

\$ and Sense of Non-point Source Water Pollution Monitoring in Central and Eastern Europe, and USAID/ Moldova Case Study

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ABSTRACT

This paper presents the pollution monitoring approach and selected results from USAID Global Environmental Facility (GEF) Danube Pollution Reduction Program in Slovakia, Hungary, and Romania; and discusses a case study on non-point source pollution monitoring in Moldova associated with USAID and non-USAID programs.

The USAID/GEF Danube project in three key tributaries of the Danube River was meant to improve water quality and reduce transboundary pollution coming from Slovakia and Romania into Hungary and ultimately to the Black Sea. The program's intent was to serve as one implementation model for similar environmental improvement activities (Ref. 1 and 2) to be undertaken in 17 countries of the Danube River Basin as part of the Environmental Action Plan (EAP) and Strategic Action Plan (SAP). The intent of Moldova case study on non-point source pollution monitoring also has a strong potential of replication in Central and Eastern Europe.

INTRODUCTION

USAID Global Environmental Facility (GEF) Danube project was meant to help in pollution reduction from tributaries to the Danube River as it flowed through **Slovakia, Hungary, and Romania**. In addition to the trans-boundary water pollution monitoring issues, the USAID also successfully implemented non-point source pollution monitoring in Moldova as part of compliance required by USAID funded programs in accordance with 22 CFR 216, USAID Environmental Procedures. .

USAID GLOBAL ENVIRONMENTAL FACILITY (GEF) DANUBE POLLUTION REDUCTION PROGRAM IN SLOVAKIA, HUNGARY, AND ROMANIA:

This initiative was part of the USG contribution to the Global Environment Facility in international waters. USAID Initiative in three key tributaries of the Danube River was meant to improve water quality and reduce transboundary pollution coming from Slovakia and Romania into Hungary and ultimately to the Black Sea (Figure 1). The program will now serve as an implementation model for similar environmental improvement activities to be undertaken in 17 countries of the Danube River Basin as part of the Environmental Action

Plan (EAP) and Strategic Action Plan (SAP). Both EAP and SAP under are being implemented through the Environmental Program for the Danube River Basin through International Commission for Protection of the Danube River (ICPDR), Vienna, Austria (Ref. 1).

Reduction in pollution and human exposure to toxic substances has been achieved by reducing direct and indirect discharges of toxics from industries, reducing discharges of toxics and pathogens from municipal water treatment systems, and developing the capability to monitor and respond to periodic spikes of contamination in potable and irrigational water uses.

Project activities included:

- **Established four automatic water quality monitoring stations along three international boundaries**
- **Assisted government agencies** in developing the institutional capacity and communications network to warn downstream users when pollution may threaten them
- **Sponsored municipal wastewater treatment improvements** at Oradea in Romania and at Kosice in Slovakia
- **Assisted six Romanian industries** in adopting cleaner production techniques and in developing and implementing environmental management programs
- **Provided industrial wastewater treatment improvements at industries** in Romania

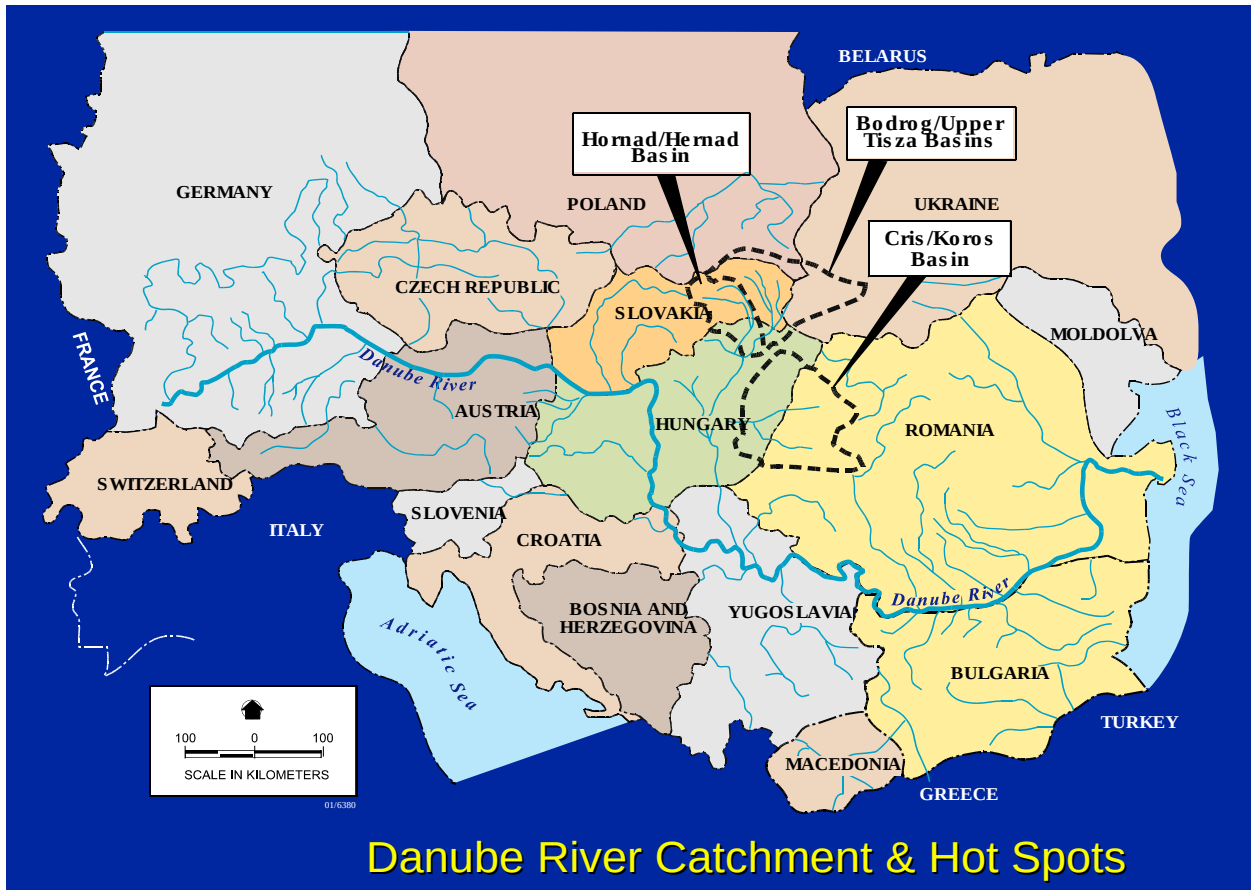
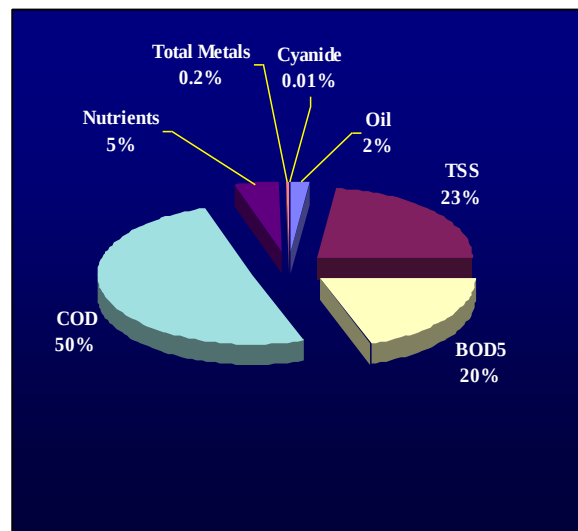


Figure 1. Three Danube River Basins

RESULTS (Ref. 3)



USAID/ Moldova Case Study

In order to have environmental compliance of USAID Regional Agricultural Development Project Activities in Moldova, the implementer was required to follow the Record of Decision (ROD) requirements of Programmatic Environmental Assessment (PEA) approved by USAID in August 2001. The ROD required CNFA/EWMI to assess the water pollution levels in Moldova and establish a Water Quality Monitoring System. In August 2001 upon the recommendation of Mr. Mohammad Latif, the USAID E&E Bureau Regional Environmental Officer (REO), and upon discussions with the USAID Moldova CTO, Mr. Sergiu Botezatu it was agreed that a number of water quality monitoring stations should be set up in order to test the water pollution levels of the main rivers from all Moldova counties on a semiannual basis (Ref. 5).

The study provides an overall picture of the water quality situation in Moldova. It is important to note that CNFA/USAID supported projects, namely Farm Stores and Farm Service Centers are distributing less than 10% of pesticides and fertilizers utilized in Moldova and thus have minimal impact on pollution levels. Besides agro-chemicals, industry and city sewage systems are also contributing to water pollution with nitrites, ammonia and heavy metals. One should also keep in mind that Prut and Dniester river data represent pollution that also comes from both Romania and Ukraine. Nevertheless, the study represents a valuable source of information in order to meet the mandatory requirements of USAID Environmental Procedures, and also provide valuable information on water quality for the Ministry, NGOs, municipalities, farmers and industries. It seems that it is the only type of such a systematic study conducted in Moldova during the last decade.

The 12 representative monitoring sites were initially selected jointly with the state representative and Deputy Head of State Ecology Institute. These sites corresponded to areas of CNFA/EWMI project activities. Later on, in order to further establish the specific impact of the CNFA and EWMI projects on the environment, it was necessary to extend the number of tested water bodies by adding 3-4 lakes and 3-4 boreholes to be located in the areas of highest density of CNFA and EWMI projects, and thus making it a total of 18 monitoring sites. Selected data is presented in three tables (Ref. 4) attached to this paper.

Water samples were taken on a six months basis, in the fall and in the spring in normal weather conditions (after a non-rain period of at least 2-3 days), and tested for 28 ingredients at the Chemical Laboratory of State Hydro-Meteorological Department. This laboratory is one of the best in the country and has an official accreditation in Moldova Republic and is periodically tested by Moldova State Department of Standards. This laboratory is well equipped with modern laboratory appliances, including an Atomic Absorption Spectrophotometer for heavy metals testing according to the methodology used.

The 28 ingredients were selected in order to match the array of chemicals officially approved by State Chemicals Registration Center for selling in Moldova. These ingredients were selected together with the above-mentioned laboratory staff taking into consideration the active substances compounds of the range of new pesticides used in the country.

Each ingredient's concentration was examined and analyzed by comparing it with the Maximal Admissible Concentration (further referred to as MAC), which is a figure officially accepted in Moldova and published in the Moldavian Parliament official magazine – Monitorul Oficial al Republicii Moldova. It is important to mention that in Moldova two different water MACs remaining from soviet times are still valid: the first one is more strict and is designed for biodiversity (esp. for fish) protection, the second which is more mild, refers to general sanitary admissible levels (GSAL). As CNFAs task was to assess the quality of surface water basins, which serves as an environment for fish, CNFA compared our records with the first MACs. For instance, N-NH₄ (ammonia) MAC for fish basins is 0.39-mg/ dm³, while GSAL is 2-mg/ dm³; for N-NO₂ (nitrites) it is correspondingly 0.02 and 0.8-mg/ dm³; for N-NO₃ (nitrates) it is correspondingly 9 and 10-mg/ dm³; for copper it is correspondingly 1 mkg/ dm³ and 100 mkg/ dm³; for zinc it is 10 mkg/ dm³ and 100 mkg/ dm³; for lead it is correspondingly 100 mkg/ dm³ and 30 mkg/ dm³. It should be mentioned that the concentrations of most of the pesticides tested are so low that they are at the borderline of the method and appliances in use. That is why in majority of the cases these remains of concentrations should be considered as absent.

When analyzing water pollution levels it is also very important to take into account the fact that absolute values of the MAC of some ingredients in Moldova are much lower than the analogical MACs in other European countries. For instance the MAC for ammonia in Moldova is 0.39-mg/ dm³, while in other European countries it is 4.00 mg/dm³. Because of this discrepancy in MACs water pollution levels in Moldova may seemingly look high but in reality are with acceptable norms.

The most important conclusions could be summarized as follows (Ref. 5):

- There seems to be no growing tendency in water pollution levels; moreover in the majority of stations, the concentrations of most ingredients is decreasing when compared with soviet times.
- Increased ammonia concentrations, while exceeds Moldova MAC in some cases are still lower than European MAC standard.
- In cases of increased concentrations of Zn where registered, it could be explained by the presence of widely spread Vendian Age rocks rich in zinc.
- There is still a cumulative, prolonged effect of soviet time agricultural practices characterized by over usage of copper containing pesticides and ammonia containing fertilizers.

References:

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Table 1C. Hydro-chemical characteristics of the Prut River at Cahul MS

Ingredient	MAC	End of 80s [4]	End of 90s [5]	IX2001	IV2002	IX2002	III2003
N-NH ₄ , mg/l	0.39	1.78	0.69	0.09	0.63	0.33	0.77
N-NO ₂ , mg/l	0.02	0.08	0.04	0.01	0.03	0.01	0.04
N-NO ₃ , mg/l	9.00	1.54	1.79	1.03	0.91	0.79	2.46
N mineral, mg/l	-	3.40	2.43	2.13	1.88	1.32	3.70
P-PO ₄ , mg/l	-	0.05	0.06	0.04	0.05	0.04	0.09
Cu, mkg/l	1.00	3.78	5.00	<3.00	<3.00	4.60	3.51
Zn, mkg/l	10.00	15.95	29.90	5.00	<3.00	<3.00	<3.00
DDT, mkg/l	absence	0.37	0.28	<0.05	<0.05	<0.05	<0.05
HCH, mkg/l	absence	0.07	-	<0.01	0.01	0.00	0.00

Table 12M. Water quality of the Dniester River near Mereșeuca Village

Ingredient	MAC	End of 80s [4]	End of 90s [5]	IX2001	IV2002	IX2002	III2003
N-NH ₄ , mg/l	0.39	0.56	0.21	0.18	0.12	0.09	0.17
N-NO ₂ , mg/l	0.02	0.05	0.01	0.01	0.05	0.01	0.01
N-NO ₃ , mg/l	9.00	1.71	2.50	1.17	2.21	1.35	2.25
N mineral, mg/l	-	2.32	2.72	1.91	2.76	2.02	2.58
P-PO ₄ , mg/l	-	0.07	0.00	0.06	0.01	0.06	0.05
Cu, mkg/l	1.00	6.00	9.00	<3.00	<3.00	<3.00	<3.00
Zn, mkg/l	10.00	10.00	10.00	15.00	3.20	<3.00	<3.00
DDT, mkg/l	absence	0.34	-	<0.05	<0.05	<0.05	<0.05
HCH, mkg/l	absence	0.15	-	<0.01	<0.01	<0.01	<0.01

Table 5R. Water quality in the Lower Dniester

Ingredient	MAC	End of 80s [4]	End of 90s [5]	IX2001	IV2002	IX2002	III2003
N-NH ₄ , mg/l	0.39	0.83	0.36	<0.01	0.09	0.33	1.27
N-NO ₂ , mg/l	0.02	0.06	0.03	0.02	0.05	0.02	0.02
N-NO ₃ , mg/l	9.00	1.15	3.85	1.10	2.73	1.18	1.92
N mineral, mg/l	-	2.04	4.24	1.76	3.30	2.02	3.21
P-PO ₄ , mg/l	-	0.11	0.12	0.15	0.03	0.12	0.11
Cu, mkg/l	1.00	20.00	10.00	<3.00	<3.00	4.20	4.00
Zn, mkg/l	10.00	60.00	0.00	22.10	8.40	4.40	10.00