

National Programme on Flood Prevention, Protection and Mitigation

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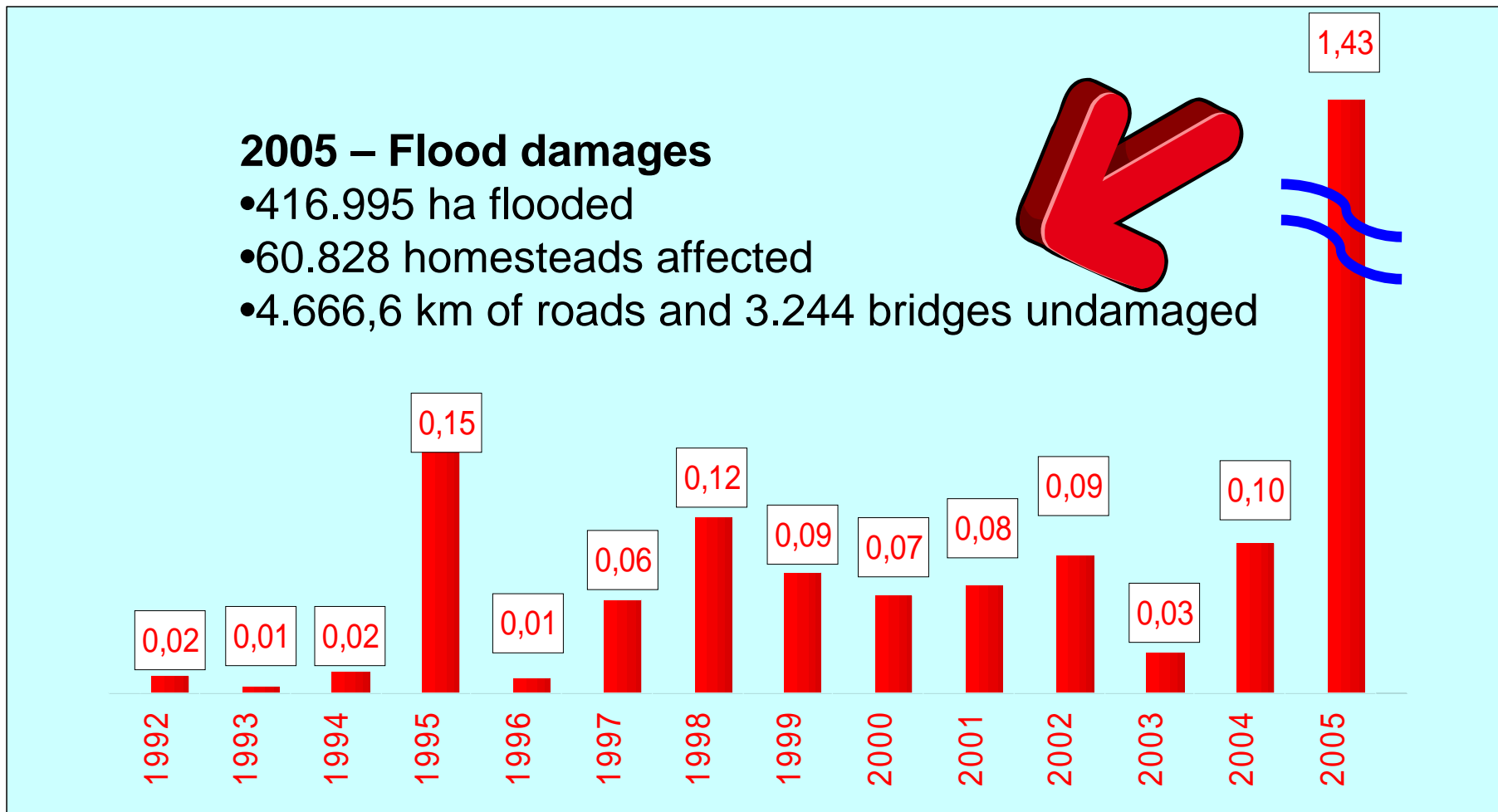
INBO Conference, Sibiu, ROMANIA

- Content -

National Programme on Flood Prevention, Protection and Mitigation

- **Scientific and technical approach**
- **Final product (main deliverables)**
- **Steps in setting up of the *Plan for floods prevention, protection and mitigation* at river basin level**
- **Follow-up**

Flood magnitude and aggressiveness : the **damages during 2005 floods (about 1.5 bn Euro)** as compared with **1993-2004 floods (about 0.8 bn Euro)**



Flood damages during the period 1992-2005 (billion Euro)

NATIONAL PLAN ON FLOODS PREVENTION, PROTECTION AND MITIGATION

- Catastrophic floods from 2005 (more than 70 lives and damage to buildings and infrastructure estimated at 1.5 Billion Euro) → the **Program of carrying out of the *National Plan for floods prevention, protection and mitigation*** (approved by MESD, through G.D. 1309/2005).

Scientific and technical approach

a river basin approach

- the physical units are the same for both Directives - the WFD (2000/60/EC) and the Floods Directive (2007/60/EC) – whose implementation is on the level of the **river basin**.
- This National Plan is made up of 11 RB Flood Management Plans (acc. to the *National Strategy for Flood Risk Management* – G.O. 1854/2005).

an interdisciplinary approach

- a lot of data, from meteorological and hydrological data to vulnerability assessment, a lot of technology, from LiDAR, areal and satelitary images, to GIS.

Scientific and technical approach (cont.)

a modelling approach

- hydrologic modelling (catchment based) ;
- hydraulic modelling (flow stream based) 1D, 2D ;
- simulation of flood event scenarios (the current situation);
- flood mapping ;
- river basin development plans scenarios;
- scenarios for future floods.

two steps approach

- I. the geo-topographical survey and topographic studies
- II. the hydrological analysis and hydraulic modelling

The final product of the studies within the National Plan for floods prevention, protection and mitigation

Main deliverables :

- flood hazard maps - shall cover the geographical areas which could be flooded according to the following scenarios : floods with 0.1, 1, 5, 10 % exceedance probability);
- the proposal of certain measures / development scenarios and the evaluation of their effects on flood hazard mitigation (river basin development projects).

Steps in setting up of the *Plan for floods prevention, protection and mitigation* at river basin level

- a) Study areas delineation**
- b) LiDAR and / or FLI-MAP scanning**
- c) Topographical survey**
- d) Hydrological analysis**
- e) Hydraulic analysis**
- f) Hazard mapping**
- g) Floods effects assessment**
- h) Identification of different scenarios of measures to reduce the likelihood of floods and/or the impact of floods in a specific location.**

a) Study areas delineation

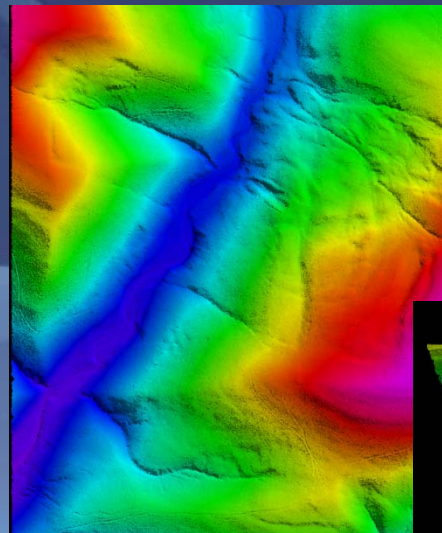
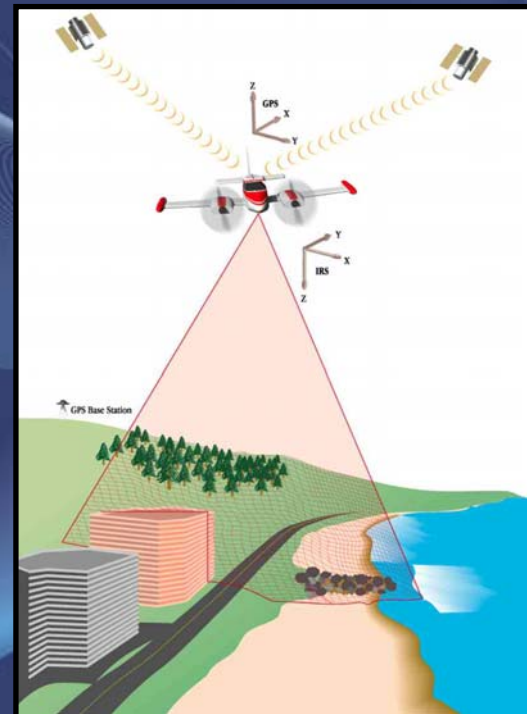
- Areas for which we conclude that „potential significant flood risks exist or might be considered likely to occur” (at present knowledge level)

Present situation - Assessment for 8 RB from the total 11	Length (km)	% from the entire cadastre river length	Surface (km ²)	% from the entire country surface
	10.900	13.8	17.800	7.5

b) LiDAR and/or FLI-MAP scanning & aerial photographic mapping.

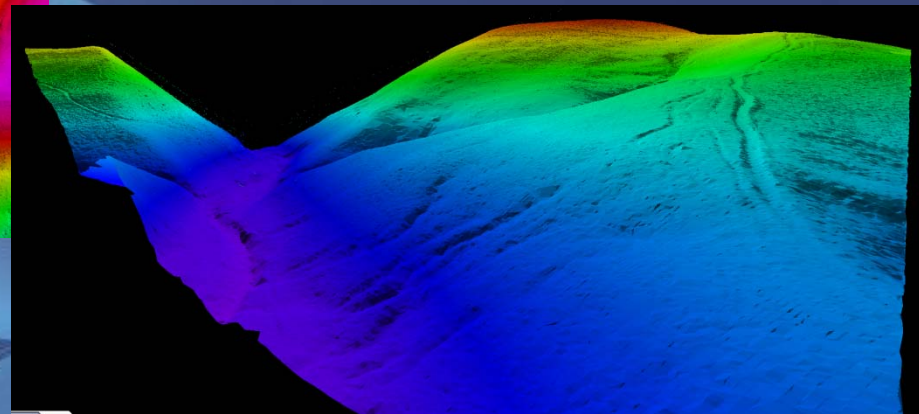


- flights have been performed above the flood plains of the rivers; the resulting “point clouds” having the coordinates x , y , z connected in the Stereo70 reference system through the GPS stations from the ground, finally lead to the generation of the DTM.



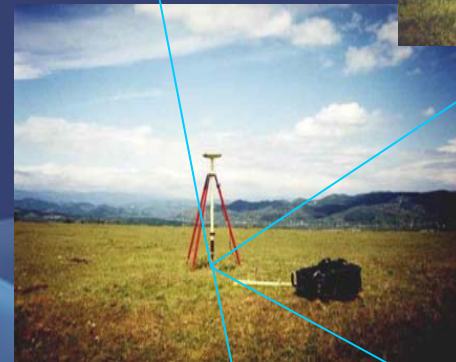
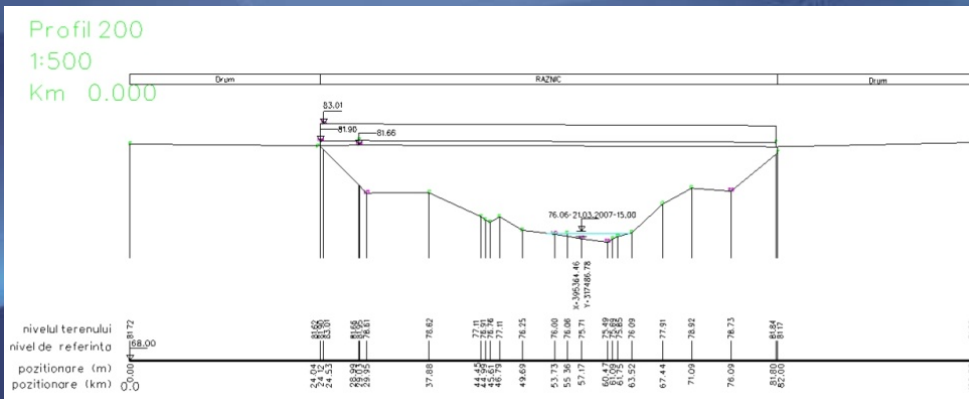
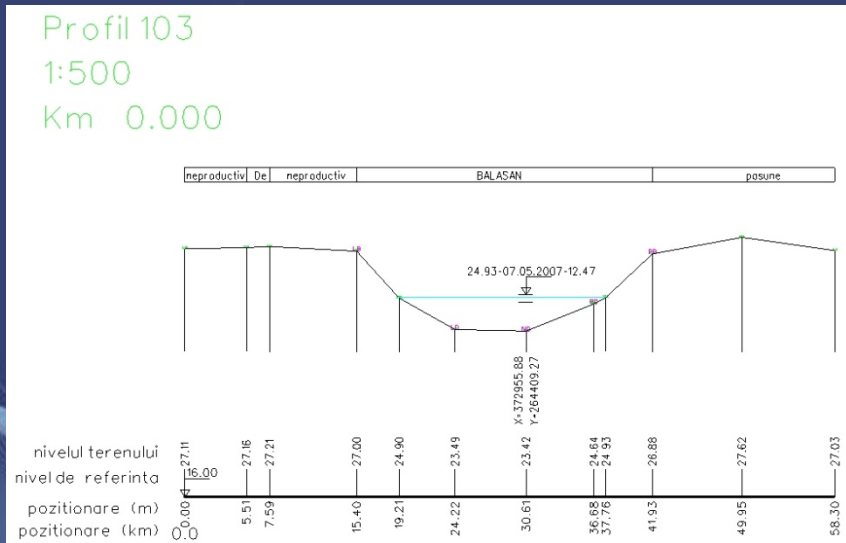
2D image of the terrain

3D image of the terrain



c) Topographical survey

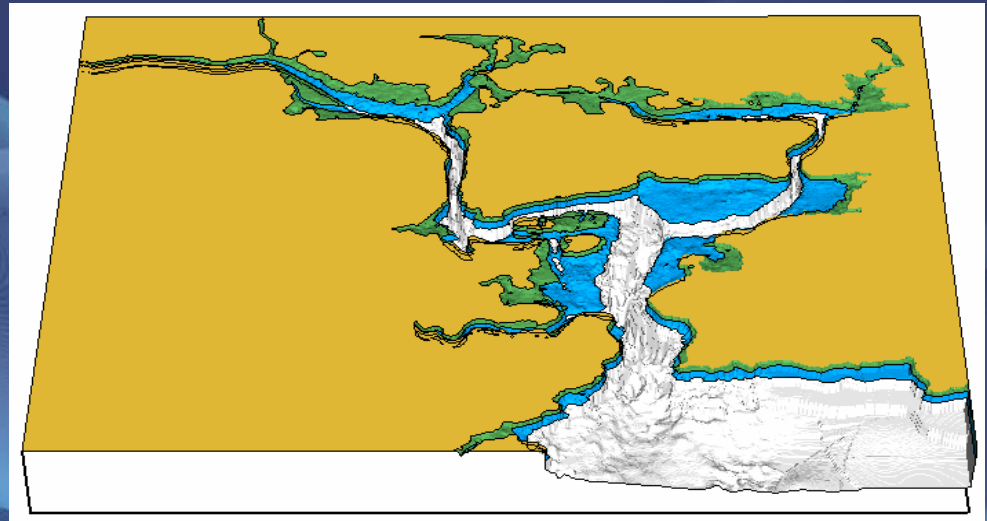
- This step includes rivers transect cross sections and measurements of the structures geometry (hydraulic structures, bridge cross-sections etc).



Field works

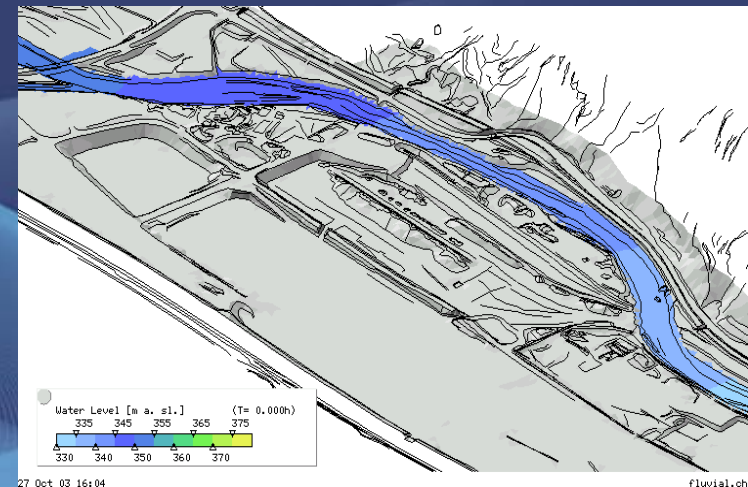
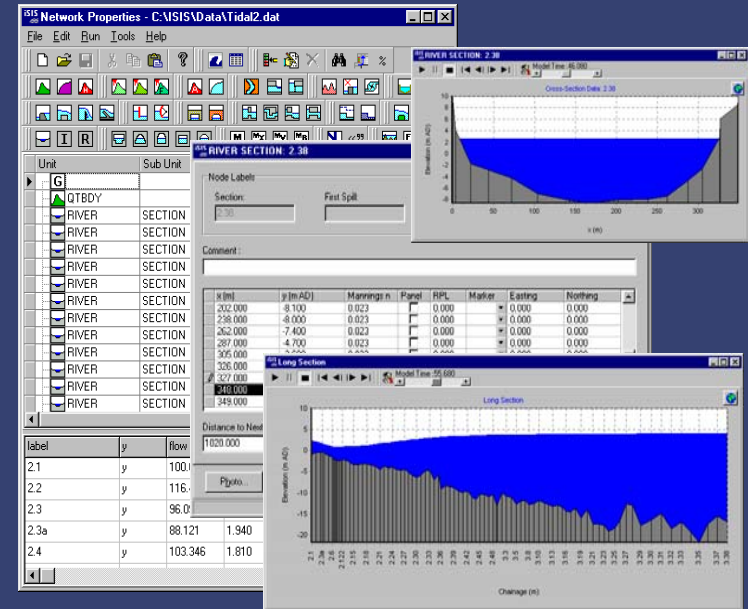
d) Hydrological analysis

- Any assessment of flood hazard requires hydrological and meteorological data :
 - Water level and Discharge hydrographs
 - Rainfall amounts
 - Evaporation
 - Snow cover
 - Temperature
 - etc.



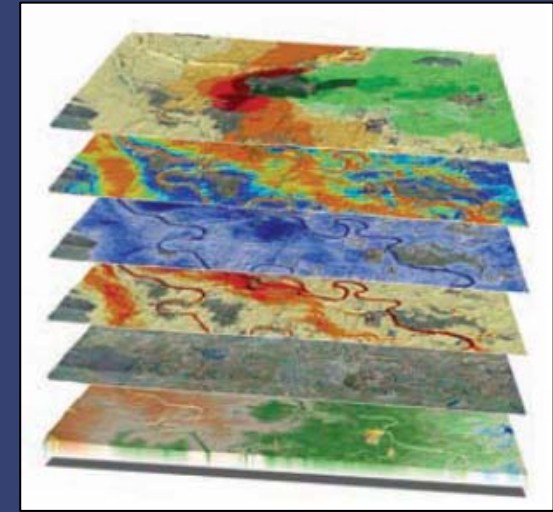
e) Hydraulic analysis

- Modelling is used to delineate the flood prone areas, to compute the depth and duration of flooding in different sections.
- **Model calibration**
 - **real problem**, since after the historical floods produced in 1970 and 1975, a huge effort for flood control, mainly consisting in structural measures (dams and dikes), was performed.



f) Hazard mapping

- Based on hydraulic analysis and all related information, the hazard maps will be set-up, showing, for different scenario, the flood extent and the water depths/water levels (mapping performed through GIS technology).



g) Floods effects assessment

- ... needs a lot of information, regarding socio-economic data, landuse, water management system data, environment data, etc;
- ... represents a „bridge” between flood hazard mapping and flood risk assessment.



h) Identification of different scenarios of measures to reduce the likelihood of floods and/or the impact of floods in a specific location.

- The available options that need to be considered include structural and non-structural methods, like : flood forecasting, land use zoning and planning, engineering works ...

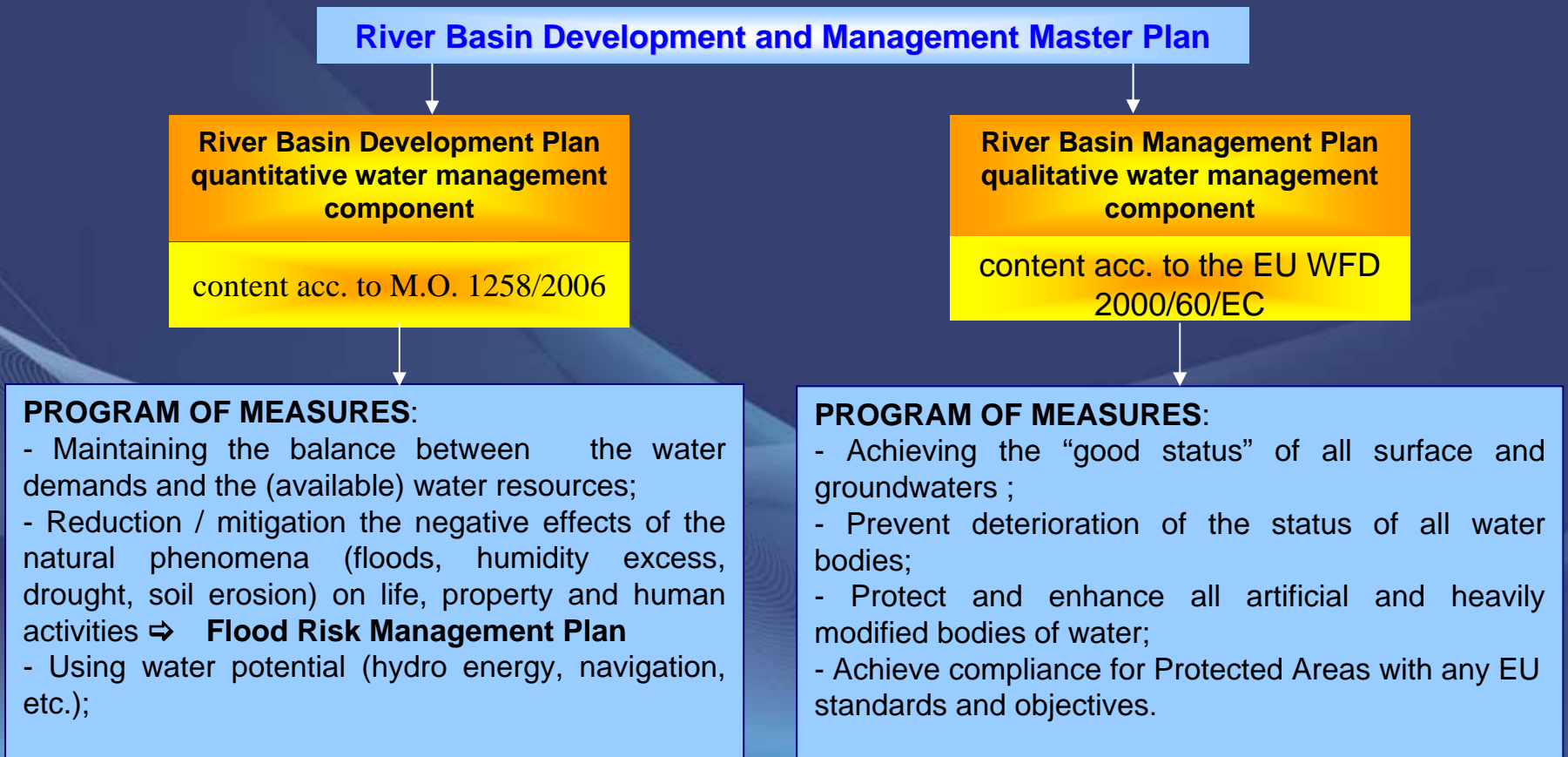


4. FOLLOW-UP

- **Flood risk mapping**
- **Integration of the Plan for floods prevention, protection and mitigation within the River Basin Development Plan, as part of Flood Risk Management Plans**

FOLLOW-UP (cont.)

- *Integration of the Plan for floods prevention, protection and mitigation within the River Basin Development Plan*



DEADLINE: 22 December 2009

Thank you for your kind attention !
Merci beaucoup de votre attention !
Va multumim pentru atentie !

