Ministerie van Verkeer en Waterstaat

Flood Risk Mapping in Europe,
Experiences and Best Practices

EXCIMAP

Jos van Alphen, Robert Slomp:

Ministry of Transport, Public Works and Water Management, The Netherlands

Frédérique Martini: *Ministère de Developpement Durable, France*

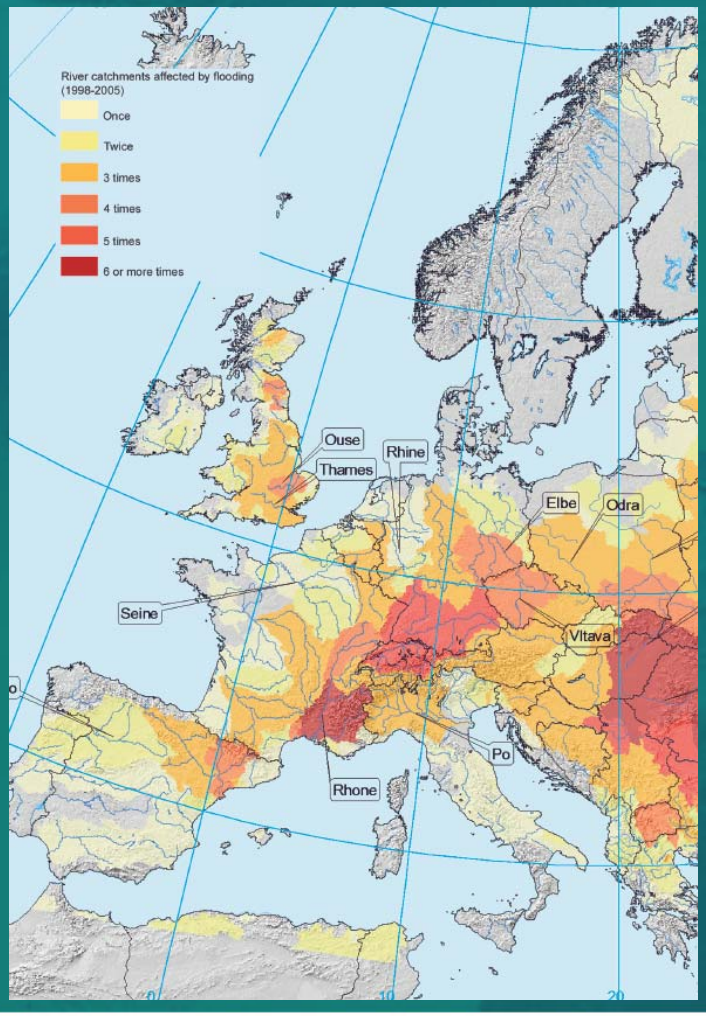
Roberto Loat: *Ministerium für Umwelt, Switzerland*

Ron Passchier: *Deltares*

Outline

1. Background: floods in Europe and FRM-Directive
2. Flood maps: what do they present?
   - Hazard maps
   - Risk maps
3. Maps and potential use : hazard cycle, users and information content
4. Conclusions

1. Background: Floods in Europe



Between 1998 - 2002:

- 100 major floods
- 25 billion Euro's insured damage
- 0.5 mill. people displaced,
- 700 fatalities

(EEA, 2004)

2002 floods: trigger to a joint approach

mid 2003:

Best Practices on flood prevention, protection and mitigation

2004: start of European policy

July 2004: EU-Commission:

- Communication on Flood Risk Management
- Expert circles (EXCIMAP)
- Flood action programme:
  - Facilitate exchange of information, knowledge and experiences (Floodsite, ERANET)
  - Targeting approach to funding
  - Proposal for legal instrument (→ Directive)

Flood Risk Management Directive (2007)

Aim: framework for the assessment and management of flood risks, → reduce adverse consequences for human health, environment, cultural heritage and economic activity.

Member states are free to formulate goals of protection, select measures and organization.

However are obliged:

- Preliminary risk assessment (2011)
- Flood hazard and flood risk maps (2013)
- Flood risk management plans (prioritized measures) (2015)
- Report progress to EC, periodically review of maps and plans every 6 years

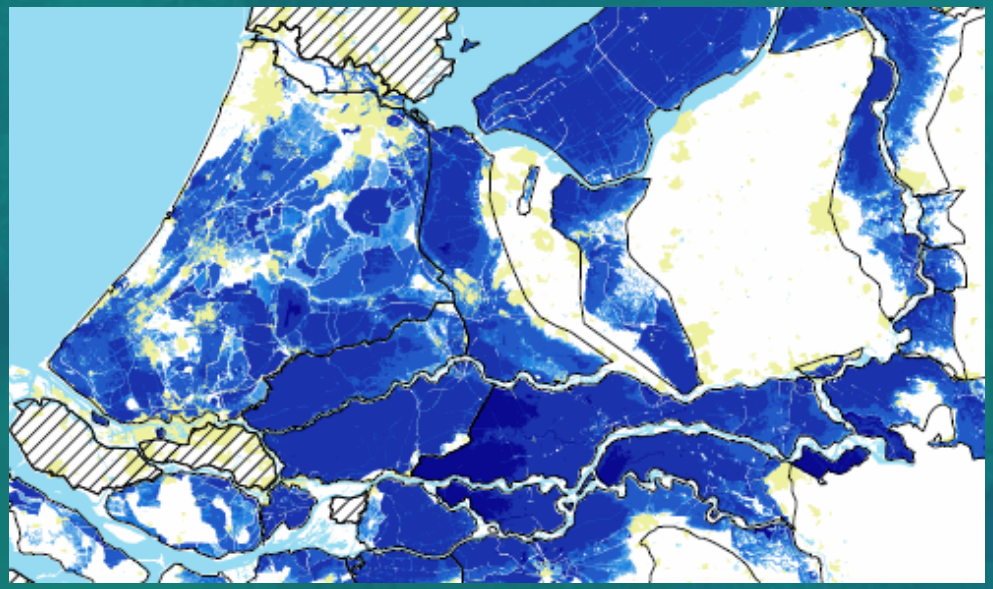
Basic principles?!

2. Flood maps, what do they present?

Possible content (EU Flood Risk Management Directive)

- Potential flood extent
- Probability of flooding
- Depth of flooding
- Potential damage, affected, environmental consequences
- Vital services and infrastructure
- Flood risk (probability x consequences)
- Hazardous locations (depth/velocities)
- Locations of vulnerable citizens (elderly, children)
- Evacuation routes and shelters

2a. Flood hazard maps



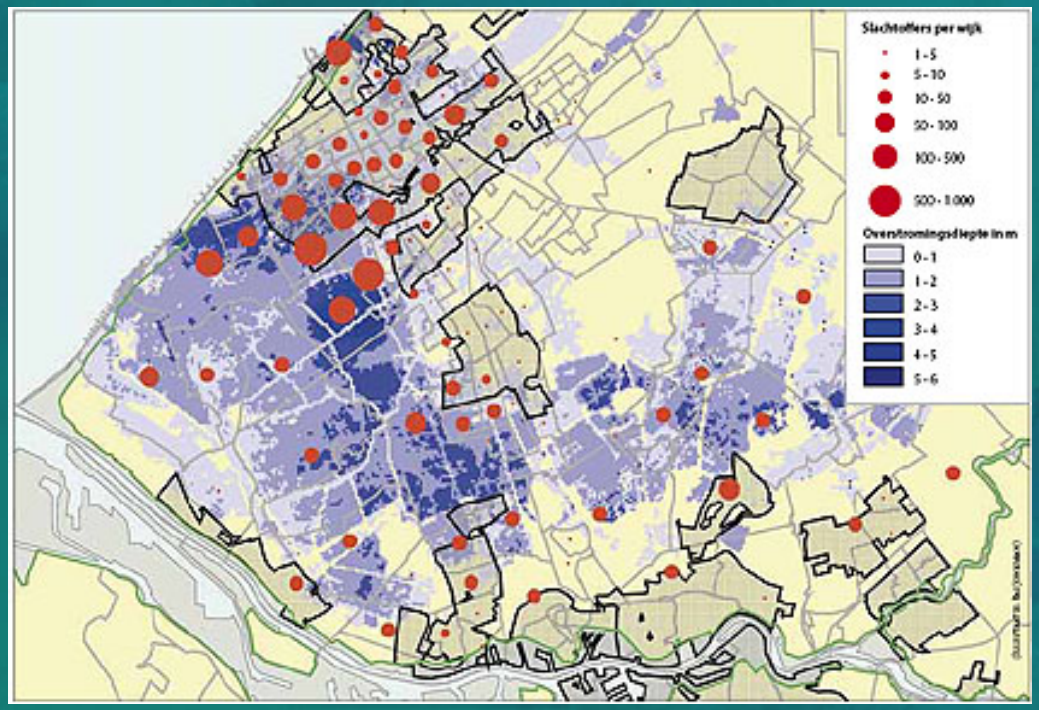
For areas with significant risk, for 3 types of floods:

- floods with a low probability, or extreme events scenarios;
- floods with a medium probability (recurrence period about 100 years);
- floods with a high probability, where appropriate.

Showing:

- the flood **extent**;
- water **depths or** water **level**, as appropriate;
- where appropriate, the flow velocity or the relevant water flow

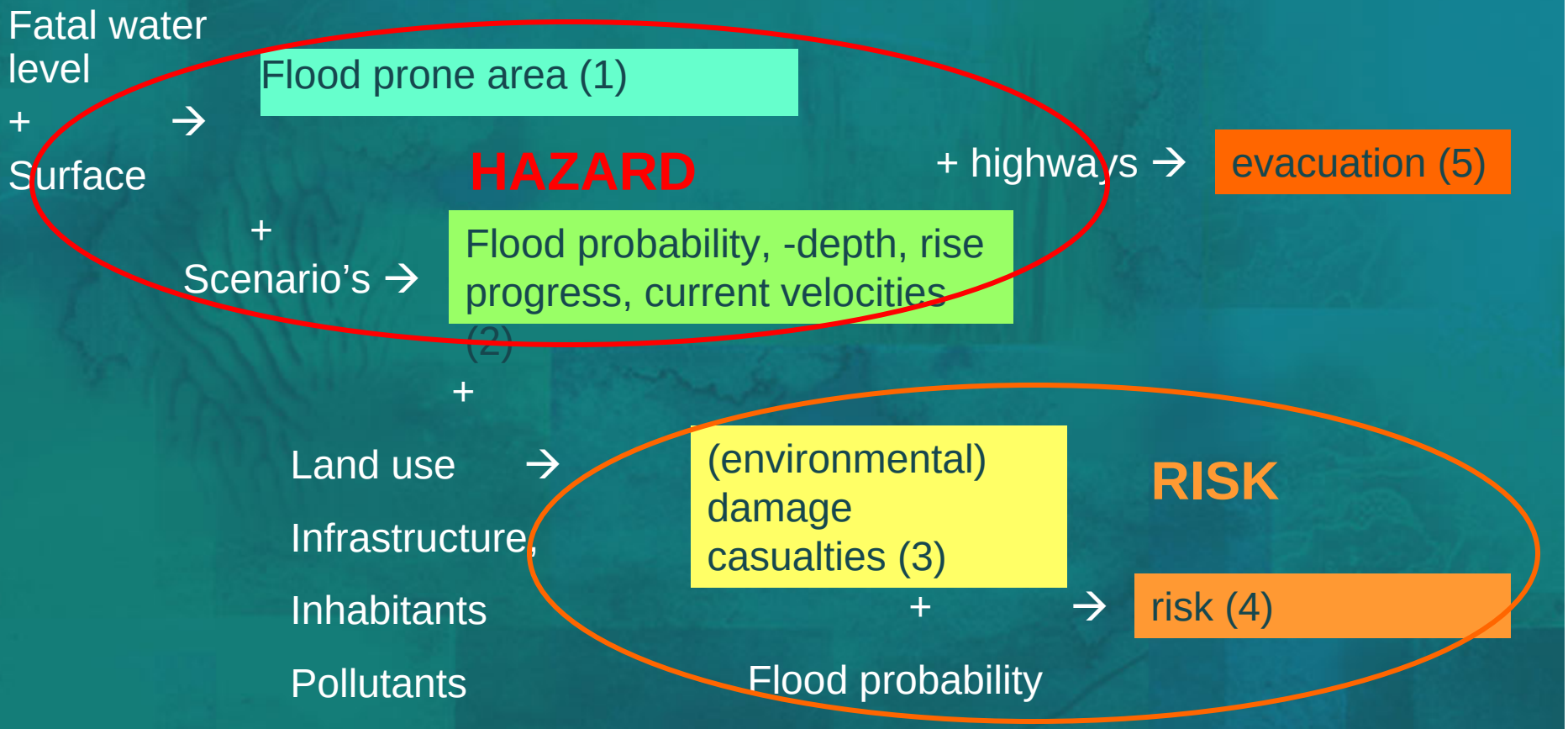
2b. Flood risk maps



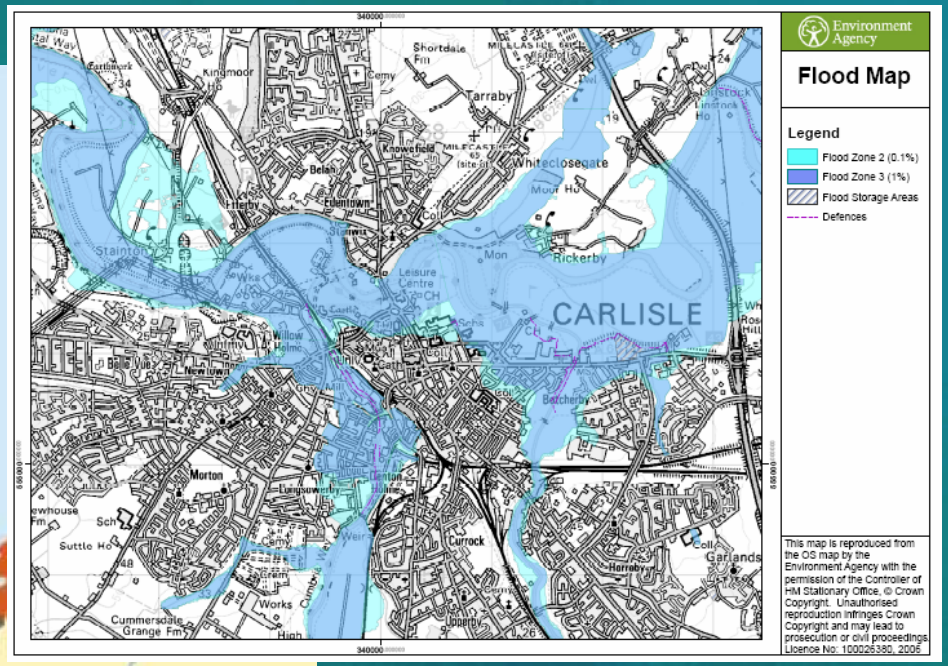
potential adverse consequences:

- the indicative number of **inhabitants** potentially affected;
- type of **economic activity** of the area potentially affected;
- **IPPC**-installations
- protected areas cf WFD that may be threatened by flooding;
- other information which the Member State considers useful, such as:
  - (...)
  - other significant sources of pollution.

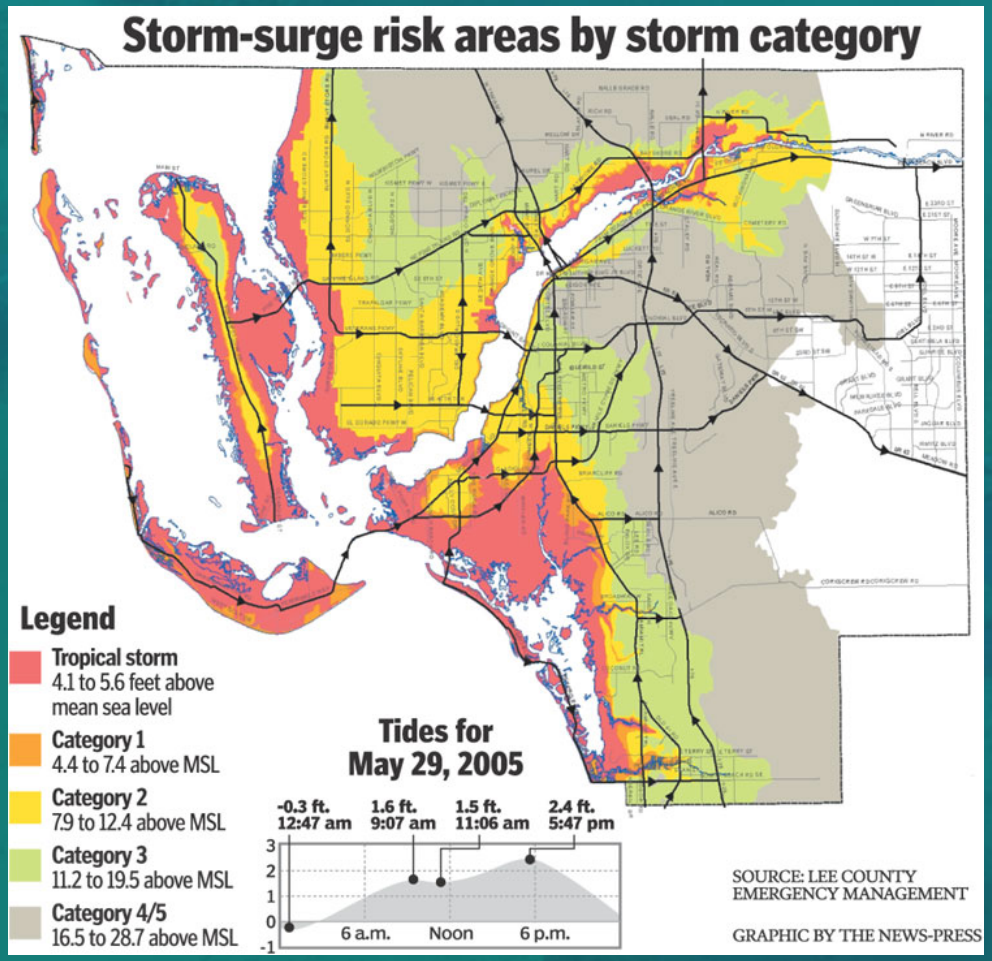
Different types and hierarchy of maps

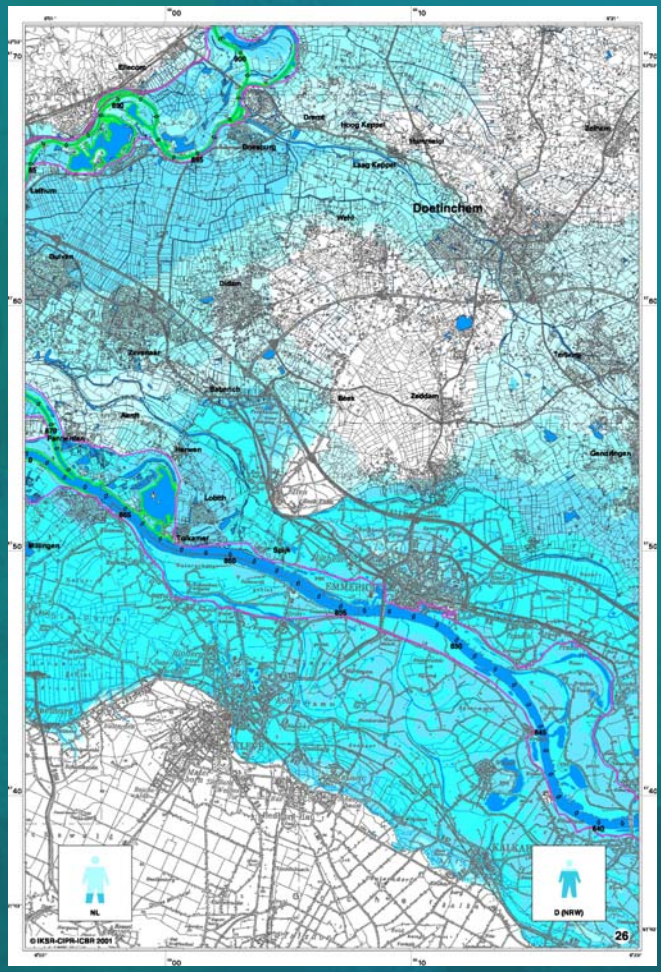


Potential flood extent



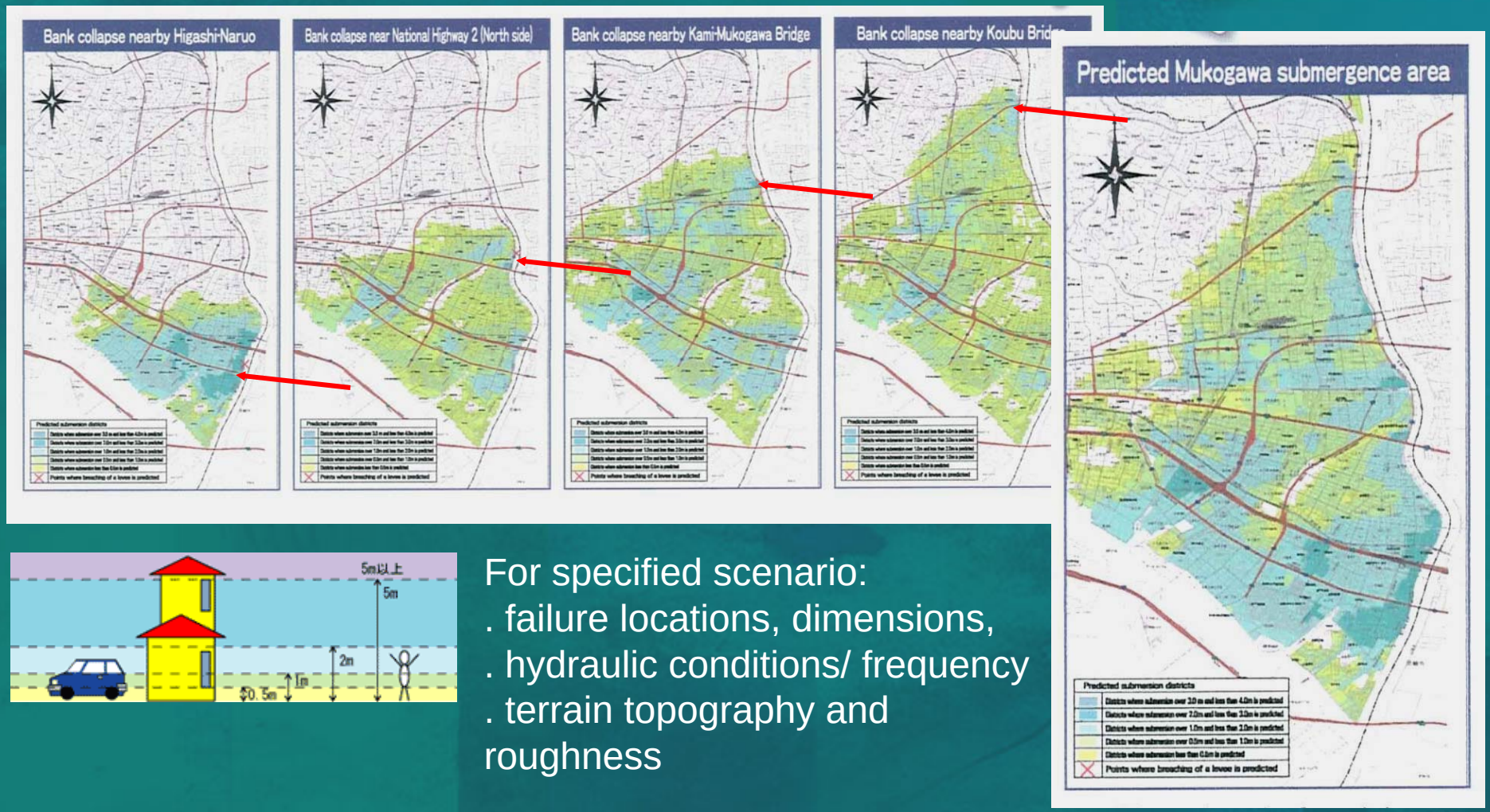
Flood extent





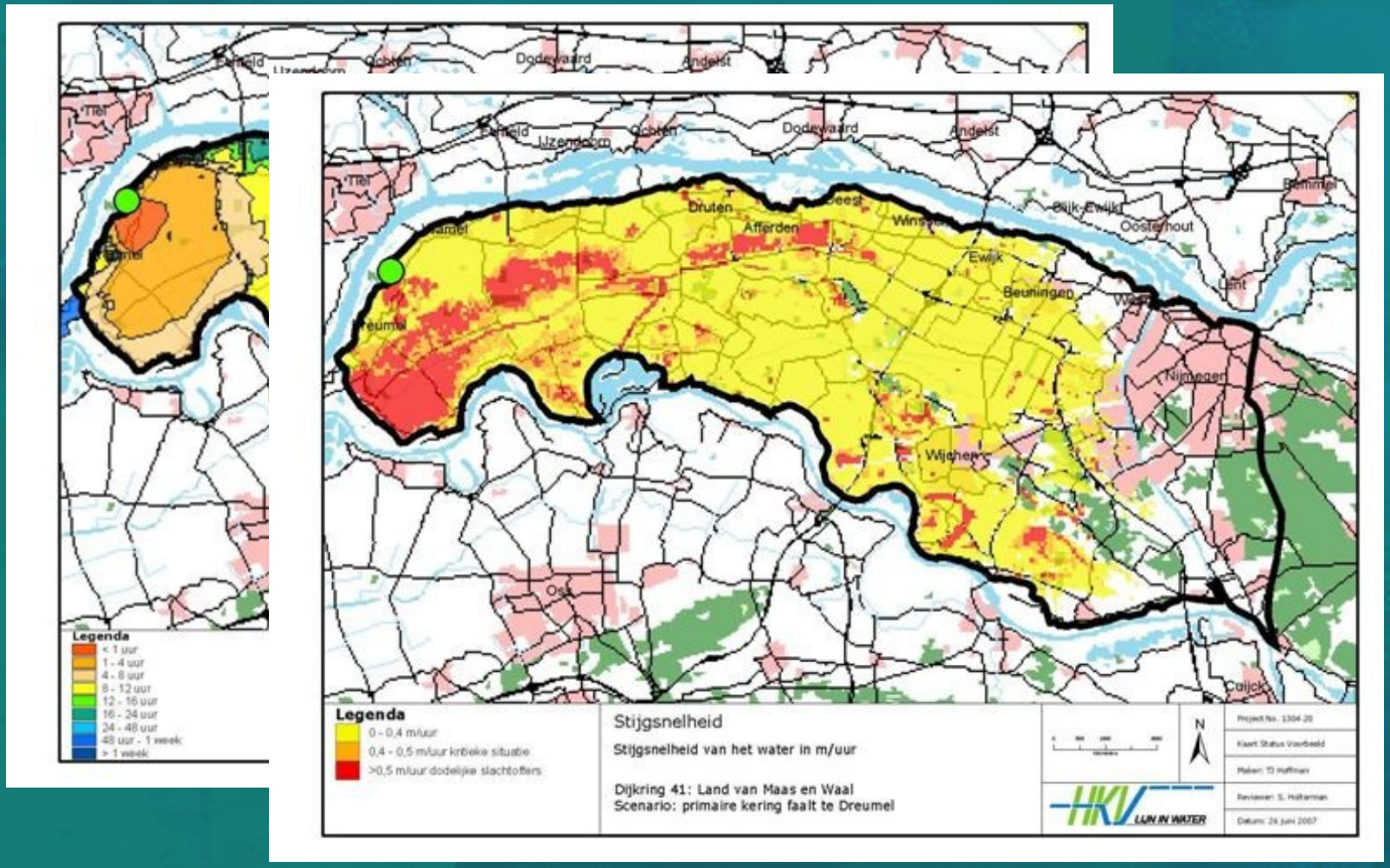
Ministerie van Verkeer en Waterstaat

Scenario's → max. depth of flooding

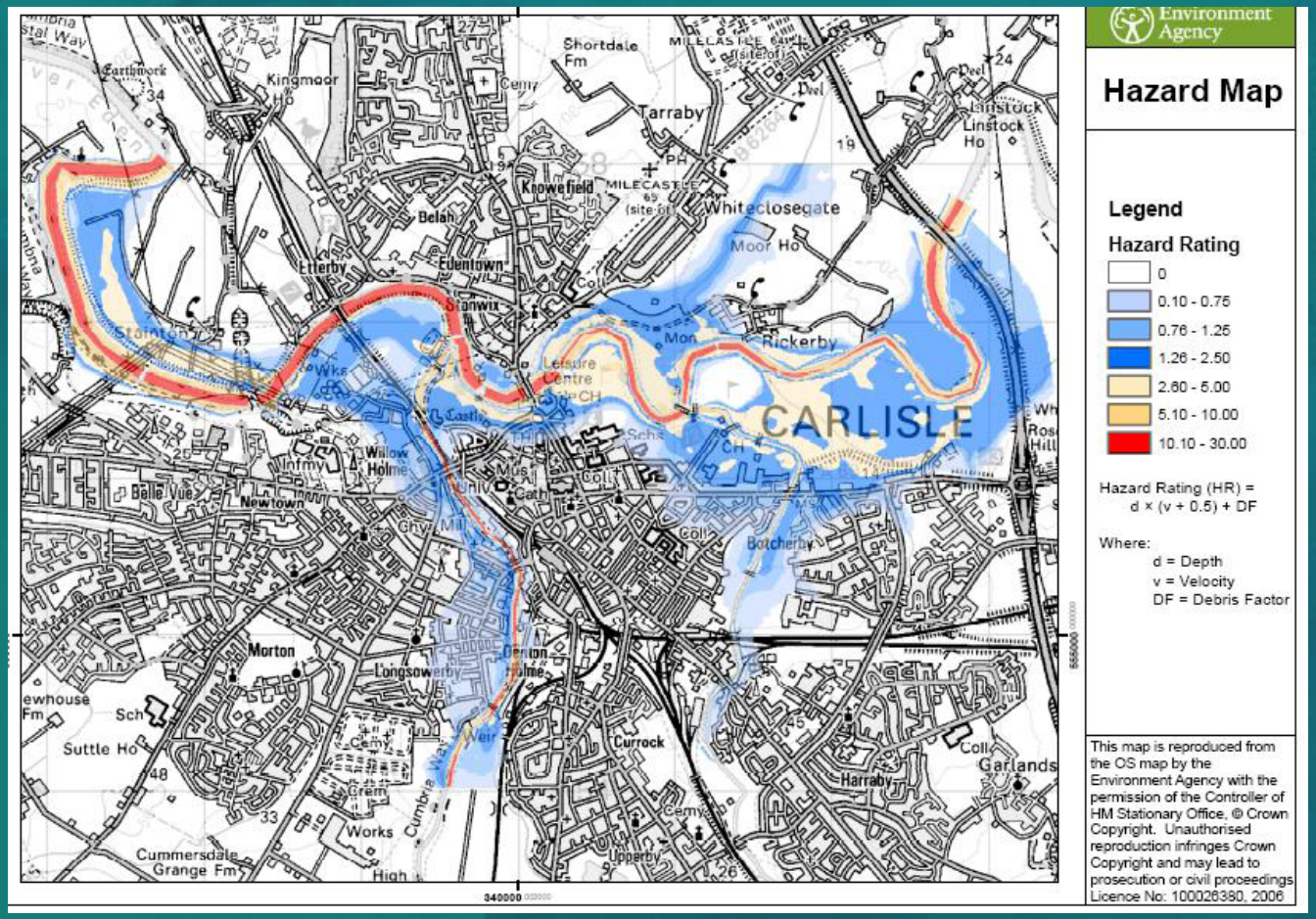


For specified scenario:
. failure locations, dimensions,
. hydraulic conditions/ frequency
. terrain topography and roughness

Hazard: progress, rate of rise



Hazard /Current velocities



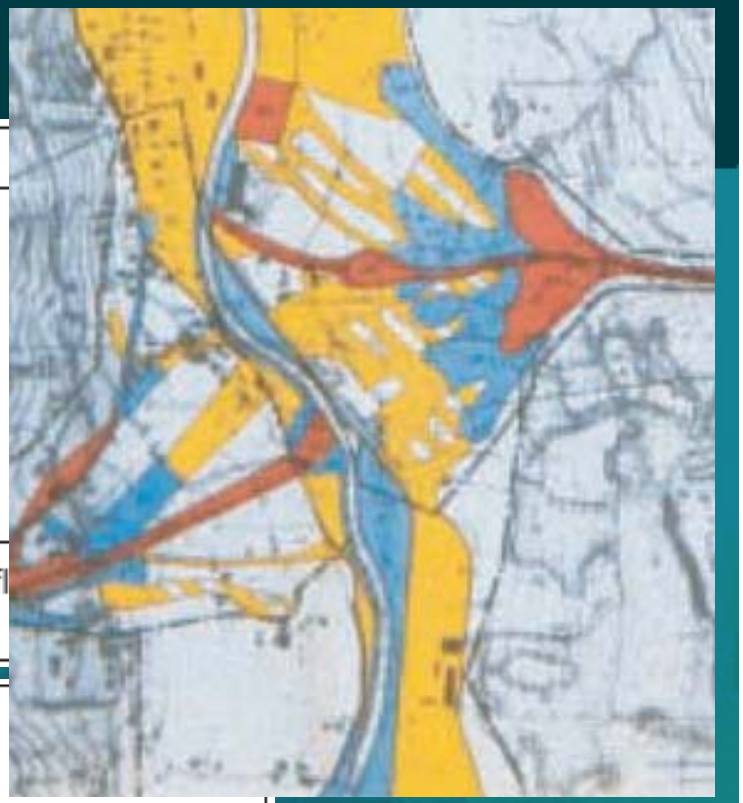
Hazard as combination of:

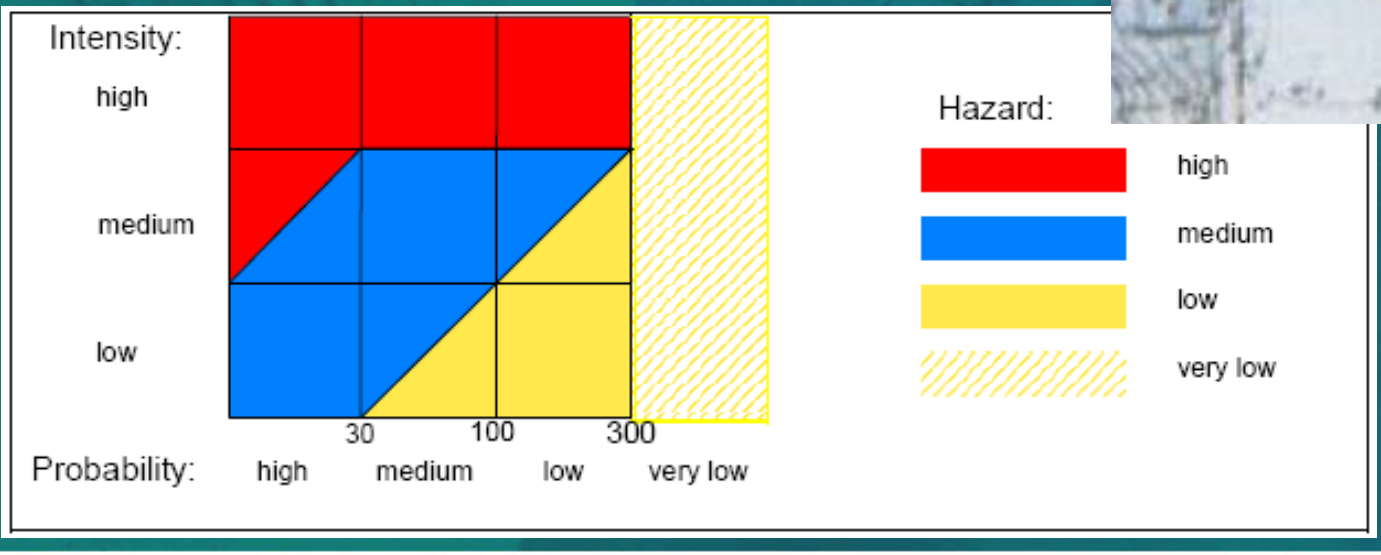
- Current velocity
- Depth
- Debris

Hazard

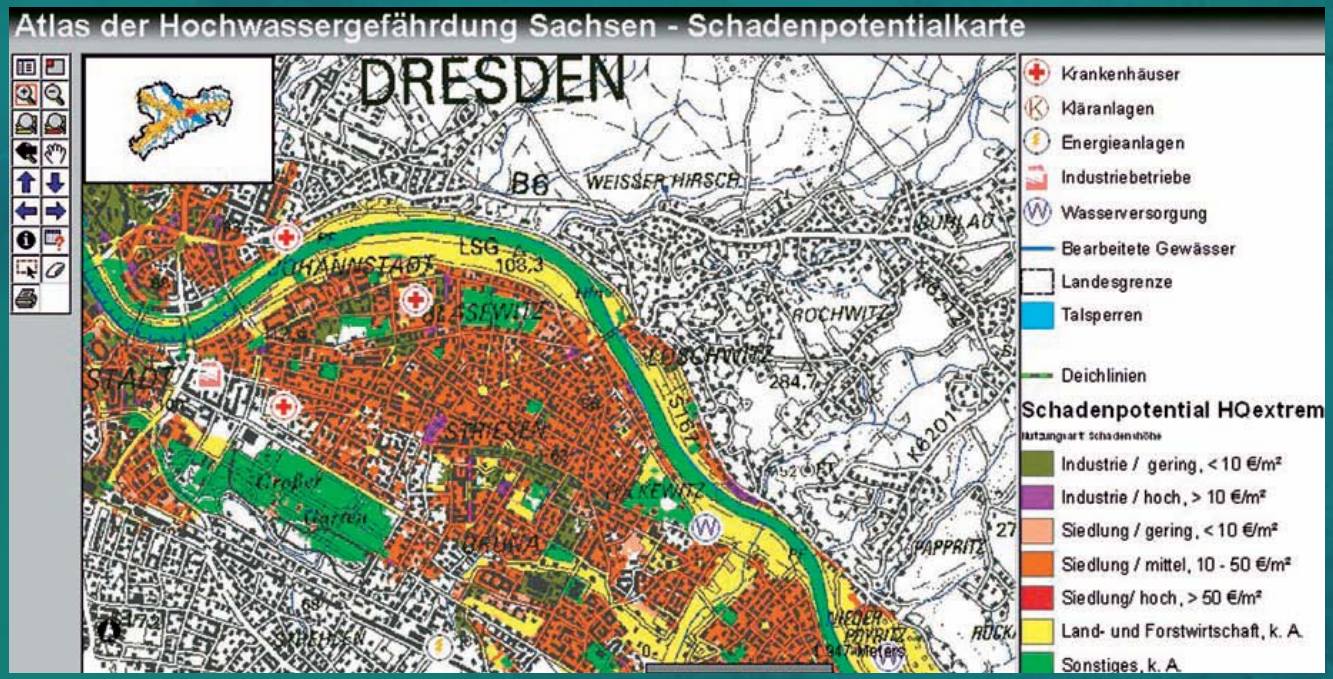
Process	low intensity	medium intensity
Debris flow	--	D < 1 m and v < 1 m/s
Static flooding	h < 0.5 m	0.5 < h < 2 m
Dynamic flooding	q < 0.5 m^2/s	0.5 < q < 2 m^2/s
Bank erosion	t < 0.5 m	0.5 < t < 2 m

D = thickness of debris front; v = flow velocity (flood or debris flow); h = fl
specific discharge ($m^3/s/m$) = h x v; t = extent of lateral erosion





Potential damage



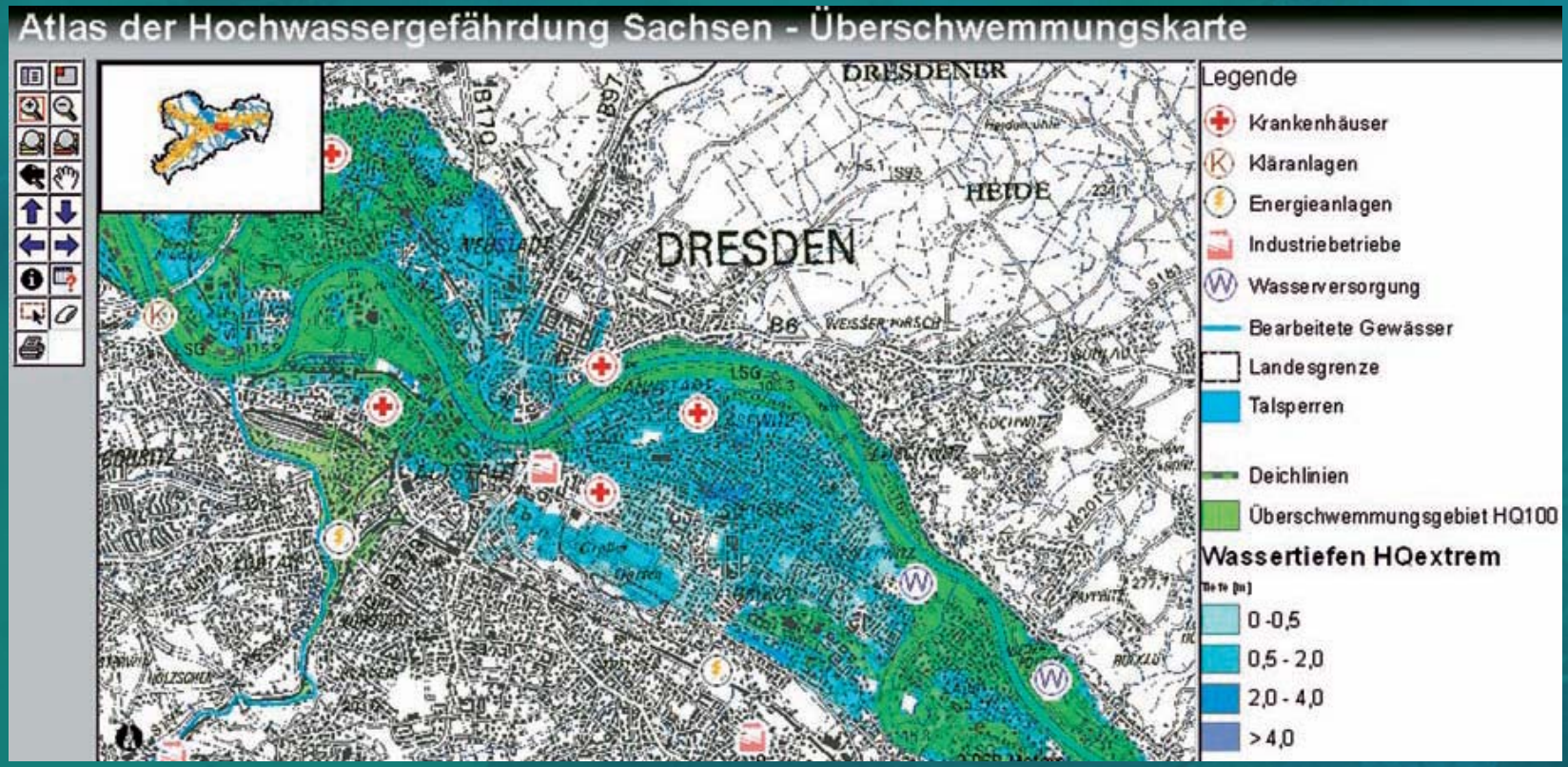
Damage in euro /m^2

Flood risk map for insurance

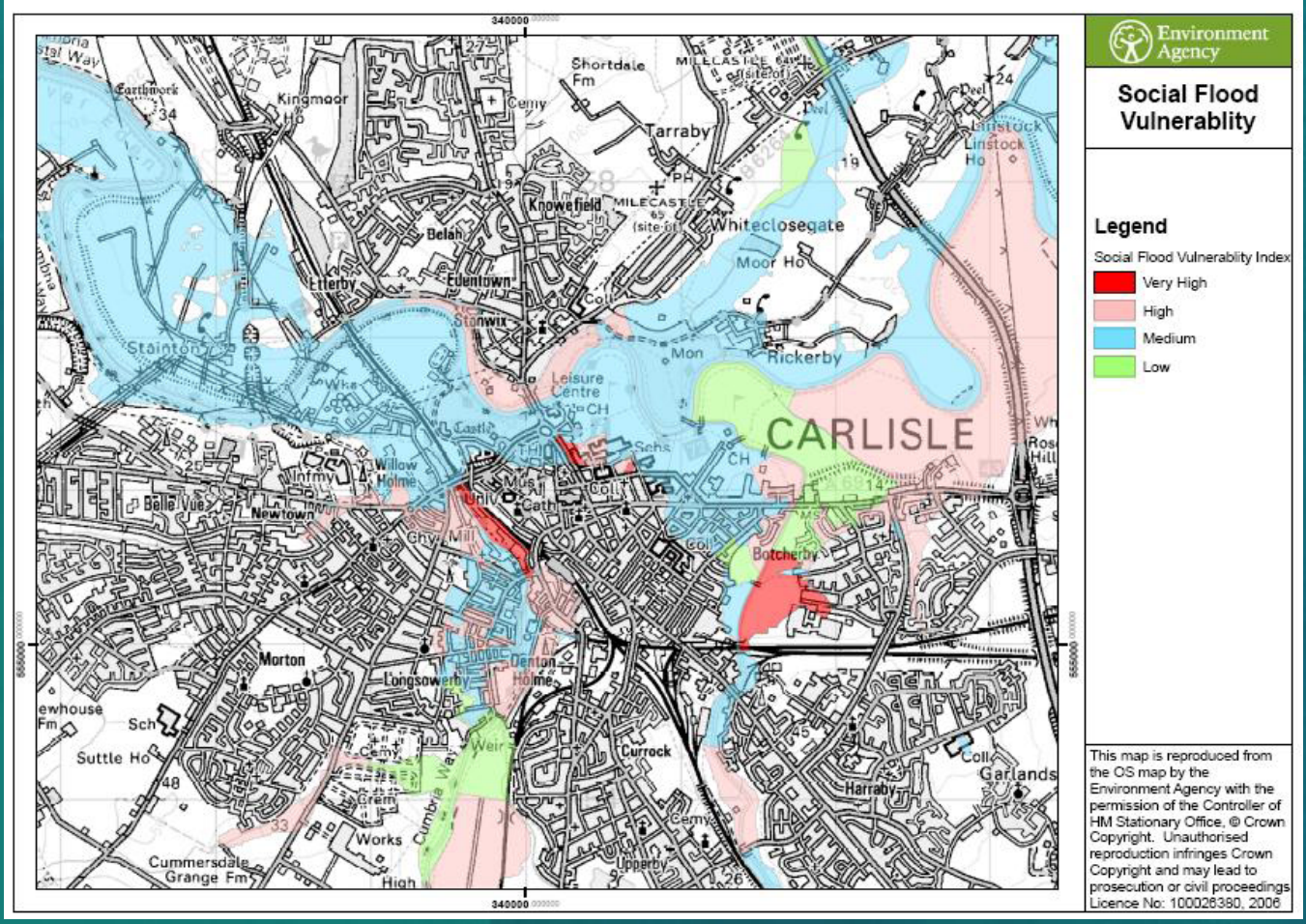
- GK1: very low risk (< 1/200)
- GK2: low risk (1/50 – 1/200)
- GK3: medium risk (1/10 –1/50)
- GK4: high risk (>1/10)

Risk = probability!

Risk / vital objects

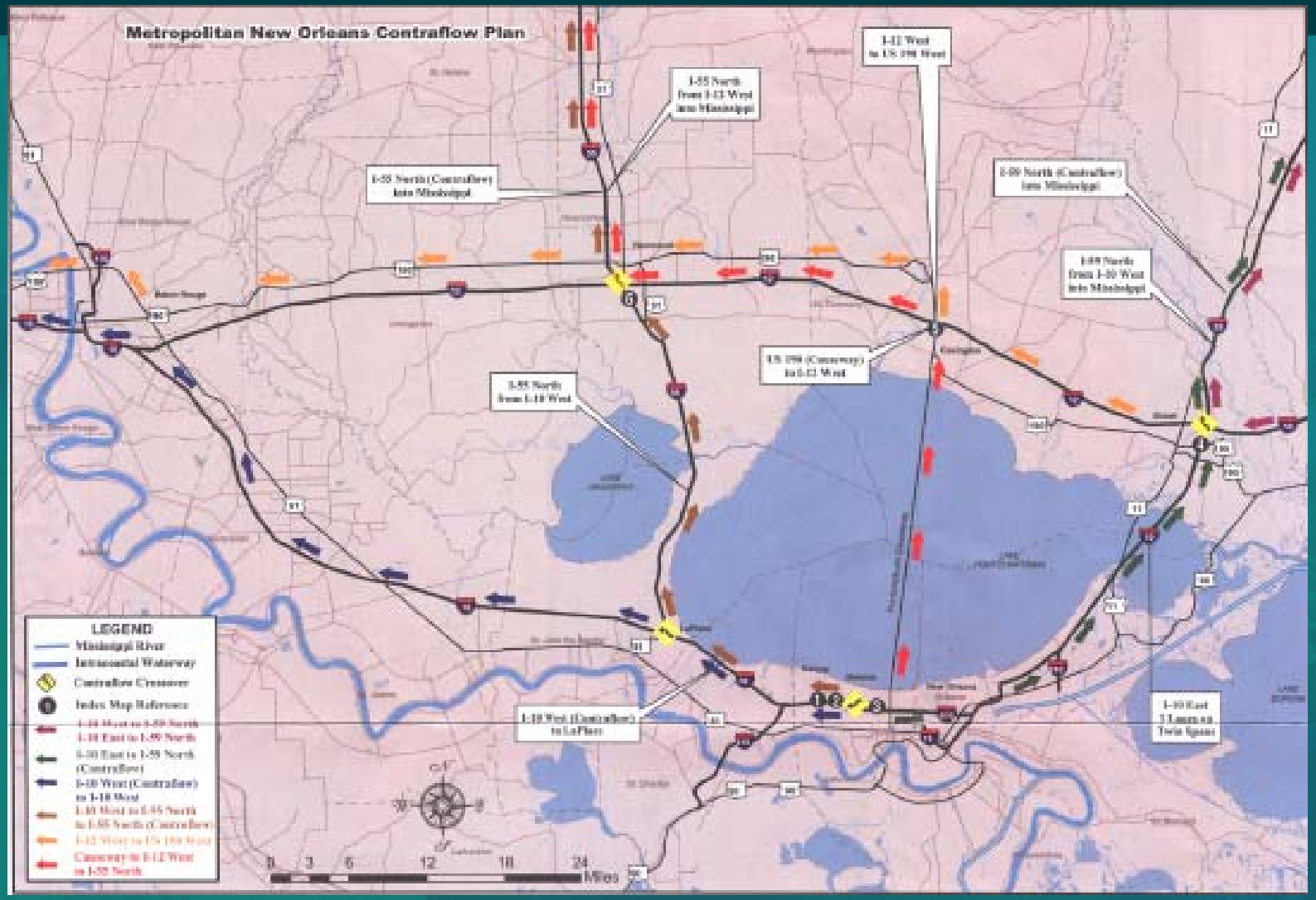


Social vulnerability



- Age
- TV and Radio
- Own car
- Unemployment
- House owner

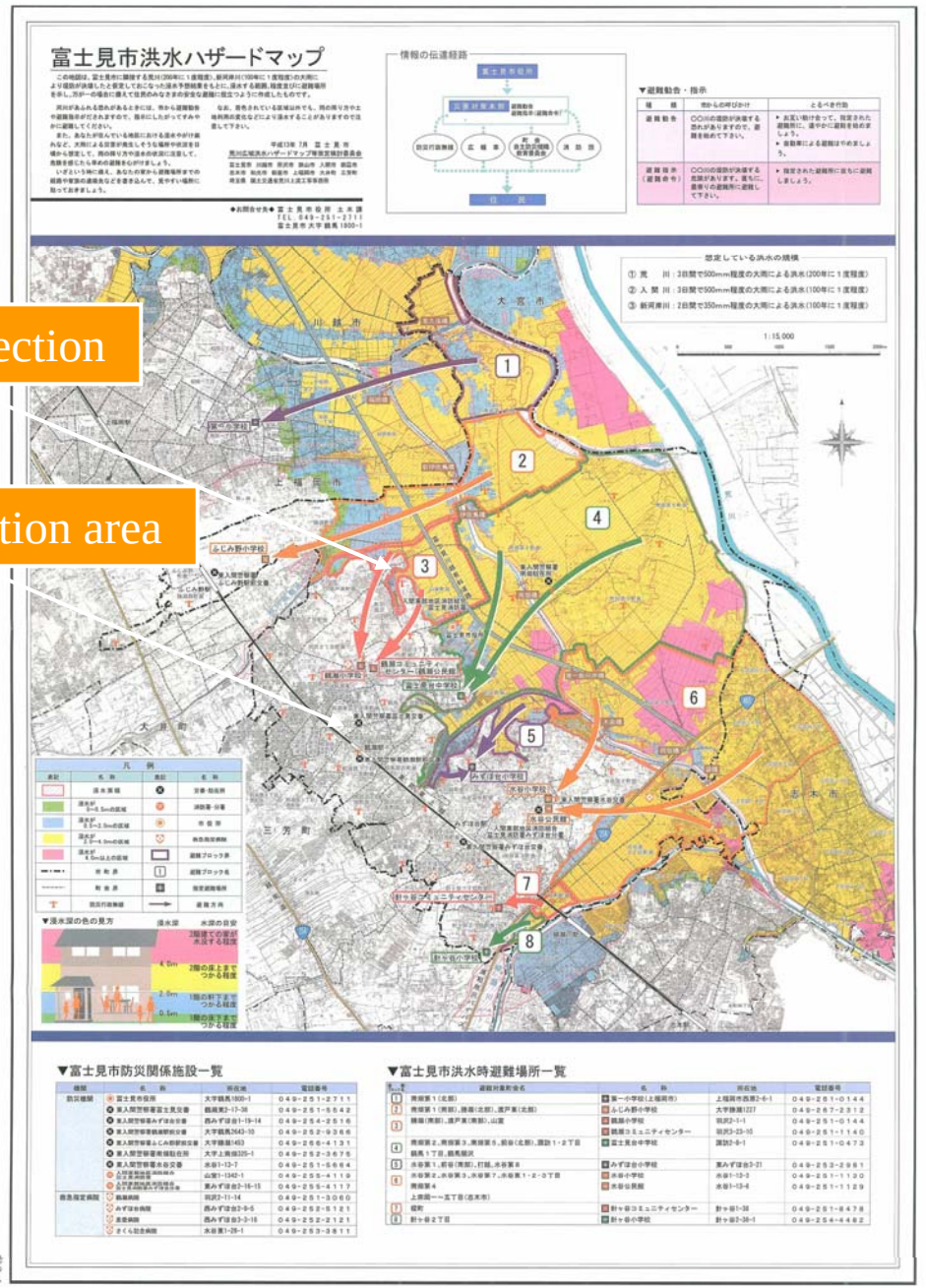
Evacuation routes



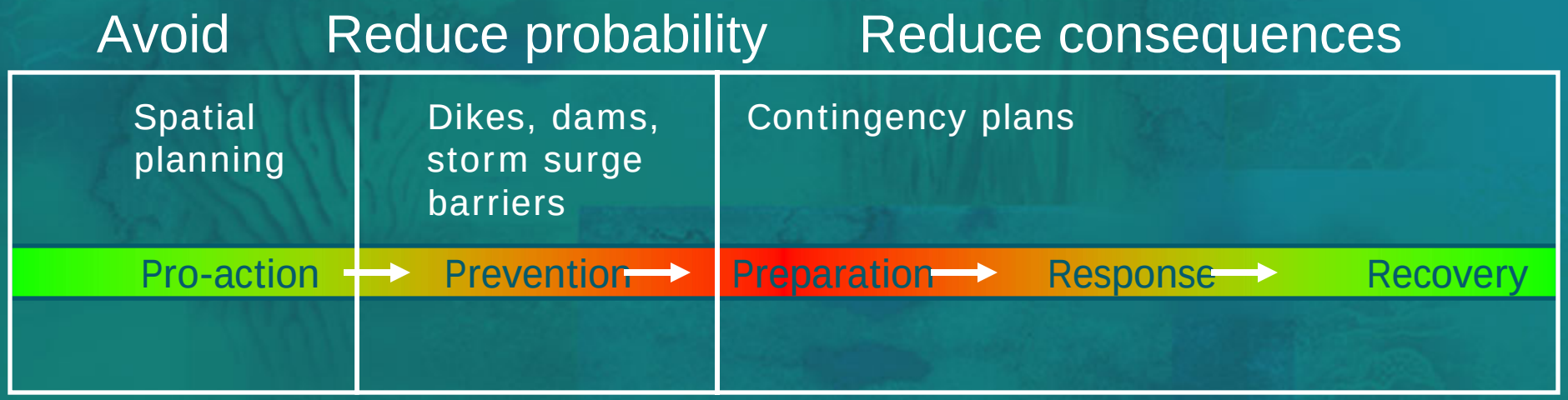
Japan - evacuation

Evacuation direction

Evacuation area



3. Type of map and potential use: the “hazard cycle approach”



Avoid

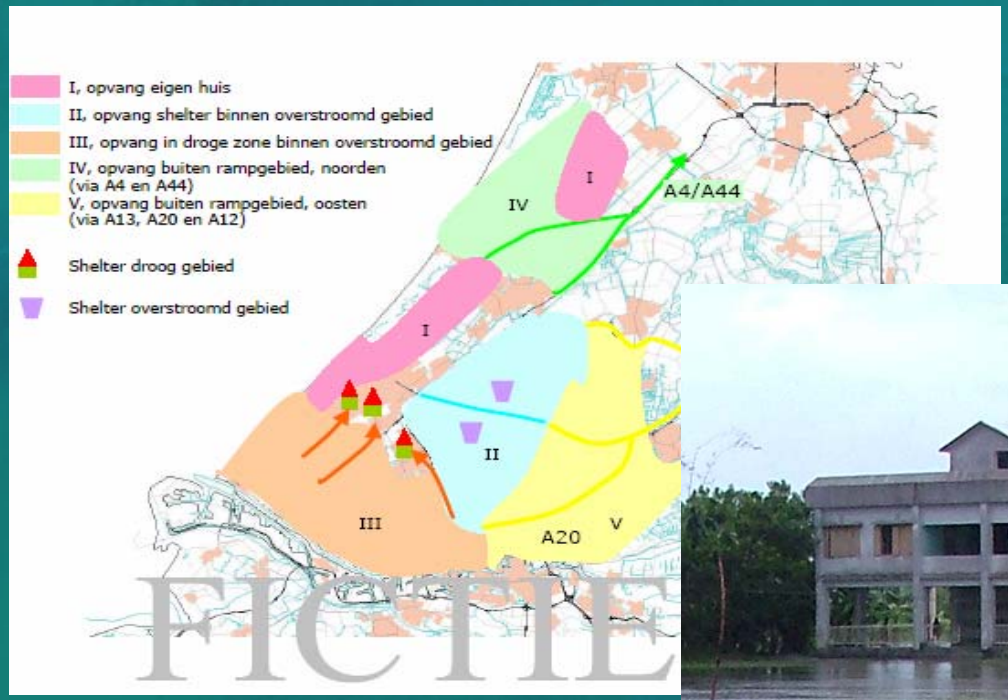
Spatial Planning:

- Hazard zones
- Building codes

Prevention

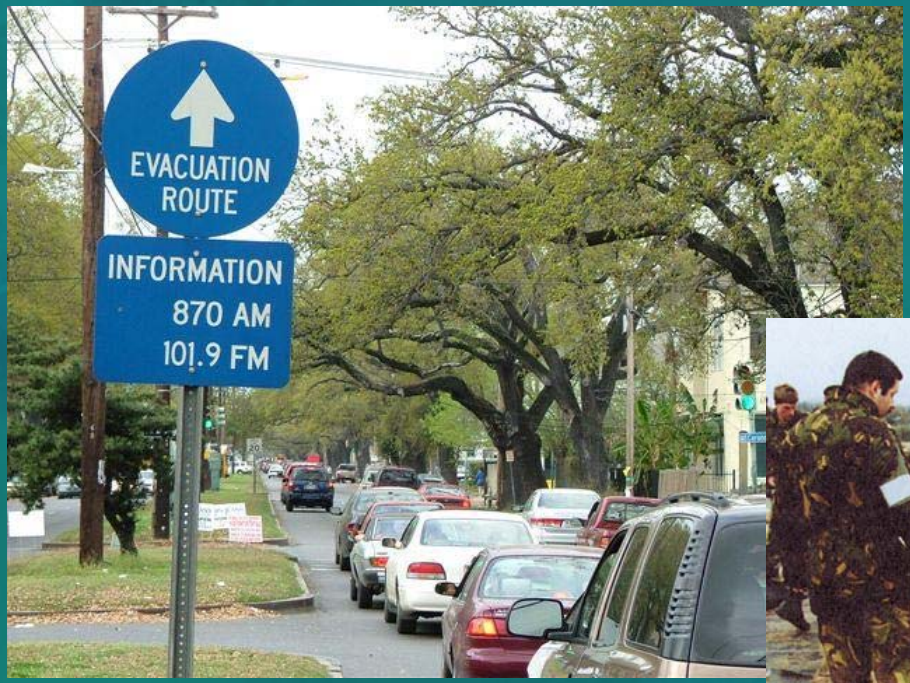
- Build and maintain flood defences:
  - sea walls
  - storm surge barriers)
  - Dikes/ embankments

Prepare



- Emergency and contingency planning
- Shelters

Response



- Early warning
- Evacuation
- Emergency repair

Repair and recovery

- Repair damage
- Insurance

Potential users:

- Authorities responsible for:
  - Land use planning
  - Flood protection
  - Emergency planning
- Companies responsible for vital services (electricity, gas, water, sewerage, communications, transport, hospitals)
- Insurance
- Citizens and businesses

Flood maps, users and content

	Extent/ probab	Depth	Velocity/ Debris	Progress/ Rise	Vulne-rability	Risk objects
Land use plng. (Avoid)	E	d	(d)			(d)
Flood risk Mngmt Planning (Prev.)	E	E	d	d	E	E
Emergency Plng (Prepare/ respons)	E	E	E	E	d/E	d/E
Insurance (Recover)	E	d	d			E
Public awareness	E	d		d		

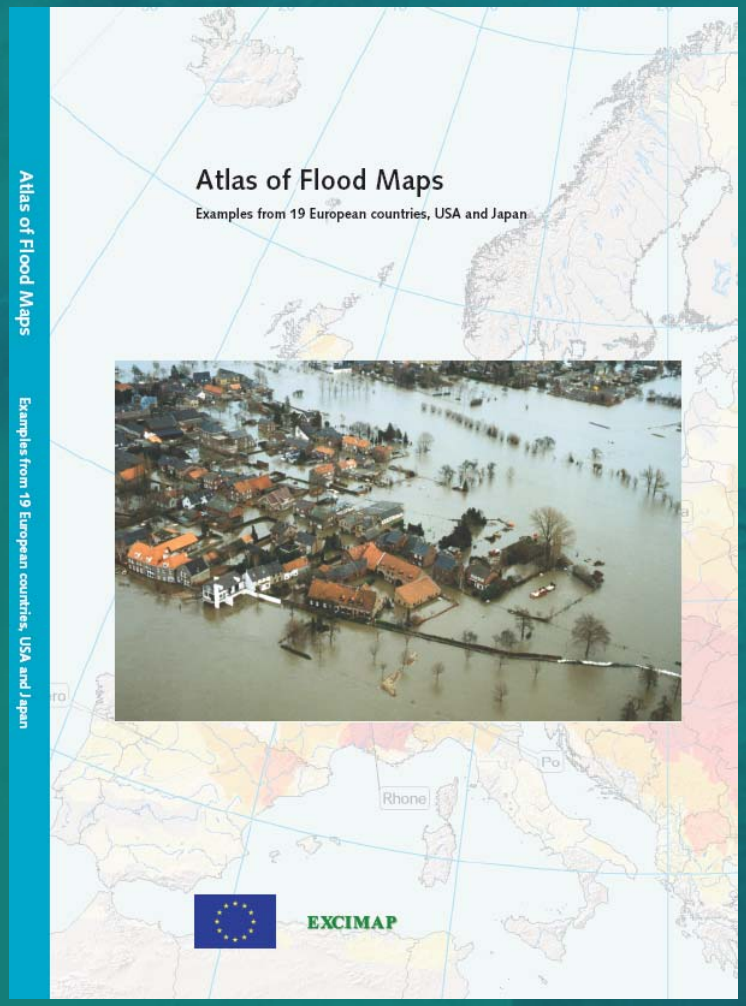
E=Essential

d=desirable

Conclusion

- Flood risk maps are vital for land use planning, preparation, response and general awareness in flood prone areas
- Flood risk maps contain specific types of information (extent, depth, ..), depending on their primary purpose
- Different types of maps require increasing types of background information (flood level, surface, land use, population densities and groups, vital services, highways)

Any questions?

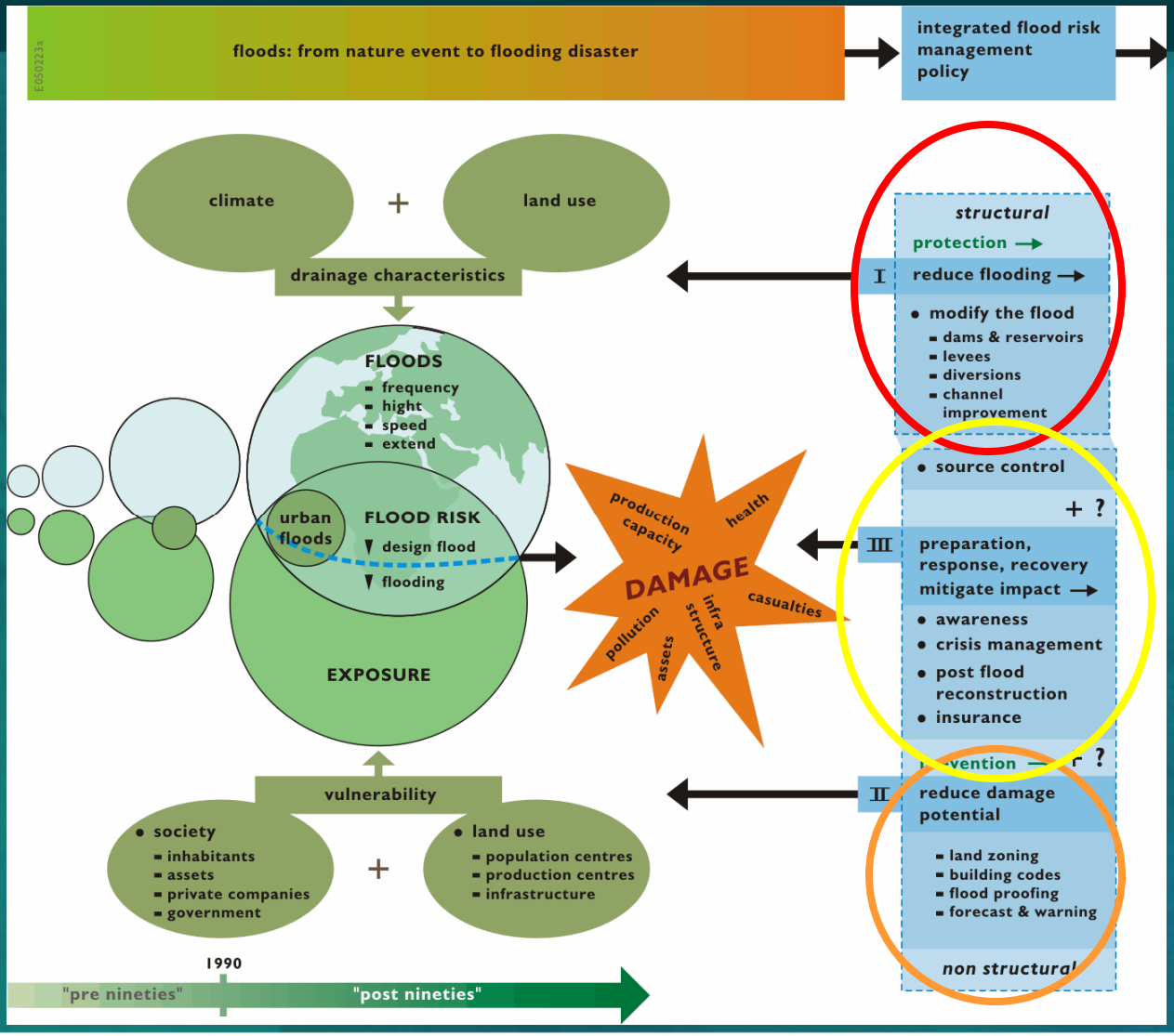


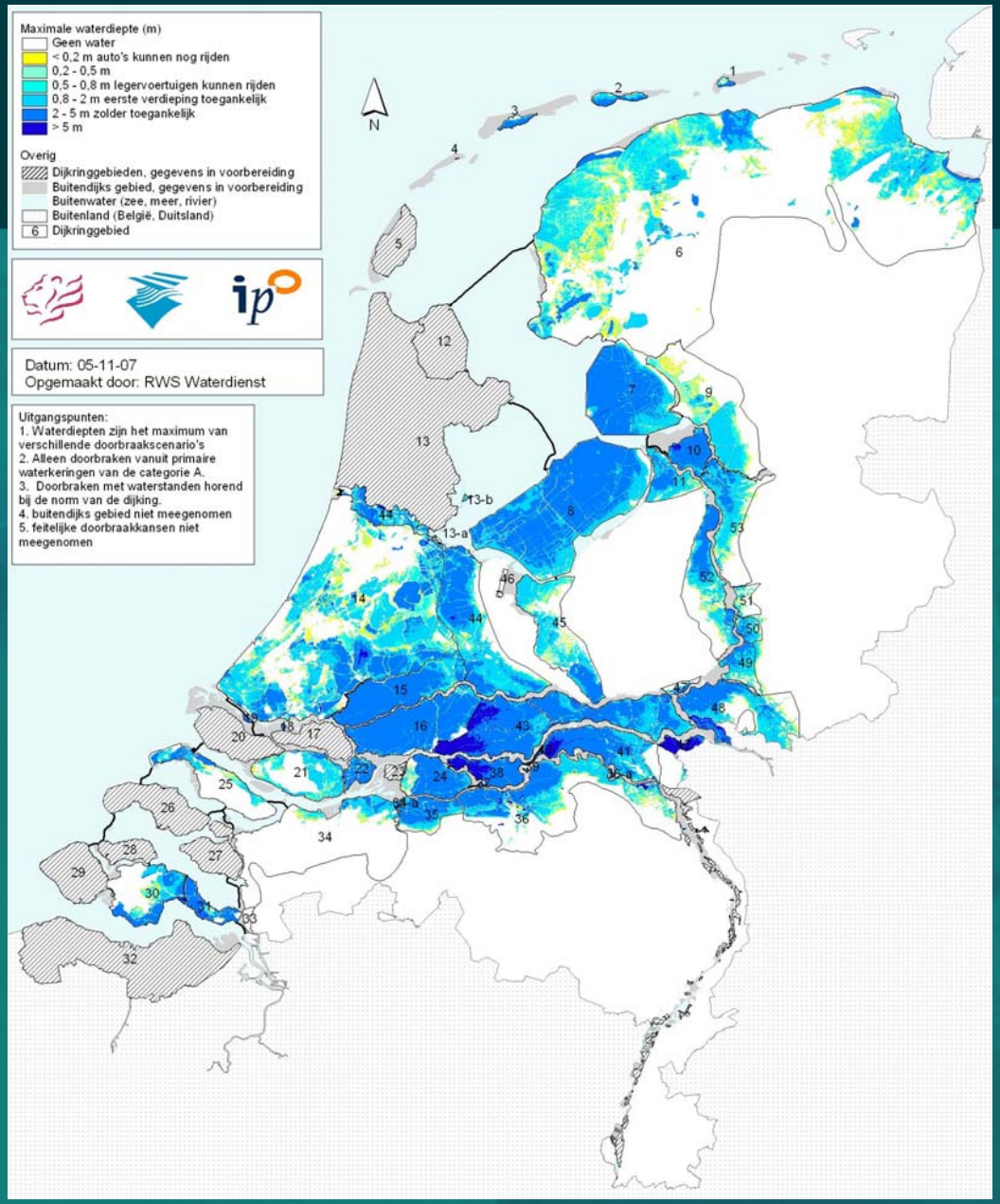
http://ec.europa.eu/environment/water/flood_risk/flood_atlas/index.htm


DAILY EXPRESS
£1 off OK! MAGAZINE
Splendid offers for your family
HALF PRICE ENTRY TO THESE TOP THEME PARKS
THIS SUPERB ENCYCLOPAEDIA CD-ROM FOR JUST £2.99
SECRET MAP THAT COULD SLASH THE VALUE OF YOUR HOME
Astonishing attack on 'scheming' Diana and the Queen Mother

Vragen ??????

2. Integrated Flood Risk Management policy and measures ("safety chain")




Maximale waterdiepte (m)
Geen water
< 0,2 m auto's kunnen nog rijden
0,2 - 0,5 m
0,5 - 0,8 m legervoertuigen kunnen rijden
0,8 - 2 m eerste verdieping toegankelijk
2 - 5 m zolder toegankelijk
> 5 m
Overig
Dijkringgebieden, gegevens in voorbereiding
Buitendijks gebied, gegevens in voorbereiding
Buitenwater (zee, meer, rivier)
Buitenland (België, Duitsland)
6 Dijkringgebied
Datum: 05-11-07
Opgemaakt door: RWS Waterdienst
Uitgangspunten:
1. Waterdiepten zijn het maximum van verschillende doorbraakscenario's
2. Alleen doorbraken vanuit primaire waterkeringen van de categorie A.
3. Doorbraken met waterstanden horend bij de norm van de dijking.
4. buitendijks gebied niet meegenomen
5. feitelijke doorbraakkansen niet meegenomen
N