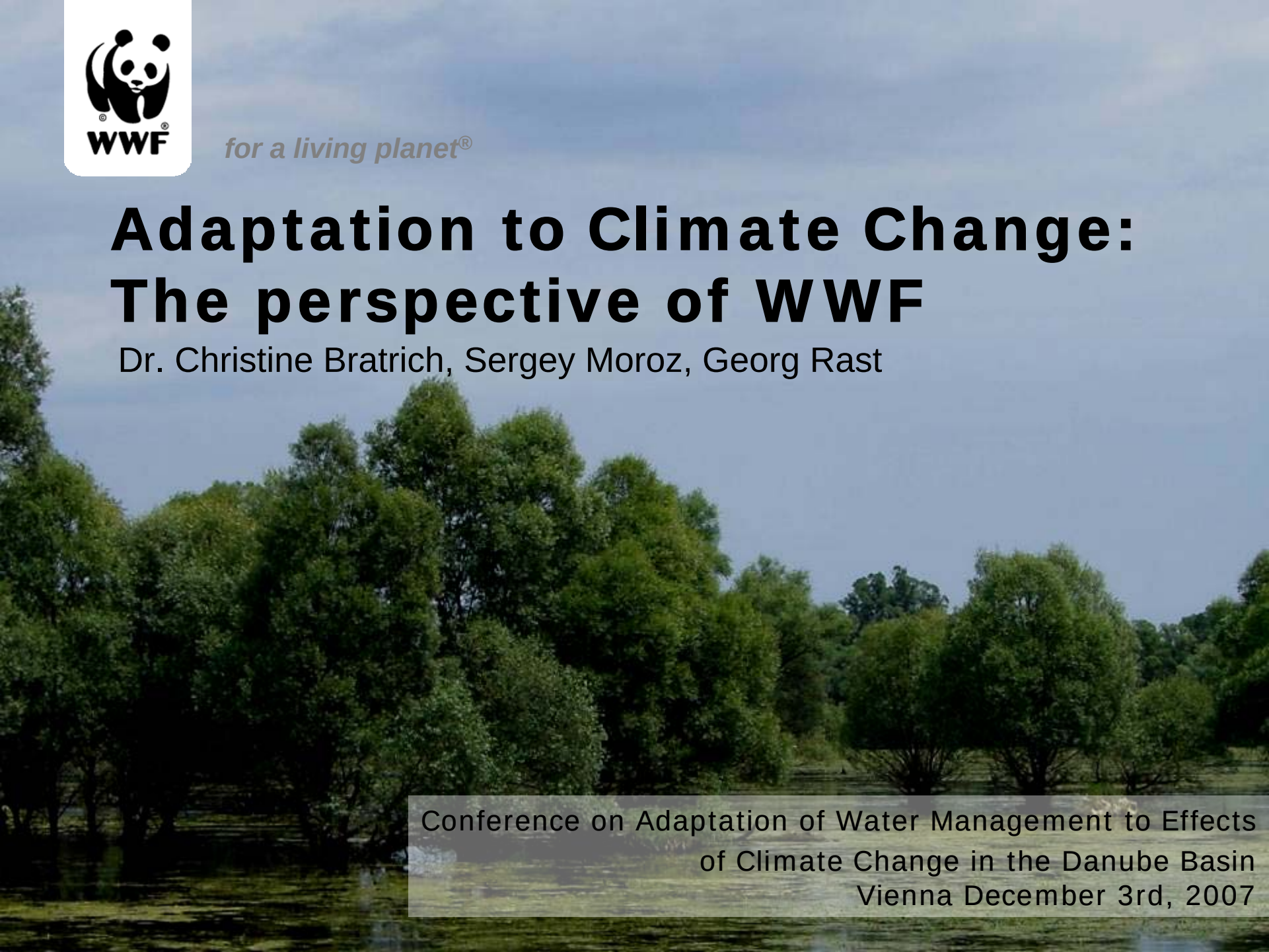


for a living planet®

Adaptation to Climate Change: The perspective of WWF

Dr. Christine Bratrich, Sergey Moroz, Georg Rast

Conference on Adaptation of Water Management to Effects of Climate Change in the Danube Basin
Vienna December 3rd, 2007

Danube: European lifeline

- > 80 million people living in the basin
- > 20 million people depend on its drinking water

Danube: European lifeline

- > 50 protected areas of international importance
- 330 bird species (223 red list)
- > 100 fish species

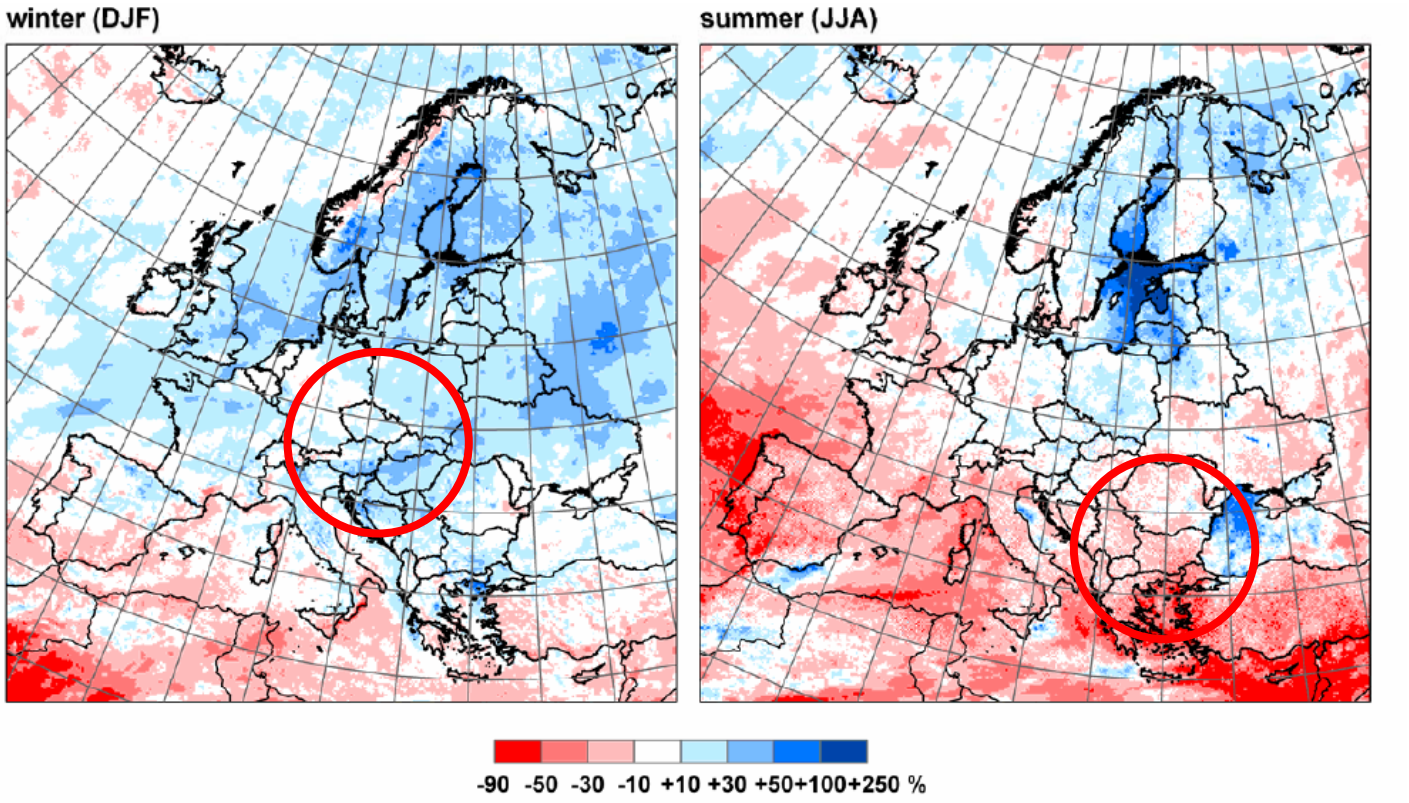
Content

1. major threats related with climate change
2. major drivers that create cumulative impacts
3. WWF's adaptation strategies


WWF
for a living planet®
Most severe effects?

Danube: impacts of climate change

Change in seasonal maximum 5-day precipitation

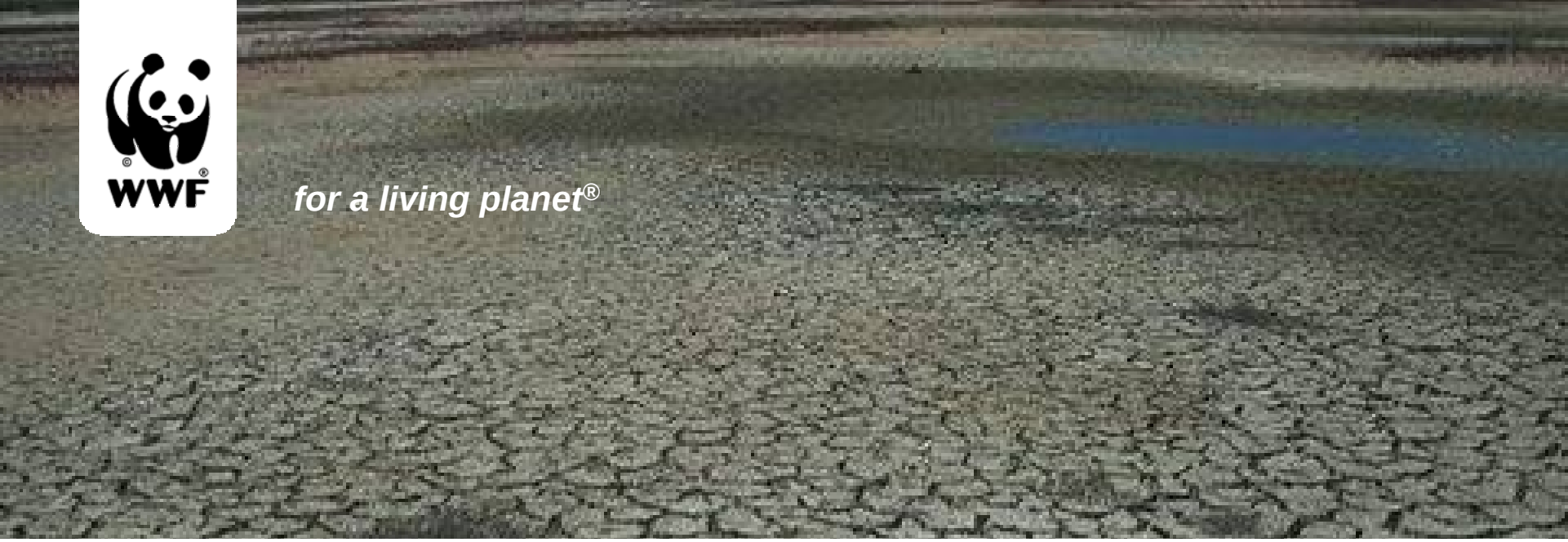


source: Danish Meteorological Institute;worst case scenario IPCC A2; maps show difference between control run (1960 – 1990) and scenario run (2070 – 2100) after M. Grasserbauer; EC 2006

Direct and indirect impacts

flood events ↑
low flow/draughts ↑
water temperature ↑

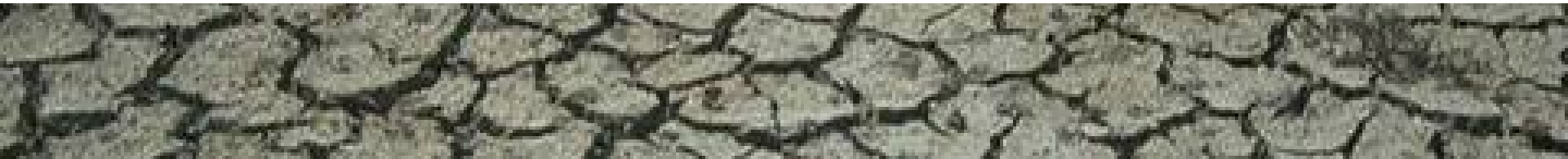
water quality ↓
invasive species ↑
groundwater recharge ↓
connection of functional habitats ↓
natural biodiversity ↓



for a living planet®

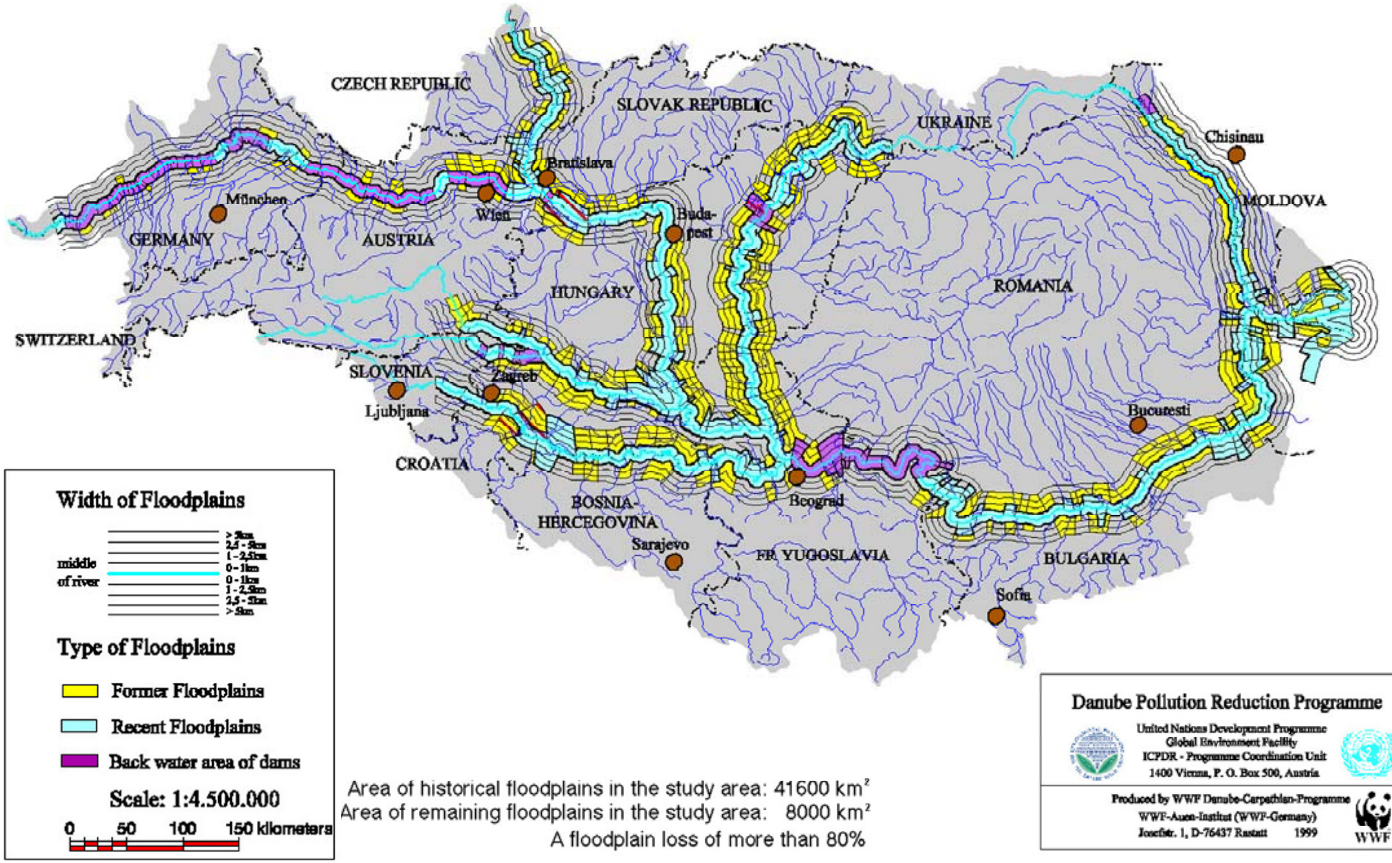
climate change comes only on top of other drivers:

reduced Danube's natural ability to adjust and absorb disturbance



landuse changes

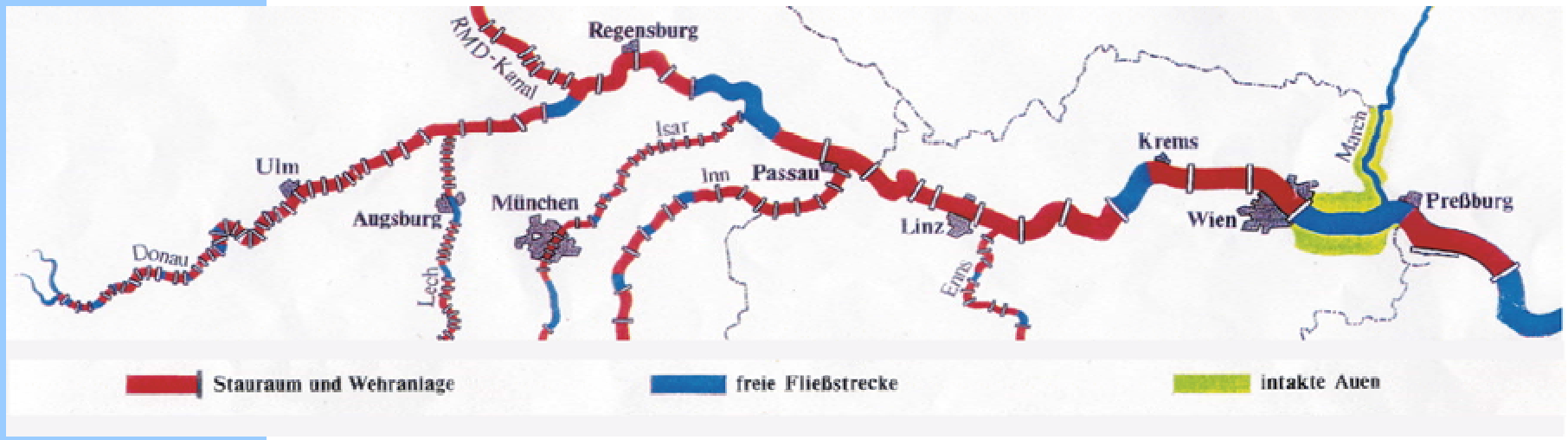
> 80% of former floodplains are already lost



hydropower

chain of reservoirs with 58 dams

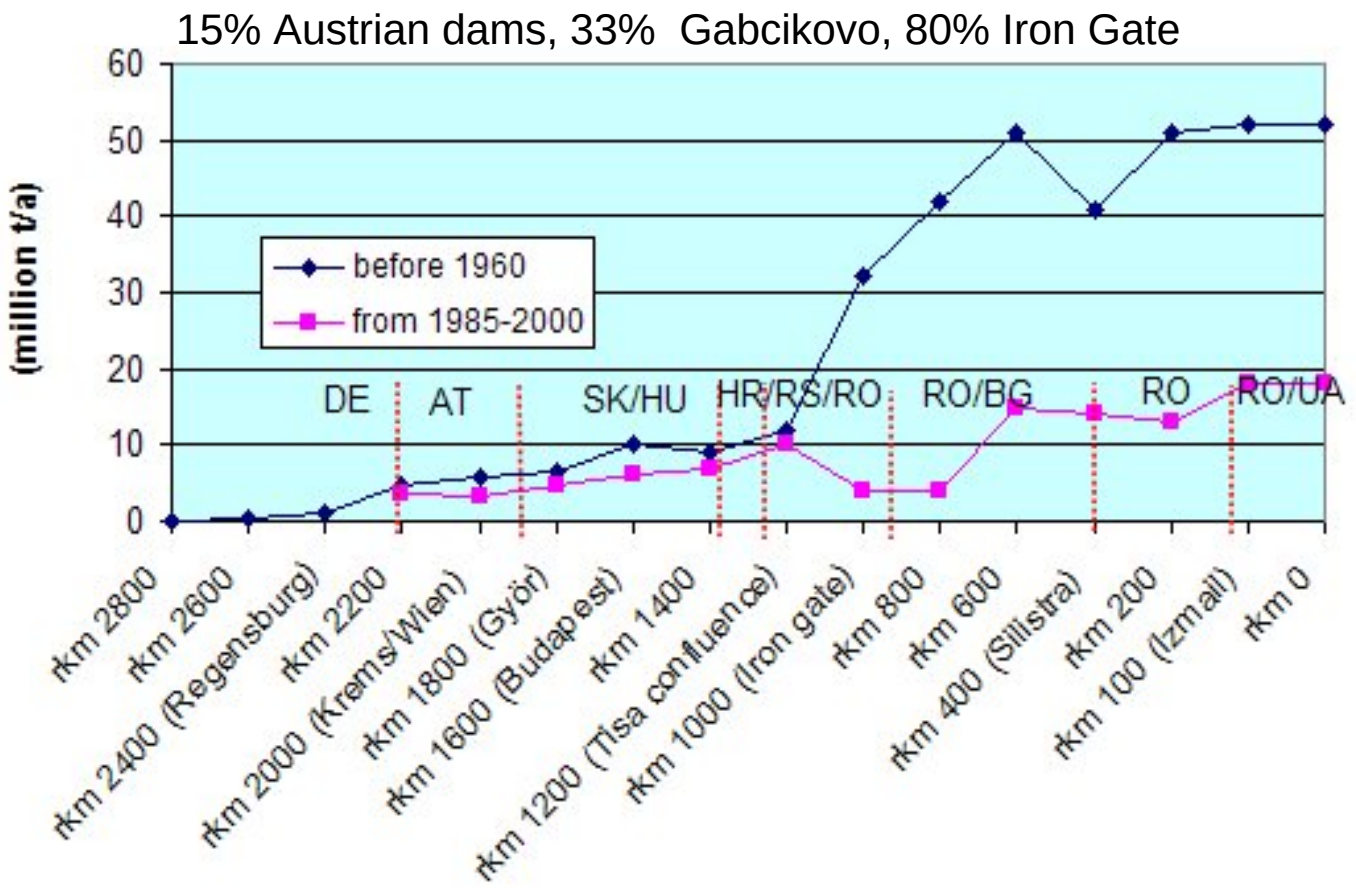
only 3 free flowing sections in upper Danube



- interruption of fish migration
- trapped sediments
- loss of habitat & species
- reduced water quality

hydropower

massive changes in suspended sediment budget



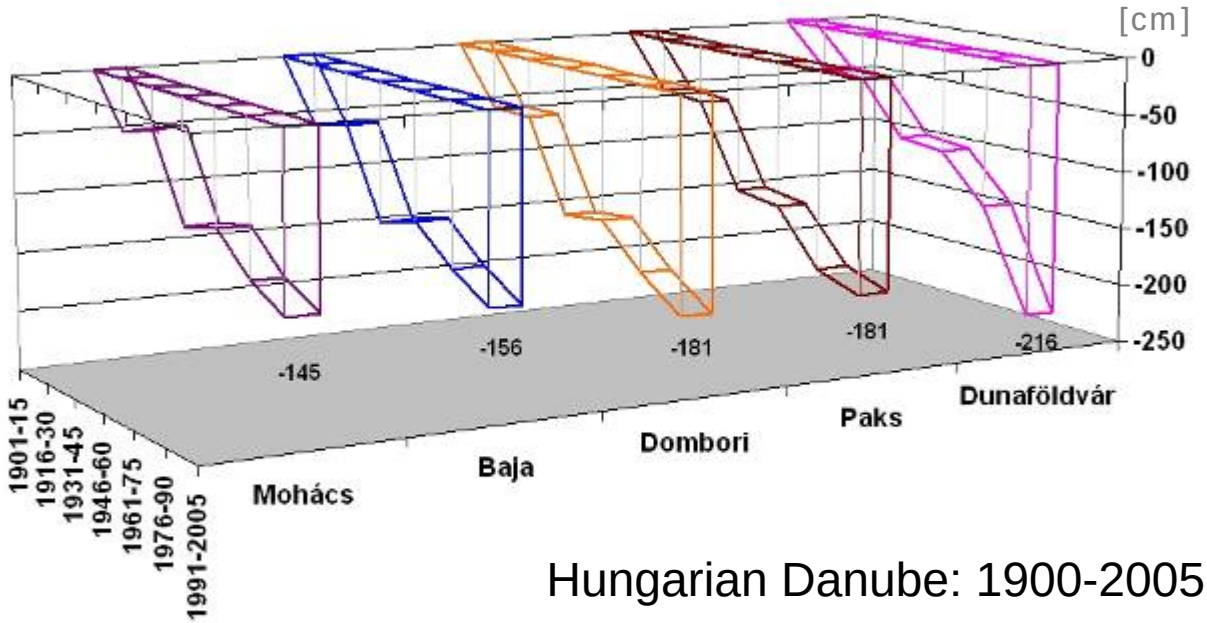
source: U.Schwarz (2007) Assessment of the balance and management of sediments of the Danube waterway

navigation

Danube is a major European waterway

fairway construction & maintenance, river regulation combined with trapped bed loads

massive incision of river beds
leads to disconnected floodplains &
lower groundwater tables



Hungarian Danube: 1900-2005

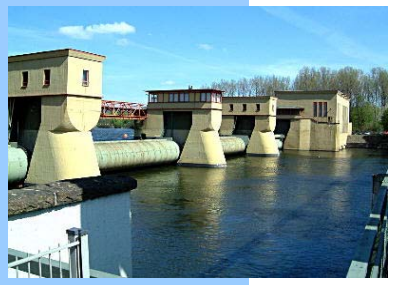
source: U.Schwarz (2007) Assessment of the balance and management of sediments of the Danube waterway

for a living planet®

WWF:

adaptation to climate change needs to consider all drivers & cumulative impacts

WWF's four adaptation principles



1. Work with nature – not against it

2. Find the right balance between use and protection & support innovative technology

3. Turn agriculture from problem driver to solution facilitator

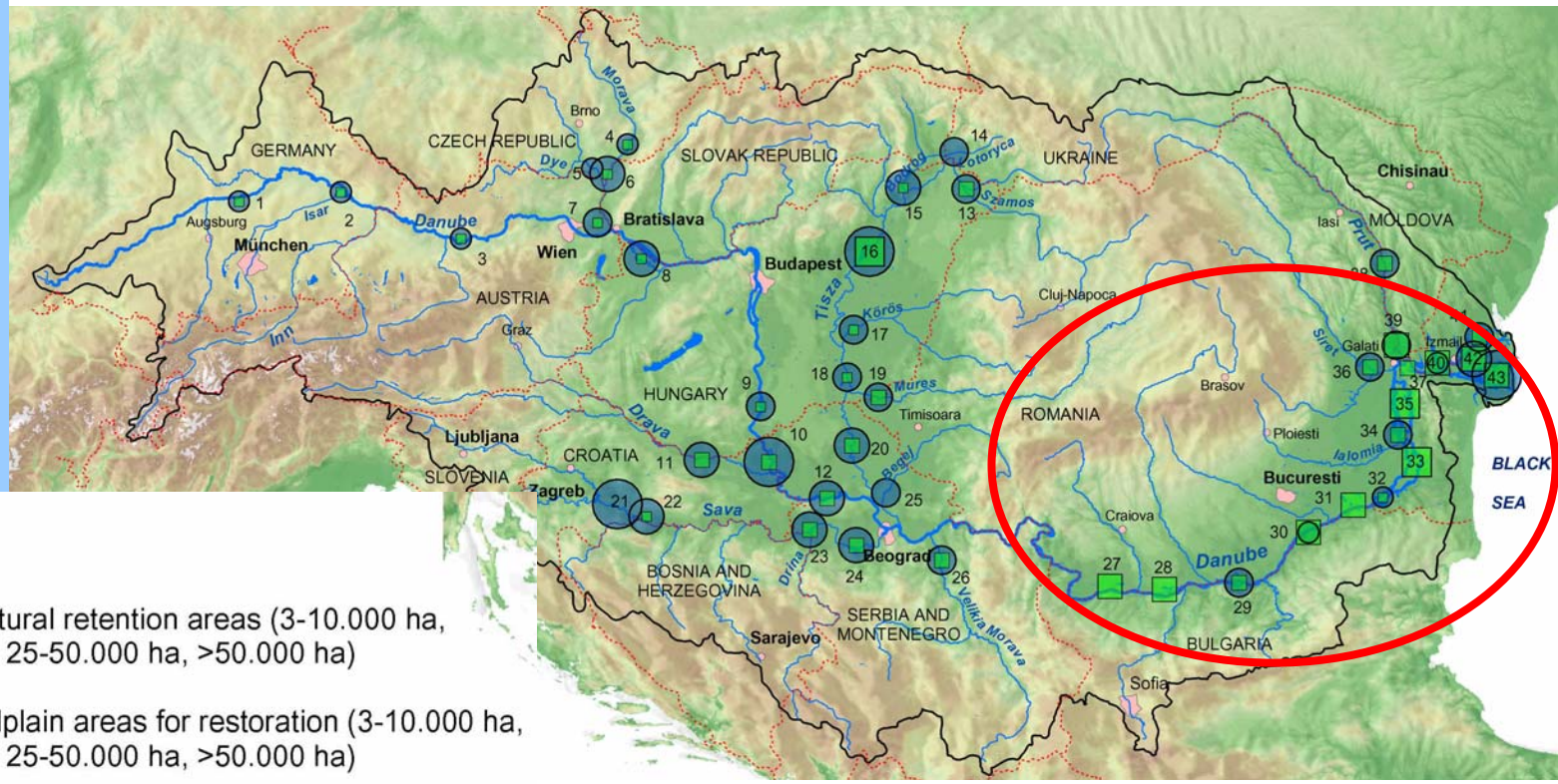
4. Integrate European policy & ensure wise use of EU funds

1. Work with nature – not against it

- protection of functional floodplain and wetland systems to buffer direct and indirect effects of climate change
- reconnection of side-arms, floodplains and wetlands
- dislocation or removal of dikes and embankments

WWF‘s study on flood mitigation

- 43 floodplains with high potential for flood risk mitigation
- total: >10,500 km^2 remaining areas; >7,000 km^2 restoration sites

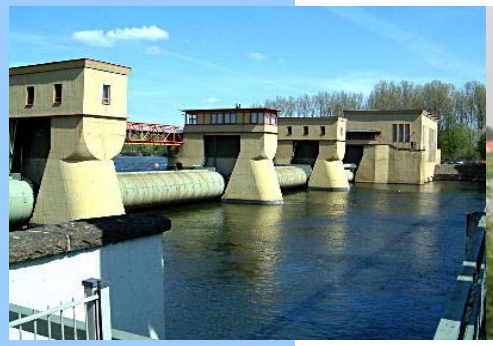


Legend

- Remaining natural retention areas (3-10.000 ha, 10-25.000 ha, 25-50.000 ha, >50.000 ha)
- Potential floodplain areas for restoration (3-10.000 ha, 10-25.000 ha, 25-50.000 ha, >50.000 ha)
- Danube River basin
- Danube

source: WWF (2006)

2. Find the right balance & introduce innovative technology



- avoid new dams in the Danube, empower existing facilities
- use existing dams for flood & drought mitigation based on sound forecast
- define fairway conditions according to ecological needs, not 2,5 m draft for the entire Danube
- renew the Danube fleet, use new ship technology & river information systems
- support intelligent logistic chains (flexible adaptation to weather conditions)

Adapt ships to the Danube

- INBAT, FLABI, Pascat, Futra Tanker…
  (catamaran, convoy techniques)
- focus on RO-RO technique
- airbag systems for low water sections (i.e. catamaran)

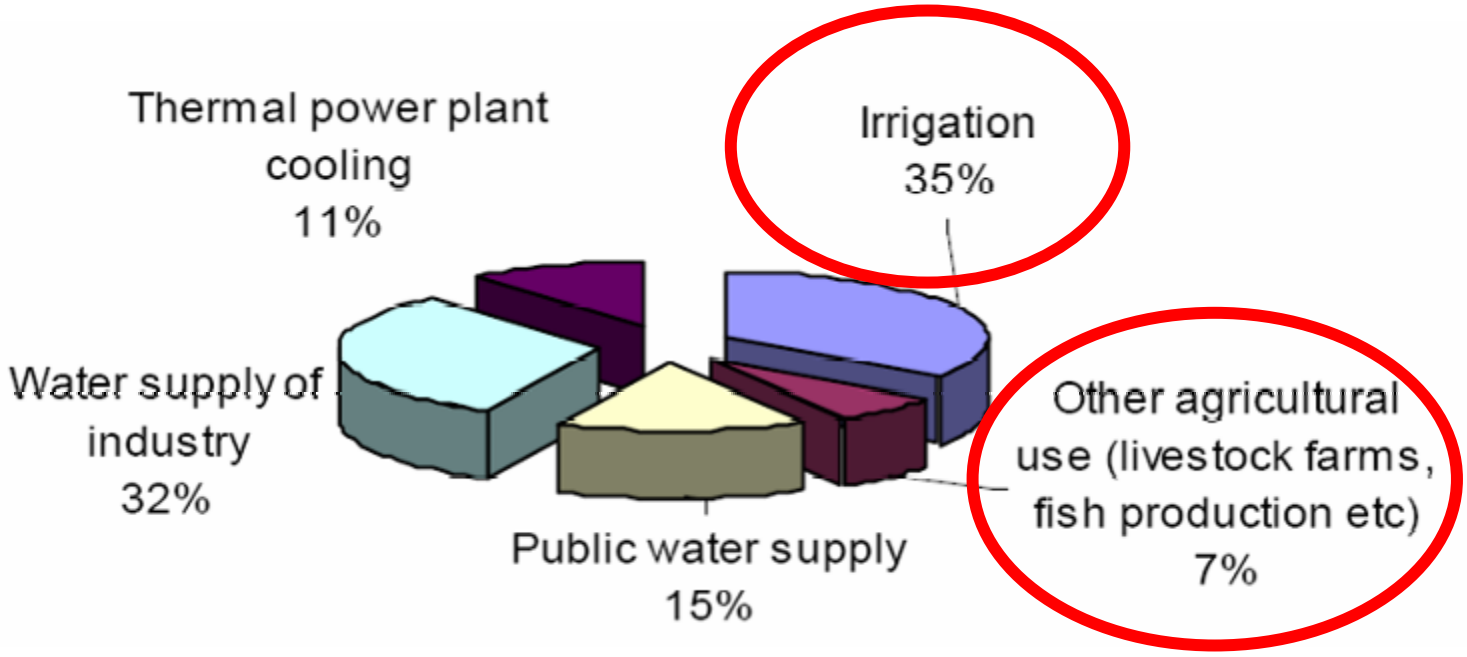
Source:
Guesnet, T. (2005) Final technical Report, Including Technological Implementation Plan. – Duisburg, 14.01.2005.

Versuchsanstalt für Binnenschiffbau e.V., Duisburg, 2004

3. Turn agriculture from problem driver to solution facilitator

- reduce peak run-off in the catchment area (afforestation, introducing natural barriers)
- improve rainwater infiltration (changing agricultural practices)
- re-install natural water courses
- increase water efficiency and equal water distribution

Ensure sustainable water use: example Tisza



- agriculture >40% of total water consumption (1% of discharge)
- during minimum flow: up to 25% of discharge for agriculture

Source: ICPDR 2007

4. Integrate EU policy & use EU funds wisely

- apply the solidarity principle to motivate upstream countries to take action
- EU Regional and Cohesion Funds: support ‘finance packages’ for measures based on river basin planning not only project-by-project
- support landowners to use Common Agricultural Policy (CAP) or Fishery Funds (EFF) for flood and drought mitigation measures

Potential restoration sites: lower Danube

- reconnecting fish ponds and former meanders
- potential to use EAFRD or EFF funds
- landmark for new cooperation (authorities, NGOs and business sector)


WWF
for a living planet®
?

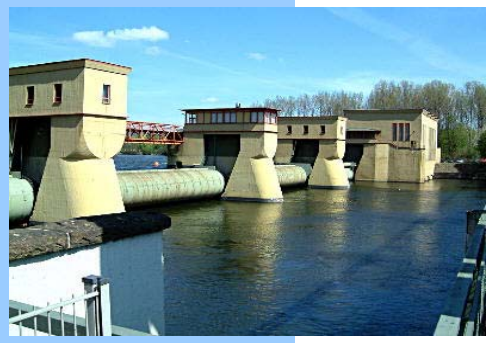
Climate change comes only on top of other drivers:

Help to improve Danube's natural ability to adjust and absorb disturbance!

for a living planet®

Thank you

Avoid new dams

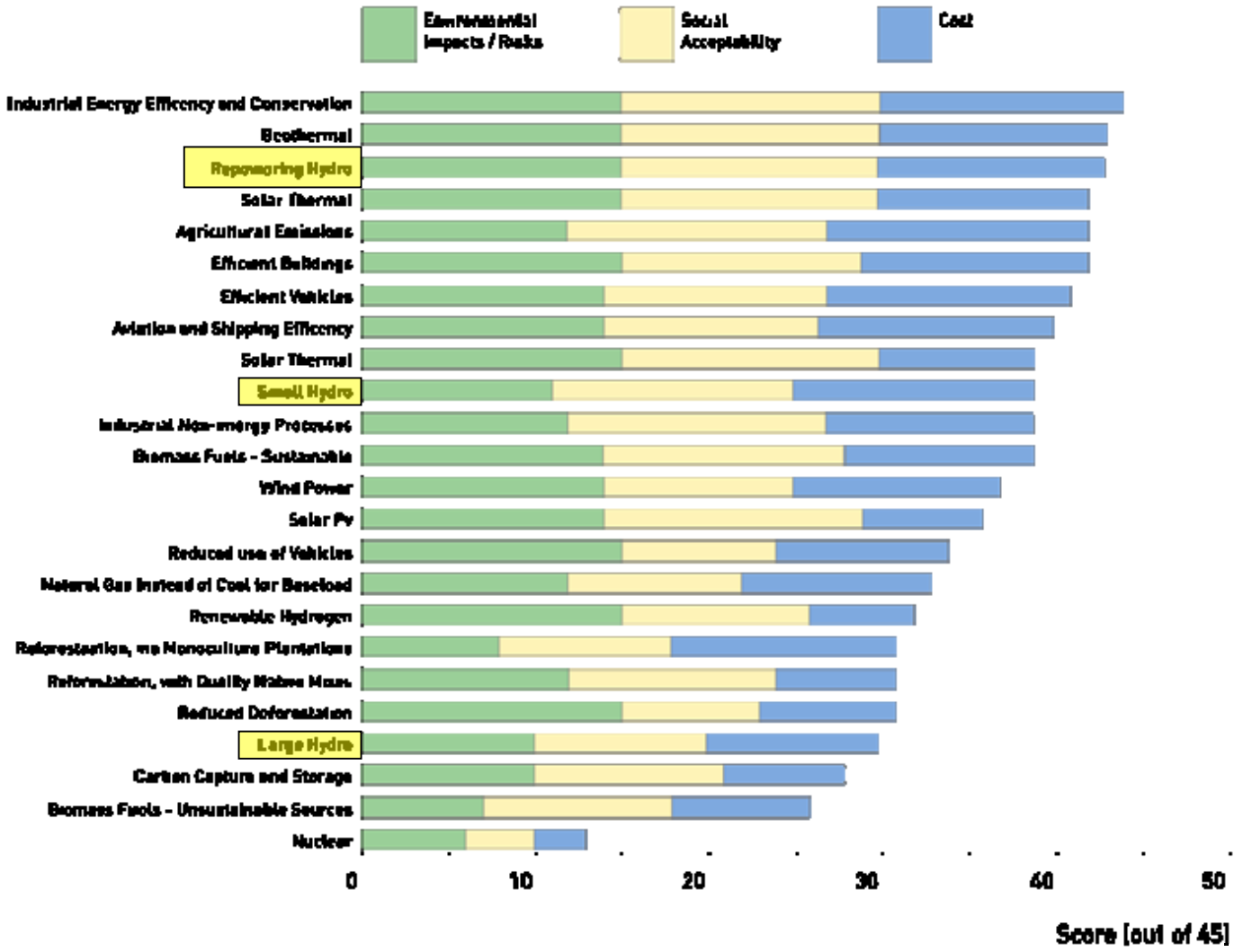


- investigation of 293 rivers worldwide impacted or not impacted by dams

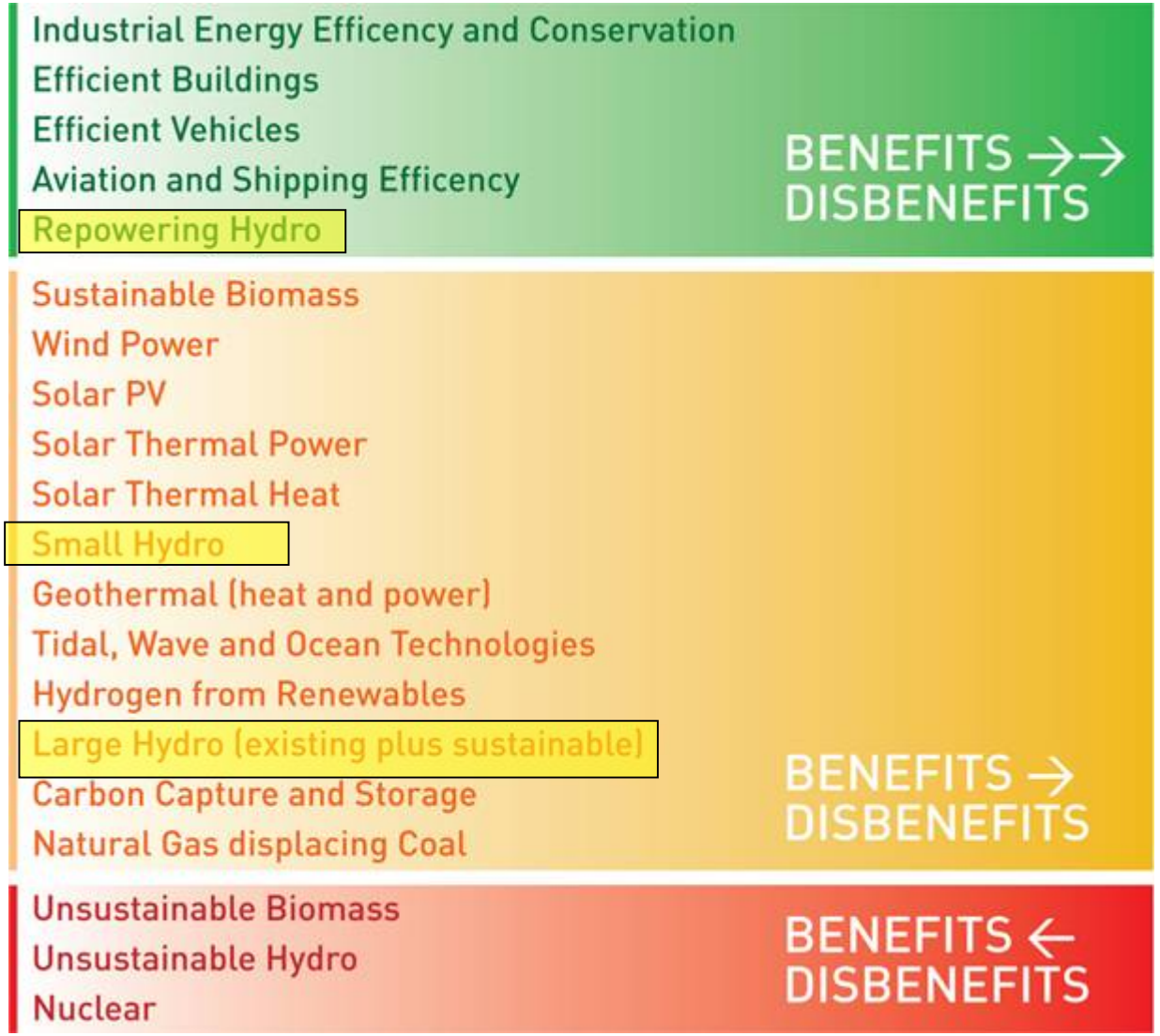
...“need of management interventions will be **much higher for basins impacted by dams** than for basins with free-flowing rivers.“

Source:
Palmer et al. 2008 ***“Climate change and the world’s river basins: anticipating management options”*** *model results for discharge and water stress change (IPCC A2 and B2 scenarios)*
Frontiers e-View, www.frontiersecology.org

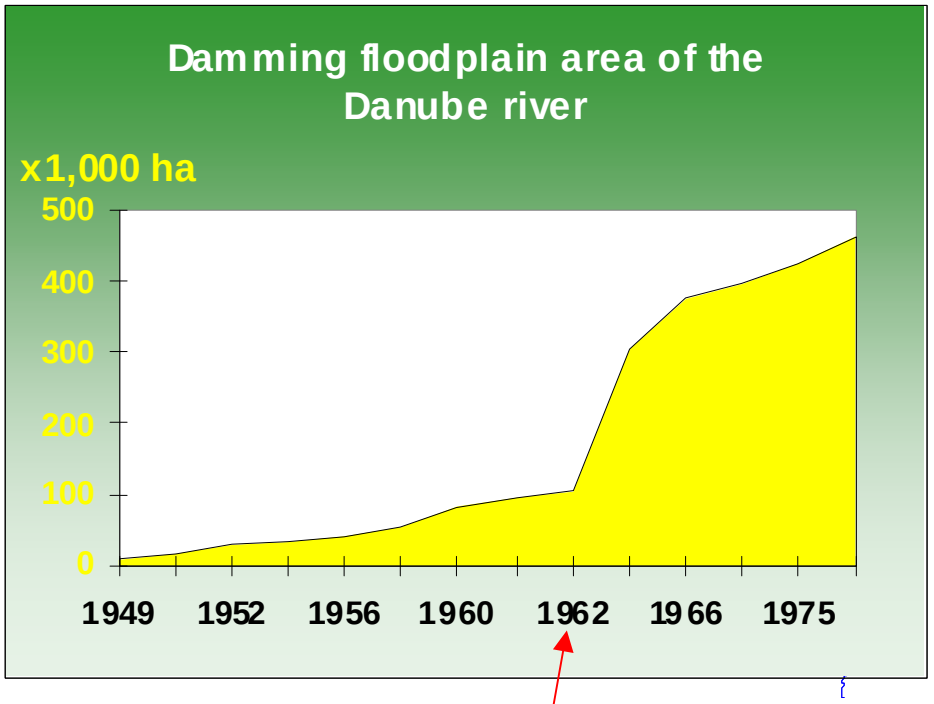
25 energy sources



WWF grouping: climate sound technolgies



Results: loss of floodplains



Zimnicea 2.5.1962
16740m3/a

- since 1960s: dramatic loss of former floodplains
- about 500,000 ha
- major use: agricultural land

Source: Danube Delta Institute 2007

future infrastructure projects

>1000 km of most valuable area are under threat

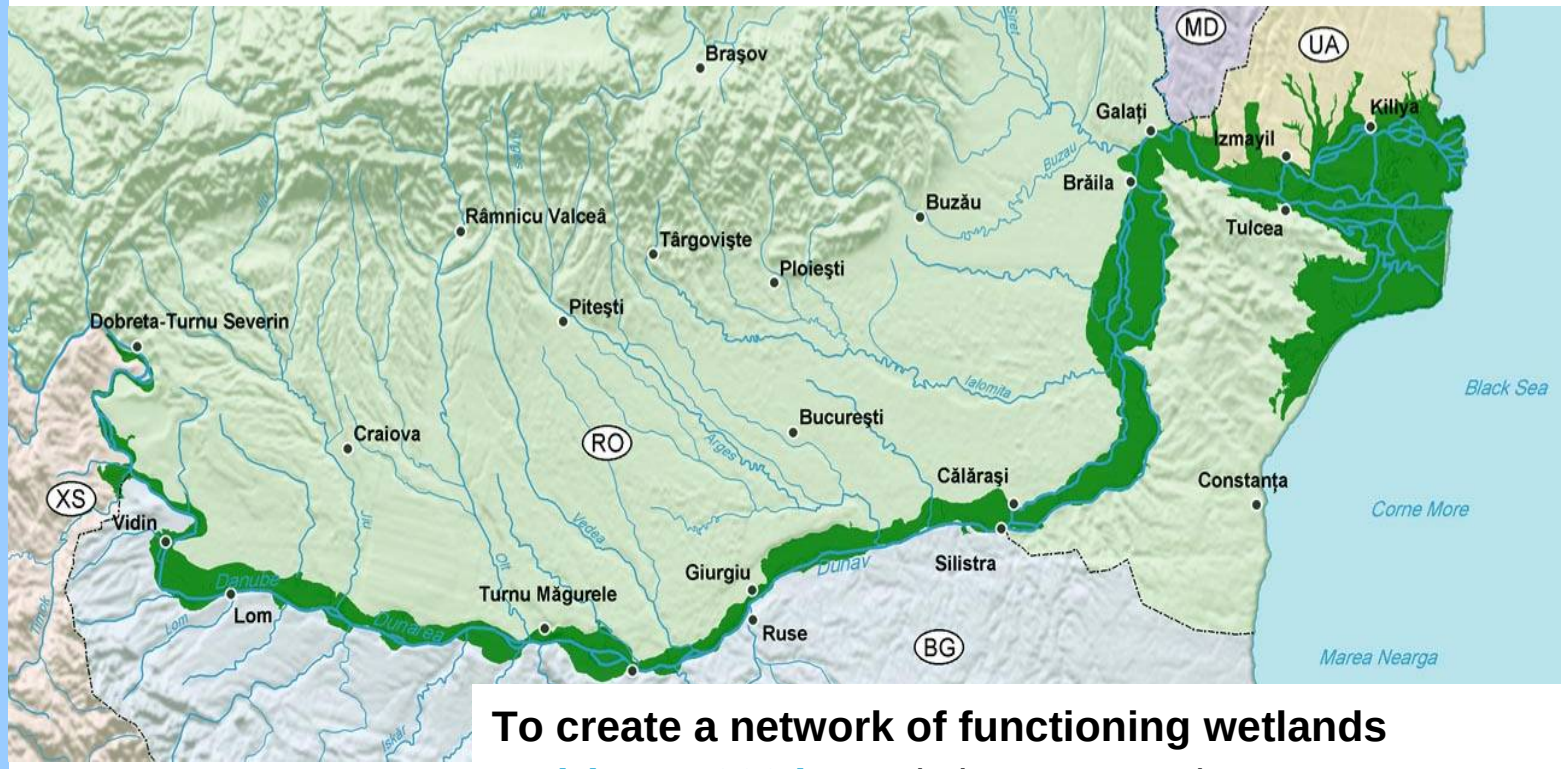
ecological hot spots

TEN-Tprojects

other IWT projects

Implementation of the Lower Danube Green Corridor Agreement (2000)

Largest international & cross-border initiative for wetland protection & restoration: Landmark for WFD implementaion

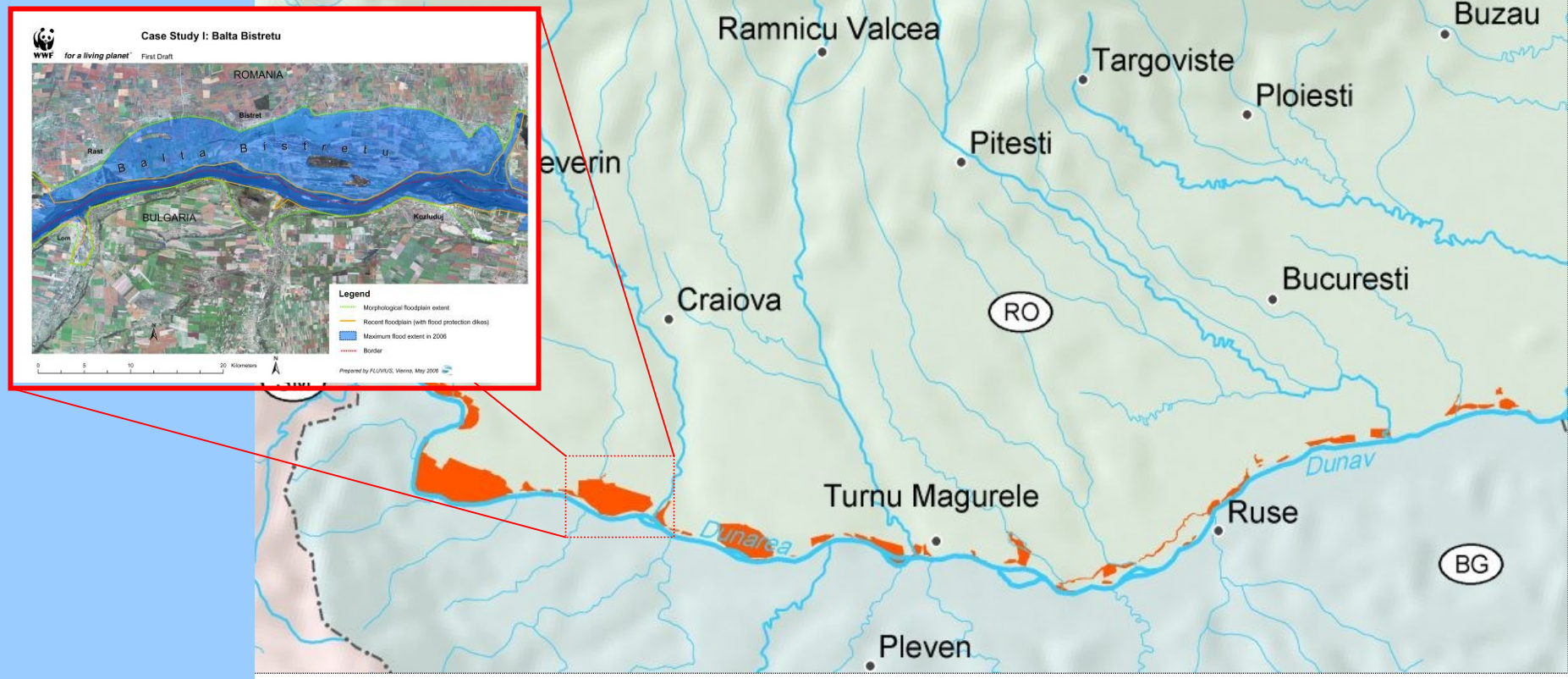


To create a network of functioning wetlands

- **(a) 775,000 ha:** existing protected areas
- **(b) 160,000 ha:** proposed new protected areas
- **(c) 225,000 ha:** proposed restoration areas

WWF‘s study on flood mitigation

- Important bird areas (IBA) with high ecological
- high potential for flood mitigation



Renew the Danube fleet

Technical data of INBAT:

Length x Breadth of the total barge train:	118 m x 9,0 m
Design Draught:	1,7 m
Length x Breadth of one single barge:	48,5 m x 9,0 m
Light draught of the barge:	0,20 m
Deadweight per barge at design draught 1,70 m:	641 tons
Length x Breadth of the push boat:	20 m x 9,0 m

Push boat with a total power of at least 480 kW transmitted with 3 propellers and sufficient thrust, for barge operation in shallow waterways with a push boat draft limited to 0,60 m

Source:
Guesnet, T. (2005) Final technical Report, Including Technological Implementation Plan. – Duisburg, 14.01.2005.
www.inbat.net