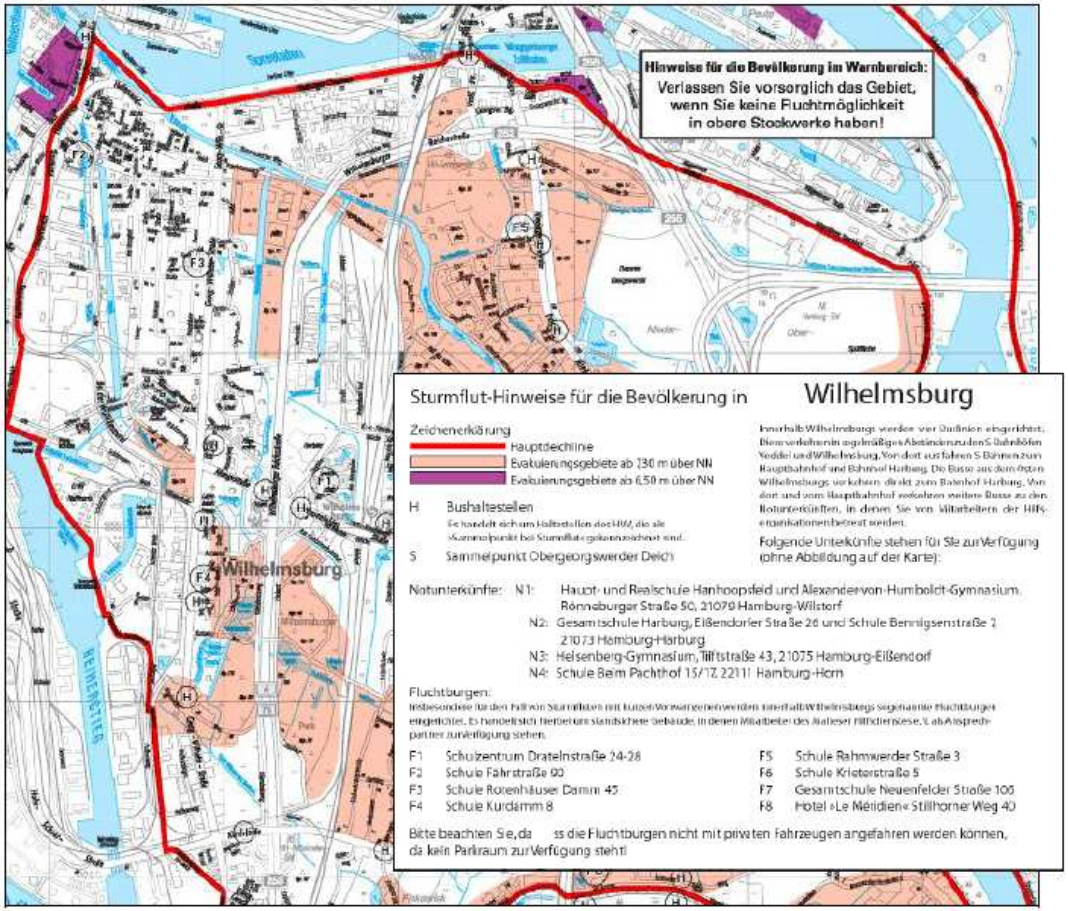


Figure 7-1 legend Part of the map with flood protection and evacuation zones of the city of Hamburg with (German)

- dike line
- evacuations zones corresponding to different water levels
- emergency residences
- evacuations places
- bus stops for evacuation
- detailed advice for the public

Hamburg

Dissemination

Dissemination

Internet

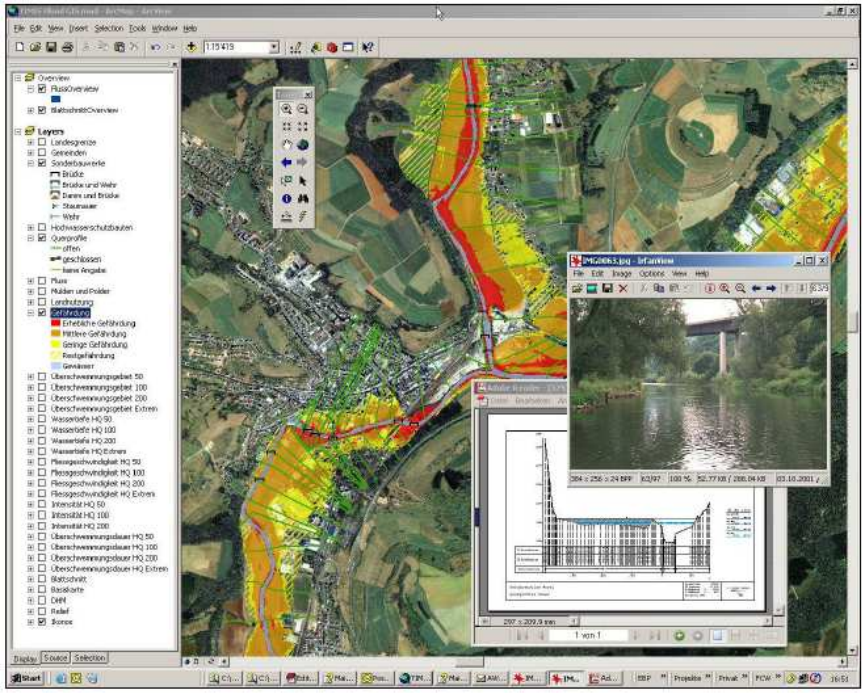


Figure 5-14 Example of the GIS environment of TIMIS for accessing the flood-related information

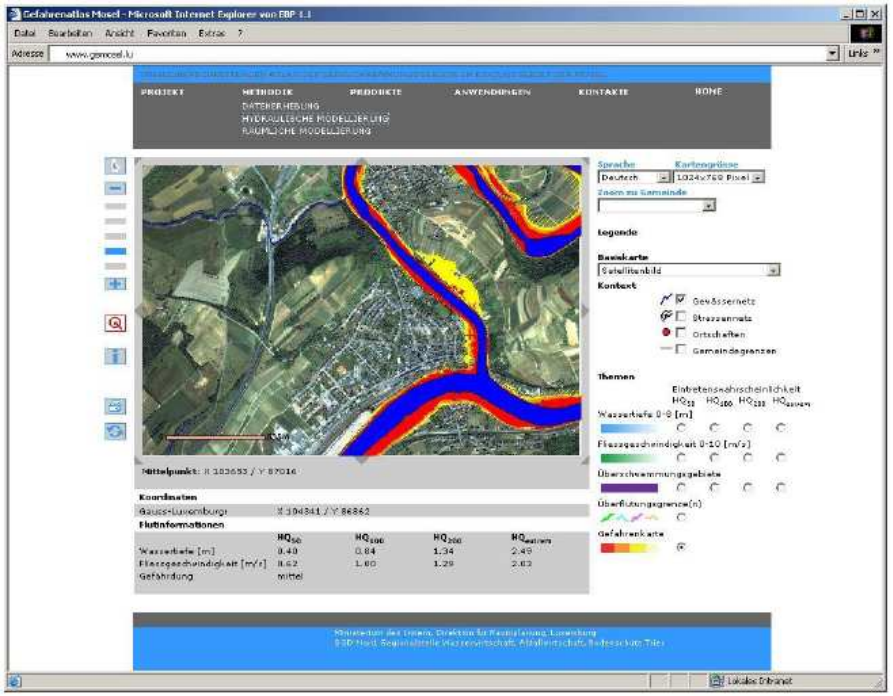


Figure 5-13 Internet page for the viewing of interactive flood hazard maps from the TIMIS project

TIMIS / Mosel

Germany, Luxemburg, France

Dissemination

Google Earth

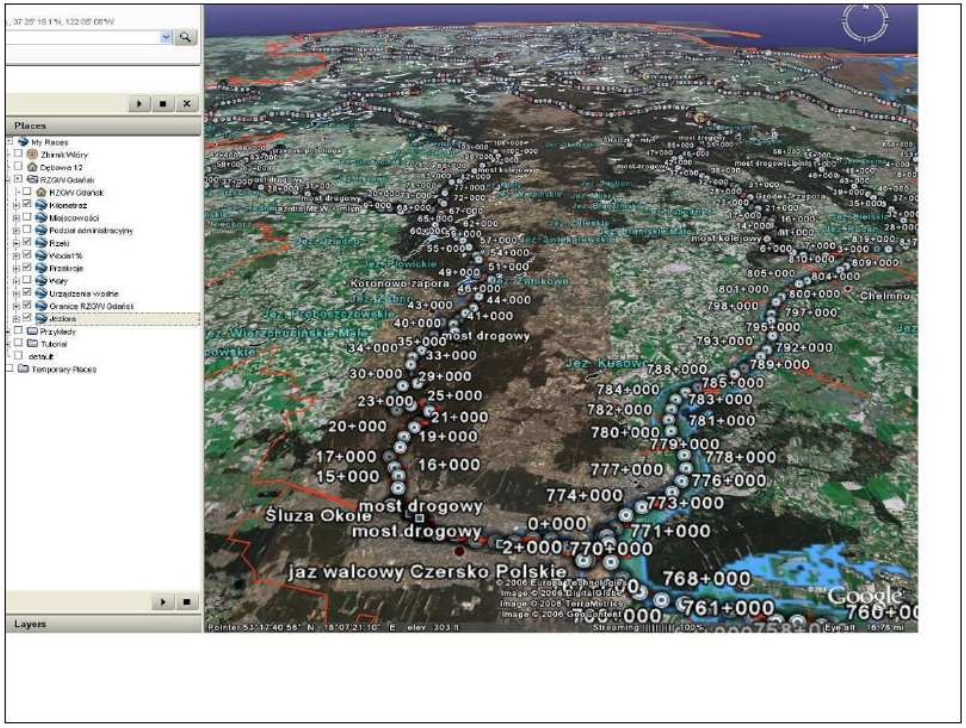


Figure 4-88 Flood extension map using Google Earth

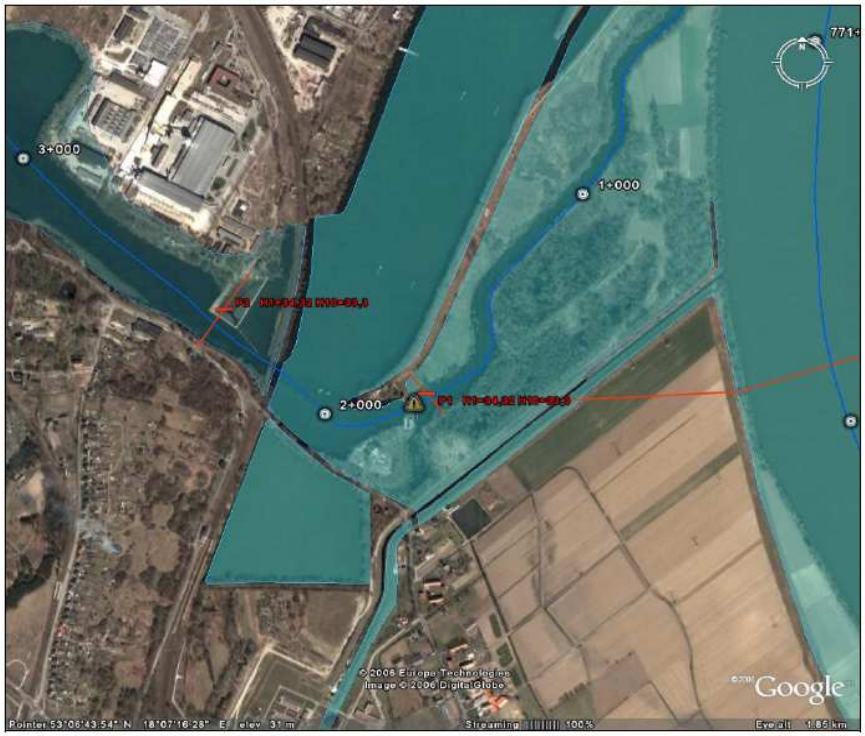


Figure 4-89 Detail of flood extension map with Google Earth

Poland

Contents

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Conclusions and expectations

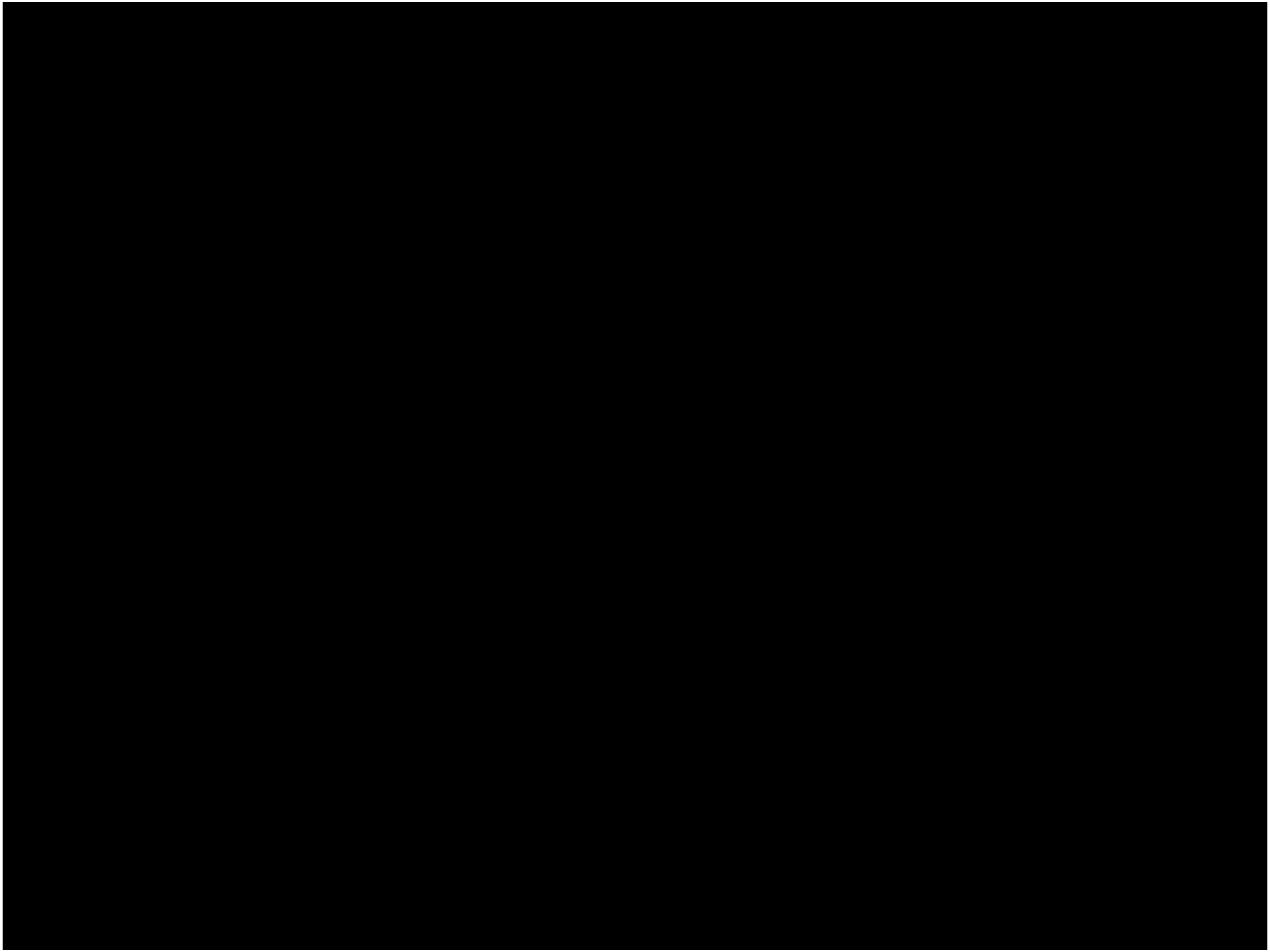
- natural hazards **can not be avoided** …
- ... but their **damages** can be **minimised** (integrated risk management)

- **hazard maps** play a key role, they have to be **accomplished** soon (2013!) and
- to be implemented into **spatial planning**
- **not allow new unacceptable risks** (avoid endangered areas, building requirements)
- **information of the public** about the hazard situation and possible mitigation measures (local flood-proofing protection measures, restrictions of use)
- promote tight **international cooperation** between all affected parties

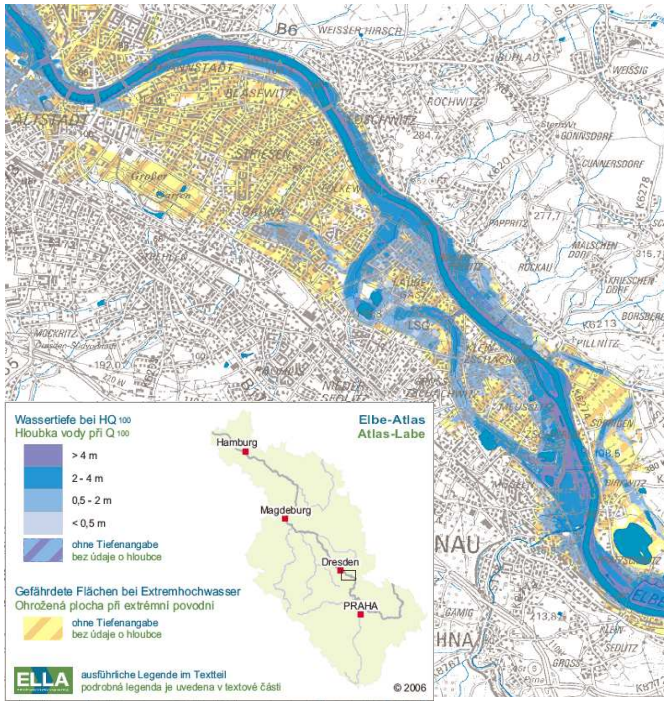
For more informations:

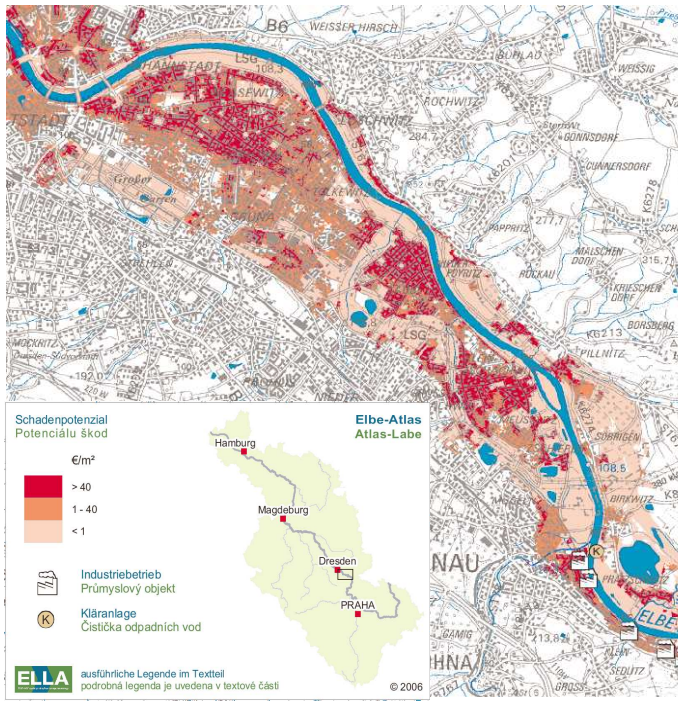
http://ec.europa.eu/environment/water/flood_risk/flood_atlas/index.htm

Thank you for your attention !



Flood risk maps





- return period: **1/100 yr**
- water depth **<0.5m; 2 m; 4m; > 4m**
- **scale 1:100'000**

- damage potential Euro/m2

ELLA / Elbe Germany – Czech Republic