THE UNECE PROJECT FOR CRISIS AND HAZARD MANAGEMENT IN THE DANUBE DELTA FOR ROMANIA, UKRAINE AND REPUBLIC OF MOLDOVA

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BUCHAREST, ROMANIA

FINAL WORKSHOP – IMPROVEMENT OF HAZARD AND CRISIS MANAGEMENT IN THE DANUBE DELTA

SESSION 1 – PROJECT FRAMEWORK, REFERENCES AND IMPLEMENTATION

LESSONS ACQUIRED 15 YEARS FROM THE "BAIA MARE" EVENT

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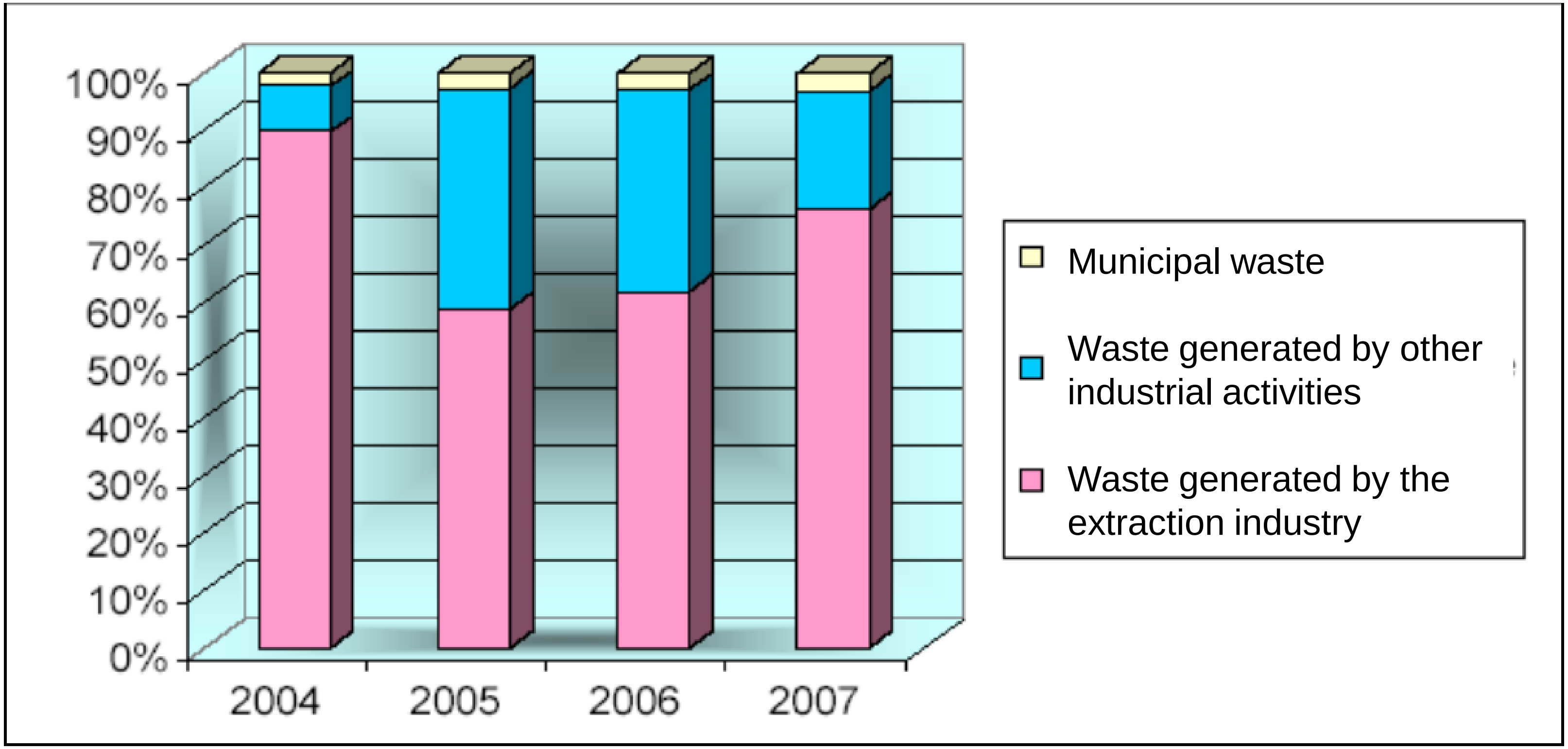
Table of Contents

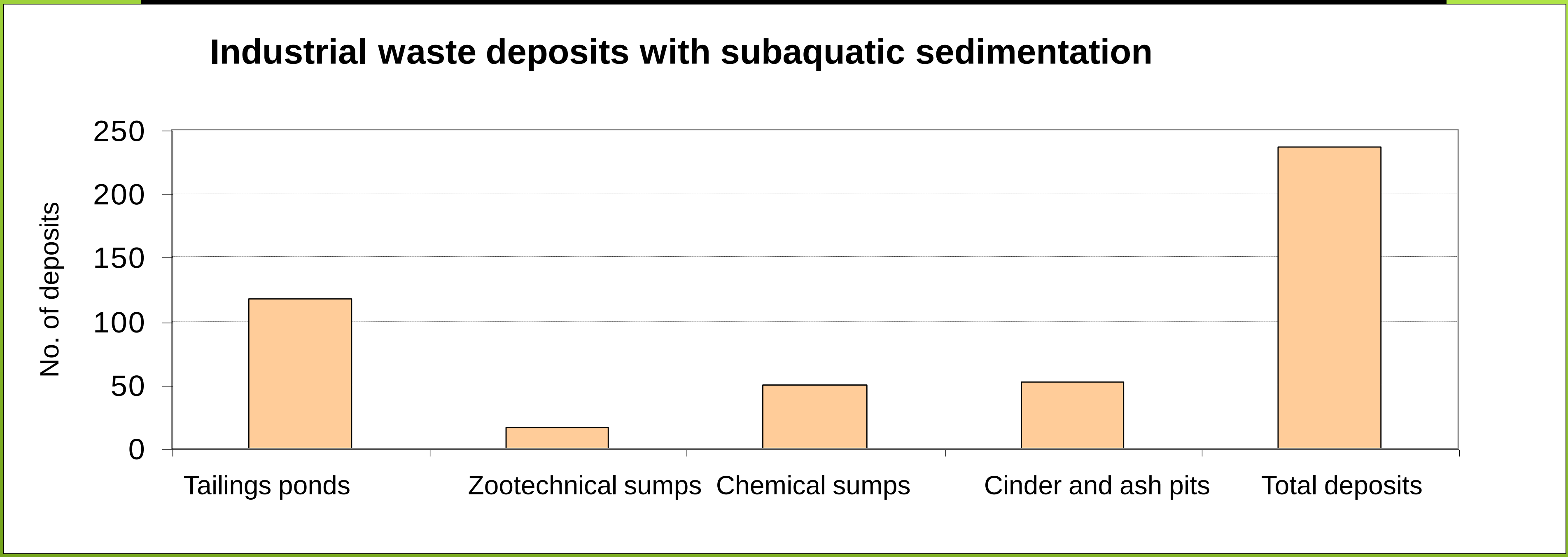
1. Environmental issues generated by tailings management facilities resulting from the exploitation of mineral resources

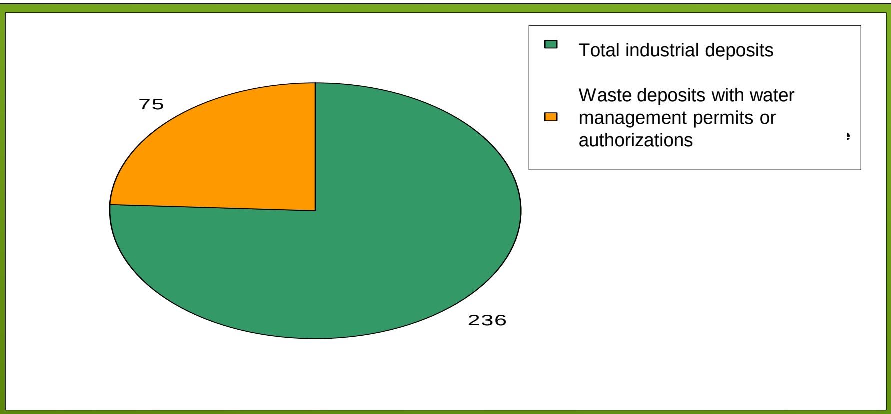
Fig. 1. *Waste generated in Romania during recent years*

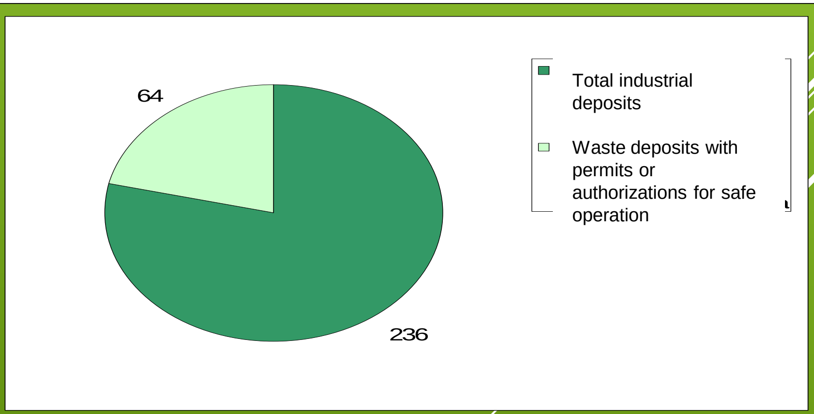
Source: National Agency for Environmental Protection and the National Institute of Statistics



1.1. The status of nationwide authorization of tailings ponds (source CONSIB)







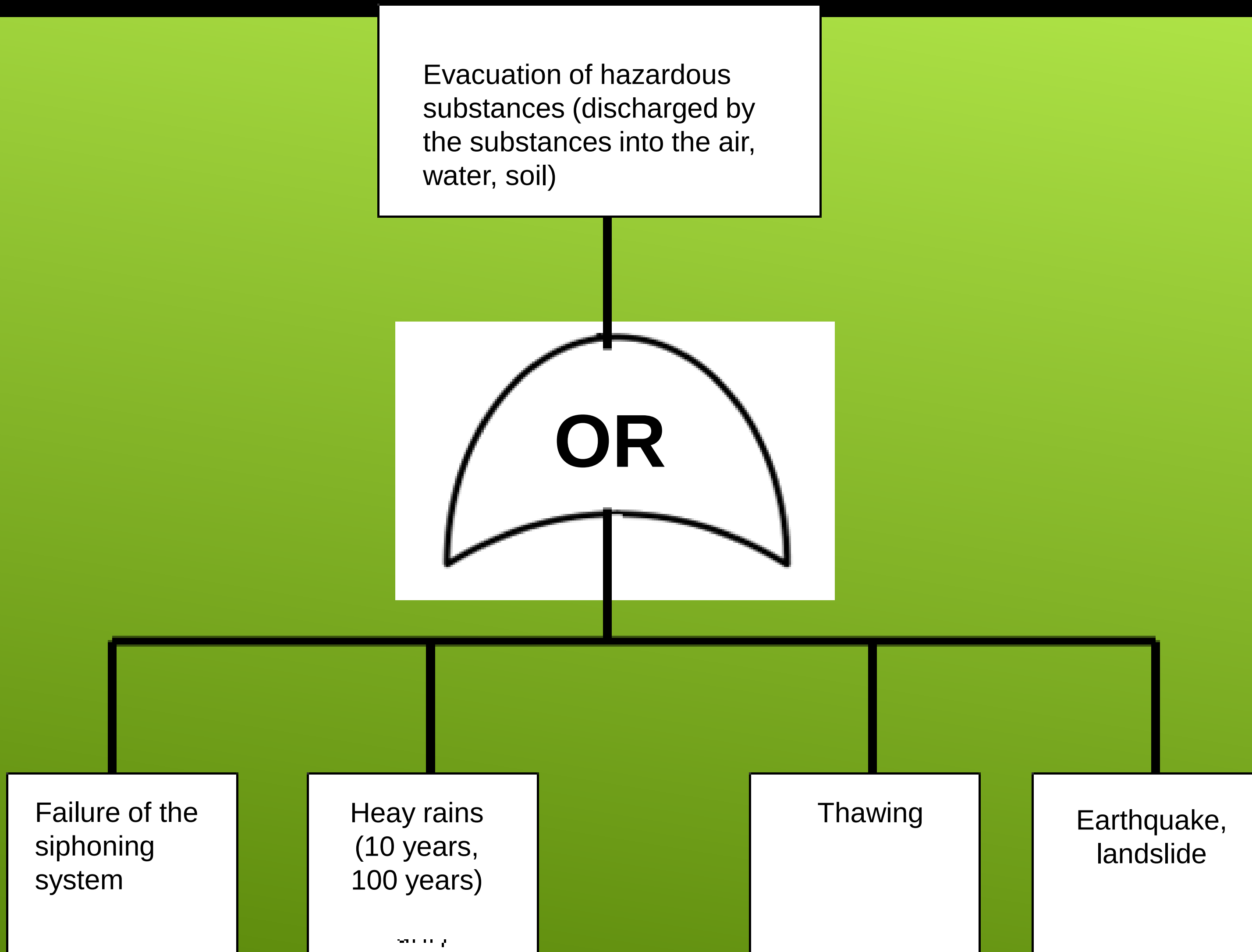
1.2 Technical issues for tailings management facilities in Romania

Many industrial deposits have been identified as displaying a series of specific deficiencies:

- **guarding trench choking up;**
- **operation failures for emergency ponds, where such exist;**
- **embankment or slope erossion caused by precipitation (streams);**
- **pit exfiltration.**

From our perspective, the most relevant impact of mineral exploitation activities is represented by the management of waste resulting from such activities, especially for tailings management facilities which imply an increasing risk, even after the cessation of associated mining activities, particularly when such contain hazardous substances (cyanides, etc.). The failures or accidents associated with such tailings ponds may cause a severe impact on the environment and local populace.

1.3. Main mechanisms causing accidents/incidents at the tailings management facilities in Romania (event tree)



1.4 Implementing the best available techniques (BAT) for waste management in the Romanian mining industry

We believe we must implement measures to prevent and reduce the natural risks which may generate NATECH (technical accidents caused by natural disasters) type accidents for mining ponds, active preserved, such measures should include:

- ***maintenance of means and works for protecting and limiting the occurance of natural disasters;***
- ***controlling the level of field occupation and finishing the development of associated plans regarding the manner of territorry or land maintenance, use or exploitaton;***
- ***informing the populace regaridng the potential risks associated with the respective inhabited area.***

2. Risk management affecting transboundary tailings ponds

- Hydraulic structures and dams in particular, including tailings ponds, are comaprable with other industrial installations in terms of risk management. Therefore, we believe that the ensurance of a safe exploitation should include the following **requirements**:

a. Monitoring of the exploitation programs;

b. The existence of a protection and safety system;

c. Application of certain security measures in order to ensure a proper management of the dam or dam neighboring area;

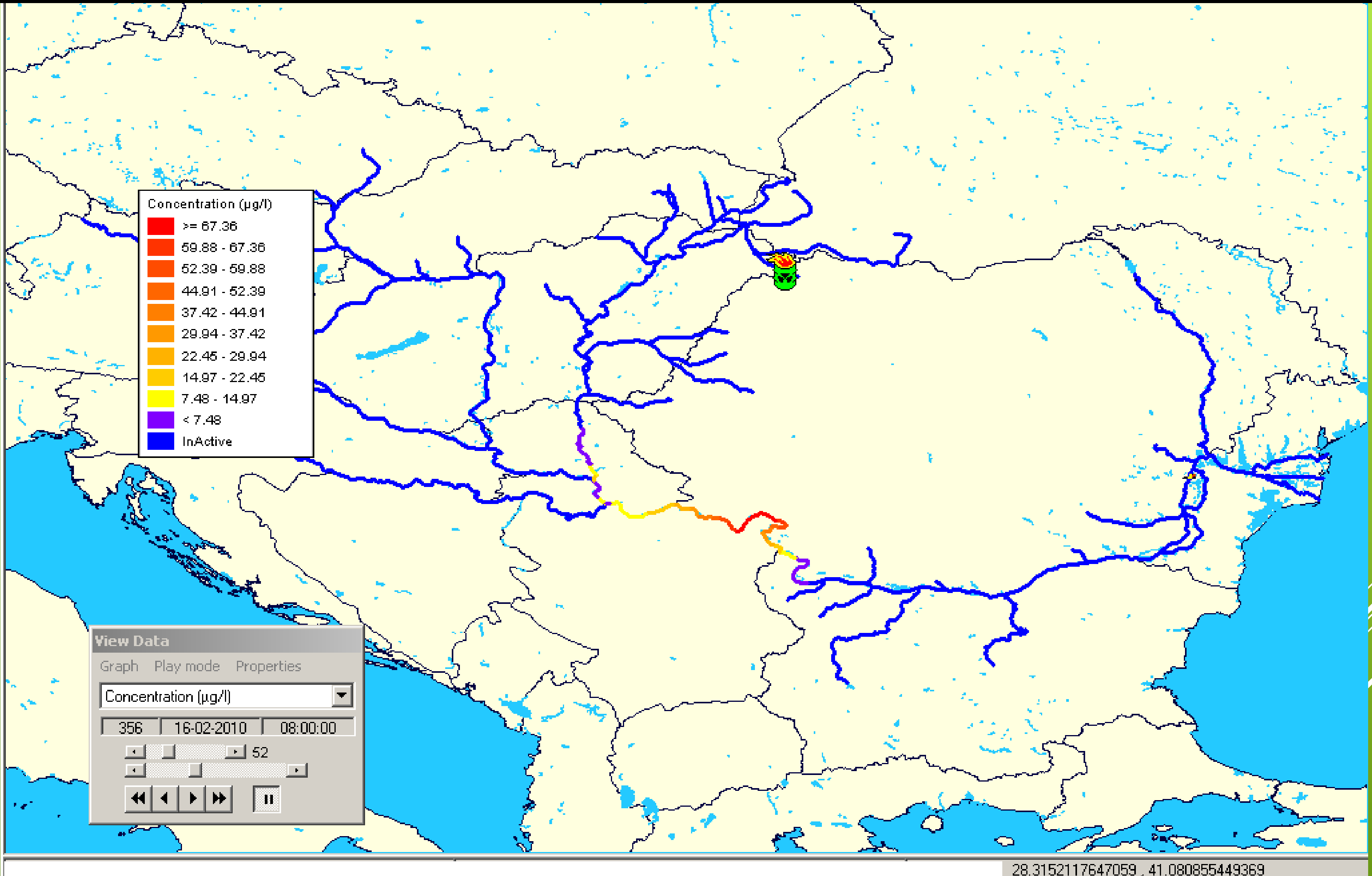
d. Installation of control and measurement equipment in order to monitor dam behavior in time;

e. Existence of an authorization for the safe operation of the tailings pond;

f. Information and alert system to warn the populace and social-economical facilities located upstream in case of accident;

g. Implementation of the tailings pond cesation, resue or abandoning procedure.

2.1 Development of scenarios for tailings management facilities with hazardous substances



Note: The diagram is drawn in order to simulate the technical accident at Baia mare, Danube Basin Alert Model – DBAM issued by ICPDR – Convention for the protection of the Danube River (having its secretariat headquartered in Vienna)

2.2 Modeling information management in case of accidental pollution: operational activities

- The Danube Basin Alert Model (DBAM) is a software which can provide forecasts regarding the propagation of a pollutant along the river (Fig.). The forecast concentration is especially useful in taking the measures imposed so as to protect the users and facilities upstream of the pollution front (in order to stop the catchments in time, prior to the arrival of the pollution front and in order to estimate the damage period caused by pollution and affecting economic activities) and, implicitly, to establish the optimal timing fro sampling.

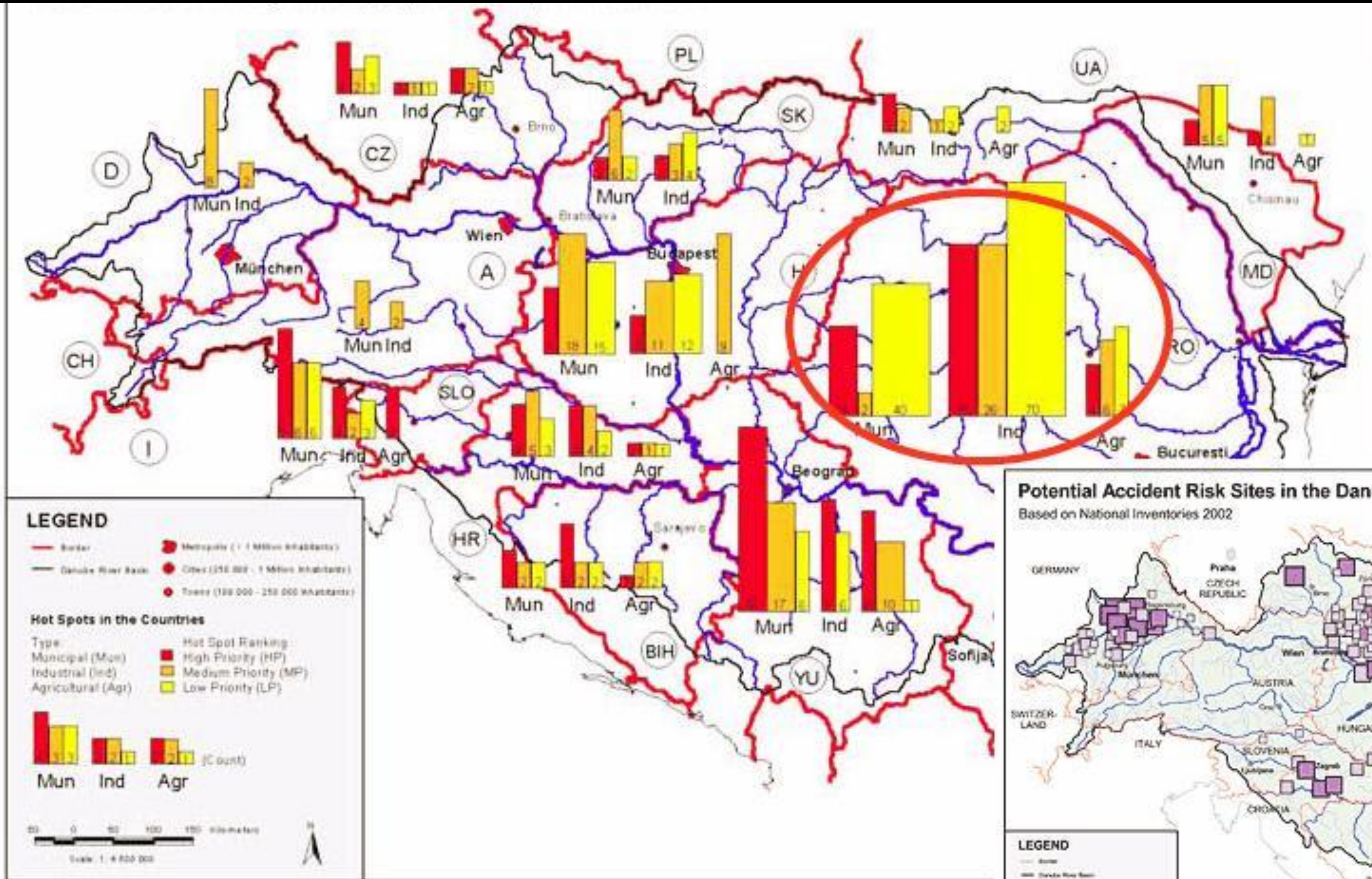
- The major institutions involved in this system are: The basin and county units of ANAR ("Romanian Waters" National Administration), through the continuous monitoring of water quality, the country and local emergency commissions, ISUJs (County Inspectorates for Emergency Situations), APMs (Environmental Protection Agencies) and county CNM-Cjs (County Commissions of the National Environmental Guard).

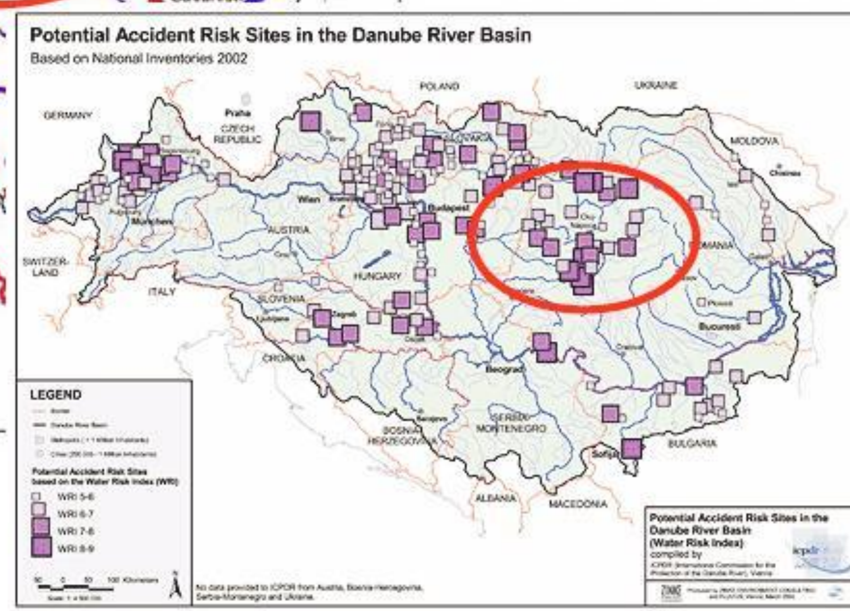
- The proper operation of this system leads to a decrease of economic damages in case of accidental pollution. Subsequently, in case of a validated accidental pollution, the information is disseminated to all organizational structures, at national, county and local level, involved in operative response activities in case of accidental pollution.

3. Measures- Applications/instruments for pollution risk management

- In September 2000, the ICPDR (International Commission for the Protection of the Danube River) decided to prepare an inventory of ARS (industrial sites with a risk of industrial accident) covering the entire hydrographic basin of the Danube. For the final assessment of the potential risk of hazardous installations, a Water Risk Index (WRI) was used - a combination of Water Risk Classes (WRC) and the respective amounts of hazardous substances deposited within an installation (the Water Risk Classes also include the substantial criteria used in the Seveso II Directive and within the UN/ECE Convention concerning industrial accidents. The ARS inventory was completed in 2001. Thus, a total of 611 sites with a potential industrial accident risk in nine countries were reported, of which Romania has a reported contribution of 67 (fig).

3.1. Identifying areas with high vulnerability to accidental pollution within the Hidrographic Basin of the Danube River (ARSs)

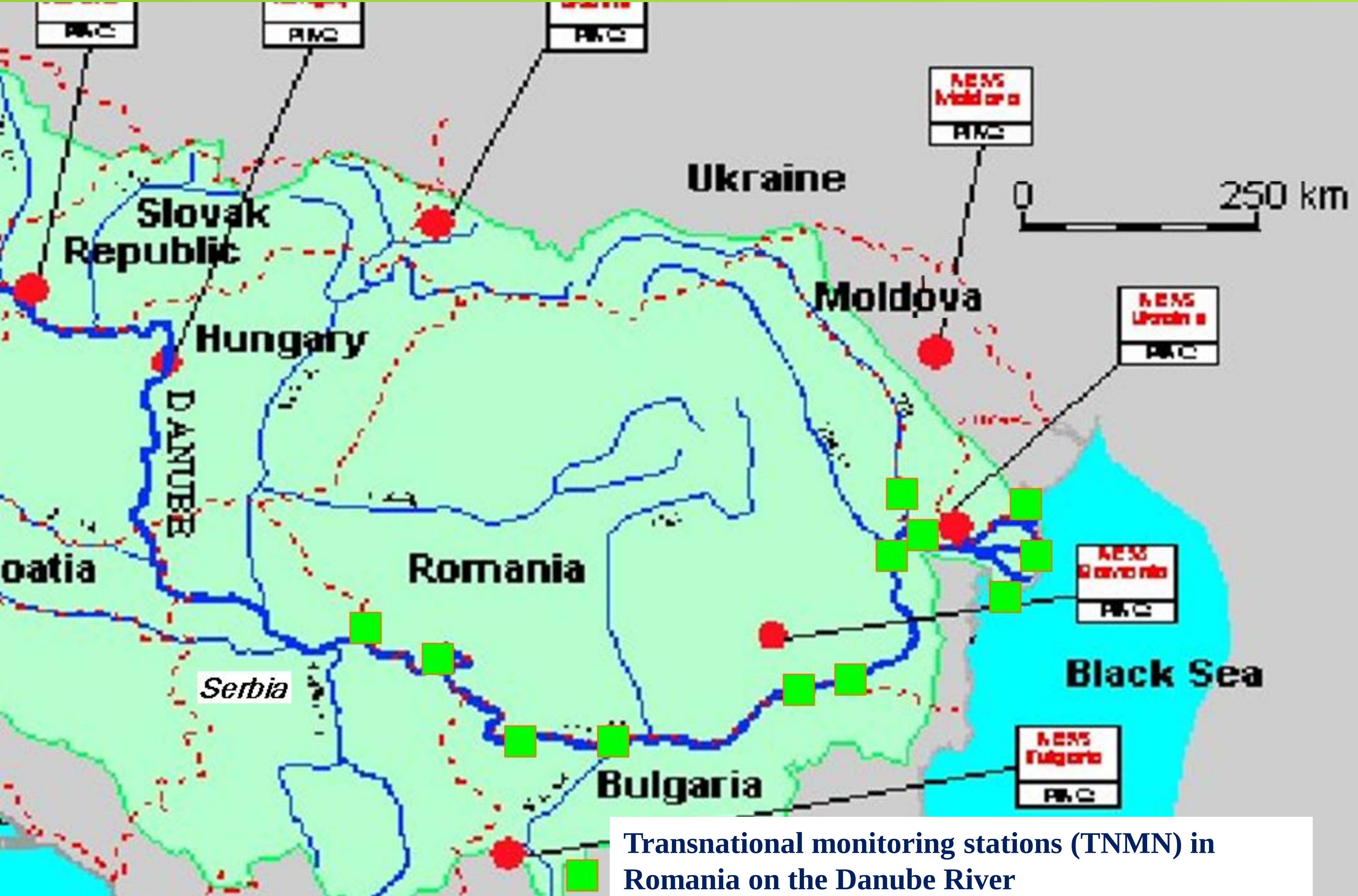




Note: The map was provided during the workshop by the accidental pollution experts within ICPDR

3.2. Equipping with adequate monitoring stations in order to monitor the flow, speed, depth, etc.

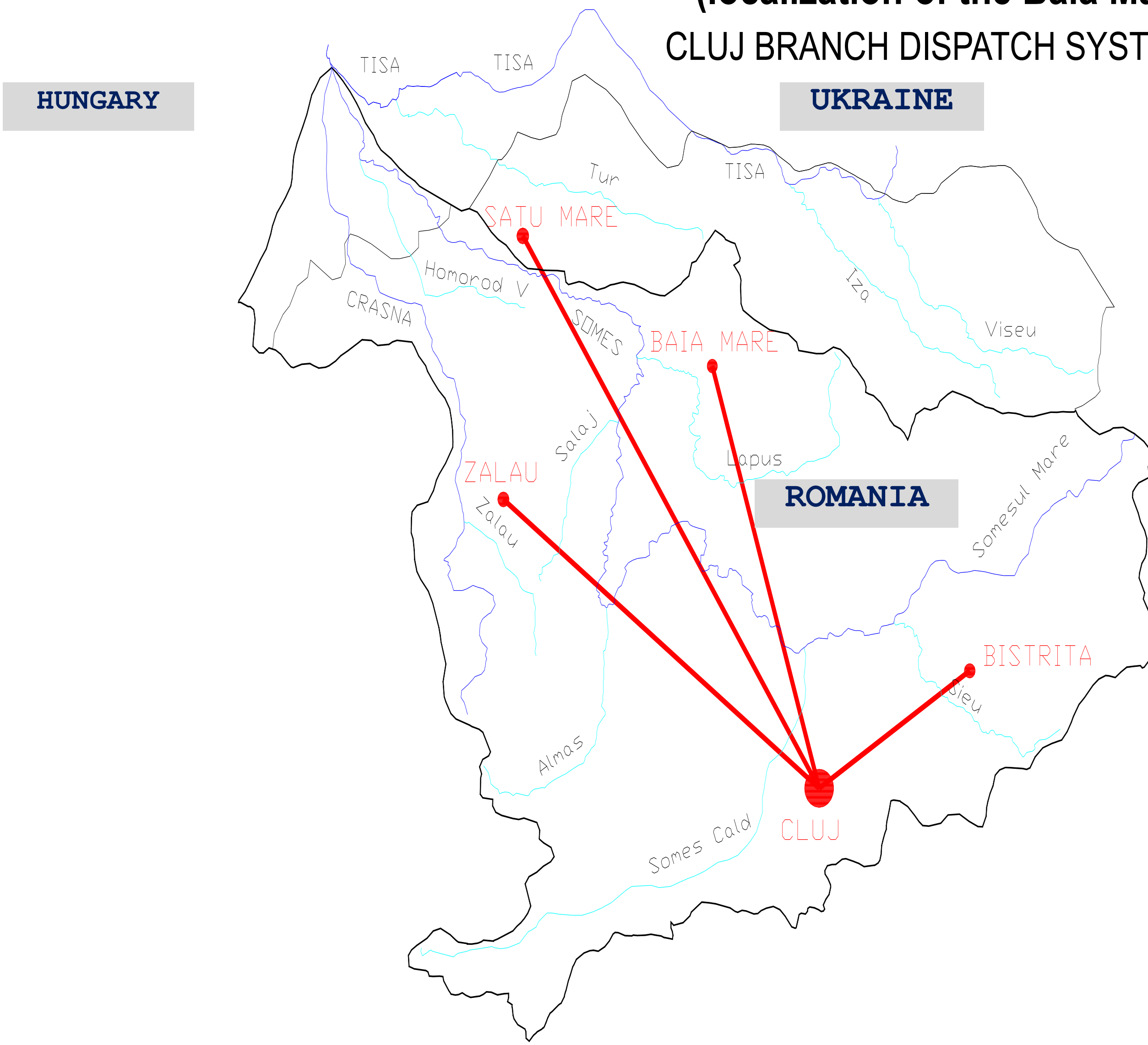
Nota: Harta produsa in cadrul grupului de lucru de experti pe poluari accidentale al ICPDR



Transnational monitoring stations (TNMN) in Romania on the Danube River

3.3. Improving the information flow for transborder warnings in case of accidental pollution at basin level – (localization of the Baia Mare tailings pond)

CLUJ BRANCH DISPATCH SYSTEM



4. Major "Baia Mare" type international accidents

- It is extremely important from the recent failures of tailings ponds due to NATECH events (technical accidents generated by natural disasters) such as Baia Mare (2000), Romania, resulting in the cyanide contamination of the Someș, Tisa and Danube Rivers, up to the Danube Delta area, before flowing into the Black Sea, such as Ajka (2010), in Hungary, with the discharge of approximately 1 million cubic meters of toxic caustic red slurry (strong alkaline, with a pH of 13) from the processing of aluminum ore (bauxite) and alumina production, resulting in 10 human deaths, 150 injured, 2000 homes destroyed and 1000 ha or arable land contaminated, but also the one at Mount Polle (2014), in Canada, which led to the contamination with heavy metal gangue of the Hazeltine water course valley, also affecting the Quesnel and Polley lakes (Fig).
- Because of such accidents, we have identified the fact that hydraulic structures and particularly dams, including tailings pongs, are comparable to other industrial installations in terms of risk management.

5. Characterization of “Baia Mare” type accidental pollution events

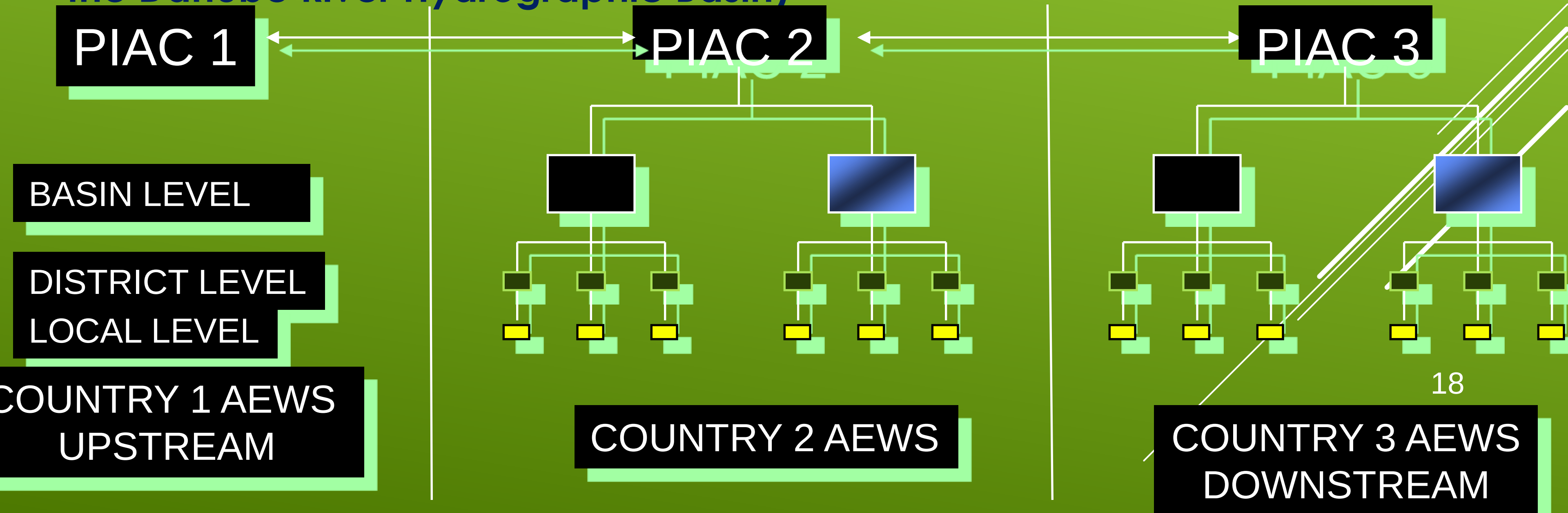
5.1. The effect of accidental pollution as a result of the Ajka and Mt. Polley accidents

5.1. The effect of accidental pollution as a result of the Ajka and Mt. Polley accidents (continued)

5.2. Alert thresholds for accidental polution used in emission models

- Establishing the alert thresholds for accidental pollution as part of the AEWS (Accident Emergency Warning System) may only be achieved if the composition and concentration of chemical substances discharged in a stream, based on the emission criterion can be estimated. Pollutants discharged into the water via a pollution event must first be classified into Water Risk Classes (WRC) with the help of R Risk criteria (R phases).

- The amount of pollutant expressed in WRC risk classes must be compared with the corresponding alert threshold (Tab). If the threshold values are exceeded, an "Alert" type message will be issued by PIAC (Principal International Alarm Center) in the country where the pollution occurred to the PIAC of the country downstream (fig. AEWS System Block Diagram – from the Danube River Hydrographic Basin)



5.3. Specific pollutants – water risk index values

For oil products, sludge and wastewater, according to the lessons learned from the recently occurred industrial accidents, most accidental pollution events are based on mineral oil or oil byproducts, which in most cases are not specified. Furthermore, the water used for extinguishing fires, sludge and farm wastewater are frequent specific pollutants (tab).

Additionally, flue dust was introduced, which can be assimilated with the mine taillings from the tailings pond (no heavy etals, highly toxic, carcinogenic, teratogenic (causing innate malformations) and mutagen.

Mixture of substances	ALERT [kg] or [l]	ALERT [kg] or [l]
	Qm flor < 1000 m3 / s	Qm flow > 1000 m3 / s
Oils (not specified)	≥ 1 000	≥ 10 000
Water for extinguishing fires	≥ 10 000	≥ 100 000
Sludge and wastewater (farms)	≥ 10 000	≥ 100 000
Flue dust	≥ 100.000	≥ 1.000.000
Water Risk Index(WRI)	**2**	**3**

5.4. Example of automatic calculation of the alert threshold for a hazardous susbtance (sodium cyanide) accidentally discharged into a stream within the Danube River Hydrographic Basin, through the ICPDR – AEWS

Alert thresholds for the Danube River Catchment

Input values:	Flow rate	34 m^3/s		
	Emission	Quantity (kg or l)	WRC	Substance mixture
	Substance 1	98	3	←
	Substance 2			←
	Substance 3			←
	Substance 4			←
	Substance 5			←
	Calculate	Reinitializare		
Output values:	Equiv. quantity	98 kg or l		
	WRI value	1.99		
	WRI threshold	2		
	Alert?	No Alert need		

note: no alert necessary

6. Lessons learned from the management of “Baia Mare” type industrial risks”

- At PIAC level, within the Ministry of Environment, Waters and Forests, the international pollution database includes relevant data concerning recent pollutions. This accident database is capable of supporting the applications required by the decision makers and of operation as an integrate part of an integrating decision support system.
- The lessons learned by assessing recent accidents have ensured a vital input for the activity improvement process.
- Due to the institutions and the public, which have become increasingly less tolerant of any type of accident, the necessity of a detailed investigation due to accidents is increasing.
- The necessity for companies to investigate incidents or accidents missed has increased proportionate to achieving a reduced number of major accidents.
- The activity resulting from the database management ensures a proper framework for analysing every aspect concerning accident investigation in order to learn the lessons and use them for the prevention of disasters and minimizing the effects thereof.

7. Conclusions

- The Ministry of Environment, Waters and Forests has undertaken to hurry the assurance of a safe industrial activity, according to the European and international standards for environmental protection, The global activities with regards to industry are performed by allotting financial resources, and also by imposing legal requirements on the industry (new units, operation sites, closed facilities).

- The AEWS (Accident Emergency Warning System), through its own PIAC, with a decision making unit located within the Ministry of Environment, Waters and Forests, represents a convergence point for all measures and initiatives within the Danube Hydrographic Basin, while for Romania, one of the most important measures is the implementation of the Water Framework Directive, concerning the improvement of the water quality status, the conditions for ensuring an improved standard of living for the population water and environmental protection services, for a safer life within a common European space.

- Additionally, the new pollution alert thresholds within AEWS Danubian, to be applied via a national methodology, coupled with an improved propagation model (DBAM, etc.) will lead to an improved framework in terms of the safety issues of any owner of water hazardous substances, so as to improve water protection and the public opinion regarding the measures taken by the competent authorities involved in water management.

7. Conclusions (continued)

We believe the recent introduction of new alert thresholds for accidental pollution (emmission criterion) within ICPDR, will lead to an improvement of water quality management activities in the Danube countries, and Romania implicitly, by also taking into account certain pollution events with cannot be neglected, even if the value of the pollutant substance indicator in the water is below the maximum allowed values (as previously considered, until 2005). In order to avoid accidental pollution events, precaution measures are required, including at the level of potential pollutants (industrial units):

-intensifying reglar inspections of the hazardous installations (which store pollutant substances), in order to ensure that the norms for handling, storing and transfering of hazardous substances are observed;

-The existence of a high and updated inventory of the amounts of hazardous substances, held at any moment by the economic agents in order to establish the exact amounts discharged into the hydrographic etwork in case of a polluting event, so as to precisely certify the establishment of alert thresholds based on the amounts of hazardous substances missing in the installations, considering that there are over 2000 mining structures similar to the hydrotechnical installations in Baia Mare and Ajka, at EU level.

-the dissemination of information on the new ICPDR methodology regarding the establishment of alert thressholds in case of accidental pollution for both the authorities involved in water quality management as well as the economic agents managing such substances.

-The equipping with pollutant propagation models in interior water streams for the quicker evaluation of the pollutant concentration progress in the surface waters, especially useful for the measures necessary to avoid pollution (ensuring a dillution of the contaminant below the alert threshold), sampling at the exact time when the pollution wave reaches the control section, in order to save reactive agent, etc.) with the field propagation data.

-Assessing the impact over the biocenosis in the affected area by using a red list of species (the existence of a detailed inventory of species endangerd prior to the pollution caused by the accident).