Flood risk management

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river terraces
a) 1839  
b) 1916  
c) 1938
aerial view
plan view
main channel
oxbow lakes
river network
Solutions?

How to describe flood risk?

How to decrease risk?

Answer can be found after the modelling of the flood pass
Which method to choose?

1D modelling – villages
2D modelling – cities (urbanized areas)
Preparing data

1. hydrological data
   (basin area, precipitation, landuse, passed floods)

2. hydraulical data
   (profiles, cross-sections, bed and valley roughness, hydraulic structures)

3. DTM
hydrological data
hydraulical data
DTM
building model
the result of 1D modeling
numerical model of water surface
inundation areas
inundation areas
flood risk – flood defence
decrease outflow

source: Norbert Bäuml, Bauoberrat, Bayerische Verwaltung für Ländliche Entwicklung, 2010
flood risk – flood defence
decrease outflow
decrease impermeable surfaces
also named “land cover”

elimination or reducing
of impermeable areas

reparation activities
flood risk – flood defence
decrease outflow
decrease impermeable surfaces
also named “land cover”

<table>
<thead>
<tr>
<th>LAND COVER [%]</th>
<th></th>
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<tbody>
<tr>
<td>0-5</td>
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<tr>
<td>5-10</td>
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<tr>
<td>10-20</td>
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<tr>
<td>20-30</td>
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</tbody>
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source:
flood risk – flood defence
decrease outflow
reservoirs
flood risk – flood defence
decrease outflow

small retention

Friedrich-Wilhelm Brumberg, Richard Kempe, 2010

Bartnik et al. 2006
flood risk – flood defence
create zones of different risk
connect risk to water depth and velocity

local velocities
prędkości lokalne

wiry tworzące się pod wpływem
chropowatości terenu zalewowego

wymiana pędu,
wiry w płaszczyźnie
rozdziału przekroju
koryta

floodplane

main channel

secondary flow - wires

shear stresses

Shiono i Knight 1991; Kubrak, Nachlik i inni 2003
flood risk – flood defence

education

evacuation plans
flood risk – flood defence
organization
flood comities
localization of flood defence stuff
spatial planning
sustainable development
Flood risk management

Thank you