Sustainable Flood Protection measures in the Danube basin

Gheorghe Constantin

Romanian Ministry of Water and Forests

Co-cordonator PA5

EUSDR Environmental Pillar Stakeholder Seminar

Budapest, 17 October 2017

Floods and Danube River Basin

- Repeated devastating flood events over past decades at the Danube Basin level (Czech Republic, Hungary, Poland, Romania, Germany, Serbia, Bosnia and Herzegovina, etc.)
- Substantial efforts undertaken at the ICPDR level for the implementation of the EU Directive on assessment and management of floods risk
- Flood Risk Management Plan for the Danube River Basin has been developed and is under implementation
- Important EU funds for reconstruction works for damaged infrastructure but more resources needed for flood defence and prevention schemes
- Effects of climate change will influence floods events in the future

Main objectives of the Flood Risk Management in the Danube River Basin

- Public safety – reducing risk to people
- Property protection – public infrastructure and private property
- Reduction in emergency response during floods
- Avoid loss of critical services – fire, police, medical etc.
- Environmental enhancement and restoration

Flood Hazard and Flooding Scenarios

FHA data for the Danube floodplain in BA, RO and RS was taken from the Danube Floodrisk Project. FHA data for Velika Morava floodplain in RS was taken from the SOFPAS 1 project.
FHA data for SI was provided for 11 out of 21 relevant flood hazard areas (based on wathershed size and national importance criteria).

www.icpdr.org

This ICPDR product is based on national information provided by the Contracting Parties to the ICPDR (AT, BA, BG, CZ, DE, HR, HU, ME, MD, RO, RS, SI, SK, UA) and CH. EuroGlobalMap data from EuroGeographics was used for all national borders except for AL, BA, ME where the data from the ESRI World Countries was used; Shuttle Radar Topography Mission (SRTM) from USGS Seamless Data Distribution System was used as elevation data layer; data from the European Commission (Joint Research Center) was used for the outer border of the DRBD of AL, IT, ME and PL.

Vienna, November 2015

Flood Risk and Population

DFRMP 2015 - MAP 2

Flood risk data in RS is roughly assessed only for the Danube River corridor. Flood risk data in BG and RO is available only for the Danube river, based on the Danube FLOODRISK project results.

www.icpdr.org

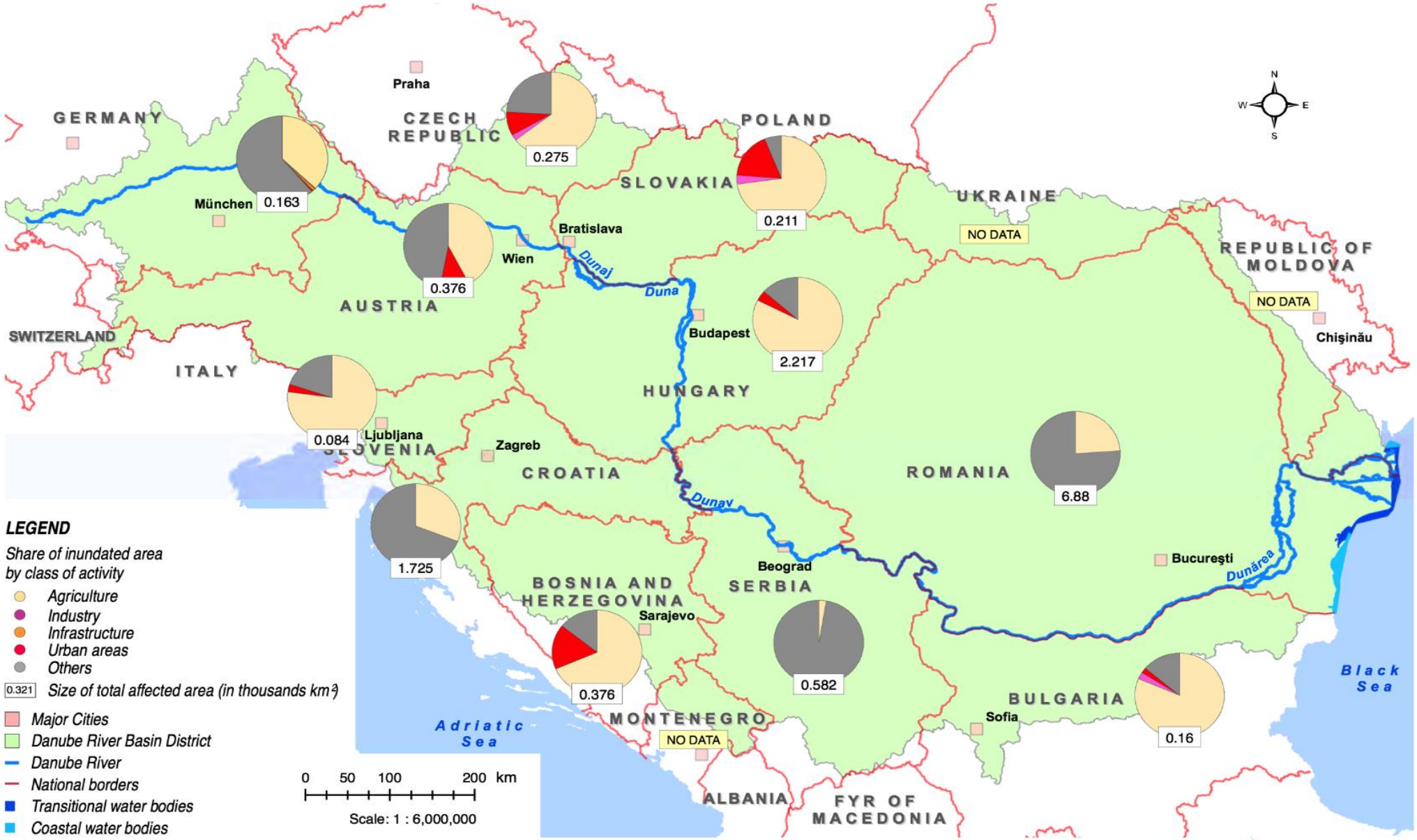
This ICPDR product is based on national Flood Risk information provided by the Contracting Parties (CP) to the ICPDR. National borders data was provided by the CPs for borders of AT, CZ, DE, HR, HU, MD, RO, SI, SK and UA; ESRI data was used for national borders of AL, ME, MK; Shuttle Radar Topography Mission (SRTM) from USGS Seamless Data Distribution System was used as topographic layer; data from the European Commission (Joint Research Center) was used for the outer border of the DRBD of AL, IT, ME and PL.

Vienna, November 2015

icpdr iksd
International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau

Flood Risk and Economic Activity - High Probability Scenario

DFRMP 2015 - MAP 3a



Flood risk data in RS is roughly assessed only for the Danube River corridor. Flood risk data in BG and RO is available only for the Danube river, based on the Danube FLOODRISK project results.

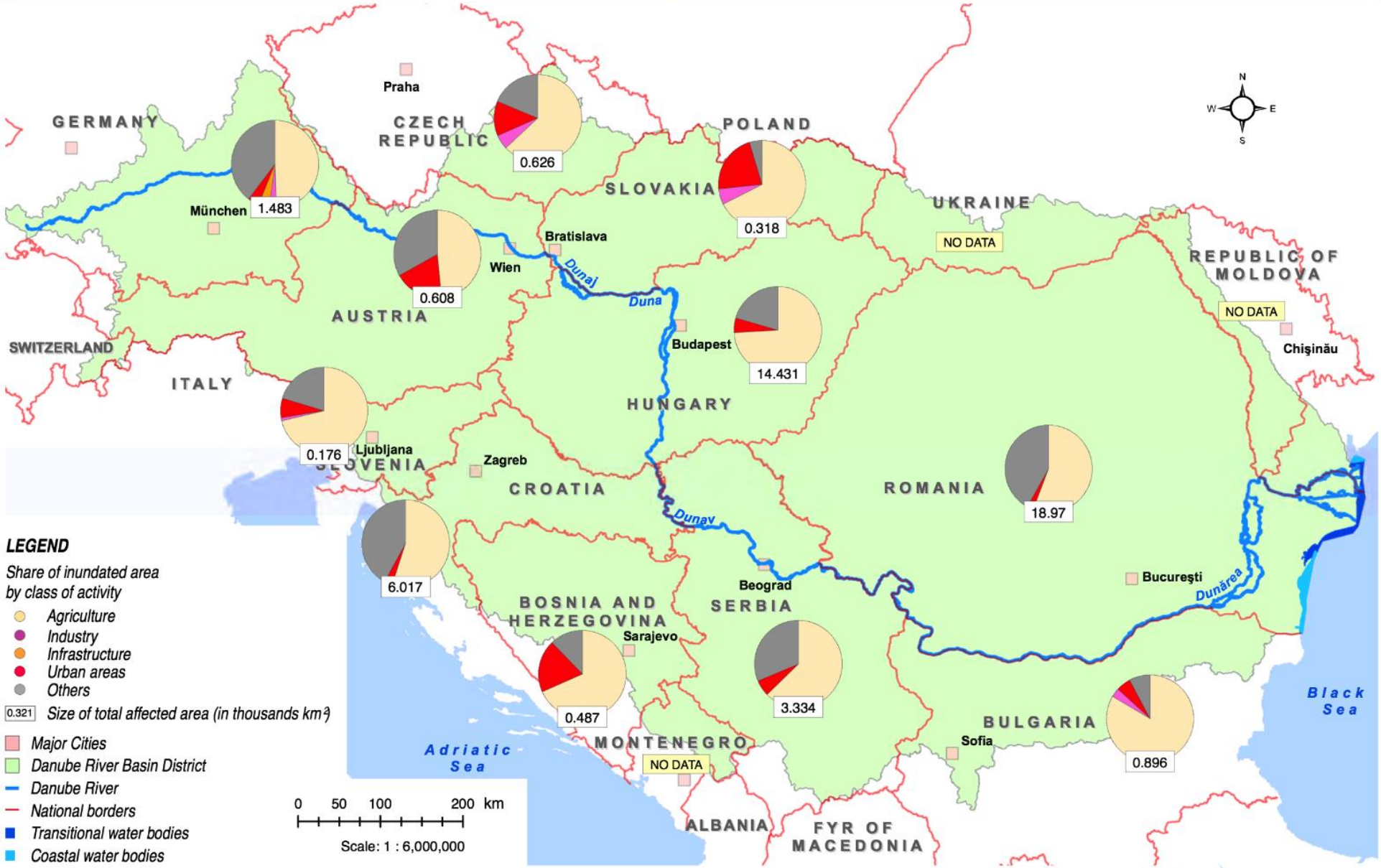
www.icpdr.org

This ICPDR product is based on national Flood Risk information provided by the Contracting Parties (CP) to the ICPDR. National borders data was provided by the CPs for borders of AT, CZ, DE, HR, HU, MD, RO, SI, SK and UA; ESRI data was used for national borders of AL, ME, MK; Shuttle Radar Topography Mission (SRTM) from USGS Seamless Data Distribution System was used as topographic layer; data from the European Commission (Joint Research Center) was used for the outer border of the DRBD of AL, IT, ME and PL.

Vienna, November 2015

Flood Risk and Economic Activity - Low Probability Scenario

DFRMP 2015 - MAP 3c



LEGEND

Share of inundated area by class of activity

- *Agriculture*
- *Industry*
- *Infrastructure*
- *Urban areas*
- *Others*

0.321 *Size of total affected area (in thousands km²)*

- *Major Cities*
- *Danube River Basin District*
- *Danube River*
- *National borders*
- *Transitional water bodies*
- *Coastal water bodies*

Flood risk data in RS is roughly assessed only for the Danube River corridor. Flood risk data in BG and RO is available only for the Danube river, based on the Danube FLOODRISK project results.

www.icpdr.org

This ICPDR product is based on national Flood Risk information provided by the Contracting Parties (CP) to the ICPDR. National borders data was provided by the CPs for borders of AT, CZ, DE, HR, HU, MD, RO, SI, SK and UA; ESRI data was used for national borders of AL, ME, MK; Shuttle Radar Topography Mission (SRTM) from USGS Seamless Data Distribution System was used as topographic layer; data from the European Commission (Joint Research Center) was used for the outer border of the DRBD of AL, IT, ME and PL.

Vienna, November 2015

River flooding and flash floods/ debris flow

Main measures in the Danube River Flood Risk Management Plan

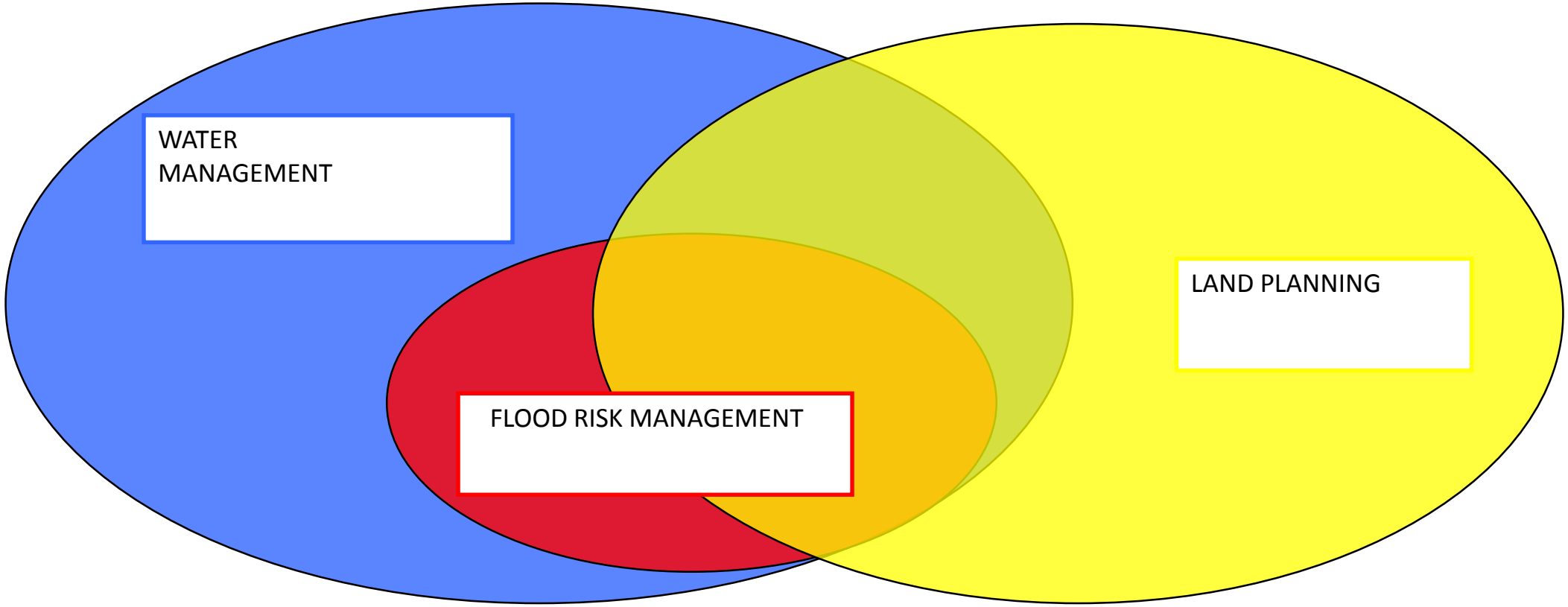
- To avoid new risks
- To reduce existing risks
- To strengthen resilience
- To increase resilience
- To apply solidarity principle

Type of measures in the Danube River Flood Risk Management Plan

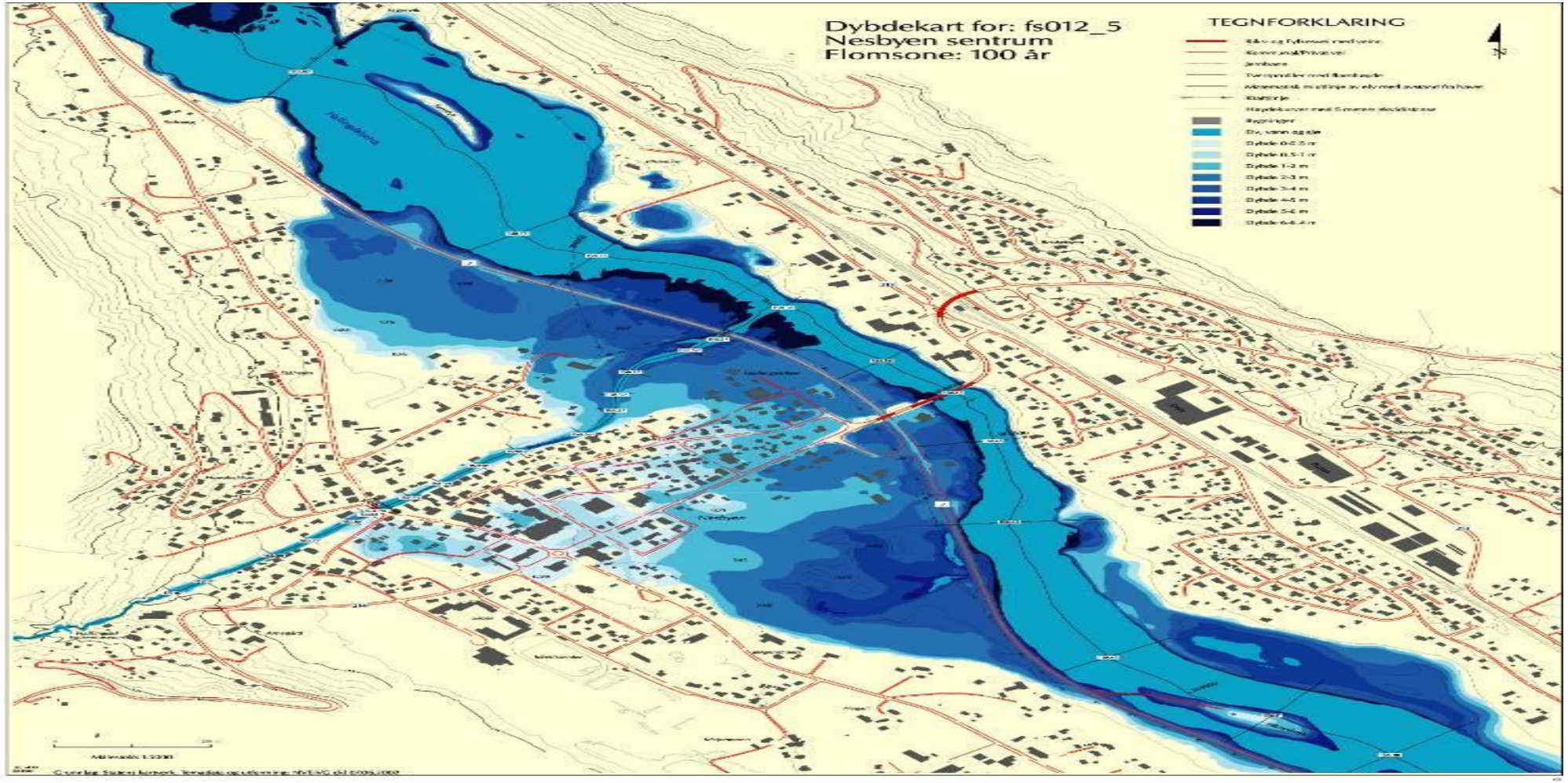
- Preventive, operational and reparatory
- Structural and non-structural
- Environmentally friendly
- Taking into account the climate change and future developments
- Involving public participation
- Planned at the basin level and implemented at the national and local level

Land planning for flood management

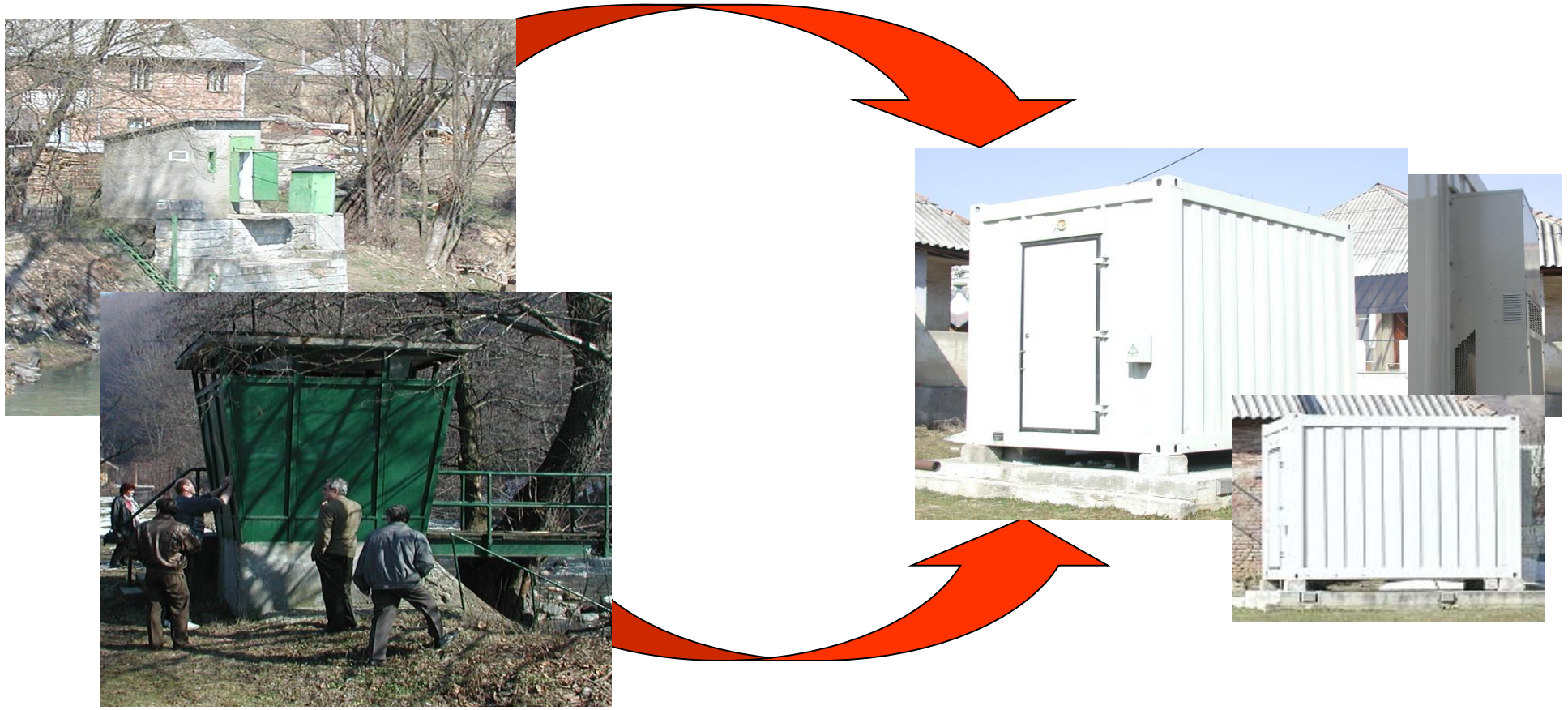
Need for coordination



Flood Risk Maps important for land planning

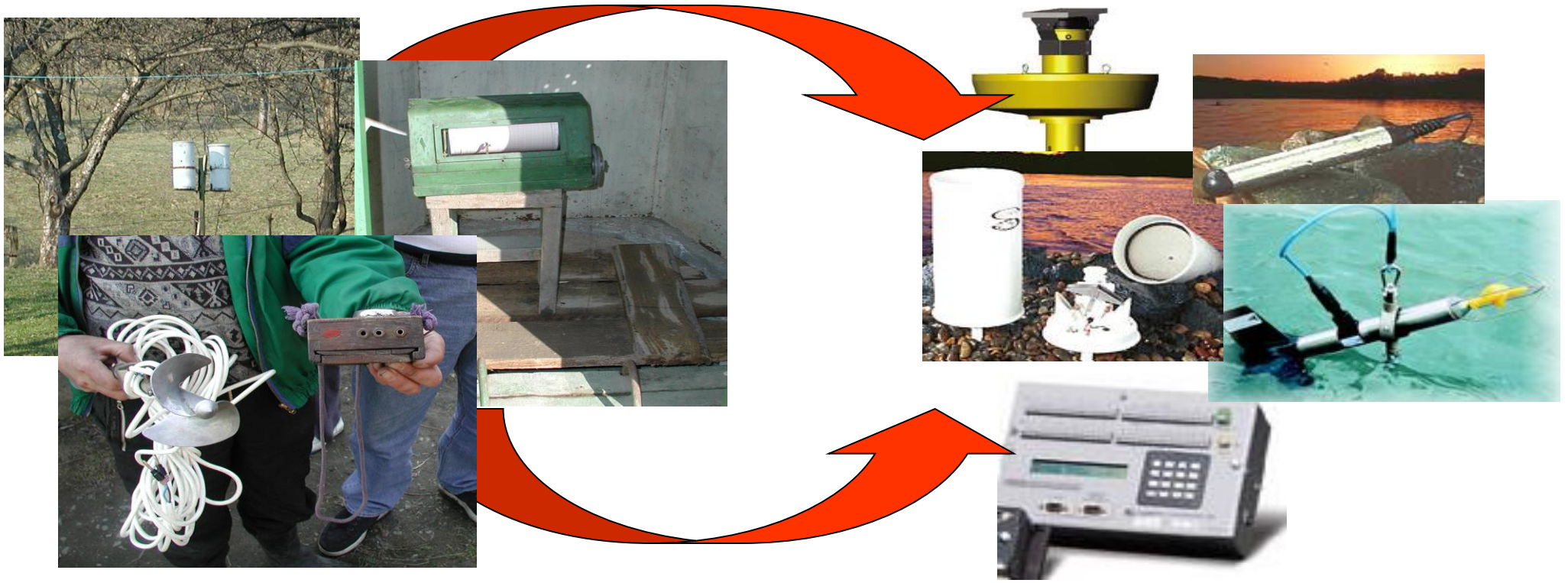


UPGRADE HYDROLOGICAL MONITORING STATIONS



UPGRADE OR REPLACE THE EXISTING STRUCTURES:

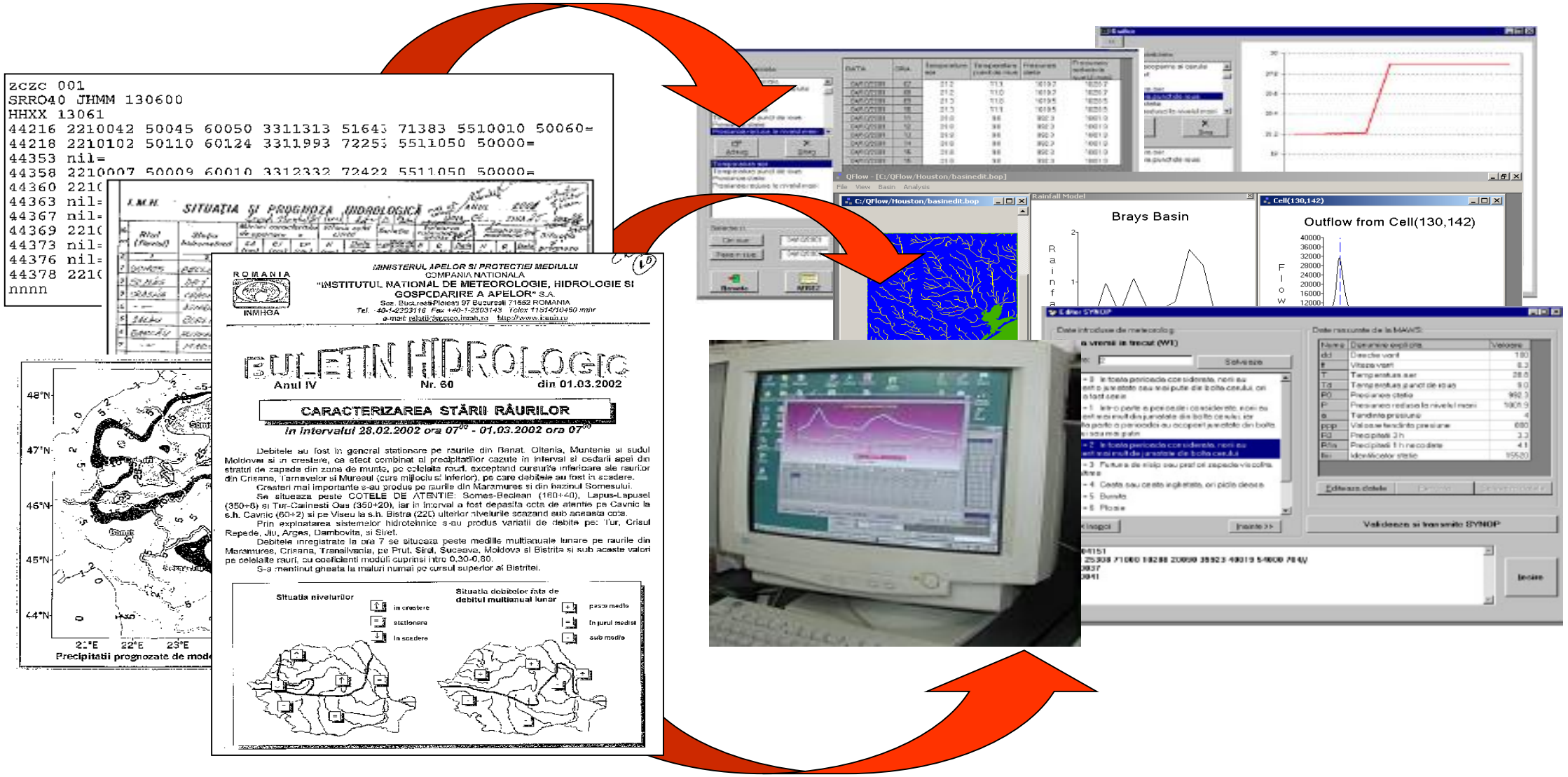
UPGRADE HYDROMETRIC SENSORS AND DATA COLLECTION



REPLACE MANUAL SENSORS WITH AUTOMATIC HYDROMETRIC STATIONS:

- Water level sensors (float, pressure, radar, soil moisture);
- Water temperature sensors;
- Precipitation sensors;
- Environmental quality sensors (dissolved oxygen, conductivity, pH, turbidity);
- Heavy metal ion (nitrates, phosphates, etc.)

DEVELOPMENT OF HYDROLOGICAL DATA INTEGRATION SOFTWARE



Enhance analysis and product generation capabilities.

Flood Risk and WFD Protected Areas

FHA data for the Danube floodplain in BA, RO and RS was taken from the Danube Floodrisk Project. FHA data for Velika Morava floodplain in RS was taken from the SOFPAS 1 project. Directives 98/83/EC and 76/160/EEC have not been transposed to RS legislation yet.
FHA data for SI was provided based on wathershed size and on national importance criteria.

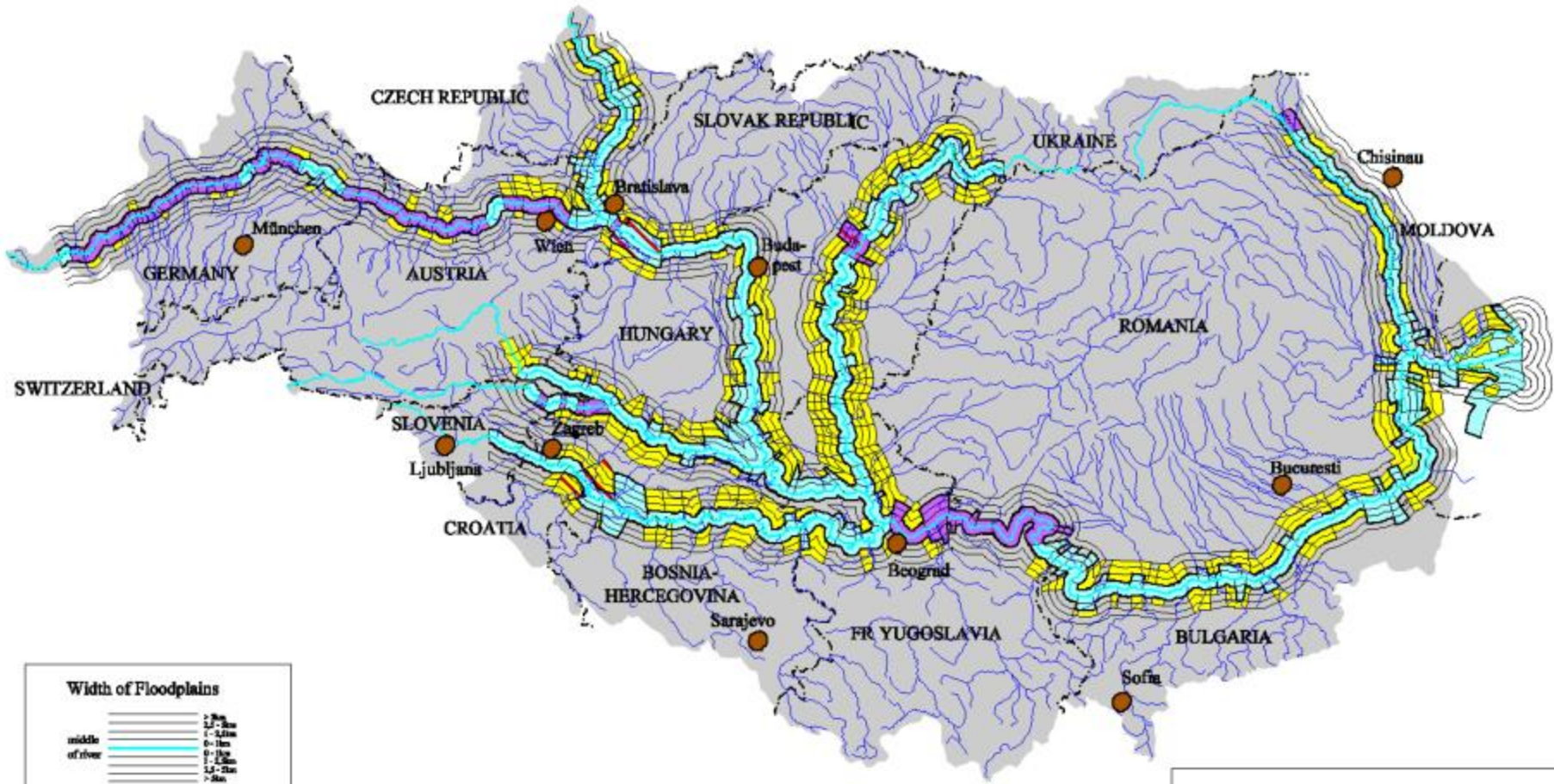
www.icpdr.org

This ICPDR product is based on national information provided by the Contracting Parties to the ICPDR (AT, BA, BG, CZ, DE, HR, HU, ME, MD, RO, RS, SI, SK, UA) and CH. EuroGlobalMap data from EuroGeographics was used for all national borders except for AL, BA, ME where the data from the ESRI World Countries was used; Shuttle Radar Topography Mission (SRTM) from USGS Seamless Data Distribution System was used as elevation data layer; data from the European Commission (Joint Research Center) was used for the outer border of the DRBD of AL, IT, ME and PL.

Vienna, November 2015

icpdr iksd
International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau

Symbolized view of floodplains in the Danube River Basin



Width of Floodplains

middle of river

Type of Floodplains

- Former Floodplains
- Recent Floodplains
- Back water area of dams

Scale: 1:4.500.000

0 50 100 150 kilometers

Area of historical floodplains in the study area: 41600 km
Area of remaining floodplains in the study area: 8000 km
A floodplain loss of more than 80%

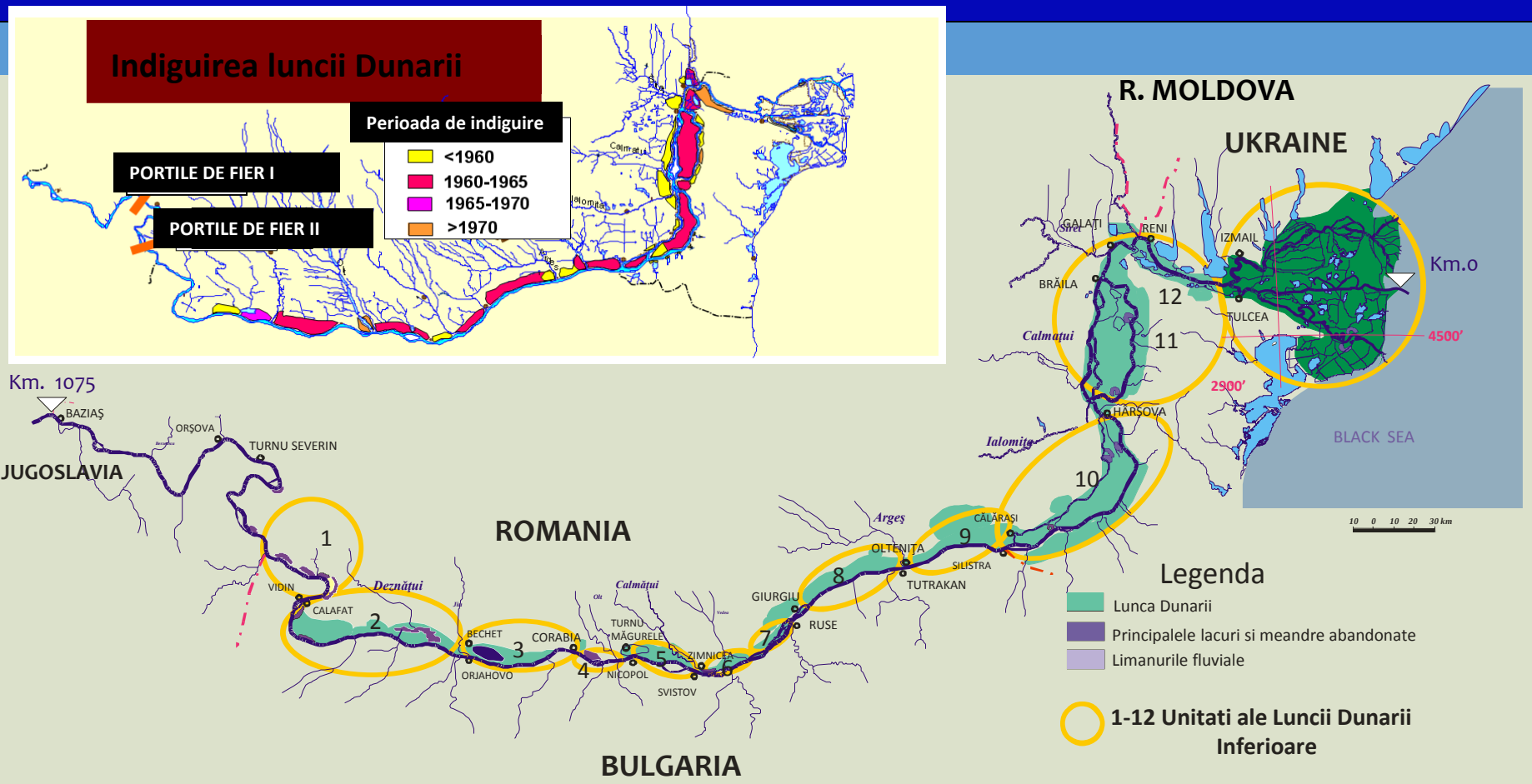
Danube Pollution Reduction Programme

United Nations Development Programme
Global Environment Facility
ICPDR - Programme Coordination Unit
1400 Vienna, P. O. Box 500, Austria

Produced by WWF Danube-Carpathian-Programme
WWF-Auen-Institut (WWF-Germany)
Josefstr. 1, D-76437 Rastatt 1999

WWF

Rehabilitation of the wetland areas in the Danube floodplain



Floodplain restoration

Foto: Iulian Nichersu
iuli@indd.tim.ro


Flood Level

Flood related activities within EUSDR PA5

- Development and adoption of an overarching Flood Management Plan at the River Basin level
- Support for the rehabilitation of wetlands and floodplains as an effective measure to increase flood protection
- Extension of the coverage of the European Flood Alert System at the entire Danube River Basin

All activities are developed in close cooperation with the ICPDR

Example of projects related to floods promoted by PA5

- DAREFFORT
- DANUBE FLOODPLAIN
- DAMWARM+
- JOINTISZA
- DANUBE SEDIMENT
- WATERatRISK


THANK YOU VERY MUCH
FOR YOUR ATTENTION!