



AIR AND WATER QUALITY MONITORING IN REPUBLIC OF MOLDOVA

The history of the State Hydrometeorological Service begins with the first meteorological observations carried out in Chisinau in 1844.



Natalia Zgircu
Environmental Monitoring Quality Department
State Hydrometeorological Service
Uppsala, Sweden
May 9th 2017



The State Hydrometeorological Service is subordinated to the Ministry of Environment and is functioning according to the **Government Law No. 401 from 3 April 2003** on the hydrometeorological activity in the Republic of Moldova.

The administration of the Service is carried out by its Director appointed by the Government **according to the Government Law No. 401 from 3 April 2003.**

In the actual formula the Service comprises three main fields of activity:

- [Meteorological Department;](#)
- [Hydrological Department;](#)
- [Environmental Quality Monitoring Department](#)

The main tasks of the State Hydrometeorological Service are:

1. To monitor the state and evolution of the hydrometeorological conditions and environment quality with purpose to protect the population and economical agents from dangerous hydrometeorological phenomena and from environmental pollution;
2. Elaborate meteorological, aeronautical, agrometeorological, hydrological forecasts, as well as the forecast on the environmental pollution;
3. To issue warnings on hydrometeorological hazardous phenomena, as well as on the environmental pollution.





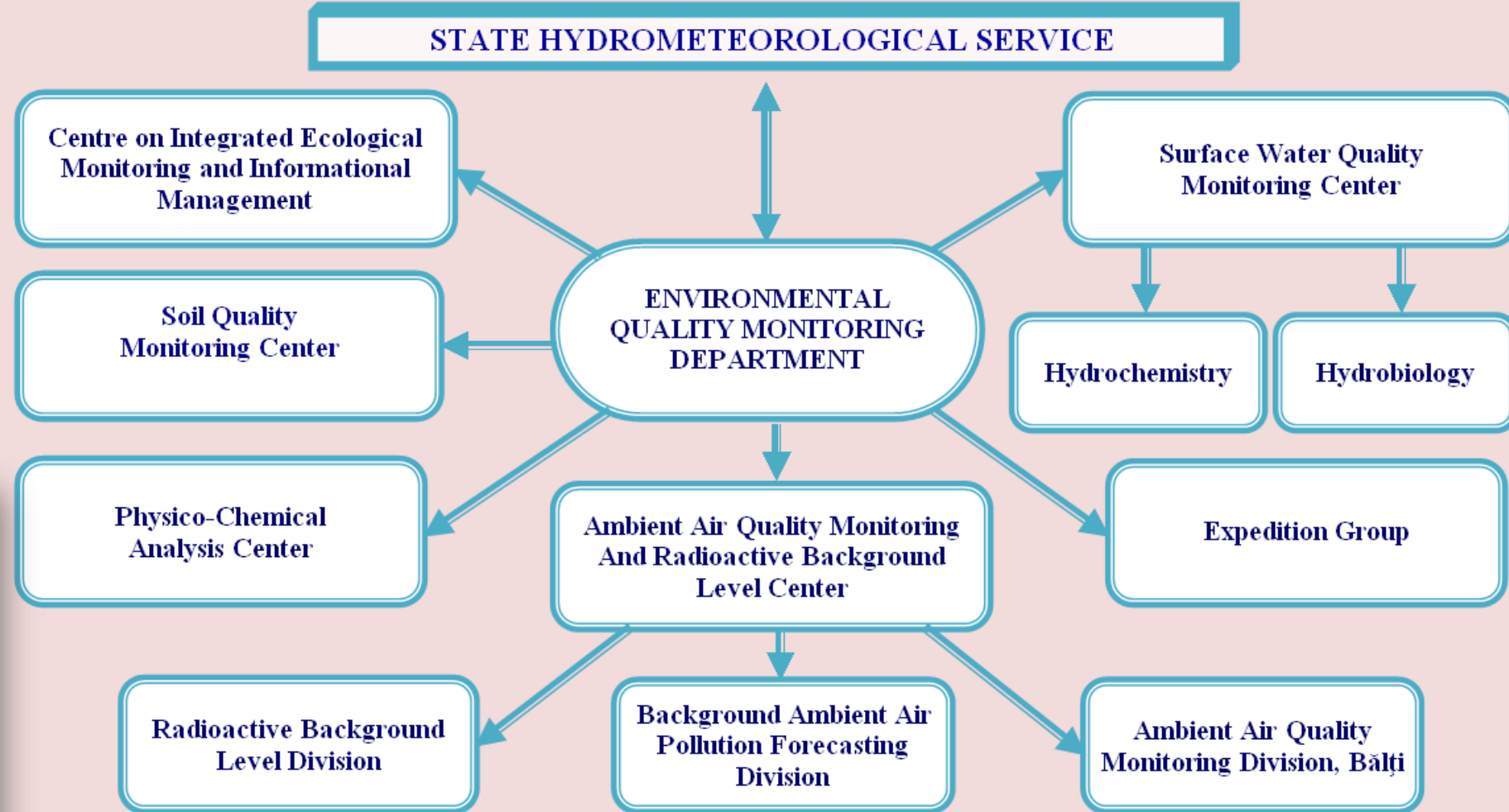
ENVIRONMENTAL QUALITY MONITORING DEPARTMENT

The national monitoring system was established in the sixth decade of the last century and systematic observations started in 1980 with the purpose of:

- ✓ monitoring of the environmental quality and determining the pollution level;
- ✓ detection of extremely high pollution of surface water, air and soil;
- ✓ prevention and mitigation of anthropogenic impact on the environment and population;
- ✓ emergency warning about extremely high pollution of environmental objects;
- ✓ systematic informing of the public of the environmental quality.



ENVIRONMENTAL QUALITY MONITORING DEPARTMENT ORGANIZATIONAL CHART





LEGAL BASIS



Laws of the Republic of Moldova:

- Law on Environmental Protection nr. 1515-XII, June 16th 1993;
- Law on Hydrometeorological Activity, nr. 1536-XIII from February 25-th 1998;
- Law on Protection Zones and Strips of water, rivers and reservoirs, nr. 440-XIII from April 27-th, 1995;
- Law on Natural Resources, nr. 1102-XIII from February 6-th 1997;
- Water Law, nr. 272 of 23.12.2011;
- Law on drinking water, nr. 272-XIV of 10 February 1999;
- Law regarding ambient air protection, nr. 1422-XIII of 17.12.1997;
- Law on the safe conduct of nuclear and radiological activities, nr.132 of 08.06.2012
- Law on ratification of the Stockholm Convention on Persistent Organic Pollutants, nr.40-XV of 19.02.04.

Governmental Decisions of Republic of Moldova:

- Regulation on monitoring systematic evidence of the surface and ground waters' status (GD 932 of 20.11.2013);
- Regulation on surface water environmental quality requirements (GD 890 of 12.11.2013);
- Measures for regulating the use of aquatic basins nr. 1202 from 8 November 2001;
- Approval of program for the development Water Management and hydro-melioration in the Republic of Moldova for 2011-2020 nr. 751 from 05.10.2011
- Measures establishing riparian areas and files of protection for rivers and water basins, nr 32 from 16.01.2001.
- Regarding national network for observations and laboratory control on environmental contamination with radioactive substances, poison, extremely toxic and bacterial means (biological)- RNOCL, nr. 961 of 21.08.2006.

International Legislation:

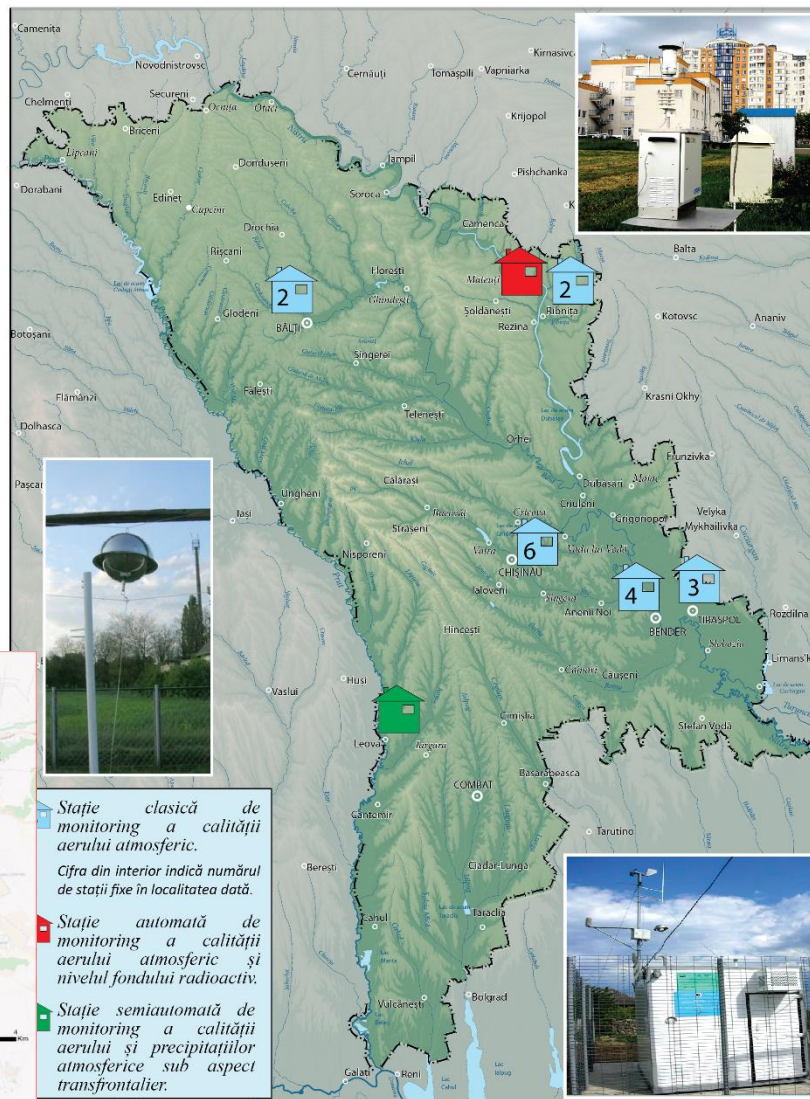
- Convention on Co-operation for the Protection and Sustainable Use of the River Danube
- Stockholm Convention on Persistent Organic Pollutants;
- Convention on the Transboundary Effects of Industrial Accidents;
- Convention on Long-Range Transboundary Air Pollution;
- Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy";
- Directive 2013/39/EU of the European Parliament and of the Council, amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy, 12.08.2013;

17 stationary stations in 5 industrial regions:

- ❖ Chişinău – 6 posts,
- ❖ Bălţi – 2 posts,
- ❖ Benderi – 4 posts,
- ❖ Tiraspol – 3 posts,
- ❖ Rîbnîţa – 2 posts.

Investigated parameters

- solid substances,
- sulphur oxide,
- carbon oxide,
- nitrogen dioxide



Stăție clasică de monitoring a calității aerului atmosferic.
Cifra din interior indică numărul de stații fixe în localitatea dată.

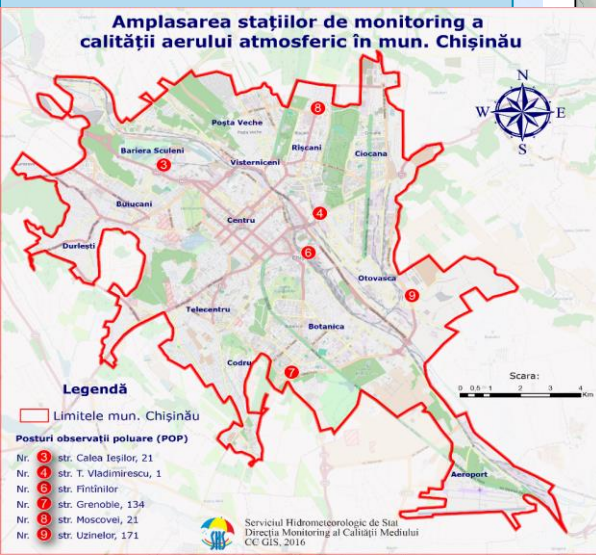
Stăție automată de monitoring a calității aerului atmosferic și nivelului fondului radioactiv.

Stăție semiautomată de monitoring a calității aerului și precipitațiilor atmosferice sub aspect transfrontalier.

Scara 1:1 500 000



Serviciul Hidrometeorologic de Stat
Direcția Monitoring al Calității Mediului
CC GIS, 2016



In 2007 the *Transboundary Pollution Control Station from Leova town* was re-established and provided with modern equipment and it started to carry out atmospheric air quality observations according to EMEP Programme (European Monitoring and Evaluation Programme):

■ **level I:**

- no organic compounds in precipitations: SO₄²⁻, NO₃⁻, NH₄⁺, H⁺ (pH), Na⁺, K⁺, Ca⁺⁺, Mg⁺⁺, Cl⁻;
- no organic compounds in the atmospheric air: SO₂, SO₄²⁻, NO₃⁻, HNO₃, NH₄⁺, NH₃, (NO₃, NH₄), HCl, Na⁺, K⁺, Ca⁺⁺, Mg⁺⁺; NO₂; troposphere O₃; PM₁₀; gas phase particles: NH₃, NH₄⁺, HCl, HNO₃, NO₃⁻)

■ **level II:**

- persistent organic pollutants (POPs) and heavy metals in precipitations).

1 Automatic Station MP-16M - Rezina (Mateuți) - April 2007

17 parameters:

- 12 atmospheric pollutants(nitrogen oxides (NO, NO₂, NO_x), sulfur dioxide (SO₂), hydrogen sulphide (H₂S), ammonia (NH₃), carbon oxide (CO), ozone (O₃), sum of hydrocarbons(ΣCH), total suspended solids, including PM₁₀, gamma background level
- 5 meteorological parameters



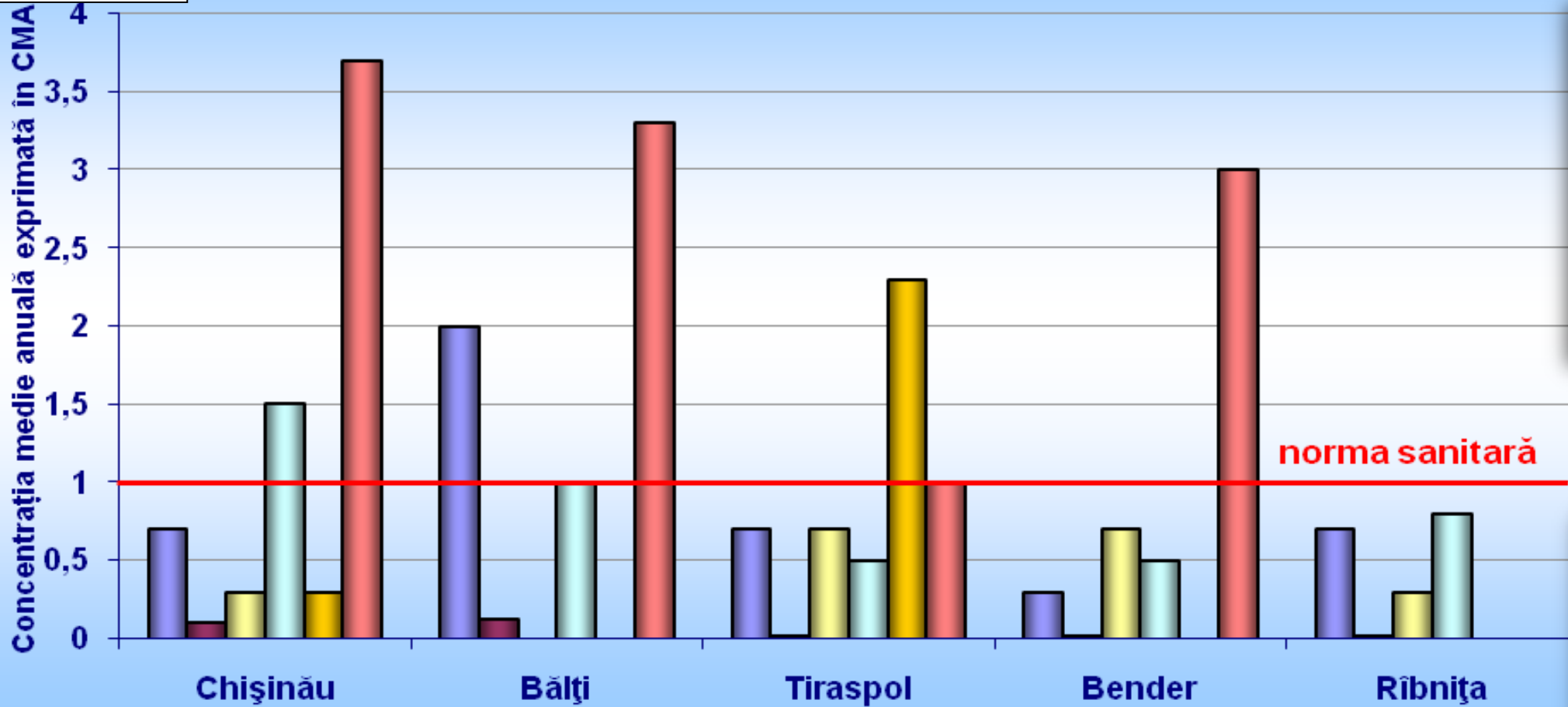


Ambient Air Pollution Level in Republic of Moldova, 2015

■ Pulberi totale
■ Dioxid de azot

■ Dioxid de sulf
■ Fenol

■ Monoxid de carbon
■ Aldehidă formică



Exceeded annual average concentrations were recorded for : *suspended solids and formaldehyde* in Bălți municipality, *nitrogen dioxide and formaldehyde* in Chișinău municipality, in Bender *formaldehyde*, *phenols* in Tiraspol municipality.

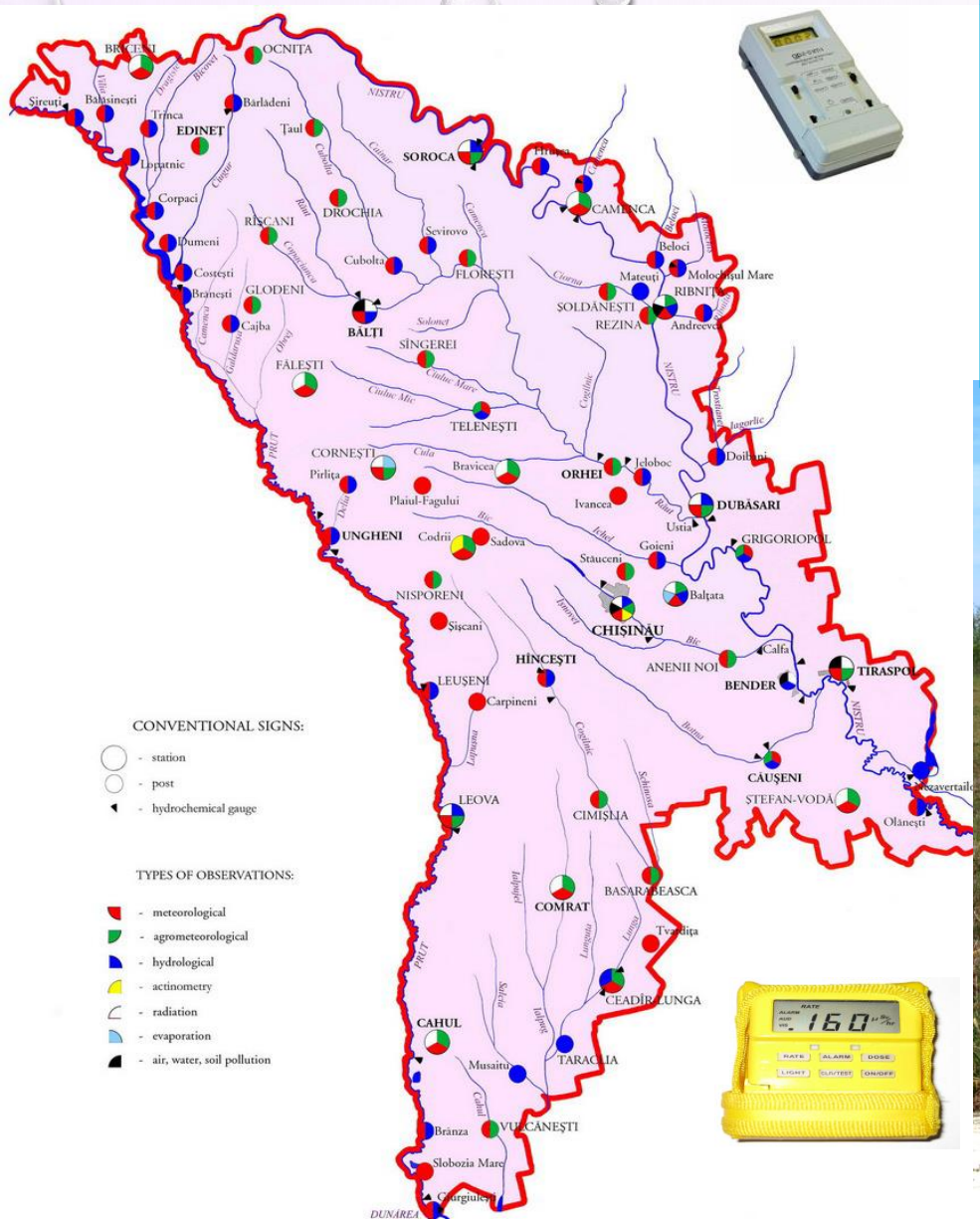


ENVIRONMENTAL RADIOACTIVITY MONITORING

AMBIENT AIR QUALITY MONITORING AND RADIOACTIVE BACKGROUND LEVEL CENTER

The environmental radioactivity monitoring in Moldova is carried out by the State Hydrometeorological Service since 1978, performing systematic measurements of ambient dose rate gamma radiation.

Gamma dose rate is being measured at 18 meteo stations (North - 7, Center - 7, South - 4)



04/05/2012 11:28

2003-anthropogenic radionuclides ^{137}Cs , ^{90}Sr , telluric radionuclides ^{226}Ra , ^{232}Th , ^{40}K , beta and gamma gross activity. Currently, these observations are being done in:

- atmospheric fallout,
- uncultivated soils,
- surface water

Qualitative and quantitative determination of radionuclides investigated as well as γ , and β activity, are carried out using gamma spectrometer with scintillation detector (NaI), type AT1315



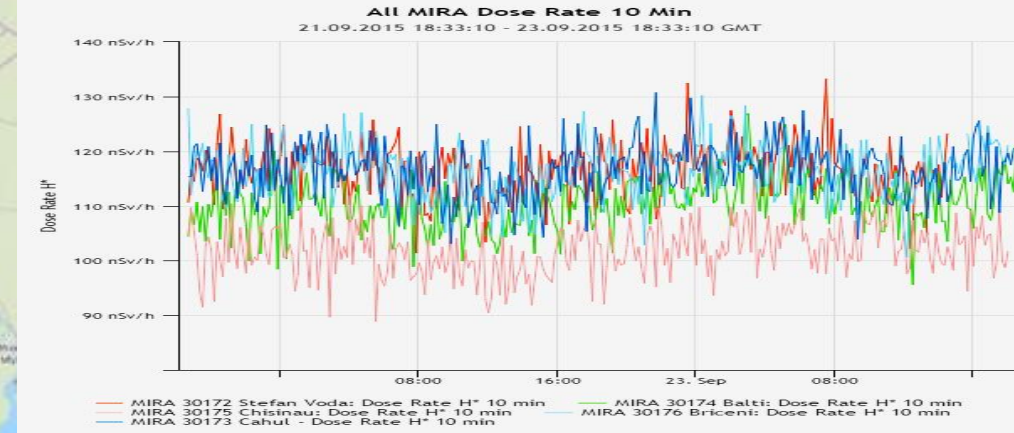
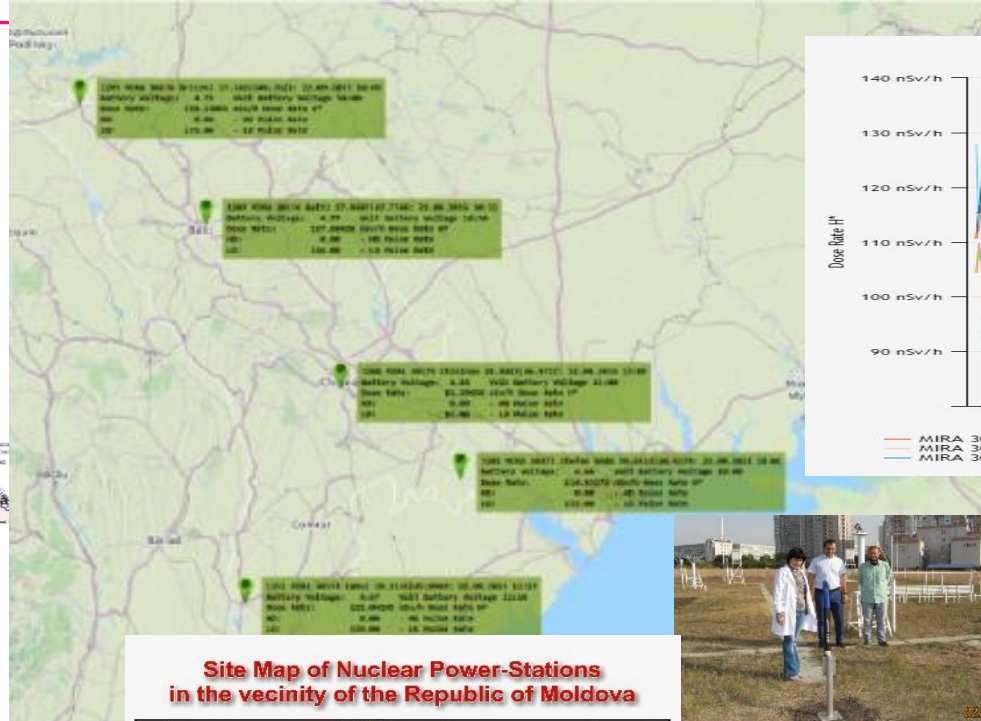
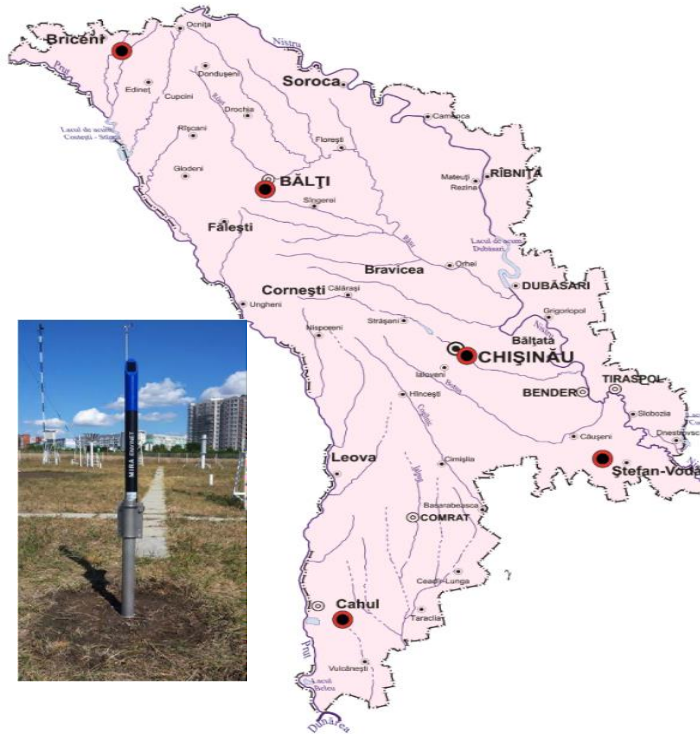
28/09/2012

Also, starting with 2009 were initiated investigations on the determination of radioactive aerosols, which are sampled using collection facilities ASS 500

Primary response in case of radiological or nuclear accidents / incidents

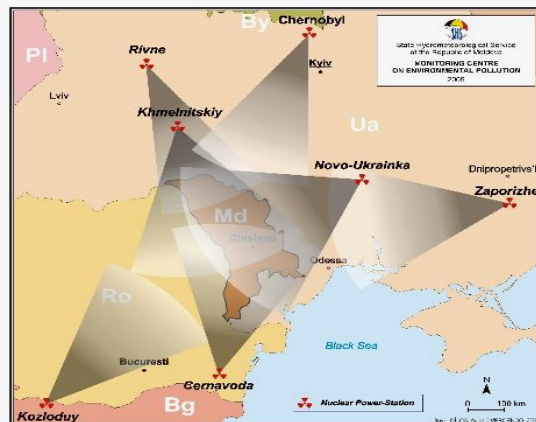
Locations of automated measurements of the gamma-dose rate starting September 2015

MIRA - Gamma dose rate monitoring system ENVINET



Technical assistance project "Strengthening national primary reactionary in case of accidents / incidents that could cause environmental nuclear pollution", Sweden

Site Map of Nuclear Power-Stations in the vicinity of the Republic of Moldova



Distance of Nuclear Power Plants from the territory of Republic of Moldova

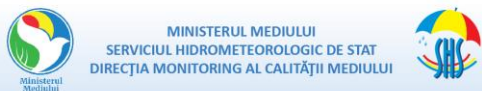
- Rovno (Ucraina) - 275 km;
- Cernobil (Ucraina) - 400 km;
- Ucraineană de Sud (Ucraina) - 250 km;
- Cozlodui (Bulgaria) - 300 km;
- Hmelnițe (Ucraina) - 150 km;
- Zaporojie (Ucraina) - 400 km;
- Cernavodă (România) - 125 km.

Contamination of the environment with radioactive products

- In a Transboundary Context;
- Industrial accidents at national level;
- Transportation of radioactive sources;
- Nuclear medicine laboratories;
- Scientific laboratories;
- Radioactive waste management

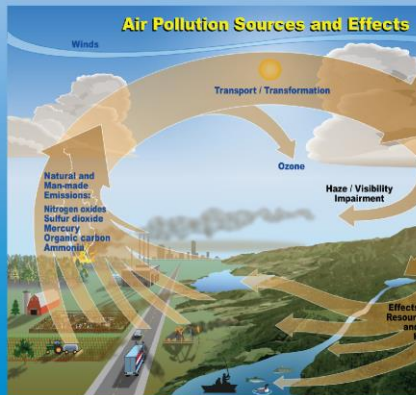


Ambient Air Quality in main cities of Republic of Moldova, 2011 – 2015 years



Raport anual

STAREA CALITĂȚII AERULUI ATMOSFERIC PE TERITORIUL REPUBLICII MOLDOVA PENTRU ANUL 2015



Chișinău 2016

**SERVICIUL HIDROMETEOROLOGIC DE STAT
DIRECȚIA MONITORING AL CALITĂȚII MEDIULUI**

Buletin zilnic privind poluarea și prognoza poluării aerului atmosferic în mun. Chișinău, Bălți, Tiraspol, Bender, or. Rîbnița și s. Mateuți (r-nul Rezina)
la situația din 24 noiembrie 2010, orele 12.00

În ultimele 24 de ore vremea în republică a fost determinată de o zonă de aer cu presiune atmosferică scăzută. Influența unui ciclon sudic, intensificările vântului de pîna la 12-14 m/s, ploile pe arii extinse, izolat puternice au contribuit la dispersia poluanților din aer.

Pe 23 noiembrie în mun. Chișinău, Bălți, Tiraspol, Bender și or. Rîbnița nivelul poluării aerului în medie pe oras și privind separat nocele a fost redus. Concentrația maximă momentană a depășit norma sanitară:

în mun. Chișinău pentru aldehida formică – de 1,3 ori, str. Calea Ieșilor, la ora 19⁰⁰ (23.11);

în mun. Tiraspol pentru fenol – de 1,3 ori, str. Secier, la ora 7⁰⁰ (24.11).

DEBITUL DOZEI AMBIENTALE A RADIAȚIEI GAMA

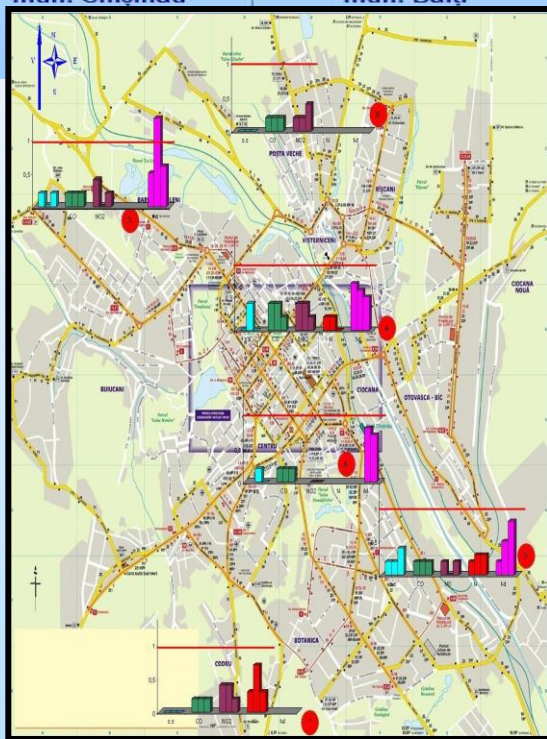
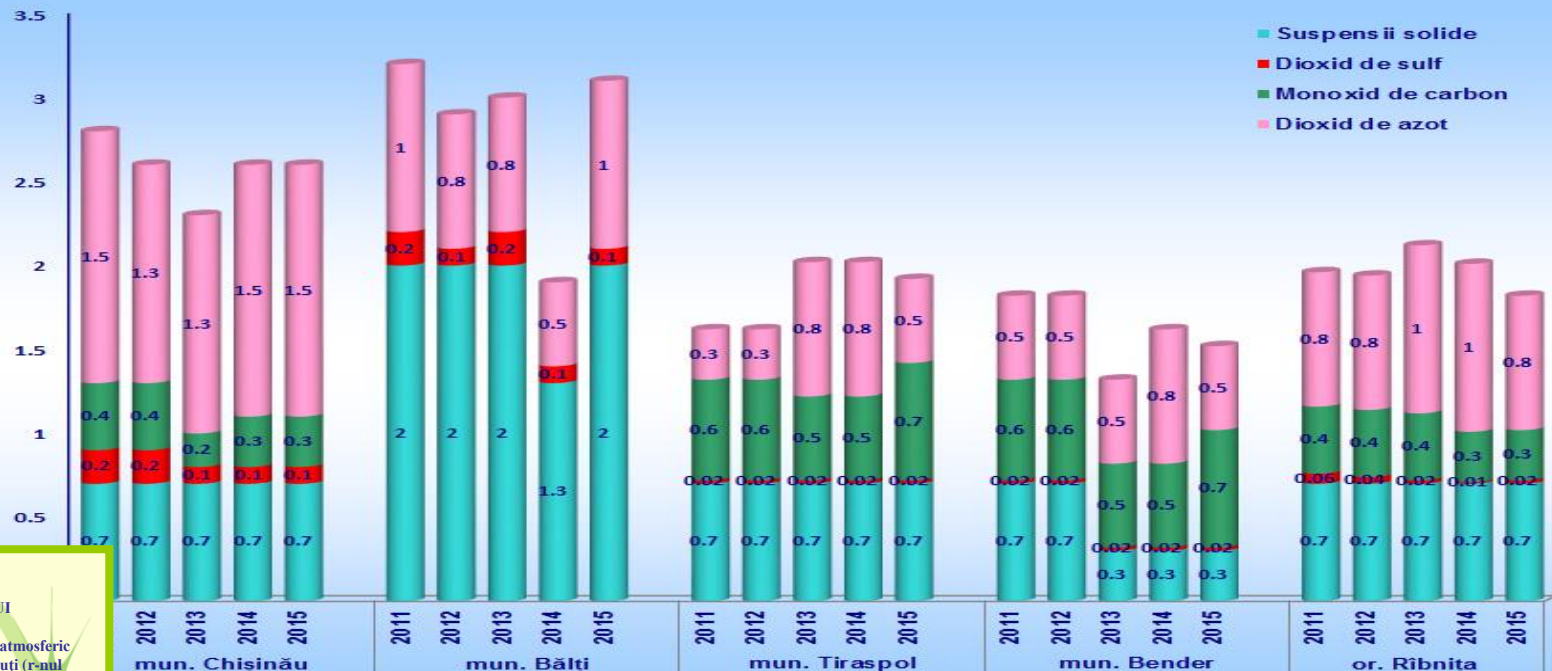
Conform datelor colectate de la 17 stații meteorologice, amplasate în teritoriul republicii valorile debitului dozei ambientale a radiației gama se încadrează în limitele de 7 - 15 $\mu R/h$ (limita de avertizare - 25 $\mu R/h$).

PROGNOZA CALITĂȚII AERULUI ATMOSFERIC în intervalul 24.11 – 25.11.2010

Pe 24 noiembrie vremea va fi determinată de o zonă de aer cu presiunea atmosferică scăzută. Vremea cu caracter instabil și izolat ploile slabe, vor contribui la dispersia poluanților din aer.

Pe 25 noiembrie vremea va fi determinată de un cîmp baric cu gradienti orizontali slabi. Ziua mișcarea slabă a aerului în direcție orizontală vor contribui la acumularea poluanților în depresiuni, în apropierea zonelor industriale și a traseelor auto.

Concentrația medie anuală exprimată în CMA



COD VERDE
Nivelul poluării aerului este prognozat ca **Redus**.

Vineri, 19 Noiembrie, 2010

Datele

- AVERTIZARE
- Vremea curentă
- Prognoza
- Caracterizări ale vremii
- Caracterizări climatice
- Calitatea componentelor mediului
- Fenomene neobișnuite și recorduri
- Terminologia și unitățile de măsurare
- Legenda simbolurilor

Despre noi:

- Noutăți
- Administrația
- Istoria Serviciului
- Rețeaua națională de observații
- Activitatea internațională
- Instituții internaționale și naționale de profil
- Serviciile noastre
- Informația difuzată prin mass-media
- Legislația
- Condiții de utilizare
- Contacte

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DESCRIEREA CODURILOR

VERDE	GALBEN	PORTOCALIU	ROSU
Condițiile meteorologice și sinoptice vor contribui la stagnarea maselor de aer cu nivel înalt de poluare. Nivelul poluării aerului este prognozat ca Redus . Se prevede situația ecologică favorabilă. Poluarea aerului atmosferic influențează nesemnificativ asupra sănătății umane și a mediului ambiant. Pentru populație nu sunt propuse măsuri de protecție. Se recomandă să se evite activitățile implicite în reglementarea emisilor, activează în regim obișnuit.	Condițiile meteorologice și sinoptice vor contribui la acumularea nxeelor în stratul de aer de la suprafața solului. Nivelul poluării aerului este prognozat ca Sport . Se prevede depășirea de 2-4 ori a concentrației maxime admisibile privind poluanții investigați. Situația ecologică se prevede nefavorabilă pentru sănătatea populației și a stării mediului ambiant.	Condițiile meteorologice și sinoptice vor contribui la stagnarea maselor de aer cu nivel relativ înalt de poluare. Nivelul poluării aerului este prognozat ca Înalt . Se prevede depășirea de 5-10 ori a concentrației maxime admisibile privind poluanții investigați. Situația ecologică se prevede foarte nefavorabilă pentru sănătatea populației și starea mediului ambiant.	Condițiile meteorologice și sinoptice sunt extrem de nefavorabile pentru dispersia nxeelor și vor contribui la stagnarea maselor de aer cu nivel Extrem de înalt de poluare. Se prevede depășirea de peste 10 ori a concentrației maxime admisibile privind poluanții investigați. Situația ecologică se prevede foarte nefavorabilă pentru sănătatea populației și a stării mediului ambiant.



08/11/2013



Surface Water Quality Monitoring Centre

SHS is the institution assigned by law at national level to monitors the quality of components of the environment throughout the country and has the following responsibilities:

- monitoring of surface water quality and determining the level of contamination;
- rapid detection and reporting of cases of high and extremely high levels of pollution;
- notification in urgent mode the governmental and local authorities, as well as ministries and departments responsible for decision-making;
- systematic information on surface water quality on the territory of the Republic of Moldova.



**Surface Water
Quality
Monitoring
Centre (SWQMC)**

Hydrochemistry

Hydrobiology

72 chemical parameters: temperature, pH, conductivity, colour, transparency, turbidity, dissolved oxygen, oxygen saturation, biochemical oxygen demand, chemical oxygen demand, suspended solids, ammonium, nitrates, nitrites, orthophosphates, total phosphorus, hardness, chlorides, sulphates, petroleum products, iron, phenols, alkalinity, calcium, magnesium, sodium, potassium, mineralization, silicates, anionic detergents, cuprum, zink, nickel, lead, cadmium, POC, HPA.

- ✓ Bacterioplankton;
- ✓ Phytoplankton;
- ✓ Zooplankton;
- ✓ Phytobenthos;
- ✓ Macrozoobenthos;
- ✓ Macrophytes



NATIONAL SURFACE WATER QUALITY

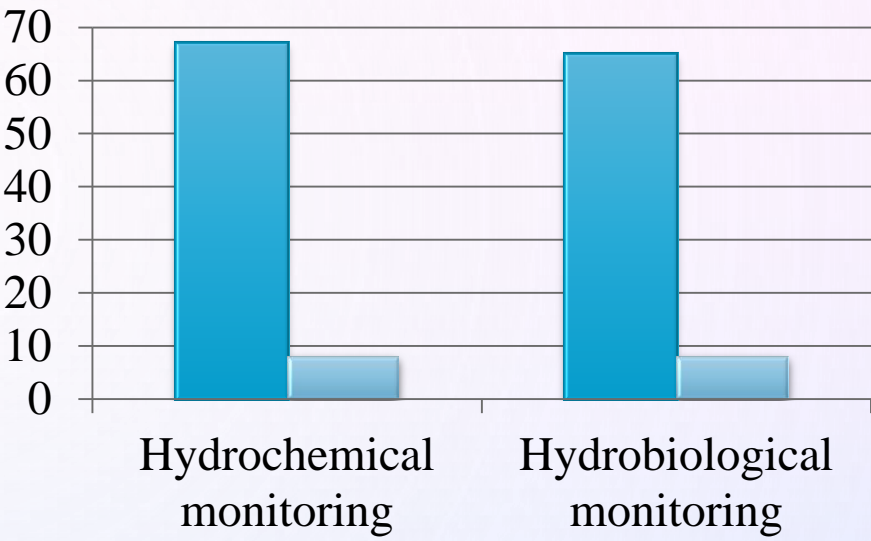
MONITORING NETWORK

The monitoring system for 2017 includes 67 monitoring sections:

- 6 water storage basins,
- 2 natural lakes,
- 29 rivers



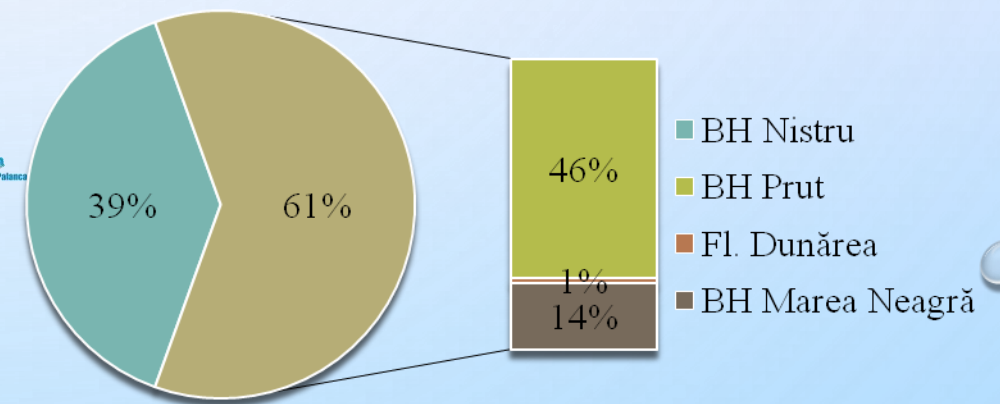
Monitoring Stations



■ Rivers
■ Lakes



Surface water monitoring sites



△ Water quality monitoring in rivers
△ Water quality monitoring in lakes

SURFACE WATER QUALITY MONITORING CENTRE

Type of investigations

Hydrobiological quality elements



Hydrochemical quality elements



Measurement parameters

Phytoplankton, including chlorophyll “a”

Macrophytes

Phytobenthos

Benthic invertebrates

Transparency: Secchi depth, turbidity, colour, total suspended solids

Thermal conditions: Temperature

Oxygenation: DO, BOD, COD, oxygen saturation

Salinity: conductivity, mineralization, Chlorides, Sulphates, sodium and potassium ions, etc.

Acidification: alkalinity, pH

Nutrients: total phosphorus, orthophosphates, nitrates, ammonium ions, nitrites

Priority substances: BPC, POC, PAH, heavy metals

Sampling methodology

Integrated samples in the water column; 1-5 sites per lake

Transect sampling perpendicular to the shore line; Photography

Scraping of substrata; In-situ observations of occurrence of natural substrate in littoral zone or among macrophytes

Qualitative and quantitative hand-net sampling

Secchi disc, turbimeter, field sample collection followed by laboratory analysis

Thermometer

Field sample collection followed by laboratory analysis; Winkler titration

Field sample collection followed by laboratory analysis

In situ measurements with pH meter, confirmed by laboratory analyses

Field sample collection, preservation, followed by laboratory analysis

Field sample collection followed by laboratory analysis



INTERNATIONAL COOPERATION AGREEMENTS

- 1) Agreement between the government of the Republic of Moldova and the government of Ukraine on joint use and protection of transboundary waters (Chisinau, 1994);**
 - ✓ Prut River – quaterly – Criva village
 - ✓ Nistru River – quaterly – Otaci town and Palanca Village
- 2) Agreement between the government of Romania and the government of the Republic of Moldova on cooperation for protection and sustainable use of water resources of the Danube and the Prut (Chisinau, 28.06.2010);**
 - ✓ Prut River – monthly - Ungheni, Valea Mare and Giurgiulești
 - ✓ Prut River – quaterly - Lipcani, Costești, Leova și Cahul.
- 3) Agreement for the establishment and management of a cross-border protected area between the Republic of Moldova, Romania and Ukraine in the Danube Delta and the Lower Prut Nature Protected Areas (Bucharest, 05.06.2000, signed by the Ministry Of Environment and Spatial Planning of Moldova, the Ministry of Water Resources, Forests and Environmental Protection of Romania, and the Ministry Of Ecology and Natural Resources of Ukraine):**

Water Quality in the Danube River Basin - 2013



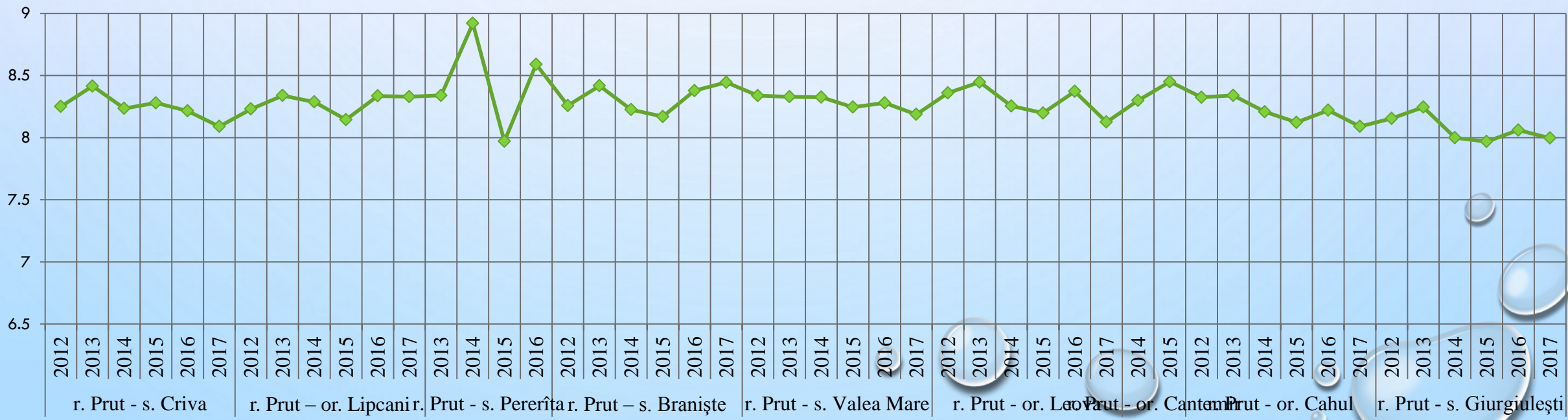
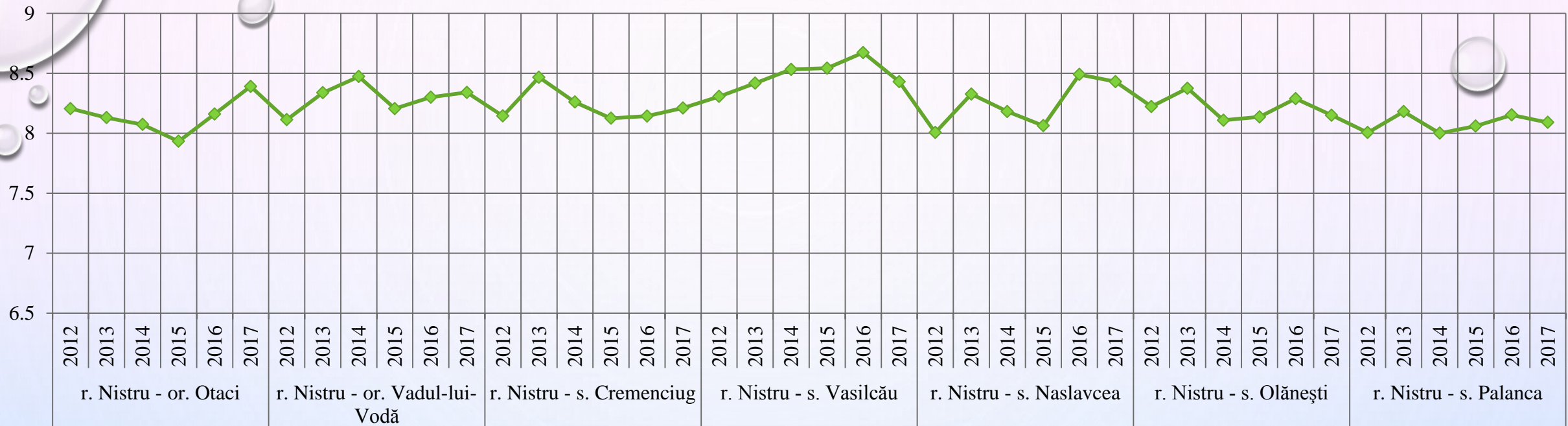
TNMN – Yearbook 2013

- **Convention on Co-operation for the Protection and Sustainable Use of the River Danube**
- ✓ **AEWS**
- ✓ **TNMN (5 transboundary monitoring station – 72 chemical parameters, 2 hydrological parameters, 5 biological indicators, and 21 chemical parameters regarding aquatic sediment quality)**

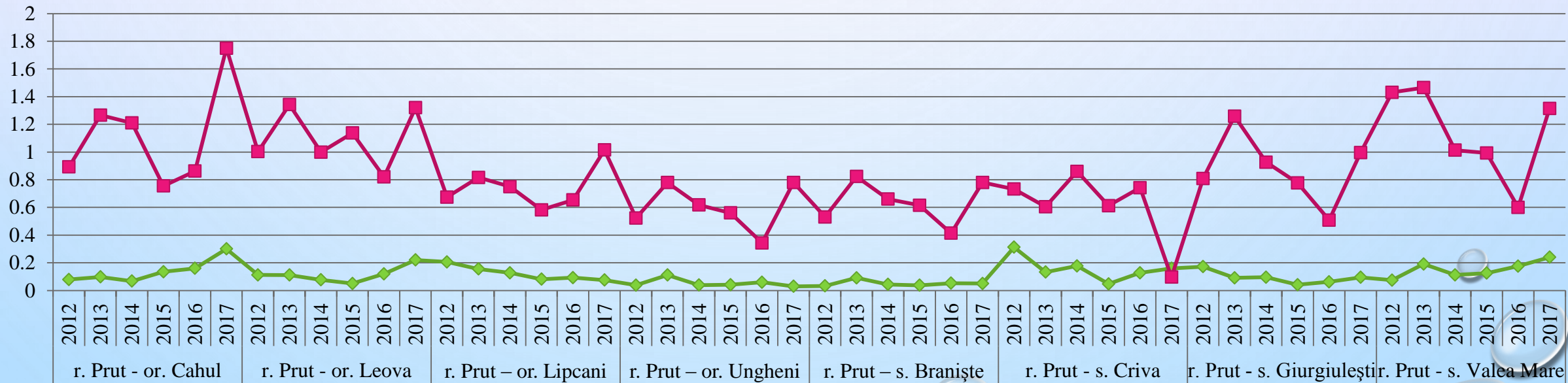
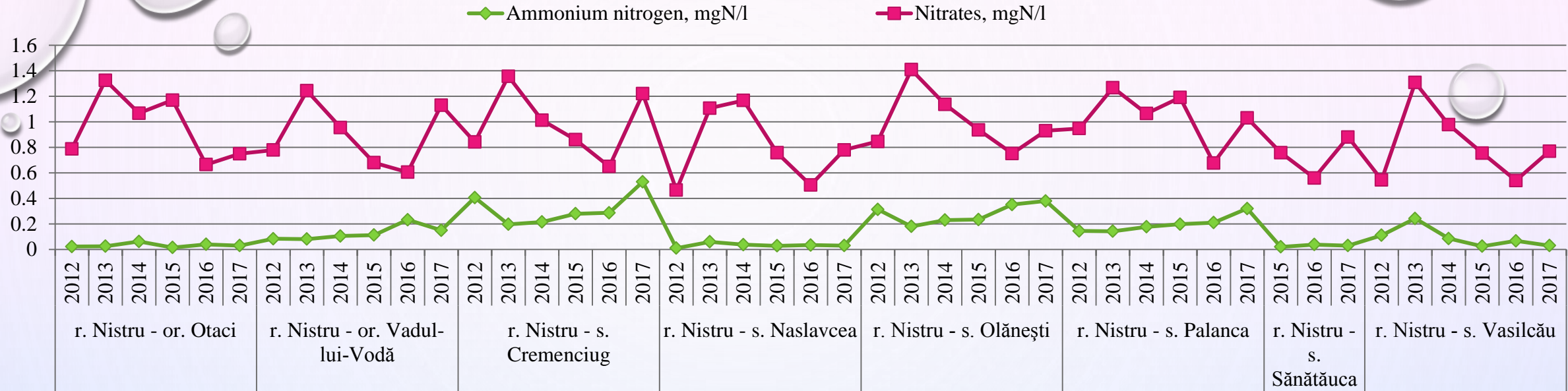


pH average value/year

SURFACE WATER ACIDIFICATION

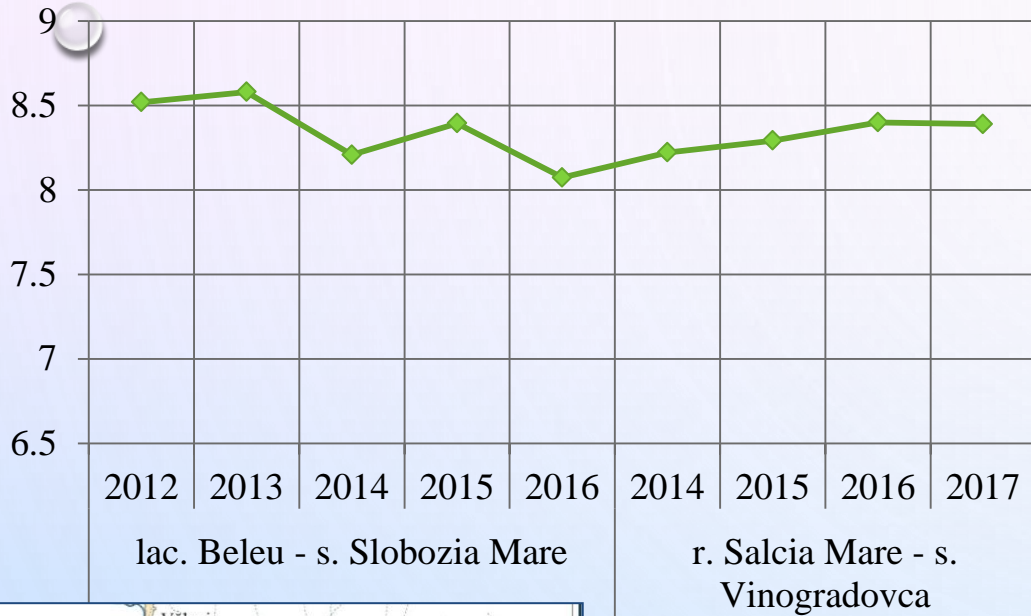


NUTRIENTS IN SURFACE WATER IN MOLDOVA

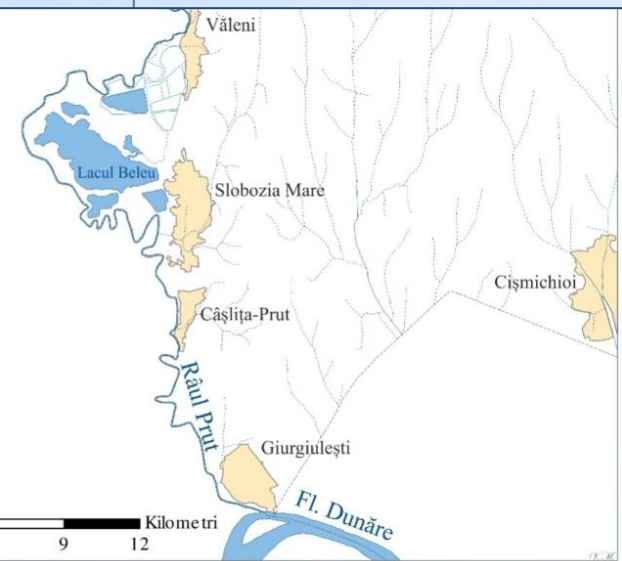
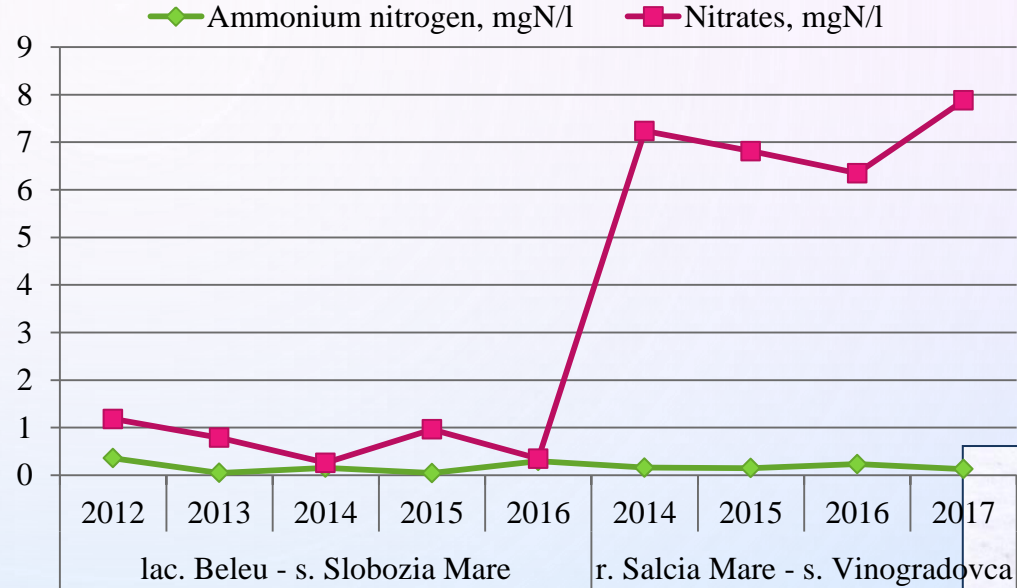


PROPOSED STATIONS FOR ICP WATERS DATABASE

pH average value/year



Average concentration



Beleu Lake represents the main geographical component of the scientific natural reserve “Lower Prut” and it is situated in the south part of the Republic of Moldova, between two picturesque villages, Valeni and Slobozia Mare

Salcia Mare River, a tributary of the Ialpuș River. This river takes its beginning at 4.5 km north from Huluboaia village and flows into Ialpuș River. It is situated in the superior part on the Tigheci hills, 150 meters above sea level.

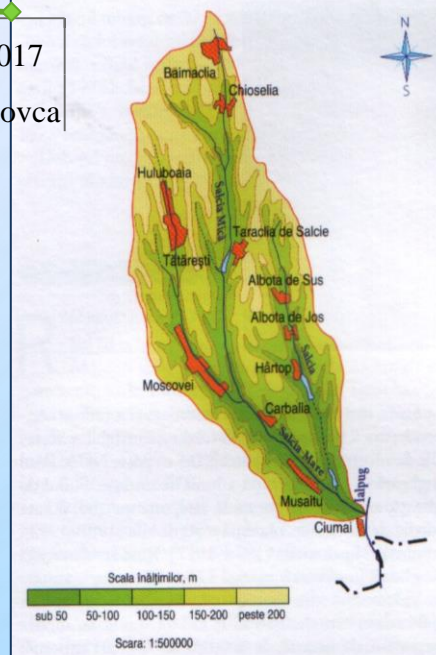


Fig. 3.111. Bazinul râului Salcia Mare

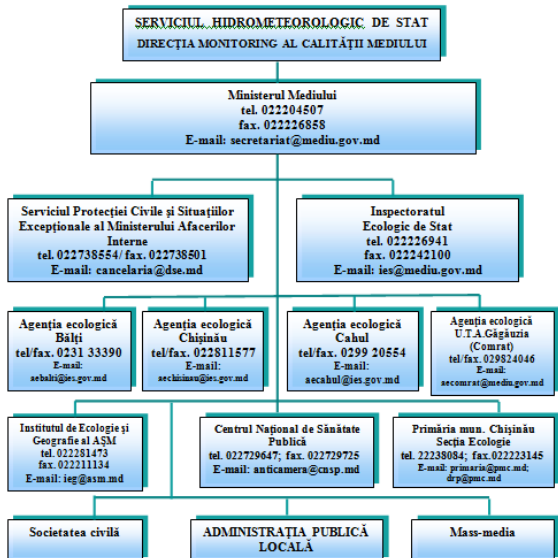


SURFACE WATER QUALITY INFORMATION

www.meteo.md

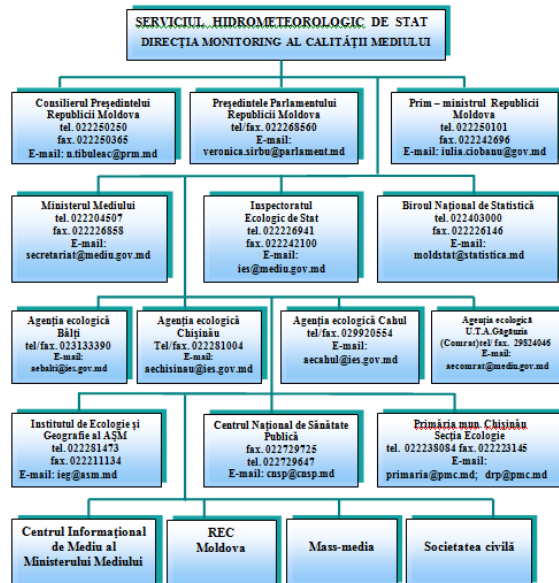
Anexa 4
la ordinul Ministerului Mediului
nr. _____ din _____

SCHEMA DIFUZĂRII BULETINULUI LUNAR PRIVIND GRADUL
ÎNALT ȘI SAU EXTREM DE ÎNALT AL POLUĂRII MEDIULUI
PE TERITORIUL REPUBLICII MOLDOVA



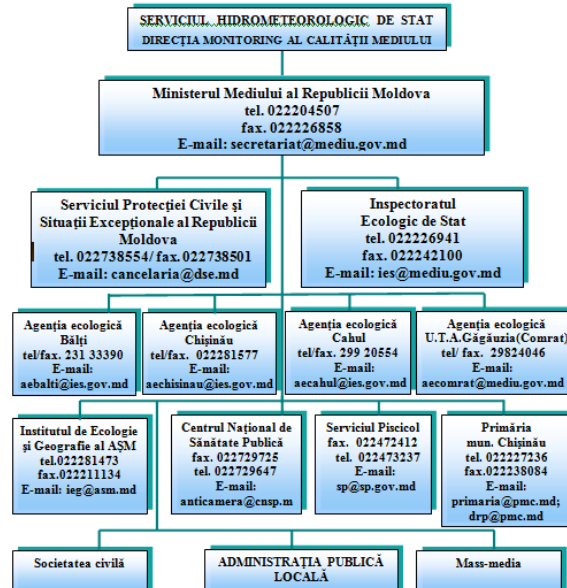
Anexa 5
la ordinul Ministerului Mediului
nr. _____ din _____

SCHEMA DIFUZĂRII BULETINULUI LUNAR PRIVIND CALITATEA
MEDIULUI PE TERITORIUL REPUBLICII MOLDOVA



Anexa 3
la ordinul Ministerului Mediului
nr. _____ din _____

SCHEMA DIFUZĂRII BULETINULUI - ALERTĂ PRIVIND
CAZURILE EXCEPȚIONALE DE POLUARE AL MEDIULUI AMBIANT
ÎN REPUBLICA MOLDOVA
(la momentul depistării)



MINISTERUL MEDIULUI AIREPUBLICII MOLDOVA

SERVICIUL HIDROMETEOROLOGIC DE STAT



DIRECȚIA MONITORING AL CALITĂȚII MEDIULUI

COORDONAT:
Șeful Direcției Monitoring al
Calității Mediului
Gavril GILCĂ
2015

APROBAT:
Directorul Serviciului
Hidrometeorologic de Stat
Anatolie PUTUNTICĂ
2015

ANUAR

STAREA CALITĂȚII APELOR DE SUPRAFAȚĂ
CONFORM ELEMENTELOR HIDROBIOLOGICE
PE TERITORIUL REPUBLICII MOLDOVA ÎN ANUL 2014



CHIȘINĂU 2015

Making surface water monitoring more efficient - PFOS

www.pops-gmp.org/visualization-2014/time-series-overview/938f81e8ef11a8a1a22c9f4681cbf470/10@v2b8@@I1@v10@@I2@v79@@I3@ve0@@@DSI4/central_val

GMP Data Warehouse – Data Visualization



SPATIAL DISTRIBUTION DATA AVAILABILITY SUMMARY STATISTICS TIME SERIES DATA EXPORTS



Filters

Matrix:
Human milk

Matrix specification:
Pooled

Compound:
Perfluorooctane sulfonic acid (PFOS)

Parameter:
PFOS

Unit:
ng/l

Settings

According to the EU WFD and Directive 2013/39 the states should monitorize 45 priority substances (POC, PAH, VOC, etc.)

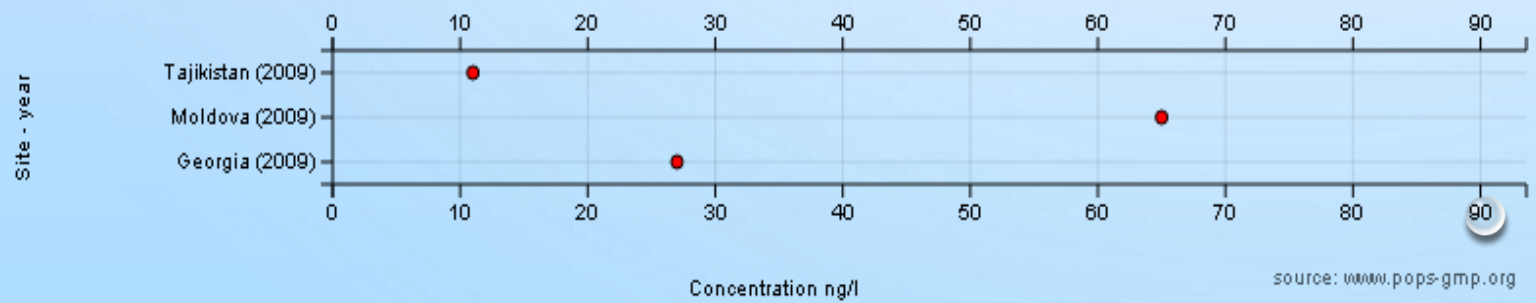
- ✓ Sampling according to international standards (ISO 5667) means appropriate sampling equipment and mobile testing laboratory
- ✓ Automatic monitoring stations
- ✓ Precise lab equipment (GC-MS, ion chromatographs, spectrometers, spectrophotometers, etc.)
- ✓ Certified reference materials- to ensure quality of the results

Submenu

- Trend Map
- Time Series Analysis
- Time Series Bar Chart Map
- Data selection
- Download map

Analysis of Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoate (PFOA) in Water Samples Using Reversed-Phase Liquid Chromatography (RPLC) with Suppressed Conductivity Detection

Mark Tracy, Xiaodong Liu, and Christopher Pohl, Dionex Corporation, Sunnyvale, CA USA



ABSTRACT
This work describes a liquid chromatography method for determination of perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) in water samples. The method incorporates on-line sample concentration, reversed-phase HPLC using Acclaim® PolarAdvantage II (PA2) columns for both and suppressed conductivity detection. For tap water samples, the LOD and LOQ are expected to be 1 µg/L and 3 µg/L, respectively, for both PFOA and PFOS. The dynamic range is 1 to 40,000 µg/L.

EXPERIMENTAL
Separation Column
Acclaim PA2 analytical column (2.1 × 150 mm, dp = 3 µm, P/N 063187, Dionex, Sunnyvale, CA, USA)
Acclaim PA2 guard cartridge (4.3 × 10 mm, dp = 5 µm, P/N 063195, Dionex)



*Thank you for
your attention!*

“Words may show a man's wit but actions his meaning.”

Benjamin Franklin