Adaptation to Climate Change: The perspective of WWF
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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
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↓
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

15% Austrian dams, 33% Gabcikovo, 80% Iron Gate

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

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 km² remaining areas; >7,000 km² restoration sites

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:

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)
Climate change comes only on top of other drivers: Help to improve Danube’s natural ability to adjust and absorb disturbance!
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 technologies

- Industrial Energy Efficiency and Conservation
  - Efficient Buildings
  - Efficient Vehicles
  - Aviation and Shipping Efficiency
  - Repowering Hydro

- Sustainable Biomass
  - Wind Power
  - Solar PV
  - Solar Thermal Power
  - Solar Thermal Heat
  - Small Hydro
  - Geothermal (heat and power)
  - Tidal, Wave and Ocean Technologies
  - Hydrogen from Renewables
  - Large Hydro (existing plus sustainable)

- Unsustainable Biomass
  - Unsustainable Hydro
  - Nuclear
Results: loss of floodplains

- 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

- TEN-T projects
- other IWT projects

ecological hot spots

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

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:
www.inbat.net