



SEPIC

Support to Enhance Privatization, Investment, and Competitiveness in the Water Sector of the Romanian Economy

INSTITUTIONAL ASPECTS of WATER MANAGEMENT in ROMANIA

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and also to
ANAR and MEWM

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Acronyms

AMC – Measurement and Control Apparatuses
ANAR – National Administration “Apele Romane”
ANM – National Administration of Meteorology
DA/ RBD – River Basin Directorate
DDRI/ IRDD – Danube Delta Reservation Institute
DESWAT – Disaster Water project
DSS – Decision Support System
EU/ UE – European Union
GD/ HG – Governmental Decision
GIS – Geographical Information System
GO/ OG – Governmental Ordinance
GOR – Government of Romania
HS/ SH – Hydrological Stations/ Service
ICIM – Environmental Research and Engineering Institute
INHGA – National Institute of Hydrology and Water Management
ISO – International Standards Organization
MRI/ ICM – Marine Research Institute
MEWM/ MMGA – Ministry of Environment and Water Management
NEAP/ PNAM – National Environmental Action Plan
NGO/ ONG – Non-Governmental Organization
OU – Emergency Ordinance
SEPIC – Support to Enhance Privation, Investment and Competitiveness in the
Water Sector of the Romanian Economy
SGA – Water Management System
SIMIN – Meteorological Information System
STAS – Governmental Standard
TAIWAT – Trade and Investment for Water
WATMAN – Water Management Project
WFD – (EU) Water Framework Directive

INTRODUCTION

WFD is a bold and forward-looking instrument that will have far reaching consequences for future management of water and aquatic ecosystems throughout Europe. The central feature of the WFD is the development of Integrated River Basin Management Plans. These plans will be instrumental in ensuring that the environmental objective of the WFD “good water status”, is achieved and maintained for all Community waters by 2015. Five key cross-cutting issues need to be systematically considered for the different tasks to be performed during the river basin process, e.g. defining river basin districts, identifying key water management issues, assessing the most cost-effective set of measures for achieving objectives, or developing monitoring programmes. Integration between organizations, economic sectors and disciplines dealing with water management issues is required for ensuring efficient and cost-effective river basin planning. Capacity among all relevant actors needs to be maximized. Capacity building, starting with awareness rising, is required for officials, planners and administrators, but also for economic sectors, local authorities and NGOs. To understand the role of each actor in water management decision system, its capacity in implementing a new system and of a new technology, it is important in implementing the WATMAN Project.

Romania’s water management system was established by the 1996 Water Law. Four main institutional components are belonging to this system:

- the Ministry of Environment and Waters Management (MEWM);
- the National Administration "Apele Romane" (ANAR);
- River Basin Directorates (DA), and
- Water Management Systems (SGA).

Other ministries have also responsibilities in the management of water use. For instance: Ministry of Agriculture, Forests and Rural Development, Ministry of Administration and Interior, Ministry of Economy and Commerce, Ministry of Transport, Constructions and Tourism, Ministry of Health (monitors drinking water quality) and National Administration for Control (which includes the Environmental Guard) and the National and counties Environmental Agencies, with an important role in water quality control.

Responsibility for drinking water supply, waste water disposal and treatment lies with the local authorities. The water users (municipalities and industries) are obliged to prepare, and apply, if necessary, their own plans for the prevention and control of accidental pollution that might occur as a result of their activity.

1. Description of the current institutional structure involved in water management, in Romania

Institutions with implication in water strategy domain and water management, in Romania

1.1. The Ministry of Environment and Water Management (MEWM)

In March 2004, the *Ministry of Environment and Water Management* was set-up (though the governmental institution for environmental protection has been first established in 1990).

The Ministry of Environment and Water Management draws up the national strategy and policies in water resources management and environmental protection. The specific functions of the Ministry include:

- strategic planning, including the drawing up of national water management and development programmes;
- preparing legislation and national policy;
- allocating and managing national budget resources for water management and infrastructure development;
- setting standards for controlling and monitoring water resources and water dams and set compliance with them;
- preparing the administrative process for the regulated use of water resources through a license and permit system;
- coordinating the accomplishment of the Danube Management Plan on Romanian territory;
- setting international cooperation and cooperation on trans-boundary water bodies.

In order to assure the coordination of the environment protection and water management activities MEWM is organized in two main Departments:

- Environment Protection
- Water Department

For further information on the MEWM reference is made to the homepage of the Ministry: www.mappm.ro.

Regarding water activity decisions for accession planning at the level of Environment and Water Management Ministry, the Inter-Ministerial Water Board was created, which has the following duties:

- to elaborate the Action Plan for implementing the WFD in Romania, and to monitor its accomplishment;
- to report the WFD implementation status to the International Board for the Protection of the Danube and the European Union Commission;
- to endorse the Romanian Water Management Plan;
- to submit for approval, to the Environment and Water Management Ministry and to the Government of Romania the Romanian Water Management Plan.

Regarding the flood defense activity, the Ministry of Environment and Water Management (MEWM) has the following responsibilities:

- Elaborate the strategy of flood defense
- Ensure the annual budget for flood defense and for the needed investments with role of flood defense and make the coordination of their execution in an unitary conception
- Coordinate at national level the entire operational activity for information with warnings and forecasts
- Initiate and modify the legislation in the domain
- Cooperate with the specific organizations at international level on the basis of the inter-state conventions for flood defense
- Verify (annually) the technical and functional state of the water works for flood defense establishing measures for upgrading their security
- Verify the works for repairing and maintenance of hydro-technical constructions with role of flood defense, the works for river bed cleaning for highlighting the flow capacity

- Ensure the functioning conditions of the Central Commission of Flood Defense and of the Permanent Technical Secretariat of this commission.

Regarding the post action, MEWM:

- Evaluates the water works with a high degree of risk and establishes together with Ministry of Transport, Construction and Tourism, the immediate and long term measures in order to avoid accidents;
- Approves the final list of the weirs, with public declaration of general character/levels, of importance category and the risk degree associates to the importance category, list of the weirs with high degree of risk and of those of major importance category, as well as the list of weirs managed by tenants of any title;
- Certifies and controls the managing personnel for the activity of supervising the operation of the weirs, in time;
- Organizes and certifies the body of experts for evaluation of security in weirs operation for weirs categories A and B, as well as the authorization of professionals in supervising security in weirs operation for weirs categories C and D.

Regarding the water pollution prevention, MEWM has the following responsibilities:

- Elaborates and implements the norms regarding the quality of water resources related to the water functions;
- Up-dates and implements the Plan of Action regarding the water protection against chemical pollution from agriculture sources and the strategic plan for Black Sea rehabilitation and protection
- Takes action in order to set the special surveillance regime or closing down the operation of the entity or installation that pollutes the water;
- Sets up the Program to eradicate, in time, the dangerous substances emission and discharge.

GO 408/2004 stipulates a new attribution for Ministry of Environment and Water Management, meaning *methodological coordination of Environmental National Guard activity regarding the implementation of the environmental strategies and politics (including water domain)*.

The Annex of this GO, mentions a specialized department within the ministry, **The State Inspection for Waters**. This department **has attributions regarding the control of water management**. Its attributions will be set through an internal administrative regulation regarding the Ministry of Environment and Water Management operations.

The entities under the Control of Ministry of Environment and Water Management that have attributions in water management are the **National, 8 Regional and 34 County Agencies for Environmental Protection**, with responsibilities for water quality control and the **Administration of Bio-sphere Reservation “Danube Delta”-Tulcea** with responsibilities in water management in the Danube Delta and the protection of the biotopes.

The entities operating under the Administration of the Ministry of Environment and Water Management are the National Administration “Apele Romane” (former Apele Romane) and the National Administration for Meteorology (former INMH), Institute of Research for Environmental Engineering and Institute for Maritime Waters.

1. 2. The National Administration "Apele Romane" (ANAR)

At the national level, the National Administration for Waters Management "Apele Romane" (ANAR) is responsible for the implementation of the national strategy through the 11 Water Branches - Water Directorates (Figure 1), organized at level of river basins and groups of basins, The National Hydrology and Water Management Institute and The Stânca Costesti multiple purpose reservoir.

The National Administration "Apele Romane" is in charge with and responsible for the ways the surface and ground waters on the Romanian territory are used and for the water management operations and it collaborates with all the owners of other operations regarding the waters.



Figure 1. First order River Basins in Romania coinciding with water directorates

Apele Romane, is responsible for day-to-day management of water quantity and quality and for coordinating flood defense activities (Ordinance No. 45/2001 and Governmental Decision 107/2002). Apele Romane operates 11 regional offices in the main river basins of the country and 40 local offices (SGAs), one in each county. According to the Water Law, Apele Romane is responsible to organize activities to prevent and fight against accidental pollution. In case of accidental pollution they must take appropriate measures to remove the causes and effects of the pollution. Apele Romane issues water management permits and notices. Each water user must present technological documentation and a plan to prevent accidental pollution (Ordinance No. 278/1997, 107/2002). Apele Romane has the right to inspect facilities and to apply penalties in case of violations of the Law. Water users must pay Apele Romane for the services of monitoring water quantity and quality (Decision No. 472/2000 and Law 310/2004). In the case of violation of maximum allowed amounts, Apele Romane registers the violation and applies fines.

1.3. The National Institute of Hydrology and Water Management (INHGA)

INHGA, provides river and flood forecasting for the major domestic and international rivers of Romania. INHGA is a major investigative organization and supports numerous research and development programs in hydrology and water management. INHGA also provides river and flood forecasts nationwide and prepares daily and weekly hydrologic forecasting bulletins for domestic and international rivers that flow out of or affect Romania.

INHGA is the technical and research board for water inside the National Administration “Apele Romane” with important operational responsibilities.

INHGA acts during the water disasters as follows:

- Elaborates and improves the projects of informational systems for data collection, transmission, quality control, applying models and dissemination of flood forecasts
- Elaborates and improves the methodology of mathematical modeling for flood forecasting models
- Carries out the plan of action for hydrological measurements of flood characteristics (Peak discharges, high levels, etc)
- Issues the warnings, forecasting and information on floods.

INHGA is subordinated to Apele Romane and both are subordinate to MEWM. INHGA requires hydrologic data for preparation of daily river forecast bulletins and relies on Apele Romane National Dispatch for such data. Apele Romane is responsible for monitoring and managing water resources in Romania and its national dispatch centre in Bucharest is the source of hydrologic data that INHGA requires – Figure 2.

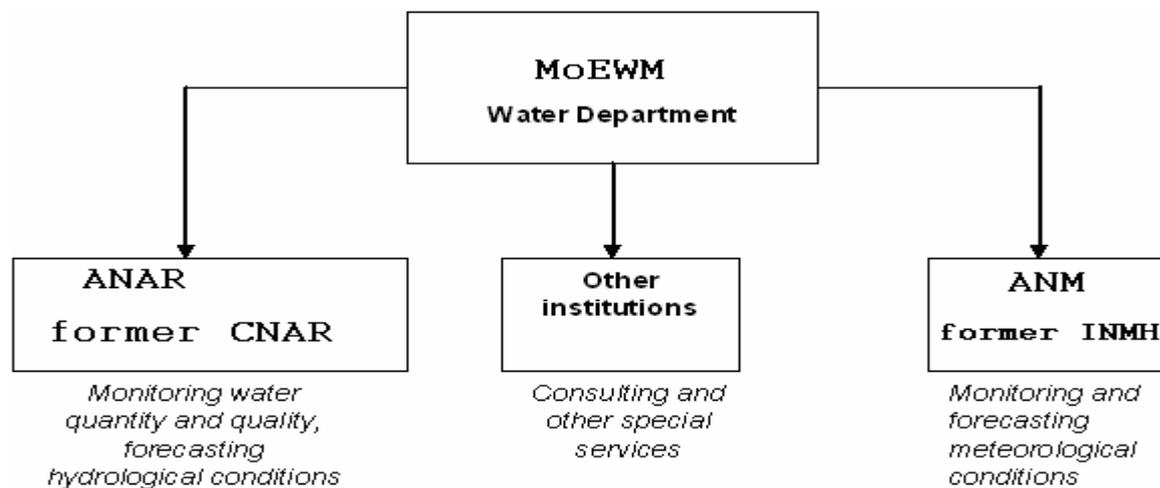


Figure 2. Brief organizational structure of water management in Romania

Detailed infrastructure of ANAR:

National Water Administration “Apele Romane”—is a hierarchical organization, with four principal levels of activity (Figure 3):

Level 1—National headquarters. The main activities of the National Water Administration headquarters are:

- Analysis of water quantity and quality throughout Romania. Via the National Water Administration National Dispatch, data and information are aggregated from lower level National Water Administration offices and disseminated laterally to offices of MEWM and INHGA in Bucharest;
- Overall operation of the water management system;
- Application of penalties for violations of water quality standards; and
- Flood protection and numerous other water-related issues.

The national level represents the planned driving force behind the operation of WATMAN, enabling action at the lower levels through legal, political, and financial means.

Level 2—Eleven regional offices- River Water Directorates, whose geographical responsibilities are defined by major river basin boundaries. Each regional office operates a dispatch centre that accepts hydro-meteorological data from subordinate National Administration Apele Romane offices. These data are required for water management and for subsequent retransmission to National Administration headquarters via e-mail or telephone. Each regional office has day-by-day water-management responsibilities in the basin and sub basins under its jurisdiction. The main responsibilities of each regional office include:

- Monitoring of water quantity and quality;
- Exploiting of surface and groundwater; and
- Operating and maintaining water-control structures for water-management and flood protection,
- Rapid intervention in case of flooding or spills etc.

To realize this activities the structure of services is presented in Figure 4.

The regional level plays a critical role in the operation of the WATMAN because it represents the “basin perspective” and, as such, is responsible for linking activities and data between watersheds.

Level 3—44 County-level organizations (SGA). The SGA offices are responsible for day-to-day management of water resources, including: permitting; monitoring of water quantity and quality; management of floods; forecasting river and flood flows; and issuing warnings at the local level. Each SGA office has a dispatch centers that aggregate data from hydrometric stations in the County, which are the lowest level of the National Water Administration hierarchy. SGA dispatch centers assure the quality of hydrometric data before they are forwarded to regional dispatch centers each day.

Level 4—1,000 river gauging stations, 1999 dams, 350 water quality stations. Most level-4 stations/dams are operated manually, with an observer (a team) dedicated to the operation of each station/dam. During floods, pollution spills, or other emergencies, observers make frequent measurements and report these data to level-3 dispatch centers promptly. Routine hydrometric and flood data are conveyed to SGA dispatch centers from the hydrometric sites and dams via a variety of radio, fax, or other means.

The National Water Administration has installed GIS software and appropriate computer hardware in all eleven river basin offices. The staff of the national office and the eleven basin offices received training in GIS techniques. The national office has procured national level maps and the basin offices are entering water supply and demand data into the GIS.

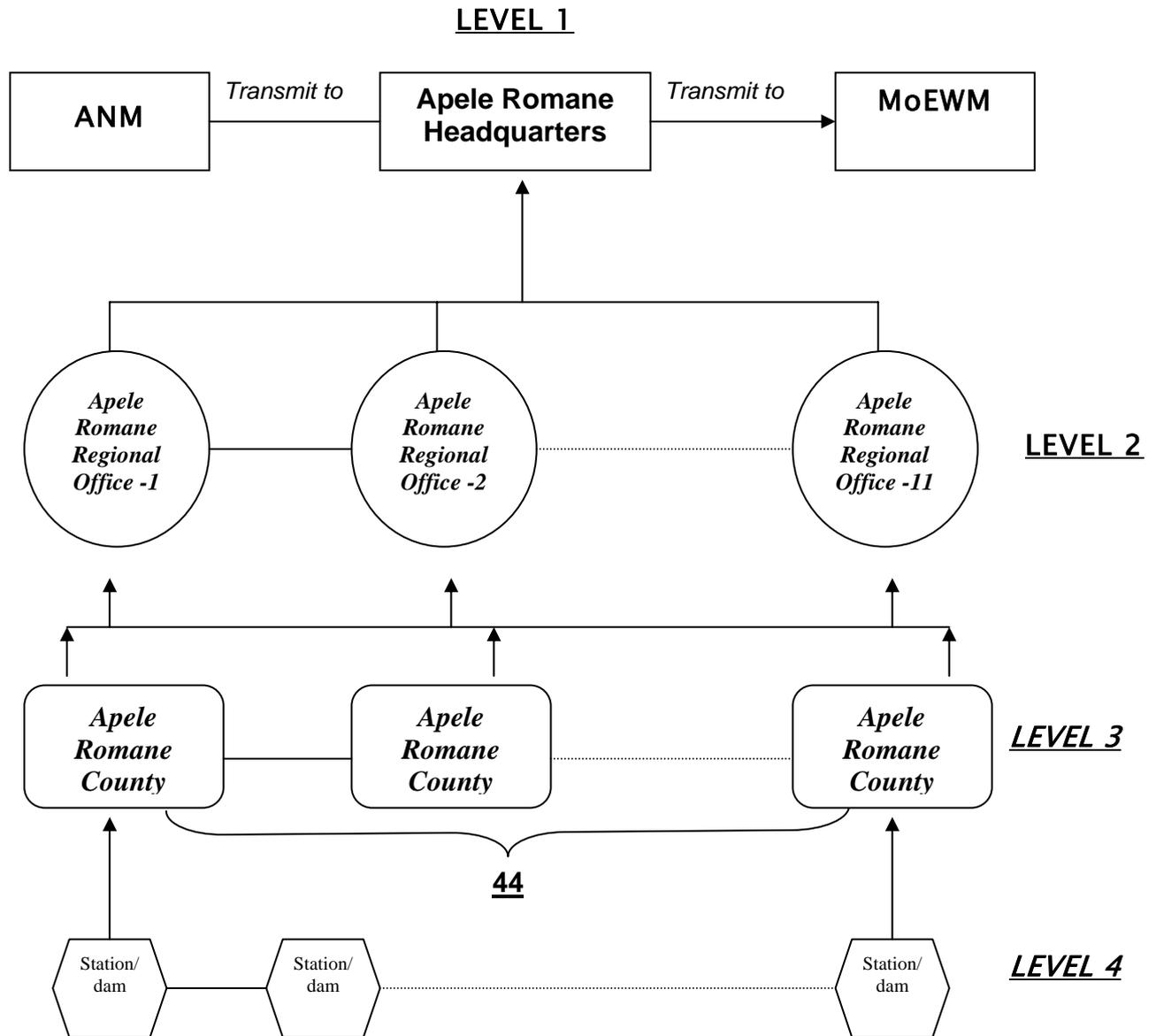


Figure 3. Structure of National Administration Apele Romane from national to local level

The decision for flood forecasting is made according to the quantity and quality of information available at a certain moment as follows:

- When the *Meteorological Forecasting Center of the National Administration of Hydrology and Water Management* provides the warnings concerning the precipitation quantity or increasing temperature that can produce the intensive snow melt in the next 1-2 days and the hydrological conditions at the basin level can lead at the exceeding of the warning levels on the rivers, the *Hydrological Forecasting Service on National Institute of Hydrology and Water Management* issues the first forecasts and provides a first hydrological warning. The entrance in "hydrological alert" of the flood monitoring system is then decided.

- When the levels at the gauging stations exceed the warning levels or the precipitation at the rain gauges exceeds the critical thresholds, these stations have the obligation to intensify the measurements and transmission. Based on this hydro-meteorological information, the hydrological forecasting service from National Institute of Hydrology and Water Management elaborates and provides the forecasts to all hydrological users at the national level. At the basin level (the main 11 river basins) the forecasting is downscaled by *the Hydrological Services of the River Basin belonging to the River Basin Authorities (branches of the National Administration "Apele Romane")*. The getting out from hydrological alert (coming back at the normal measurement and transmission program) is decided by the hydrological forecasting service from National Institute of Hydrology and Water Management, in consultation with the specialists from hydrological services from basin level and based on the meteorological forecasting (provided by Meteorological Forecasting Centre from *National Administration for Meteorology*).

The **River Basin Directorate**, as a branch of the National Administration „Apele Romane” has the following flood preparedness attributions through the services presented in Figure 4:

- The setting up of the informational system for flood warning, forecasting and dissemination and ensure the installation and normal functioning of the hydro-meteorological devices of the stations over the catchments and those located at the hydro-technical works.
- Carry out the river basin plans for flood defense, correlating the flood defense plans of the Counties and Local Commissions for flood defense (disasters (in municipalities, towns and communes)). The elaboration of the flood defense plans is made in correlation with the plans for the management of the territory and for building restrictions in the flood prone areas. The proposal concerning the plans for the river basin is approved by the Central Commission for Flood Defense. The standard contents of the flood protection plans (of the river basins and local plans) are stipulated in the “Monitorul Oficial al Romaniei” no. 385/13 August 1999.
- Technical assistance through the systems of water management for carrying out the flood defense plans at the local levels and gives advice in view of approval by the prefect. The contents of the flood defense plans are specifically previewed at all levels.
- Act as Technical Secretariat of County Commission for Flood Defense that is led by the prefect of the county. The leader of the Technical Secretariat is the director of river basin Administration or the director of the Water management system from the county.
- Ensure the constitution of stocks of materials and means for flood defense according to the established framework normative
- Develop all the economic activities for ensuring the needed equipment



Figure 4. ANAR Water Directorate organization

During the crisis ANAR acts as:

- Execute a permanent survey of the evolution of the floods. Relied on the warning and forecasting issued by the National Institute of Hydrology and Water Management it has an active participation to the warning of the Local Commissions and proposes the triggering of the alert state in the basin
- Ensure a correlated exploitation of the reservoirs over the entire basin area for flood attenuation, and survey the mode of exploitation of these reservoirs before, during, and after the flood
- Participate (through the dispatcher centers of the water management systems) to the warning of the population as well as to the preparedness of the population through the training actions to efficiently cope with the inundations
- Keep surveying and coordinate the development of the defense operational actions in the field, ensure the liaisons with the downstream and upstream counties
- Concentrate the intervention means in the critical zones
- Ensure the shelter of the removed population from flooded areas
- Ensure the transmission of the needed information to the Central Commission of Flood Defense.

Post action activities are:

- Prepare the daily reports on the flood evolution and the inundation effects as well as the synthesis reports after the ceasing of the events. The synthetic reports are made on the information provided by the Local Commissions
- Make proposals for new water works with role of flood defense and for optimizing of the existing ones after the analysis of the past event

- Make proposals for controlled inundation of the terrains which are established a priori in the flood defense plans and for special measures in operating the water release facilities of the dams (for example the pre-water releasing from the reservoirs)
- Organize periodical verifications of the cross sections at bridges, defense works, consolidation of the river banks, and the zones for extracting river bed material for construction
- Dispose obligatory operational measures concerning the exploitation of dams and reservoirs, regardless the owners, so that a maximum of efficiency should be reached over the ensemble of the river basin
- Ensure the issuing and improving of the quality of the warnings, forecasting and all needed information on floods over the basin

In Fig. 7 there are presented the organization of ANAR and schemes of decision level needed to be realized through WATMAN Project implementation.

Basin Committees (one for each river basin) were established at the level of each Water Branch through the Law no. 107/1996, art. 47. The rules regarding their organization and operation have been approved through Government Decision no. 1212/29.11.2000. The basin committees involve all "actors": state, local communities, water management institutions, representatives of industry and agriculture, NGOs. The Basin Committees comprise representatives of the Ministry of Environment and Water Management, Ministry of Health and Family, Municipal and County authorities, Water users, NGOs, and the National Administration "Apele Romane".

The main *tasks* of the Basin Committees are to:

- agree on integrated water management plans and development of programs for water management works;
- agree on the plans for preventing accidental pollution;
- propose the revision of water management norms and standards;
- establish special norms for wastewater discharges;
- recommend priorities concerning water management investments;
- ensure public information.

These basin committees have the main *responsibilities* in analyzing the development projects in the water management field and to make a prioritization of the hydraulic works, which will be planned for construction. Through the Basin Committees the public participation in the decision-making process is ensured.

The Basin Committee consists of **15 members**, as follows:

- a) two representatives of the Ministry of Environment and Water Management of whom one shall be selected from within the environmental protection agencies of the respective river basin directorate;
- b) one representative of the Ministry of Health, selected by such ministry from within the county health inspectorates and preventive medicine inspectorates of the river basin;
- c) two large city mayors and one town or commune mayor, elected by the mayors of the localities in the respective river basin;
- d) one representative elected by the non-governmental organizations having the headquarters in the respective river basin;
- e) one prefect from the respective river basin nominated by the Ministry of Administration and Interior;

- f) one county council president elected by the county council presidents of the respective river basin;
- g) three water users representatives of the respective river basins;
- h) two representatives of the National Administration "Apele Romane";
- i) one representative of the Consumer Protection Department.

The representatives of the local public administration elected in the Basin Committee function therein only throughout the mandate of the position they represent. The prefect, county council president, and the mayors elected are provided from different administrative-territorial units. The waters users' representatives are proposed and elected by the Basin Committee, depending on the demand and the impact of discharged waste water into the water resources. The members of the Basin Committee can be replaced by those who selected or elected them.

The Basin Committee *collaborates with the National Administration "Apele Romane"* in the application of the national water management strategy and policy, for which purpose it must:

- a) agree on the framework schemes, as well as on the development programmes of waters management works, installation and structures;
- b) agree on the plans of preventing accidental pollution and eliminating the consequences of the thereof, developed in the consistency with the conditions of the respective river basin;
- c) approve the local schemes and integrate them into the frame schemes, by determining the technical and financial priorities;
- d) approve the integrated qualitative and quantitative river basin water management plan;
- e) propose the revision of the water management norms and standards, and, if necessary, develop effluent water quality norms, specific to the river basin; such norms may be stricter than those at national level;
- f) establish special norms for waste waters discharges, if necessary, for observing the established water quality norms;
- g) approve the identification of the quality classes of the watercourses in the respective river basin;
- h) recommend priorities regarding the financing and compliance, in order to carry out the development programmes of the works, installations and water management structures;
- i) ensure public information, and the guarantee of a period of time required to receive the public's comments, to arrange public hearings on all aspects proposed for approval, and to ensure the access of the public to its documents.

Other Institutions with responsibilities in flood defense

1.4. National Administration of Meteorology (ANM)

ANM has the following responsibilities regarding the flood defense:

- Carry out the information, warning and forecasts on the dangerous meteorological events and transmit this information to the Permanent Technical Secretariat of the Central Commission for Flood Defense, to the National Dispatcher Centre of the National Administration' Apele Romane" and to the Dispatcher Centers of the River Basin Authorities (branches of the National Administration' Apele Romane")
- Ensure the normal functioning of the meteorological network
- Carry out guidelines for establishing the critical meteorological thresholds and for transmitting the meteorological information during floods. These guidelines are approved by the Ministry of Environment and Waters Management.

1.5. The Ministry of National Defense ensures through the County and Bucharest Inspectorates and Units and military formations for Civil Protection the followings:

- Transmission of the warnings, and all information concerning the formation of dangerous floods, to the local commissions for flood defense
- Participation with their own forces and means at the actions and interventions for flood defense according to the flood defense plans in order to mitigate their effects and for the evacuation of the goods and coordinates the alarm systems of the population in the localities and verifies the functioning state of these devices.
- Participation at the programs of preparedness of population; lead the exercises and applications for flood defense actions executed by the population and economical agents.
- Verification of the applicability of flood defense plans.

1.6. The Ministry of Interior has the following responsibilities during water disaster abatement, as to:

- Participate with means and equipment in special cases of inundations for salvation of the population and the goods, as well as for the operational transmissions.
- Execute the control of the circulation on the roads and ensure the priority for different specific paths needed for evacuation of population, livestock and archive fund and goods.
- Make the guard of the goods and ensure the order during the intervention and post-flood actions.
- Ensure by the fireguards the needed potable water in the towns under calamities.
- Participate at the transmission and dissemination of the warning, forecasts and information on floods.

1.7. The Ministry of Transport and Public Works acts during the flood defense, as to:

- Establish, together with local administration organizations, the transport facilities needed to limit and setting off the flood effects.
- Establish, together with the Ministry of Interior, the interruption of the circulation of damaged roads and assure the resuming the circulation after flood.
- Establish the specific rules for navigation during floods
- Control of the application of the stipulations from the documentation of urbanism and of the management of the territory concerning the interdiction or restriction for settlements in the flood prone areas.

1.8. The Ministry of Communication role during flood defense is to:

- Ensure all the needed liaisons of communication according to the flood defense and dissemination of information plans, giving needed priorities.
- Coordinate and control the reorganization of the development of the telecommunication facilities, installing and replacing the transmission lines and terminal points.

1.9. The Ministry of Health through the County Health Directorates acts during floods defense, to:

- Direct towards the damaged zones the sanitary personnel for health assistance

- Dispose the epidemiologic survey of the dislocated population and for assuring the potable water and non-contaminated food
- Organize together with the Red Cross the education and training of the population
- Organize the health personnel for specific training.

1.10. The Ministry of Economy and Commerce through “Hidroelectrica” acts for flood protection, to:

- Equip the systems with hydrometric apparatus needed for flood surveying and forecasting in the reservoirs as well as for measuring the released water from the reservoirs
- Install the facilities for alarm of the population downstream the reservoirs
- Equip the units under its Administration with materials and means for intervention
- Make a special plan for alarm in case of accidents at the dams and their water release weirs and gates.

1.11. The Ministry of Agriculture, Forests and Rural Development, through the Autonomous Branch of Land Reclamation participates in the activity of flood prevention to the:

- Flood defense of the embankments on the bases of the specific plans
- Maintenance of the water discharge systems and evacuation of water in excess and the restoration of damaged water works which are under their Administration
- Equip the land reclamation systems with hydrometric facilities for flood measurement and transmission
- Organize and conduct the training for creating the own specific intervention teams in case of inundations
- Carry out of the specific plans for flood defense of the land reclamation systems.

1.12. The National Administration of the Forests:

- a) Through its branches, it ensures the planting of protection shelter-belts for the works of defense against the floods and their exploitation in conformity with the defense requirements;
- b) It ensures the establishment of plantations on the mountain coasts, with anti-erosion effect, in correlation with other water utilizations works, in order to prevent their filling; it interdicts the total land clearing and it establishes the forest exploitation conditions with protection role;
- c) Put at the local defense committees and commandments disposal, with priority, the limber material necessary in defense and rebuilding of the damaged or destroyed constructions;
- d) Ensures the communication to the water utilization units of the data received from the hydrometrical and meteorological stations in their own units;
- e) Ensures the establishment of materials and means of defense stocks against the floods, from their own resources, for the defense commandments formed at the level of forestry units;
- f) Through the forestry administrations, it takes measures to remove the limber material on the riverbeds which are in their administration and to clean up the bridges and the footbridges in order to ensure the draining.

1.13. Local Committees of Defense against Disasters

With the technical assistance of the water utilization units from the National Administration “Apele Romane” and of the ports and of the navigable channels administration, the municipal,

city and commune committees of defense against disasters, draw up the defense plans against floods and ice, will be designing.

1.14. District (judet) Committee of Defense against Disasters

The district committee of defense against disasters through the Permanent Technical Secretary approves the *defense plans of the local committees* which are verified and sanctioned by the Department of Defense Against Floods, in case of dangerous meteorological phenomena and potential accidents at the dams. They represent distinct sections in the protection and intervention plans in case of disasters.

Defense plans for hydro-technical works are drawn up by the water utilization systems of the National Administration “Apele Romane”, by the hydro-energetic systems of the S.C. “Hidroelectrica” S.A., by the hydro-improvement systems of the Autonomous Administration of the Land Reclamation and by other systems working in technical commissions for flood mitigation and spills recovery.

Institutions with control attribution in water management

1.15. State Water Inspection

Operates within the Ministry of Environment and Water Management. The attributions of this body result from the provision of paragraph no. 78 of the Law no. 107/1996

After introducing themselves and presenting their empowerment, the personnel of this body has the right to:

- a) access to the waters, within the zones along the water sectors, in any other place, unit or installation, regardless the tenant or the owner, in order to verify the conformity with the regulations in force and water management rules;
- b) control the works, constructions, installation or activities related to water and to verify if these are realized according to the specific legislation and water management authorization/agreement;
- c) verify the installation of flow measurement, to take water samples, and to examine within legal frame, any information and document necessary to the control action;
- d) discover any break of the law in water management and draw-up the documents according to the legislation in force.

The representatives of the Ministry of Environment and Water Management who control the units with special status also have to obtain the permit from the ministry that co-ordinates the activity of respective unit.

On the navigation water and in harbors the specific activities are carried out together with the Ministry of Transport, Constructions and Tourism.

1.16. The Environmental National Guard

It is a public institution under the National Administration of Control, re-organized through G.D. no. 761/2003. It is a specialized body for control purposes that has specific status and attributions in enforcing the Romanian Government policies as per preventing and punishing the law breaking in the environmental area, including water.

Other institutions with responsibilities regarding water environmental protection and connected research development

1.17. National Agency for Environmental Protection

Public institution, **legal body**, set-up through GO no. 1.625/2003 has, among the general attributions regarding the environment, some specific attribution regarding the water management and protection: sets up the technical policies, strategies and plans of action in environment protection, having as basis the concept regarding the steady development and coordinates the activity of national laboratories that provide references for **water environment**. It supervises the regional agencies for environment protection in the process of authorizing the activities under the Government Emergency Ordinance (OU) no.34 regarding the prevention, reduction and the integrated control of pollution, approved and modified by the Law no. 645/2002. Other implication is to coordinate the activity of setting up the national and local inventory of the future preservation areas – areas of communitarian importance – and areas of animal and water protection, in order to set up the European Network of Protected Natural Areas – NATURE 2000 and for this activities collaborates with the regional and county agencies.

1.18. National Institute of Environmental Engineering and Research (ICIM)

ICIM is the main actor in environmental programs implementation. Related to water domain, ICIM is responsible for research and development in water quality, waste water treatment new methods, and identifying polluted areas and the rehabilitation strategy. At this level it is made the linkage with the historical data base for water quality.

ICIM has developed some models for water quality and it is the main actor collaborating with MEWM for the Danube River water quality monitoring and forecasting.

1.19. The Danube Reservation Institute, in Tulcea (DDRI)

DDRI is responsible with environmental research of the Danube Delta Reservation, of the biotopes in this space, as well as with biological aspects. The protection and conservation of few important species are aspects related with the DDRI activity.

1.20. The Marine Research Institute, in Constanta (MRI)

MRI is responsible with Black Sea monitoring program, together with Dobrogea Directorate of ANAR. The main monitored parameters referred to environmental aspects like: maritime life, biotopes, species evolution and migration, etc. Sea shore evolution (erosion) is another important aspect, as well as long term water quality evolution and different changes/ trends in currents, waves, etc.

We have to point out that the very vague definition of this body attribution of control, in the above mentioned G.D., can result in confusions and abuses among both the entities subject to control and other institutions with control attributions, as well as in multiple controls on the same issue.

2. Linkages between national authorities and regional/local authorities

The linkage between different partners in flood control system is presented in Figure 3. The decision is taken at different levels, on top being the inter-ministerial commission named **Central Commission for Flood Control, Dangerous Meteorological Phenomena and Hydro technical Constructions Accidents**.

2.1. Inter-ministerial commissions

2.1.1. Central Commission for Flood Control, Dangerous Meteorological Phenomena and Hydro technical Constructions Accidents

This Inter-Ministerial Commission has a long tradition in Romania (before 1989). Actually, this commission is established according with the article 7 of the Water Law 107/1996. The aim of the activity of the Central Commission for Flood Control, Dangerous Meteorological Phenomena and Hydro technical Constructions Accidents, further named Central Commission for Flood Control, consists in organizing and coordinating of protection activities regarding:

- floods caused by natural overflowing of water courses or sedimentary ice;
- floods caused by accidents and damages of hydro technical constructions;
- disasters caused by dangerous meteorological phenomena (downpours, abundant snowfalls, storms and snow storms, ice sedimentation, white frost, block frost, early or late freezing, hail, and drought).

The Central Commission for Flood Control has the following **main competences**:

- elaborates the national defense strategy against floods, dangerous meteorological phenomena and hydro technical constructions accidents, and participates at elaboration of national defense strategy against disasters within Governmental Commission for Defense against Disasters;
- participates at elaboration of operative defense plans and of general programmes in case of disasters, at Governmental Commission for Defense against Disasters request;
- pursues the complying with international conventions in the field of defense against floods, dangerous meteorological phenomena and hydro technical constructions accidents;
- analyses the regularization projects for flood control, dangerous meteorological phenomena and hydro technical constructions accidents, interior rules for organizing and functioning of Central Commission for Flood Control, as well as the request of modification of these, and subjects to approval Governmental Commission for defense against disasters;
- approves the Operative plan for floods control, dangerous meteorological phenomena and hydro technical constructions accidents;
- approves counties' plans for flood control, intervention in case of dangerous meteorological phenomena and hydro technical constructions accidents and the plans for flood control on basins.

The Central Commission for Flood Control works under the Ministry of Environment and Water Management and it is subordinated, in case of disasters, to Governmental Commission of Protection against Disasters.

The Central Commission for Flood Control is formed of representatives of central public administration, of national companies and other economical agents with competences and responsibilities in protection actions against floods, dangerous meteorological phenomena and hydro technical constructions accidents, as well as professors and specialists from research institutes. Members of Central Commission for Flood Control are named by units' leadership that they represent.

The president of Central Commission for Flood Control is the minister of environment and water management, and the vice-president is the state secretary of the minister that coordinates the water management activity. In the president's absence, the prerogatives are taken over by the vice-president.

The permanent technical secretariat of Central Commission for Flood Control is ensured by Flood Control Directorate from Ministry of Environment and Water Management. The Secretary of the Central Commission for Flood Control is the Director of Flood Control Directorate.

In order to carry out its competences, the Central Commission for Flood Control uses information in statistical-slow flux and in rapid-operative flux which are managed by factors participating or collaborating at defense actions. At the commission's request, this information is put at the disposal of those involved into these actions, free of charges, and with a maximum operability.

The Central Commission for Flood Control is endowed with telecommunication equipment, computation techniques, and apparatus for documents multiplication, audio-video apparatus and a car.

2.1.2. National Commission for the Dams and other Hydro-technical Works Safety

This inter-ministerial Commission has been established in 2000 by the Emergency Governmental Ordinance concerning dam safety (after Baia Mare accident) and approved by law in 2001 (Law 466/2001).

This Commission is working under the Ministry of Environment and Water Management. Its main task is to ensure a framework for meeting the requirements concerning the safety of dams and dykes for water retentions, of barrages and dykes which produce industrial waste disposal of hydro-electric power plant, and of water lakes from dams on the waterways.

The **main tasks** of the Commission are:

- to review, together with owners, the way in which it is undertaken the works entail and safety operation;
- to analyze and agree on the legal acts concerning safety of hydro technical works;
- to elaborate, together with the State Inspectorate for Construction, methodology concerning defining the hydro technical works importance category and methodology concerning assessment of the hydro technical works safety state;
- review and approve annual reports of the hydro technical works owners / administrators concerning the activities in the field of works safety;
- to cooperate with other institution concerning the quality control of the constructions (hydro technical works).
- order technical expertise for the works which have shown safety risks;

- agree on the technical expertise documentations concerning the operation safety of technical works.

2.1.3. Commission and Support Group for applying the Action Plan for water protection against pollution by nitrates from agricultural sources

This Commission has been established by the Governmental Decision 964/2000 concerning the approval of the Action Plan for water protection against pollution by nitrates from agricultural sources.

The Commission Technical Secretariat is composed from the staff of Water Department from Ministry of Environment and Water Management, and the Commission and Support Group' Secretary is the Director of Strategies, Regulations and Authorizations Directorate from the same Ministry.

The Commission's activity is represented by working sessions or public debates hold at the headquarter of the Ministry of Environment and Water Management, or other public institutions, at the meetings proposed by secretary and approved by Commission's president or at the solicitation of one of the two ministries. Two working sessions will be hold annually, at least. The works of working session are led by the president or, in absence, by one of the vice-presidents.

The Commission has the following main **competences**:

- Takes over from Ministry of Environment and Water Management, within one year from the date of coming into force of the Action Plan, and then at 4 years periodically, the *cadastre of waters polluted by nitrates and of waters*;
- Takes over, within 2 years from the coming into force of the Action Plan, and then at 4 years periodically, from the Ministry of Environment and Water Management *the list with vulnerable zones up-dating*;
- Elaborates and approves The Code of Good Agricultural Practices for farmers and agricultural producers, which will be up-dated when the Commission considers necessary, but not later than every 4 years;
- Elaborates a programme regarding training and information of farmers and agricultural producers with the purpose of promoting the Code of Good Agricultural Practices;
- Establishes Actions Programmes regarding the vulnerable zones;
- Takes additional measures with the purpose of implementing actions programmes;
- Proposes elaboration and putting into practice of some surveillance and control programmes by the system of surveillance and control and other qualified factors, for estimation of Action Programmes efficiency;
- Elaborates the measures proposed for Action Plan implementation, which will also contain the procedures and instructions for the surveillance and control system elaborating the Action Plan;
- Elaborates, every 4 years, a report that is sent to the Ministry of Environment and Water Management and then published.
- Proposes to the Ministry of Environment and Water Management and Ministry of Health the elaboration of necessary regulations, methodologies and procedures with the purpose of implementing the Action Plan;
- Collaborates with ministries and institutions involved in Action Plan accomplishment, and also with the basin committees;
- Decides on nominal composition of National Support Group;
- Coordinates the activity of the National Support Group;

- Disposes measures for carrying out all tasks of the National Support Group within established terms;
- Elaborates and approves the specific internal documents that are considered necessary to ensure the action development in good conditions;
- Ensures public debates and attending on all aspects regarding the development and putting into practice of Action Plan;
- Ensures public information and access regarding organized actions, public debates and attending, working sessions, provisions of the Code of Good Agricultural Practices, its official documents and those of the National Support Group.

In carrying out its competences, the Commission has the following **rights**:

- to ask, in legal conditions, the support of any public institution with the purpose of obtaining information, reports and audits considered necessary, and also about the assembly halls needed for working sessions and public debates;
- to ask, every time it is necessary, agricultural units and centers, units of communal management, National Administration "Apele Romane", users with very polluted waste waters and fertilizers of animal origin, and also other qualified factors, to carry out independent audits regarding utilized and evacuated quantities, quality status of water resources, technical state and functioning of waste water treatment systems and equipments at approved parameters, etc.;
- to request the National Support Group to analyze and issue an opinion on any problem occurred in development of its activity and of the Action Plan;
- to be informed about any modification or completion of cadastre of waters affected by pollution with nitrates and of those susceptible to be expose to this pollution, as well as of the list containing the vulnerable zones, within 3 months from its issued date;
- to request from the Ministry of Environment and Water Management reports on Action Plan;
- to request to the National Support Group an assessment and opinion on measures concerning the implementation of the Action Plan;
- to inform the control authorities from the Ministry of Environment and Water Management on accidental infringements of Water Law no. 107/1996 through repeated pollution with nitrates of underground and surface waters;
- to request from the Ministry of Environment and Water Management and Ministry of Education, Research and Youth the financing from central budget of research-development studies and themes necessary to developing and application of Action Plan and action programmes regarding the vulnerable zones;
- to take the necessary steps and propose to qualified factors the elaboration and carrying out of programmes of rehabilitation and/or building of sewerage-treatment and irrigation systems from vulnerable zones or susceptible to become vulnerable.

2.1.4. Inter-ministerial Working Committee for promotion, coordination and implementation of the Action Programme for the reduction of the aquatic environment pollution and underground waters, caused by the discharge of certain dangerous substances

This Committee has been established by the Governmental Decision no. 118/2002 concerning the approval of the Action Programme for the pollution reduction of the aquatic environment and groundwater, caused by the discharge of certain dangerous substances.

The Committee adopted the Rules for organization and functioning, which were approved by a Joint Ministerial Order issued by the Minister of Environment and Water Management, Minister of Economy and Commerce and Minister of Health.

The Committee is coordinated by the Secretary of State for Waters as President together with a Vice-president. In its activity the Committee is supported by a Technical Group, composed of specialists in the field, whose nominal composition and competences were established in the first working session of the Committee.

The Committee includes: 5 experts from the Ministry of Environment and Water Management, 2 experts from the Ministry of Economy and Commerce and 2 experts from the Ministry of Health.

The Technical Working Group includes representatives of the National Administration "Apele Romane", of the Basin Committees, of the research institutes sub-ordinated or under the coordination or Administration of the ministries mentioned above.

The Committee will promote sets of measures for the achievement of the Action Programme, will establish and implement appropriate procedures for monitoring and will take over the results of the monitoring programme in order to elaborate periodical reports.

The Committee will review, every five years, the list of priority substances/priority dangerous substances and could transfer, according to the results of the research concerning their effects on the aquatic environment and underground waters, substances from the list of priority substances to the list of dangerous priority substances.

In order to establish and review the inventory of the waters affected by this kind of pollution, the Committee will demand the responsible units to present reports concerning the results of the monitoring activity of the priority substances/dangerous priority substances concentration into the surface and underground waters.

The Committee will elaborate:

1. A framework-scheme for the prevention and reduction of the pollution of aquatic environment and underground waters, caused by the discharge of certain dangerous substances, for the industrial field based on the guidelines provided in *Annex 4* of the Governmental Decision 118/2002. This framework-scheme will be updated according to the progress in the field and occurrence of the new industrial technologies and practices with a low impact on the environment.
2. A plan with provisions concerning implementation of this framework-scheme for the industrial field and for the human health.

2.1.5. Inter-ministerial Committee for the coordination of the environmental protection aspects integration into the sectorial strategies and policies

This committee has been established in 2001 and it is a consultative body, without legal personality, working under the Ministry of Environment and Water Management. The Inter-ministerial Committee is composed from the representatives of:

- Ministry of Environment and Water Management;
- Ministry of Economy and Commerce;
- Ministry of Transports, Constructions and Tourism;
- Ministry of Health;
- Ministry of Public Finance;
- Ministry of Administration and Interior;
- Ministry of Education, Research and Youth.

Nominal composition of the Inter-Ministerial Committee is approved by its president based on the proposals made by the leadership of the respective ministries.

Members of the Inter-Ministerial Committee are represented at the level of State Secretary. In the situation when they can not attend a meeting, they are replaced by representatives at the level of General Director or Director, entrusted by the respective Minister or the State Secretary.

According with the agenda anyone from the Inter-Ministerial Committee members could propose to the president, participation, with consultative role, of experts from their ministry or from other governmental or non-governmental organizations.

The president of the Inter-Ministerial Committee is the Minister of environment and water management. In the situation when the minister of environment and water management could not follow its position in Inter-Ministerial Committee, he/she will delegate the responsibilities and tasks to the Secretary of State in charge with environmental protection.

Inter-Ministerial Committee coordinates and agrees on sectoral strategies and policies in order to integrate environmental protection requirements at the national level. In this respects it performs the following tasks:

- adopts the necessary decisions in order to assure a coherent framework in the development and approval process of the legal acts concerning environmental protection;
- approves the National Action Plan for the Environmental Protection;
- approves the programs and plans for the integration of the environmental protection requirements into the sectoral strategies and policies and follows their implementation;
- establishes, through the National Action Plan for the Environmental Protection, priorities in the environmental protection field, with the aim of their financing;
- approves the projects which include environmental protection equipment, in order to be excepted from custom taxes;
- initiate the necessary actions for the mobilization of the available financial resources for carrying out established priorities;
- assesses annually or when it is necessary the status of achievement of the National Action Plan for Environmental Protection, as well as, the status of adoption of environmental Acquis and elaborates a report based on this assessment which is made available to the public;
- submits to the Government, at least once a year, a report concerning its activity and the plan for the next year.

In performing its tasks Inter-Ministerial Committee cooperates with the National Council for Environment and Sustainable Development, as well as with public and private institutions and non-governmental organizations.

The Secretariat of the Inter-Ministerial Committee is provided by the Ministry of Environment and Water Management.

3. Overall Roles and Responsibilities in Water Management in Romania

3.1. Monitoring activity

ANAR monitors the quality of rivers on 22,000 km out of 78,900 km, using 318 gauging stations. In rapid flux data are transmitted daily from 65 control stations. Classical monitoring system is extended with 318 additional stations, providing samples and analysis once a month). About 40 physical, biological and microbiological parameters are measured.

There are water quality standards, necessary for the interpretation of the laboratory analysis results and the assessment of water quality. The assessments are carried out according to standard 4706/1988 on the classification of surface water. There are also standards for the analytical methods used for determining each kind of parameter. The spatial density of the monitoring network for surface waters is one control river section every 745 km², and it is in compliance with the EUROWATERNET European Network.

ANAR monitors water quantity in 1,016 hydrometric stations by measuring the levels and flows. About 40% of the river quality monitoring stations also measure quantity. For the other water quality stations, discharge information is transmitted from the nearest hydrometric station.

The water quality of the Danube River is monitored by ANAR in cooperation with ICIM. The location of measuring points, the monitored pollutants, and all information on sampling is correlated all along the Danube River and among the different riparian countries. In each country there is a centre for early warning of accidental pollution, connected by satellite. In Romania, the centre is located in the MEWM and it is technically supported by ICIM.

Groundwater is monitored by ANAR in 3,695 hydrological stations, of which 1,434 take water qualitative measurements. In addition there are some 12,000 survey points situated in the vicinity of pollution sources, drillings and water wells for water supply, mainly in rural areas. Eighteen general physico-chemical parameters (temperature, pH, conductivity, total dissolved solids, oxygen regime, nutrients, etc.) are measured for groundwater. For the drinking water supply, bacteriological parameters are measured too. For the boreholes that might cause pollution (oil exploration), specific parameters are measured depending on the potential pollutants. Sampling frequency is between 2 and 4 times a year. There are standards for the analytical methods for each type of parameter analyzed. The analysis results are validated by comparison with the water quality requirements of standard 1342/1991 – drinking water.

Black Sea water quality is monitored by ANAR and the Marine Research Institute every year at 13 sampling stations. Between Navodari and Vama Veche the sampling from March to October is monthly and between Sulina and Midia seasonal. Twenty-eight physico-chemical parameters are monitored (oxygen regime, nutrients, organic pollutants, heavy metals, etc.), three biological parameters (phytoplankton, zooplankton, zoobenthos) and four microbiological parameters (mesophil bacteria, total coliforms, faecal coliforms, faecal streptococci). For their interpretation, the results are compared to standard 4706/88 values for Black Sea surface water.

The monitoring of waste-water discharges (emission monitoring) of about 2,100 point pollution sources is performed by ANAR.

The ANAR’s labs accreditation process, according to international standards (ISO 9000), is in progress in Romania. At present the quality insurance system consists mainly of parallel sampling and analyzing (inter-calibration) between the laboratories of ANAR and foreign laboratories, followed by a spatial analysis of the results.

3.2. Data Communication

ANAR and the National Institute for Hydrology and Water Management (INHGA) in Bucharest, are responsible for water management, and national flood forecasting, respectively. Via a *National Dispatch Centre*, the National ANAR Office aggregates data and information from lower levels and disseminates selected information and data laterally to offices of MEWM and INHGA in Bucharest.

INHGA receives data from the National Dispatch Centre (and some data directly from the field sites as well). These data are used as input to precipitation-runoff models to predict flood events. These predictions are regional in their geographic extent and can not be used to provide basin level or site specific predictions. INHGA does not receive real-time data on reservoir water levels or storage volumes. These data are needed in order to improve the predictions.

The **Level-1** National Dispatch Centre data base is in electronic format using SQL system containing the real-time data, and the historical record. Communication from the National Level Dispatch Centre to Level-2 Centers is over a high-speed Virtual Private Network (VPN) with a 2-3 minute time delay in transmission – Figure 5.

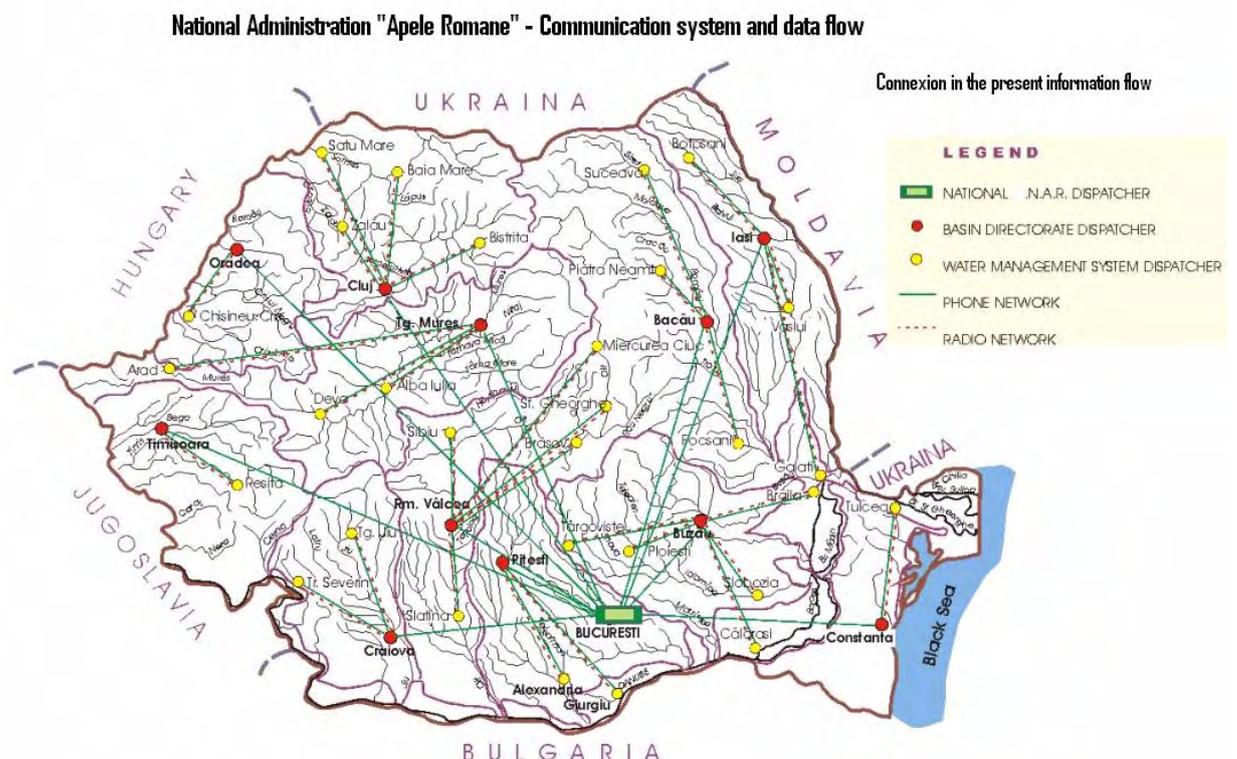


Figure 5. Communication system and data flow for ANAR

Once implemented, DESWAT and WATMAN stations on rivers, dams and other water works will report continuous discharge measurements to the Level-1 data base. Level-1 Centre has an ARC-SDE GIS server system installed with ArcInfo and ArcView GIS softwares in use. GIS use is increasing due to EU WFD reporting requirements.

Level-2 - At the second level are eleven ANAR Basin Water Authorities, whose geographical responsibilities are defined by major river basin boundaries. Each of the 11 Basin Water Authorities operates a Regional Dispatch Centre that accepts hydro-meteorological data from subordinated offices and a Hydrological Service, staffed with INHGA personnel, who are responsible for basin data quality and forecasts at the local level. Each Basin Water Administration has day-by-day water-management responsibilities in the basin and sub-basins under its jurisdiction – Figure 6.

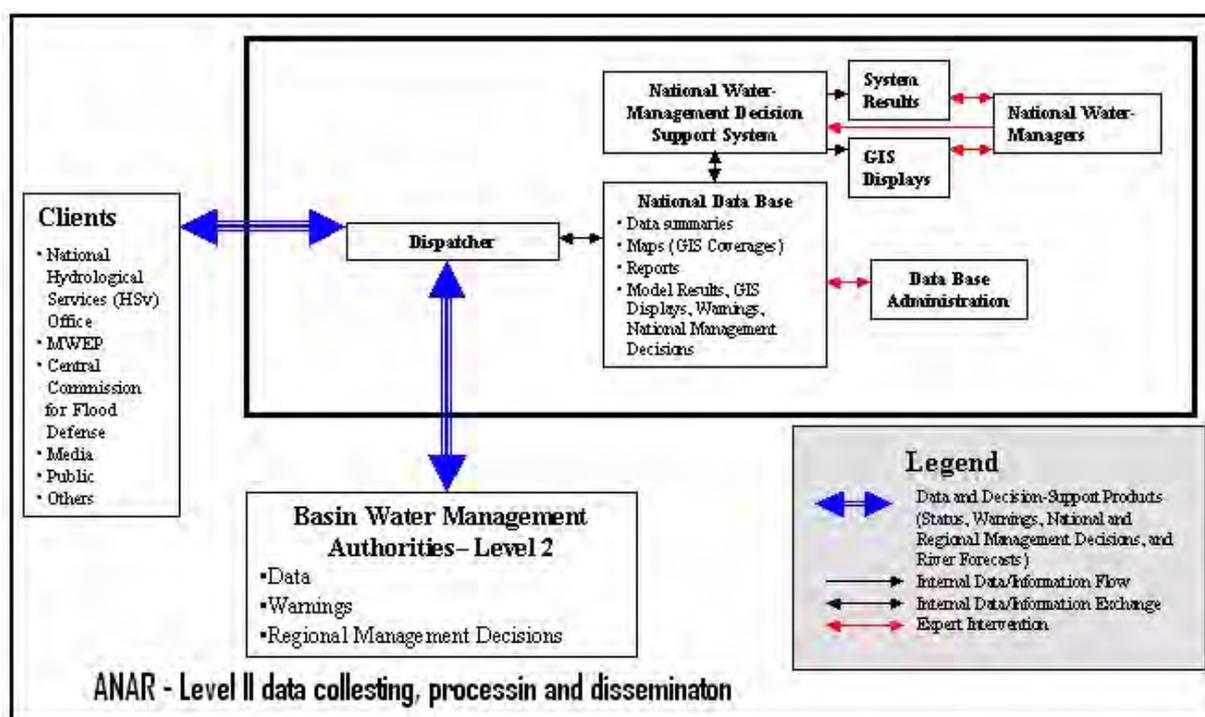


Figure 6. Data base data processing in ANAR system –Level II

These *responsibilities* include:

- Monitoring water quantity and quality
- Exploiting surface and ground water
- Managing lakes and reservoirs
- Operating and maintaining water-control structures for water management and flood protection
- Coordinating the operation of water control structures with hydropower organizations
- Operating a water-use permit system
- Implementing inter-basin transfers
- Providing water for municipal and irrigation withdrawals.

The Level-2 data base is in electronic format using SQL system containing the historical record. Note that the real-time data passes through these centers, but it is not archived or used here. There are no computer models used at the Regional Dispatch Centers at this time, but

there are plans to deploy forecasting models at this level in the future. The National Hydrologic Service has staff (reporting to and trained by INHGA) at the Level-2 Centers for making and interpreting local forecasts. It is not clear how they are making any forecasts if they have no models. Currently, much time is lost in communicating information from the Level-2 Basin Dispatch Centers back to the Level-3 SGA Centers.

Level-3 - At the third level there are 41 Judet-based ANAR organizations (SGA) and 57 Hydrological Stations. In contrast to the hydrographic boundaries at the regional level, political boundaries define the jurisdictions of the SGA offices. Hydrological station operators are responsible for collecting, validating, and direct processing daily data from the gauging stations (hydrometric stations) and for generating the HYDRA and HYAVERT bulletins. Each SGA office has a Local Dispatch Centre that transmits the telegrams from the hydrological stations in the Judet. Local dispatch centers forward data (telegrams) to the Regional Dispatch Centers every day. The SGA offices also have ongoing relationships with municipal and community based organizations in their counties. During times of flooding, the dispatcher collects data from the gauging stations (Level-4) on a more frequent basis and provides the information directly to the County Commission for Disaster Control. The existing Level-3 data base is hard-copy and consists of the historical record of main daily discharge, 2-3 highest floods for each year. There is a need to improve the management of large dams at this level. There is no ability or time to make forecasts, validate data or calculate discharges at this level; this is in the responsibility of the Hydrological Station staff, which provides daily discharge information; at the Level-2 it is provided a basin based analyze, the water balance in the basin, taking into account the information provided from the Level 3. Level-1 staff of Dispatch is mainly responsible with data dissemination and keeping informed the staff from the ministry dispatch. The hydrological forecasts are provided by INHGA at the national level and by the Hydrological Service at the Level 2. No software abilities are provided at the dispatch or Hydrological Service regarding water distribution in the basin and appropriate software in case of accidents (as an example dam break or spills).

Recent legislation has placed the Level-3 SGAs into the loop for flood and accidental spill warning. This means that ANAR is no longer responsible just for analysis and warning, but has a large responsibility for protection against such events.

3.3. Data processing and Forecasting

Data processing in real time is the responsibility of Hydrological Service (HS) and of INHGA. Both are providing forecasts in the basin, first for the local interest and the second for the national interest. INHGA is providing warnings too, taking into account the meteorological forecast and outputs of meteorological models. Both services are providing a back-up information to diminish the possible errors or to complete the missing information or the lack of forecasting tools and methodologies for some very difficult forecasting basins and areas.

During winter time, Hydrological Stations (HS) provide each morning a very valuable information regarding the winter phenomena influence. After flooding or low flows periods, the HS update the rating curves for each gauging station.

The basin dispatch is collecting data from dams and reservoirs stages. This data is used in different modeling application or in water balance for daily discharge forecast or to evaluate the attenuation during floods. The dispatches command the actions at this level after certain thresholds.

During spills, SGAs personnel are collecting samples and give them to the homologated laboratories of ANAR, to be analyzed. Very few automatic stations bring valuable information regarding possible accidents. This information is coming from the hydrological observatory and/or population at the moment.

3.4. Flood defense activity planning and responsibilities in Romania

The local defense plans against floods and ice are designed by the Local Commissions and have the following content:

1. The municipal, city or commune council's decision of establishment for the committee of defense against disasters;
2. The nominal structure of the members of the committee against disasters, mentioning the unit that they represent, the function, the address and the work and home telephone numbers;
3. The telephone, fax or telex numbers of the permanence (the city hall, the police, the civil protection, etc) where there can be transmitted warnings, forecasts, decisions, provisions and information;
4. The operative – decisional informational flux scheme for defense against floods and dangerous meteorological phenomena;
5. The table with the objectives that can be affected by floods, in the area of the respective municipal, city or commune, which must contain:
 - current number;
 - objective name, the socio-economic importance, the owner;
 - the river on which it is located, the cadastre code, the kilometrical position;
6. The table containing the plans of defense against floods, on the municipal, city, commune area, technical features, insurance degree (normalized, real, date of its last check), critical points (under-crossovers, active erosion on the bank, lack of forestry protection shelter-belts, area with griffins, infiltrations, etc.), the owner, the year when it was put into function, etc.;
7. The table containing the hydrometrical stations or the pluviometrical regional posts and the local hydrometrical stations, the kilometrical location on the river, on the dam, for each objective, the characteristic regional values (levels or rainfalls) and warnings of defense, the time of propagation of the high water waves from the warning station to the local roads of the objectives or the average time of dangerous rainfall concentration from the pluviometrical post to the objective; the critical points of defense against the ice;
8. Measures that will be taken against the floods and ice for each characteristic defense value. Short description of the intervention measures at the dams and earth dykes in case of high waters: rabbit dams, eliminating griffins, eliminating the infiltrations. The signal used to alarm the population, the place in which are placed the instructions regarding the evacuation methods for the population and the assets;
9. The tables containing the resources and the intervention means, and the identification of the units that will provide them;
10. The table with the stocks of the existing materials and means of defense, the way in which the deficit is covered (from local available assets and with support from the superior defense committee or from the military units in the area);
11. The responsibilities regarding the enforcing of the defense measures and people and assets evacuation for each endangered objective, as well as for setting on the warning – alarming devices. The responsibilities for transmitting the daily informative reports during the defense and of the synthesis reports to the district committees of defense against disasters;
12. The plans at a 1:10,000 or 1:25,000 scale, with the location of the endangered objectives, the delimitation of the areas endangered by the flood, of the hydrometrical and meteorological

- stations for which it was established the characteristic local values of defense and the preventive evacuation and accommodation areas for the population, animals and assets;
13. The longitudinal profile and sections of the dams and dykes existing in the municipal, city or commune area, which will contain: the level of the designed and existing crest of a wave, the maximal calculation level, the maximal level produced, the critical points (transit rolling through dams, griffins area, infiltrations, areas without shelter-belts, areas with active river bank erosion, ground elevation in interior and exterior of the enclosure, local gauge datum, in the reference system of the water cadastre axle, levels corresponding to the three defense phases, in the year the profile was executed);
14. Periodical instruction slip, on defense against floods problems, of the local defense committees.

For the isolated objectives as building yards, ballast pits, wells and oil deposits, etc, there will be established defense plans, adapted according to their specific nature and they are transmitted to the local committee to which the objective belongs to.

The district defense plans have the following content adapted to the specific conditions:

1. Copy of the council's decision of establishment of the defense commandment of the hydro-technical system;
2. The table containing the defense commandment structure, drawn up at the hydro-technical system level; telephone number, radio – telephone, fax and mobile numbers of its members;
3. The technical description of the hydro-electric system: its location into the hydrographical area, the system role and functions, presentation of the main feature of the projects and of the work; the year when was put into function;
4. The safety degree of the works (normalized or real, date of the last check). Water discharge and dimensioning and verification levels in the project phase. Water discharge and maximal levels produced. Present water discharge corresponding to the importance class. Regional characteristic values of defense (levels or critical limits at the rainfalls) and local ones (defense phases) for each dam, locality and endangered objective, and defense phases at the dykes.
5. Critical points: transit rolling through dams, griffins area, infiltrations, mountain sliding, river bank erosion, areas without shelter-belts, difficulties in maneuvering the closing installations and prevention measures; short description of the intervention measures at the earth dams and dykes, at high waters; eliminating the infiltrations, the griffins, etc;
6. Private hydrological and meteorological devices or the ones from the national network, which serve the system in defense actions against the floods, the dangerous meteorological phenomena and the project accidents;
7. The regulation for the high water exploitation, competences in taking decisions in special cases;
8. The materials and means of defense (normalized, existing or to be completed), the depositing place and their administration;
9. Private teams and intervention resources;
10. Measurement and control devices (AMC) to watch the dam's evolution;
11. The critical point of notice, alert and danger downhill the dams. For each dam it is established the warning – alarming plan in conformity with the criteria and standard content of the annex no. 1g);
 - 11.1 drawn pieces, graphical materials and other helping materials;
 - 11.2 the system map at 1:100,000 scale, containing the location of the water utilization works of defense, the of the annex no. 1g);
 - 11.3 drawn pieces, graphical materials and other helping materials;
 - 11.4 the system map at 1:100,000 scale, containing the location of the water utilization works of defense, exploitation headquarters, those of the regional and local

- hydrometrical and meteorological devices, of the area and evacuation routes in case of high waters or the possible accidents;
- 11.5 informational flux of system decisions;
- 11.6 the storage situation plan for the downhill influence area, in case the dam breaks down;
- 11.7 transverse profile for the dams with characteristic defense levels (defense phases, calculation and verification levels, maximal produced levels, waste-way levels for high waters, water inlets, bottom-discharge, etc.)
- 11.8 longitudinal and transversal profiles, through dykes with the designed and existing crest of a wave, levels corresponding to the 3 defense phases, ground elevation in interior and exterior of the enclosure, the maximal levels produced, the critical points (transit rolling through dykes, griffins area, infiltrations, areas without shelter-belts, active river bank erosion, local gauge datum, the year the profile was executed, and the reference system, etc.);
- 11.9 floodable belts on the main rivers at 1:5,000 – 1:10,000 scale, marking the floodable areas, with insurance certainty of 10%, 5%, 1% and on the other rivers with the dense populated sectors or with important objectives;
- 11.10 dispatcher graphics of the storage channels;
- 11.11 watermark post keys for the surface outlet structure, for the bottom-discharge, and mixed;
- 11.12 watermark post keys at the warning and local rods, correlative graphics between the regional – local defense quota.

The ***defense plans of the hydro-technical systems*** are sanctioned by the water utilizations of the National Administration “Apele Romane” and they are approved by *president of the district committee of defense against disasters*. The ***Danube hydro-improving systems*** are sanctioned also by the Autonomous Administration of Land Reclamations, and then it is transmitted to the district committee of defense against disasters, being a distinct component of the district committee against floods, dangerous meteorological phenomena and accident at projects plan.

The ***defense plan of the district committee*** represents a synthesis of the objectives of the local commandments and committees plans, of the hydro-technical systems plans and of the warning – alarming downhill the dams plans.

The district plan correlates the technical, organizational and informational elements of the local plans approved by the president of the district committee of defense against disasters and it has the following content:

1. District presentation report:

- physic-geographical characterization
- the hydrological and meteorological conditions
- short report of the events and damages;
- presentation of the main projects of defense against floods, no matter the owner, technical features, the insurance degree (normalized and real, its date of the last check), their technical and functional status, the year they were put into function;
- observation and intervention measures for each of the characteristic value of defense;
- the localities and objectives affected in case of the project accidents , the population and assets evacuation areas;
- the established areas for controlled flooding in special situations;

2. The prefect order for the establishment of the district committee of defense against disasters of the Permanent Technical Secretary, as well as of its Department of defense against floods, dangerous meteorological phenomena and accident at the projects;
3. The committee's nominal structure, indicating its members' position, place of work, address and telephones.
4. The Permanent Technical Secretary nominal structure and its action of defense against floods, dangerous meteorological phenomena and the project accidents, and the telephones or the existing means of telecommunications which ensures its permanency, the mobile telephones of its members;
5. Block diagram of the hydrometrical and operative informational system for the respective district, which will include: pluviometrical, hydrometrical, meteorological and hydrological stations, regional meteorological centers and the dispatchers of the reservoir branches (water administration) of the National Company "Apele Romane" – S.A. with the connections between those and the permanent technical secretaries of the district committee of defense against disasters – the defense against the floods, dangerous meteorological phenomena and the project accidents departments, the local defense committee and commandments. The block diagram will include the connection between the Central Committee of Defense against Floods and the neighboring district committees of defense against disasters, as well as with the defense authorities of the neighbor countries;
6. The map of the hydro-meteorological and operative informational system, at the 1:100,000 scale, on which will be located the elements of the block diagram;
7. The table containing the defense technical elements of the local committees and commandments, which will contain:
 - current number;
 - the local committee, commandments;
 - the hydrographical (river, cadastral code) location;
 - the warning (regional) pluviometrical or hydrometrical station;
 - the characteristic regional warning values (levels or rainfall), specific to the attention, floods and danger quantities;
 - local hydrometrical stations;
 - characteristic local defense values;
 - the telephone, radio-telephone, telex and fax numbers through which the local committees and commandments can be announced about the danger;
 - the average time of dangerous rainfall concentration from the pluviometric post to the objective or the flood propagation time from the warning hydrometrical station to the local committee;
 - projects of defense;
 - locality's normalized importance class (calculation insurance and the verification insurance, in conformity with STAS 4.068/1987 and 4.273/1983) and the real insurance;
 - the means and resources requested by the local authorities for the defense actions;
8. The table containing the intervention means established at district level, in order to help the local defense committees;
9. The table containing the intervention means available at the district committee, indicating the units that own them (address, telephone);
10. The table containing materials and means of defense stocks (necessary, existing, deficit) for all the local committees and separate, for each hydro-technical system;
11. The situation plan, which will contain the routes and areas of population and assets evacuation;
12. The floodable belts on the rivers, location of the affected objectives;
13. Longitudinal and transversal profile of the dams and dykes, which will contain: the designed and existing crest of a wave level, the maximal calculation level, the maximal

produced levels, critical points (transit rolling through dykes, griffins area, infiltrations, areas without shelter-belts, active river bank erosion areas), ground elevation in interior and exterior of the enclosure, local rods with rod gauge datum, the levels corresponding to the 3 defense phases, the year the profile was executed, and the reference system, etc.);

14. watermark post keys for each hydrometrical station, the correlation graphics between the regional and the local defense quantities;

Separately, the district defense plan contains also the defense plans against the effects of the dangerous meteorological phenomena, the plans for warning – alarming the population, the economic and social objectives located downhill the storage lakes, in case of the project accidents, and the defense plans of the Danube hydro-improving systems. It also includes the official report regarding the periodical instructions, on defense against the floods matters, of the district personnel involved in this kind of disaster.

The ***district plan*** is drawn up by the defense against the floods, dangerous meteorological phenomena and project accidents department of the Permanent Technical Secretary of the district committee of defense against disasters, and it is approved from the point of view of the organization, by the district prefect, it is verified by the Permanent Technical Secretary of the ***Central Committee of Defense Against Floods***, it is approved by the Central Committee of Defense Against Floods president and represents a district department of the district plan of protection and intervention in case of disasters.

The ***hydrographical reservoirs defense plan*** against the floods and ice, drawn up by the reservoir branches (water management system) of the National Administration “Apele Romane” is made up by assembling the district defense plans regarding the informational system and projects exploitation, in situation of high waters.

In special meteorological situations or when forecasting them, the National Administration for Meteorology transmits warnings of floods or of dangerous meteorological phenomena to the National Waters Dispatcher and to the reservoir dispatchers of the water administration of the National Administration “Apele Romane” – S.A. These warnings are disseminated to the permanent technical secretaries of the district committees of defense against disasters, in order for those to enter the defense state on time. It is concise described the phenomenon, its intensity, possible effects, the endangered area, the probable moment when the phenomenon will start and its duration. According to the phenomena real evolution, there will be made forecast up dates.

After the rain starts or the whether warms up suddenly, the reservoir dispatcher drafts forecasts in conformity with the following table, on rivers and hydrometrical stations, from which results the up to date situation, the forecast on 24 hours and the maximal values related with the defense quota, which they transmit to the permanent technical secretary of the district committees of defense against the disasters – defense against the floods, dangerous meteorological phenomena and the project accidents departments.

In case of the danger represented by the ice blocking on the river, in collaboration with the specialized units from the Ministry of Transportation, there will be indicated the most endangered areas and the possible winter phenomena magnitude.

The permanent technical secretaries of the district committees of defense against disasters, the departments for defense against the floods, dangerous meteorological phenomena and project accidents are requested to disseminate the information, forecasts and warnings received from all endangered objectives, specified in the defense plans, and alert the most endangered areas.

Hydrological forecast model drawn by the reservoir dispatcher for the district committees and by the National Company “The National Institute of Meteorology, Hydrology and Water utilization” – S.A. for the Central Committee of Defense against Floods.

4. National Environmental Action Plan (NEAP)

This plan includes some proprietary projects which are to be implemented. In water quality protection is included the quality protection of both, underground and surface waters. The following objectives were followed:

- to reduce the quantity of nitrates and other chemicals;
- to reduce the quantity of heavy metals and organic products which exist in sediments;
- to reduce the degree of charging the used industrial and urban waters, as well as to improve the cleaning parameter of cleaning installations;
- to control and maintain below acceptable level of the diffuse pollution;
- to improve the quality of water resources;

In the past ten years, Romania has become part to the most conventions and international agreements in environment protection and to all international conventions for nature protection, their provisions can be applied as national legal norms, according to our Constitution.

In 1996 some strategies were elaborated:

- *The National Strategy and National Plan of Action for Preserving the Biologic Diversity and long term use of its components*, which contain objectives and measures in accordance with *Pan-European Strategy for Preserving the Biologic Diversity and Landscapes in Europe* and comply with the provisions of the main international conventions and agreements;
- *National Strategy of Water Management and Strategy of Forest Development*
- *National Strategic Plan of Action for Black Sea*, which represents the Romanian version of *Strategic Plan of Action for rehabilitation and Protection of Black Sea*, adopted at the Environment Ministries Conference of the Black States, held in Istanbul in October 1996.

NEAP will be up-dated, in accordance the provisions of the Program of Communitarian aquis.

In the NEAP is defined the **concept of integrated water management of water resources**.

The concept of integrate management of the waters make the accord between using water and nature protection. The objectives below are to be followed:

- a) Ensuring the continuous supply of the water, specially for the population:
 - Making new sources of water, through artificial lakes with complex use for the zones with low level of water;
 - Making separate water distribution networks for industry and population;
 - Saving water and cutting loses in the water distribution networks
- b) Improving the quality of water sources;
 - Applying new clean, non-pollution technologies in all industries;
 - New cleaning stations and modernization of the existing ones;
 - Implementing means of prevention, limitation and reduction of accidental pollution effects.
- c) Ecologic reconstruction of the rivers:
 - Improving the natural habitats for preserving bio-diversity;
 - Ensuring normal flows of the rivers in order to protect aquatic ecosystems;
 - Ensuring the continuity of the river's flows in order to facilitate the fish migration

- d) reducing the overflow risk:
- Artificial lakes with complex use which have protection volume against overflows;
 - Building fences and protecting the zones with humidity;
 - Forbid the constructions in the zones of overflow risk.

5. Description of the current process and players involved in providing and analyzing water data

ANAR operates a 4 level data collection and management structure:

Level-1 - AR National Office and the National Institute for Hydrology and Water Management (INHGA) in Bucharest, responsible for water management, and national flood forecasting, respectively. Via a *National Dispatch Center*, the National Office aggregates data and information from lower levels and disseminates selected information and data laterally to offices of MEWM and INHGA in Bucharest.

INHGA receives data from the National Dispatch Center (and some data directly from the field sites as well). These data are used as input to precipitation-runoff models to predict flood events. These predictions are regional in their geographic extent and can not be used to provide basin level or site specific predictions. INHGA does not receive real-time data on reservoir water levels or storage volumes. These data are needed in order to improve the predictions.

The Level-1 National Dispatch Center data base is in electronic form using SQL system containing the real-time data, and the historical record. Communication from the National Level Dispatch Center to Level-2 Centers is over a high-speed Virtual Private Network (VPN) with a 2-3 minute time delay in transmission. Once implemented, DESWAT stations will report continuous discharge measurements to the Level-1 data base. Level-1 Center has an ARC-SDE GIS server system installed with ArcInfo and ArcView GIS software in use. GIS use is increasing due to EU WFD reporting requirements.

Level-2 - At the second level are eleven AR Basin Water Authorities, whose geographical responsibilities are defined by major river basin boundaries. Each of the 11 Basin Water Authorities operates a Regional Dispatch Center that accepts hydro-meteorological data from subordinate offices and a Hydrological Service, staffed with hydrologists, who are responsible for basin data quality and forecasts at the local level.

The Level-2 data base is in electronic form using SQL system containing the historical record. Note that the real-time data passes through these centers, but it is not archived or used here. There are no computer models used at the Regional Dispatch Centers at this time, but there are plans to deploy forecasting models at this level in the future. The National Hydrologic Service has staff (reporting to and trained by NHGA) at the Level-2 Centers for making and interpreting local forecasts. It is not clear how they are making any forecasts if they have no models. Currently, much time is lost in communicating information from the Level-2 Basin Dispatch Centers back to the Level-3 SGA Centers.

Level-3 - At the third level are 41 Judet-based AR organizations (SGA) and 57 Hydrological Stations. In contrast to the hydrographic boundaries at the regional level, political boundaries

define the jurisdictions of the SGA offices. Hydrological station operators are responsible for collecting, validating, and direct processing daily data from the gauging stations (hydrometric stations) and for generating the HYDRA and HYAVERT bulletins. Each SGA office has a Local Dispatch Center that transmits the telegrams from the hydrological stations in the Judet. Local dispatch centers forward data (telegrams) to the Regional Dispatch Centers every day. The SGA offices also have ongoing relationships with municipal and community based organizations in their counties. During times of flooding, the dispatcher collects data from the gauging stations (Level-4) on a more frequent basis and provides the information directly to the County Commission for Disaster Control. The existing Level-3 data base is hard-copy and consists of the historical record of mean daily discharge, 2-3 highest floods for each year. There is a need to improve the management of large dams at this level. There is no ability or time to make forecasts, validate data or calculate discharges at this level; this is in the responsibility of the Hydrological Station staff, which provide daily discharge information; at the Level-2 is provided a basin based analyze, the water balance in the basin, taking into account the information provided from the Level 3. Level-1 staff of Dispatch is mainly responsible with data dissemination and keeping informed the staff from the ministry dispatch. The hydrological forecasts are provided by INHGA at the national level and by the Hydrological Service at the Level 2. No software abilities are provided at the dispatch or Hydrological Service regarding water distribution in the basin and appropriate software in case of accidents (as an example dam break or spills).

Level-4: There are approximately 1,000 hydrometric stations throughout Romania, which means that each Level-3 Local Dispatch Center is responsible for aggregating data from about 20-25 hydrometric stations. Traditionally, Level-4 hydrometric stations were operated manually, with an observer dedicated to the operation of each station. The observer usually lives near the station and is responsible for making water level, precipitation, and water-temperature observations at 07:00 and 19:00 hours each day. During floods, pollution spills, or other emergencies, observers make more frequent measurements than twice per day and report these data to Level-3 Local Dispatch Centers promptly.

6. ANAR Data Base

Apele Romane National Dispatch Centre – Data comes to the Level-1 National Dispatch Center from all of the 11 Level-2 Regional Dispatch Centers. The National Dispatcher then compiles all of the data and performs a validation procedure on the data to determine if there are irregularities in the data. The National Dispatch Centre is responsible for managing data, but not for decision making, the Centre synthesizes data for the entire country and coordinates decisions that affect more than one Regional Dispatch Centre (e.g., regional flooding). However, water management decisions are made at the Level-2 Regional Dispatch Centers and confirmed and supported by the National Dispatch Centre.

No computer assisted tools are currently used in the National Dispatch Centre to analyze data or to confirm Regional Dispatch Centre decisions. Likewise, no computer-aided tools are used for decision making at the Regional Dispatch Centers. Written procedures and rules are used to make decisions regarding the setting of infrastructure controls for water management. These rules were developed prior to 1989 for a situation where there was a water demand in Romania that was twice that existing today. Thus the existing operating procedures for the water management infrastructure in Romania may be out of date and in need of revision. Situations requiring the management of multiple reservoirs are difficult using these old and

manual procedures. Very little possibility exists for understanding the effects of decisions that are taken in these cases.

Regional Dispatch Centre staffs are not prepared to make basin level or site specific predictions of events. This function is covered by the Hydrological Service staff. The WATMAN Decision Support System is intended to be deployed at the Regional Dispatch Centre level. Lack of capacity of Regional Dispatch Centre staffs to use this software to make predictions using the DSS will hamper the effectiveness of the DSS. The dispatch personnel will need a continuous assistance of the Hydrological Service staff to accomplish this function.

Operational data base - Operational (real-time) data bases exist at all dispatch levels: National (including INHGA), Regional and Local (SGA). The National Dispatch Centre is the only level at which data covering multiple regions exists. Regional Dispatch Centre data bases contain data only for that region. A new SQL data base is being developed at the National Dispatch Center to handle all of AR's hydrological and meteorological data. The data base is being designed to make use of the ARC-Hydro data model for hydrological data and modeling. Currently, AR has a SQL data base containing economic information and this is being used as a model for the hydrologic data base.

AR National Dispatch Centre and Computer Centre staff will work with the WATMAN project to develop representative data sets to be used offline in developing the DSS.

Historical data base - INHGA prepares the historical data base of hydrological and meteorological data for the country based on validated, real-time data received from field measurements. This is in the form of an ORACLE data base. This data base is updated on a regular basis (monthly) with validated data. Annual reports of daily data are prepared from this data base.

DESWAT/SIMIN Data Collection - The DESWAT system will be comprised of 600 flow and precipitation measurement stations, 66 water quality stations, and 250 precipitation stations. The SIMIN system is comprised of 7 radar station. The EU PHARE program has installed 2 radar stations that are integrated with the SIMIN stations. In addition, there are 74 other meteorological stations and a number of other stations of various kinds.

SIMIN radar precipitation data are currently being transmitted to the Operation Centre for Meteorology where they will be archived once the full system is operational. Currently, 2 of 7 radar stations are operational and reporting data (Bucharest and South Romania). These data are to be used for forecasting and stored in an ARCGIS data base.

DESWAT data are not yet being collected as the project is in the organization phase. Level 4 sensors are collecting data in the traditional manner, with some stations collecting data automatically in data files format and classical collected data are transmitted using the HYDRA telegram system.

7. Description of the current process and players taking decisions for water management, in Romania

7.1. Decision inside ANAR's management structure

At the national level the water management decisions are taken only in case of some thresholds: during droughts and special floods when water diversion between different basins is needed, or in case of accidental pollutions, when water volumes for dilution have to be delivered sometimes in contradiction with other local or basin interest in water management.

Each Basin Water Administration has day-by-day water-management responsibilities in the basin and sub-basins under its jurisdiction. These responsibilities include:

- Monitoring water quantity and quality
- Exploiting surface and ground water
- Managing lakes and reservoirs
- Operating and maintaining water-control structures for water management and flood protection
- Coordinating the operation of water control structures with hydropower organizations
- Operating a water-use permit system
- Implementing inter-basin transfers
- Providing water for municipal and irrigation withdrawals

Recent legislation has placed the Level-3 SGAs into the loop for flood and accidental spill warning. This means that AR is no longer responsible just for analysis and warning, but has a large responsibility for protection against such events.

The decision support system (DSS) developed in the WATMAN component is intended to be deployed at the Level-1 National Dispatch Centre and the 11 Level-2 Regional Dispatch Centers. Some computer system enhancements at the Level-3 SGA offices are envisioned, but these are intended to be computer and communication upgrades. Some forecasting and alarm methodologies will be implemented for accidents to the dams and spills in case that a dispatch has responsibilities regarding decision for water management in an important reservoir.

7.2. ANAR's License for water use

Romania's water resources system is broadly developed. Quantitatively, its water resources are sufficient to cover its water demand. In particular, hydro-structures have spare capacity and are generally sufficient to manage floods and droughts but in some cases will be necessary to continue to equip river basins with such water works.

In some places, however, water resources are badly affected by pollution. About 9% of the river stretches that are monitored are excessively polluted. The degradation of river water quality has been caused mainly by untreated waste-water discharges from municipalities: only 18% of municipal waste water is treated properly. The capital city, Bucharest, still has no waste-water treatment plant. The degradation of groundwater is caused by heavy farming practices, in particular incorrect manure spreading and over-fertilizing of the fields (pollution by nitrates). Accidental pollution from industrial tailing ponds is also a serious problem.

Because of the recession and the collapse of irrigation systems, water consumption by industry and agriculture has fallen considerably over the past ten years. Nevertheless, industry (including energy production) is still responsible for 60% of water demand. An effort should be made to reduce this consumption firstly by closing cooling loop systems in the low flow regime of rivers.

Even worse is the demand for drinking water for household purposes. It has stabilized at a very high level with an average consumption of 500 liters/inhabitant/day. This is, in fact, due to water losses in the obsolete distribution networks, and very largely to water wastage by the consumers. The lack of individual water meters, the very bad state of household plumbing, the cuts in water supply and the irrational consumption by the people themselves are all causes of this over-consumption. The consequence is a correspondingly excessive volume of waste water generated by the users, leading to a need for a correspondingly oversized sewage network and waste-water treatment facilities, and unnecessary investment.

Licenses and permits according to the water legislation in force, the rights to use surface and groundwater are established through water management licenses. Such rights also include waste-water discharges to surface waters. The water legislation also seeks to ensure that discharges into the water resources meet the pollutant limits and loads defined in the licenses and permits.

Licenses and permits are issued for no more than 5 years. Pollution limits are set in the licenses and permits and these limits are water quality standards and not emission limits: they are defined for each pollutant, fixing a maximum concentration in the receiving water body according to its quality class. Compliance with the permit is verified from 1 to 24 times a year, depending on the importance of the discharge.

Regarding WATMAN DSS a data base with water users and with their licenses and permits will be needed, as well as a small description of the industrial process in which water use is included, to plan the restriction plans without big loss for each water user.

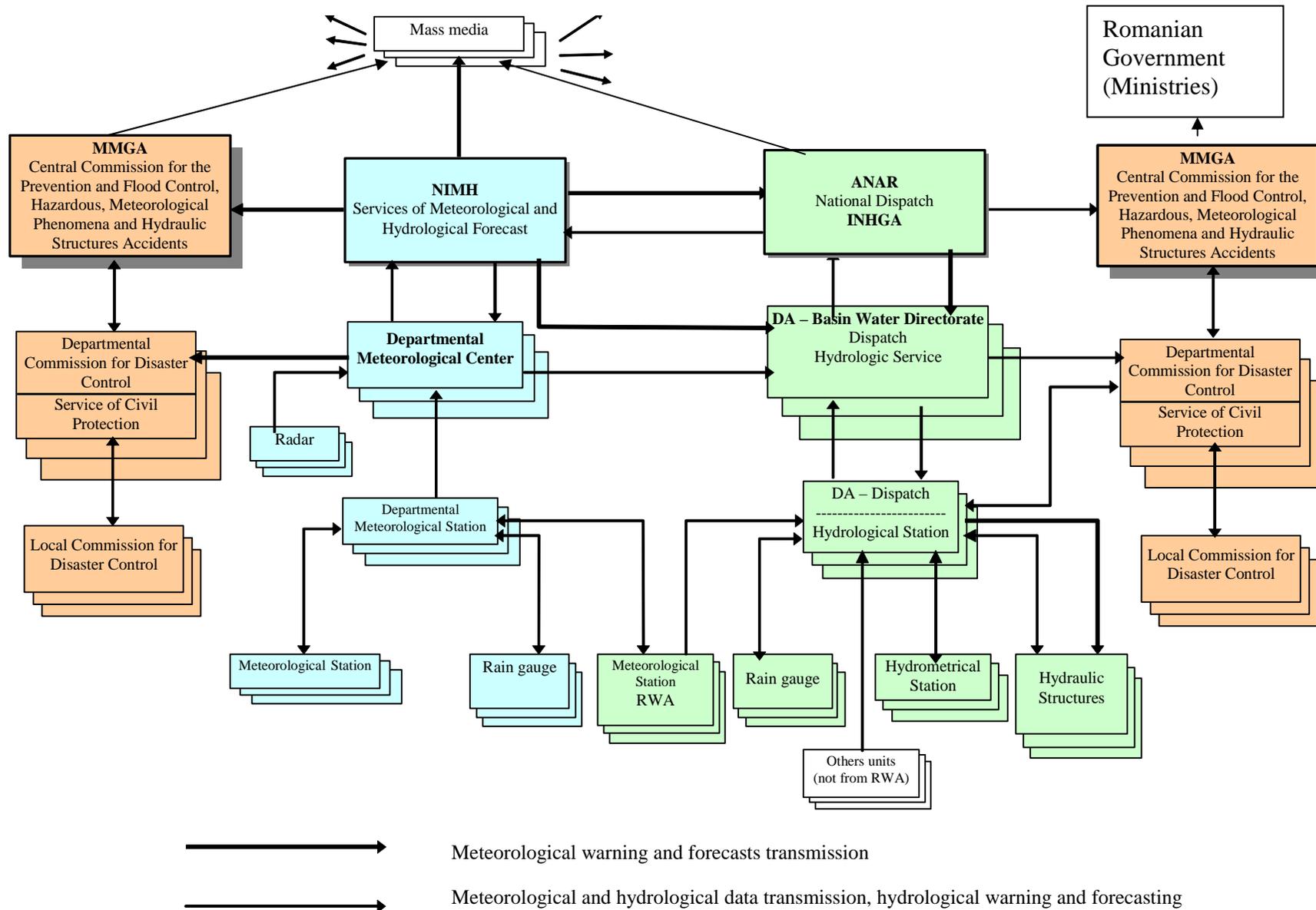
7. 3. Disseminating information related to water allocations (on a regular basis and in time of drought) flood prevention and emergency response, and accidental spills

Data dissemination during flood and spills is presented in Figure 7. INHGA is responsible of meteorological warnings and forecasts.

The forecast and hydrological warnings are sent by INHGA to radio and TV, to mass media and using dispatch system to all hydrological services and hydrological stations, to SGA with dam and reservoir responsibility, to Hidroelectrica and Power Supply Systems of the big reservoirs.

In case of spills, ANAR central dispatch sent data and information to MEWM and GOR, to mass media. The local dispatches are responsible with local activities and decisions.

Figure 7. The structure of flood control system



CONCLUSIONS

Some aspects regarding legislation defining institutional attribution and responsibilities need to be specified:

- all specific legislation must be reviewed from the institutional attribution point of view - there are too many authorities and institutions, national or regional, with the same attributions; the decisions and actions could be blocked by similar bodies; the bureaucracy is encouraged and a large personnel increase the cost of all programs; and, between so many bodies and people the scope of the laws is lost.

To be able to adequately implement the EU legislation, some measures should be adopted:

- Each Administration, with attribution in implementing EU legislation, with control and executive attribution, must take direct responsibility, through the management staff, on the way the new laws are implemented and enforced;
- The tasks and responsibilities must be clearly defined for each person; if the implementation of some law, program or project is delayed or blocked by one or few persons, penalties have to be applied;
- It must be improved the communication with population, because the population supports the impact on long term. None of the bodies analyzed in the present report has a special department in this respect. The population must know that any complaint regarding new projects, of any nature, with negative impact on their lives is taken into consideration, analyzed and referred to decisional Administration.
- Mass-media shall campaign for presenting the right and obligations of water consumers;
- Educational programs, shall be developed beginning in school, to teach the young people to respect and protect environment and wild life, and through them, to educate their parents.

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