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IMPROVING WATER MANAGEMENT AND FLOOD RESPONSE

Romania Support to Enhance Privatization, Investment, and Competitiveness in the Water Sector (SEPIC) Final Report

JULY 2007

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Flood monitoring and transmission equipment was installed in the Arges River basin by USAID as part of the new national flood early warning and response system, known as WATMAN.

NOTE TO READERS

This final report comprises the text on the following pages and the CD in a sleeve attached to the inside back cover. The text summarizes the major activities and achievements of the Support to Enhance Privatization, Investment, and Competitiveness in the Water Sector (SEPIC) project in Romania. For a more in-depth look at the project's work to improve management of Romania's waters and water emergencies, the electronic text on the CD — which is identical to the printed version — links to project reports, presentations, and a CD photo gallery organized by major area of activity. A condensed summary of SEPIC activities and their principal results can be found in Chapter Four, page 31.

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In Romania, untreated wastewater is often discharged into rural channels. The SEPIC project helped several local governments develop sound, bankable water and wastewater projects.

CONTENTS

FRONT COVER: An official holds a warning sign during a flood emergency drill in the Arges River basin in central Romania. USAID helped Romania create a modern system for flood preparedness and response.

BACK COVER: Technicians of the Arges River Basin Directorate test for water depth in Rausor reservoir, in central Romania, during a USAID-sponsored flood emergency drill in 2006.

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TOP: Communist-era water towers are still spread throughout rural Romania. Water systems incorporating such towers are now largely obsolete and in disrepair, and are gradually being replaced by modern water systems.

CENTER: Participants in SEPIC's flood emergency drill in Rausor, in central Romania, distribute drinking water from a reservoir.

BOTTOM: This levee was overtopped during severe flooding in 2006. Romania is now better equipped to undertake long-term flood management planning and to mobilize investments.

OVERVIEW

"Water is the essential economic good, and its current mismanagement has an enormous adverse impact on the Romanian economy. Satisfying the needs of the public, industry, and agriculture, protecting water resources against depletion and pollution, and reducing the negative impact of flood emergencies requires the commitment and work of all stakeholders."

That language sets out USAID's rationale for designing and implementing the Support to Enhance Privatization, Investment, and Competitiveness in the Water Sector (SEPIC) project in Romania. The project ran from August 2003 to August 2007 and was funded at nearly $4.5 million.

Through SEPIC, USAID sought to improve management and enhance privatization, investment, and competitiveness in the water sector of the Romanian economy. SEPIC worked in three principal areas of water management.

EMS AND P2

By implementing and promoting environmental management systems (EMS) and pollution prevention (P2), SEPIC helped companies improve environmental performance and implement practical P2 measures to improve the quality of Romanian waters. The SEPIC team:

- Worked with manufacturing enterprises and water supply/wastewater treatment utilities in two pilot cities to design and install pollution monitoring systems, incorporate P2 measures, and establish environmental management systems to continually improve environmental performance.

- Worked with water/wastewater utilities and their upstream polluting enterprise customers

ROMANIA
Counties and Surrounding Countries

to establish P2 Action Groups that cooperated to reduce pollution in effluent sent for treatment.

- Provided training and gave presentations on EMS and P2 to members of the Romanian Water Association (ARA), members of the General Union of Romanian Industrial Associations (UGIR), and at many water-related conferences throughout Romania

- Developed guidance for trade association and government Web sites on the principles and practice of sound environmental management and pollution prevention.

FLOOD MANAGEMENT

SEPIC helped Romania create a modern national system for flood preparedness and response. The team worked with the Ministry for Environment and Water Management (MEWM), River Basin Directorates (RBDs), and local authorities to prepare for and respond to floods and pollution spills rapidly and effectively. The SEPIC team:

- Designed, pilot-tested, and prepared financing documentation for WATMAN — a national preparedness, early warning, alarm, and response system for floods and pollution spills — on behalf of the Romanian government.

- Developed a flood intervention plan (FIP) template to enable local authorities at the river basin level to access and assemble information for flood management via the Internet.

- Prepared Internet-based resources for local officials explaining their flood management responsibilities under Romanian legislation and how to access related resources.

- Provided ongoing flood management technical advisory services to MEWM.

- Supplied emergency flood response equipment to local areas and national agencies.

- Organized and supported three U.S. study tours on water and flood management for Romanian water officials.

WATER RESOURCE FINANCING AND MANAGEMENT

By rationalizing and obtaining financing for water resource management operations, SEPIC helped the Romanian National Waters Administration (ANAR), RBDs, and other national and local authorities improve water management, pricing, conservation, and economic benefits. The SEPIC team:

- Provided institutional development support to ANAR, especially to help it conform to European Union (EU) standards, with an eye to EU accession, which occurred on January 1, 2007.

- Developed a tool for ANAR to set water tariffs and pollution charges at levels that enabled the agency to achieve self-sufficiency while taking account of policy priorities.

- Conducted an assessment of ANAR's assets and activities and made recommendations on which could be assigned to other entities or privatized.

- Developed an approach for assuring quality water/wastewater services in rural areas and implemented the approach in an initial county, including financial documentation.

- Conducted a feasibility analysis and prepared documentation to support investments to mitigate erosion in parts of Romania's Black Sea coast.

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A simple boom blocks pollution from flowing further downstream into the Arges River. SEPIC worked with a wide variety of public and private water management entities, and promoted both simple and high-tech water management measures.

CHAPTER ONE

ENVIRONMENTAL MANAGEMENT SYSTEMS AND POLLUTION PREVENTION

IMPLEMENTING EMS AND P2

Starting early in the current decade, Romania experienced a series of environmental and economic shocks that included several polluting spills and major floods; the demands of EU accession, including the Water Framework Directive and "integrated pollution prevention and control"; a relentless upward shift toward market prices for water, energy, and other production inputs; global economic competition; and increasing market demand for conformance to voluntary standards such as ISO 14001, which provides a framework for sound environmental management.

As the decade progressed, the Romanian government and private sector began to acknowledge the link between operational efficiency and good environmental performance. The SEPIC project aimed to demonstrate the power of environmental management systems (EMS) and pollution prevention (P2) practices as key tools for improving environmental performance and operational efficiency, and thereby increasing competitiveness.

Drawing on extensive EMS and P2 experience, the SEPIC team worked with partner water/wastewater companies and industrial concerns, primarily in the cities of Braila and Pitesti, to identify P2 opportunities and implement P2 measures. Initially, the emphasis was on measures that would inexpensively and quickly produce significant reductions in water pollution and significant cost savings for enterprises. Examples of P2 measures are substituting nontoxic for toxic inputs, reducing waste at the source through improved processing, improving monitoring and control of

inputs, and improving water and energy efficiency. These actions result in preventing pollution rather than cleaning it up after it has been created, thereby improving environmental performance while reducing costs.

SEPIC demonstrated the linkages between reducing pollution and improving the bottom line. The team provided training and technical assistance to help enterprises establish environmental management systems. An EMS is a principal means for identifying and applying P2 measures to achieve steadily declining levels of effluent pollution while increasing cost savings. After a year of work, the five partner organizations had achieved impressive results, summarized in the table below.

For additional information, please see the PowerPoint presentation "EMS and P2 Success Stories" on the CD.

SEPIC packaged the results of its EMS and P2 work in Romania into conference presentations and training programs and adapted it for publication on several government and trade organization Web sites. Vast improvements in Romanian industrial environmental performance are evident in ANAR water and wastewater quality monitor-

RESULTS OF POLLUTION PREVENTION MEASURES BY SEPIC'S FIVE PARTNER ORGANIZATIONS

Combined Environmental Performance Improvements	Annual Cost Savings
Water use reduced by 309,000 m^3 per year	$296,000
Energy use reduced by 1,780 MW per year	$423,050
Effluent reduced by 682,000 m^3 per year	$215,800
Pollutant releases reduced each year (phosphorous, ammonia, organics, pH, suspended solids, others)	$297,300
Other benefits (reduced water monitoring costs, reduced pollution penalties)	$502,000
Totals and Averages	**Amount**
Total annual savings realized	$1,734,150
Total investment, including labor and other indirect costs	Approximately $125,000
Average payback period	Approximately 1 month
Average rate of return each year	Approximately 1,400%

ing data, and in an enormous increase in the demand for EMS and P2 consulting services.

In a letter to the project team, one EMS consulting company said, "We now have a great many requests for EMS proposals, and I wish we had twice the number of employees to be able to answer them all. We are living in exciting times business-wise, and I believe that will last for some years."

For more information and details on each partner enterprises, please see the "Final Report on EMS Implementation and Demonstration Activity" on the accompanying CD. The "Environmental Competitiveness" PowerPoint presentation on the CD also shows how EMS and P2 contribute to overall enterprise competitiveness.

BUILDING POLLUTION PREVENTION ACTION GROUPS

At the start of the project in 2003, SEPIC's two water/wastewater partner companies were regularly fined by ANAR for exceeding pollution limits in the treated wastewater they returned to Romanian rivers. With project assistance, these utilities improved their own performance considerably, but because they received polluted wastewater from their upstream clients, they were unable to prevent pollution at the source and could only treat it when it arrived downstream.

To address this problem, SEPIC provided technical assistance and training that helped these companies establish and support P2 Action Groups.

Through the P2 Action Groups, the water/wastewater companies identified and organized their upstream polluters, provided P2 training, and worked with them to identify and undertake P2 measures that would reduce effluent pollution and achieve cost savings.

As a result, cleaner wastewater began arriving at the treatment facilities, leading to lower treatment costs and a longer useful life for treatment equipment. Because the incoming water was cleaner, the outgoing water was cleaner, which helped eliminate the pollution fines these facilities had been paying.

After 18 months, at the conclusion of SEPIC's involvement, the two companies had organized 160 upstream polluters into eight P2 Action Groups by sector (for example, food processing, wood products, textile manufacturing). Huge reductions had been achieved in the quantities of nitrogen, phosphorous, cyanide, organic loading, suspended solids, ammonia, heavy metals, and other pollutants in the effluent sent for wastewater treatment.

Data were not available for cost savings by P2 Action Group member enterprises, but the two water/wastewater companies recorded combined savings of approximately $1 million annually.

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TOP: Laboratory technicians monitor drinking water quality at a treatment plant in Braila, in eastern Romania. USAID provided some of the equipment.

BOTTOM: Led by the project team and its wastewater treatment partners, industries such as the NOVOTEX textile plant in Pitesti joined P2 Action Groups to reduce the quantity of pollutants entering the wastewater system.

These companies will continue to realize similar savings every year due to lower treatment costs, lower repair and replacement costs, and elimination of pollution fines.

For more information on the results of P2 Action Group activities, see "Final Report on EMS Implementation and Demonstration Activity" on the CD.

DISSEMINATING KNOWLEDGE OF EMS AND P2 THROUGH TRAINING

To disseminate information relating better environmental performance to better economic performance more broadly, the SEPIC team conducted several special training activities that presented EMS and P2 in broader contexts.

Environmental competitiveness. A total of 154 industry association representatives from the textile, heavy metals, machine tools, metallurgy, water facilities, and chemical industries participated in three training programs at the headquarters of the General Union of Romanian Industrial Associations (UGIR) in Bucharest between November 2004 and April 2006. While training was adapted to the particular needs of each industry, all the programs centered around the concept of environmental com-

petitiveness, of which EMS, P2, and environmental monitoring are core elements.

P2 Action Groups. Special training for water/wastewater operators was conducted in cooperation with the Romanian Water Association (ARA) in Baile Felix, Bihor County, in 2005. In attendance were representatives of 25 water/wastewater operators and some of their service suppliers, all members of ARA. This training program dealt with EMS, P2, and environmental monitoring, but also featured P2 Action Groups, a particularly powerful tool for this audience in light of Romania's impending EU membership at the time.

The SEPIC team packaged elements of this training into shorter presentations that they delivered at a number of conferences throughout Romania.

PowerPoint training presentations, "Environmental Competitiveness" and "Introduction to EMS and ISO 14001," are on the accompanying CD, which also includes photographs related to SEPIC EMS and P2 activity under the photo gallery heading "EMS & P2."

DISSEMINATING KNOWLEDGE OF EMS AND P2 THROUGH THE INTERNET

With the aim of leaving behind assets that would continue to help Romania make the most of its EU membership long after the project ended, SEPIC's EMS and P2 experts invested heavily in developing EMS and P2 Web materials. These pages provide carefully organized and cross-referenced information on EMS, including the international ISO 14001 EMS standard and P2 for reducing pollution as a means of saving costs.

The Web materials reflect four years of USAID project experience in EMS and P2 under SEPIC and its predecessor project. Over this period, USAID and Chemonics worked with water/wastewater operators and a variety of industries in four Romanian counties, so there was a rich history of experience to draw from. These materials were developed to be incorporated into their Web sites by the Ministry for Environment and Water Management, ARA, and UGIR. The EMS and P2 Web materials can be found under "EMS Web Sites" on the CD.

SEPIC

In 2006, massive flooding struck eastern Romania. The city of Braila was severely impacted, and its port area (above) suffered extensive damage. Before it could be accepted into the EU, Romania had to demonstrate its resolve to improve flood management.

CHAPTER TWO

FLOOD MANAGEMENT

BUILDING A NATIONAL SYSTEM FOR FLOOD WARNING AND RESPONSE

Earlier USAID work had laid the basis for vastly improving Romania's hydro-meteorological forecasting, real-time surface water monitoring, and flood forecasting. The SEPIC project was tasked with designing a system that would expand the range of flood risks that could be forecast to include dam breaks and other accidents; to provide early warning to potentially affected communities through a sophisticated network of information and communications technology (ICT) and alarms; to establish rapid response capabilities to minimize pollution, damage, and human misery; and to improve allocation and control of surface water overall. This system was given the name WATMAN, for water management.

A SEPIC team of U.S.-based and Romanian experts spent two years designing, pilot testing, and refining the various WATMAN system components. The exercise included training managers and operators in a pilot river basin. The team calculated the cost for establishing WATMAN in Romania's 11 river basins to be about $180 million. SEPIC developed the overall technical specifications for national implementation of WATMAN and then, at the request of the Romanian government, developed detailed equipment specifications and assisted with financing documentation.

The government structured the WATMAN investment into six implementation components:

- A monitoring system for dams and other water management infrastructure

- A warning and alarm system for flood-prone areas
- A rapid response system for floods and polluting spills, including 36 rapid response centers (RRCs) nationwide
- A modernized hydro-meteorological and water management communication system
- A decision support system comprising a package of models for flood management and for water resource allocation in drought periods based on data from meteorological, hydrological, and water management databases
- Integration of meteorological, hydrological, and water management systems using very high-powered computers

Implementation of the first WATMAN component, financed

HYDROLOGICAL RIVER BASINS OF ROMANIA

The USAID/SEPIC project selected Siret and Arges-Vedea (areas in dark blue) as pilot river basins. Bacau, Braila, Pitesti, and Ploiesti (names in gray) were the pilot localities.

directly by the Romanian government at a cost of about $60 million, was well under way at the conclusion of the SEPIC project. Because of WATMAN, infrastructure and economic damage, loss of life and livelihoods, and human suffering caused by floods and spills will be greatly reduced. As additional benefits, there will be better overall surface water management and time-series data on flooding, flood impact, and flood response that will provide a basis for flood mitigation and improved emergency preparedness into the distant future.

The "Overview of WATMAN" PowerPoint presentation and the print document entitled "The WATMAN Flood Management Project for Romania" on the CD provide an overview and details of the WATMAN system. The CD offers more photographs related to SEPIC flood management activities under the photo gallery heading "Flooding and Flood Response."

DEVELOPING A FLOOD INTERVENTION PLAN TEMPLATE

Following catastrophic floods in 2005, the Ministry for Environment and Water Management concluded that every River Basin Directorate (RBD) needed to develop and maintain a flood intervention plan (FIP) to deal quickly and effectively with future flood emergencies at the river basin level. USAID, through the SEPIC project, undertook to design a model FIP that each of the 11 RBDs could adapt to its own unique circumstances and requirements.

Project experts first undertook a survey of FIP activities for integrated flood management in large river basins in the European Union and the United States. Survey findings led to a set of recommendations regarding the array of critical flood intervention planning activities needed and their associated data requirements and responsible institutions. On the basis of the survey, the team also assembled an inventory of methodologies for mapping natural and man-made flood risks, then evaluated these methodologies for their usefulness and practicality in light of general circumstances in Romania.

Next, SEPIC documented and evaluated flood intervention capabilities at the local, county, and river basin levels, using the Arges basin as a pilot. Adapting their initial recommendations to these realities, the team devised a preliminary FIP template with fixed and adaptable components, data requirements for key variables, required linkages with various databases maintained by national agencies, and procedures for continual updating. The preliminary FIP template was presented for review and comment at a conference of flood management and emergency response experts from across Romania in late 2006. Based on feedback from experts at the conference and from stakeholder meetings in the Arges river basin, the team refined the FIP template model and posted it on the ANAR and MEWM Web sites for public comment early in 2007.

The first half of 2007 was spent testing and refining the FIP template based on fresh comment. The pilot experience in the Arges basin, which included posting the preliminary model on the Internet, made it clear that the template should be Web-based for ease and immediacy of access, and to facilitate universal upgrading and updating.

As of this writing, the FIP template was posted on the ANAR intranet and was accessible to ANAR, MEWM, the 11 RBDs, and 41 county institutions for testing and for filling in additional data. In 2008, links are to be added to topographical, cadastral, meteorological, and hydrological databases, with the expectation that the template will be ready for use in the 2008 flood season.

More detail on the FIP template developed by SEPIC experts can be found in "Developing a Flood Intervention Plan (FIP) Template for Romania's River Basins" on the CD.

PREPARING FLOOD MANAGEMENT MANUALS FOR LOCAL AUTHORITIES

In the wake of massive floods in 2005, Romania adopted a plethora of laws and regulations dealing with flood preparedness and management that spelled out responsibilities at several levels of public administration. The problem was that the typical prefect (county governor) or mayor was generally unaware of and unable to research the applicable laws and regulations, or for that matter, unable to access the flood response resources available under the law for his or her level of administration.

In late 2005, USAID/SEPIC and MEWM agreed on a plan to address this problem on an emergency basis. Project specialists launched a program of intensive legal research to identify, catalog, and summarize all relevant Romanian laws and regulations, and then present the salient points in compendia structured for easy reference by target user groups. This effort led to two flood preparedness and response manuals, one for prefects and one for mayors.

The manuals, in both print and electronic formats, lay out succinctly and in easy reference format the actions that must be undertaken by local county and town officials for flood preparedness, flood management, and remediation following floods. The guidance includes staffing requirements and lists of equipment that need to be in place at each level. Both manuals were adopted as official documents by the government, were published in the Official Gazette, and are now used in government-sponsored training programs for local officials.

These manuals were put to their first test during the extensive flooding in southern and eastern Romania in 2006. In TV interviews, local officials in areas affected by the floods publicly affirmed the usefulness of the manuals in their flood preparation and management efforts.

SEPIC

A major square in Braila, in eastern Romania, is flooded by the Danube River in early 2006. The widespread loss of life and property resulting from the floods were among the factors prompting the Romanian government to accelerate implementation of national flood management projects, undertaken with assistance from SEPIC.

PROVIDING EXPERT SUPPORT TO MEWM FOR FLOOD MANAGEMENT

In 2006, following repeated severe flooding that resulted in loss of life and property, MEWM asked USAID/SEPIC to provide flood-related expert capacity on a continuing basis. In response, USAID authorized SEPIC to assign one staff member to provide flood protection, monitoring, reporting, and management support to MEWM on request.

The expert, supported by a Romanian consultant and other SEPIC staff, also helped MEWM and other government units develop and implement a variety of national flood management projects and represented Romania at international conferences dealing with flood-related issues.

In addition to providing day-to-day advisory services and organizing and participating in workshops and conferences for MEWM, the SEPIC expert:

- Developed terms of reference for consultants to prepare documentation for funding flood protection investments at the river basin level.
- Developed technical specifications for tendering the WATMAN Phase 1 and 2 investments, taking into account a new list of equipment identified as priority for flood interventions based on experience with the 2005 and 2006 floods.
- Worked with MEWM to implement a water monitoring and flood forecasting initiative that preceded WATMAN, and to develop a strategic approach and technical specifications to ensure its integration into WATMAN.
- Helped verify and implement the "Hidrolog" software appli-

cation for automatic hydrological data processing as the base for a platform for hydrological forecasting.

- Led MEWM's installation of special software for water management data collection and processing in real time to support flood management and intervention decision-making.

- Prepared materials for MEWM to assist EU Flood Directive implementation.

- Participated in a meeting of MEWM and U.S. Army Corps of Engineers (USACE) experts and, on behalf of MEWM, reviewed the language of a proposed Memorandum of Understanding covering technical cooperation in water resource management, river engineering, wetlands management and restoration, flood control, coastal zone management, and disaster preparedness between USACE and MEWM.

Through this activity, SEPIC was able to lend critical technical support to MEWM at a pivotal time, just before and after Romania's acceptance into the European Union. During this period, it was essential for Romania to demonstrate its resolve and ability modernize its flood early detection, warning, and response capabilities, as well as its capacity to undertake long-term strategic flood management planning and related investments. With USAID/SEPIC's help, Romania successfully met this challenge.

Readers will find more information about the expert support SEPIC provided to MEWM in the "MEWM Advisory Services Summary Report" on the CD.

SUPPLYING EMERGENCY FLOOD RESPONSE EQUIPMENT

The flooding in 2005 most seriously affected four counties in western and southwestern Romania; in fact, these counties were declared disaster areas by the U.S. Embassy. The SEPIC team collaborated with USAID to adjust its program so that $150,000 could be made available for flood emergency rapid response in these counties.

However, making the money available was only part of the challenge. The SEPIC team worked closely with ANAR and the Banat RBD, designated by ANAR as the recipient of the emergency equipment, to identify exact needs and prioritize them to match available funding. Chemonics experts procured and shipped the equipment in accordance with USAID regulations. The team inspected the equipment upon arrival, organized its transport to final destinations, arranged for user training, and drafted and executed legal paperwork conveying title and releasing USAID from further responsibility or liability.

Emergency equipment procured included a backhoe/front-loader, self-propelled inflatable boats, inflatable booms, a portable drinking water treatment plant, drinking water purification kits, free-standing motorized

pumps, electric energy generators with high-powered lamps, and personal protection equipment. All the equipment was procured, delivered, and put to use in three months or less. Although purchased for emergency response, the equipment has been absorbed into the RRCs for future use in the Banat River Basin. As of this writing, USAID and the SEPIC team were working to provide additional equipment worth $40,000 for use by flood emergency responders.

The CD offers more photos related to this topic under the photo gallery heading "Flooding and Flood Response."

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TOP: In response to the 2005 flooding in western Romania, SEPIC worked with USAID to secure extra funding for procurement and distribution of emergency equipment.

BOTTOM: A breach in the Tatina levee on the Danube River is repaired following the 2006 floods.

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CONDUCTING U.S. STUDY TOURS ON WATER AND FLOOD MANAGEMENT

Three times in the course of SEPIC's four years, the field and home-office project teams collaborated with USAID to organize and conduct U.S. study tours for Romanian officials from MEWM, ANAR, and related organizations. The study tours focused on water and flood management in the United States from both an institutional and technological perspective. The first and second study tours, in December 2005 and March 2006, were conducted jointly with USAID's EcoLinks program. The third, in November 2006, was conducted jointly with the U.S. Department of Agriculture (USDA), which sponsored delegates from Romania's Ministry of Agriculture and Rural Development. USACE helped a great deal with all three study tours by arranging and hosting many of the site visits.

The third event was only one week long, but in many ways it best illustrates the nature of the study tours. The purpose of this study tour was to share U.S. approaches and experience with Romanian officials in six areas of critical and immediate concern, including:

- Developing flood control infrastructure

SEPIC

On a study tour of U.S. water management facilities, Romanian environmental officials visited Vicksburg, Mississippi, and were briefed on USDA water management structures in the Mississippi River watershed.

- Protecting water resources through clean agricultural practices
- Carefully managing water resources
- Restoring wetlands
- Forecasting severe weather and providing early flood warning
- Modeling of watercourses

Participants in the study tour included the minister of environment and water management; the director of the ministry's International Relations Division; the deputy director general of ANAR; the deputy commissar of the National Environmental Guard; and the president of the Environmental Fund Authority. The delegation was accompanied by representatives of USAID, SEPIC, and Chemonics.

During the first two days the delegation visited a number of agencies in the Washington, D.C., area, including USDA's National Resource Conservation Service and Joint Agricultural Weather Facility; USACE's Civil Works Department; the National Weather Service of the National Oceanographic and Atmospheric Administration; and the U.S. Environmental Protection Agency.

During these visits, the delegation studied easements as a tool for environmental and water resource management on private lands; USACE's civil works programs in flood management, disaster response, coastal management, wetlands restoration, and river basin management; climate prediction and hydro-meteorological prediction technologies and methodologies; and a variety of related topics.

On the third day, the delegation traveled to Vicksburg, Mississippi, where they visited USACE's Engineer Research and Development Center (ERDC) and were briefed on watershed modeling; integrating models for water and watershed management; and practices and approaches for controlling sedimentation and erosion, managing agricultural runoff, managing watersheds, and protecting stream banks. The delegation toured ERDC's research facilities and were briefed on USDA water management structures in the Mississippi watershed.

On the last day of the study tour, the group visited the Coastal Louisiana Ecosystem Assessment and Restoration (CLEAR) facility at Louisiana State University. CLEAR conducts scientific research in support of Louisiana's coastal area restoration program, similar to the way the planned Danube Delta International Research Center (DDIRC) is intended to support Danube Delta restoration and conservation needs. The visit yielded important lessons for establishing the DDIRC.

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Rausor Dam is one of many earthen dams that are a source of concern in Romania. If such dams are not carefully, constantly, and thoroughly monitored and maintained, they can pose a serious flood risk. The SEPIC flood response drill in 2006 took into account a possible breech of the dam.

CHAPTER THREE

WATER RESOURCE FINANCING AND MANAGEMENT

SUPPORTING ANAR'S INSTITUTIONAL REFORM

ANAR is the national water management authority, and as such implements national water management policy and strategy on behalf of the Romanian government. The requirements of EU accession, especially those connected with implementing the EU Water Framework Directive, have forced a major change to the scope of ANAR's functions, requiring a commensurate change in ANAR's structure, operations, and financing.

Previously, ANAR was responsible for nearly all aspects of water management nationwide, including many functions that in other European countries are typically in the hands of lower levels of government or the private sector. These functions included financing, building, and operating water infrastructure such as dams, reservoirs, canals, pumping stations, water and wastewater treatment facilities, and the like; hydrological and hydro-geological monitoring; flood management and emergency response; river basin management; and so on. Now, ANAR had to shed many of these functions — transferring them to local government, other entities, and the private sector — and become more of a manager of national water interests and policy, and less of an implementer and day-to-day operator of water facilities. SEPIC was asked to help ANAR determine what this would mean for its size, structure, method of financing, and other institutional characteristics.

SEPIC began with exploratory meetings and data collection at ANAR headquarters in Bucharest and met with top management of RBDs in Bacau, Pitesti, and Buzau. The team carefully studied

the personnel and revenue structure of ANAR and performed a gap analysis comparing its current responsibilities with its responsibilities according to the EU Water Framework Directive. The team conducted research on the structure and operations of similar water management institutions in France, Hungary, and the Czech Republic, representing a cross-section of EU countries.

An analysis of all the information at hand led the team to conclude that ANAR needed to change its structure to become primarily a regulatory and oversight agency, with direct implementation and management responsibility only in selected areas of national interest. The principal means for accomplishing this change were to:

- Outsource many activities in order to cut direct costs.
- Externalize non-core activities and assets.
- Improve the tariff-setting procedure to bring revenues into better alignment with costs.

The team followed up by conducting studies on water pricing and externalization for ANAR. The findings of the SEPIC expert team are set out in the report entitled "ANAR in Transition: Charting a Path to Sustainability" on the accompanying CD.

HELPING RATIONALIZE PRICES FOR WATER AND POLLUTION

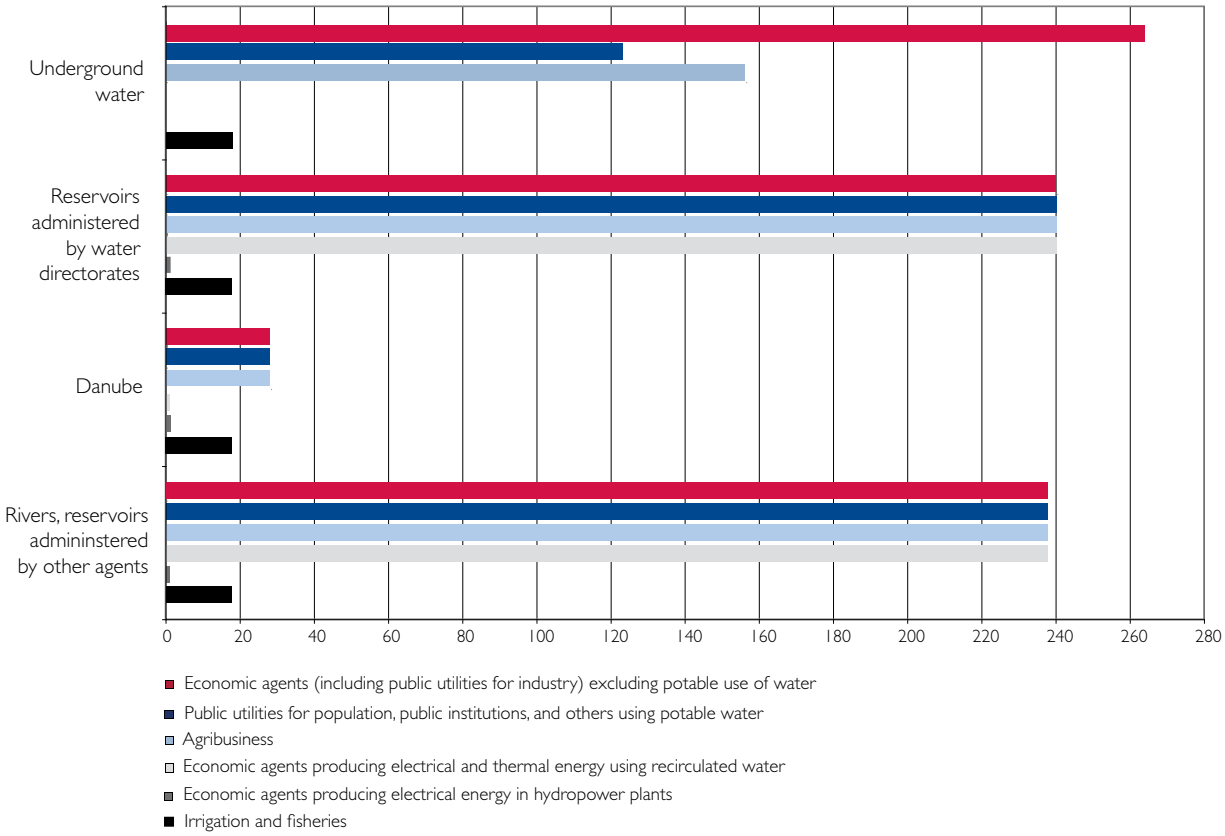
ANAR had been financed from revenues it generated from water sales and pollution charges, and also from the national budget. Because of insufficient funding, ANAR had an ever-increasing backlog of repair and maintenance work on dams and other water management infrastructure. Moreover, impending EU accession demanded additional expenditures to upgrade a variety of water management procedures and facilities to conform to European standards. For the first time, a new law allowed ANAR to set water tariffs, pollution charges, and penalties (for violating standards) to achieve sustainability instead of continuing the old system of tying its fee schedule to the consumer price index. ANAR asked the SEPIC project for help in determining how to set new prices.

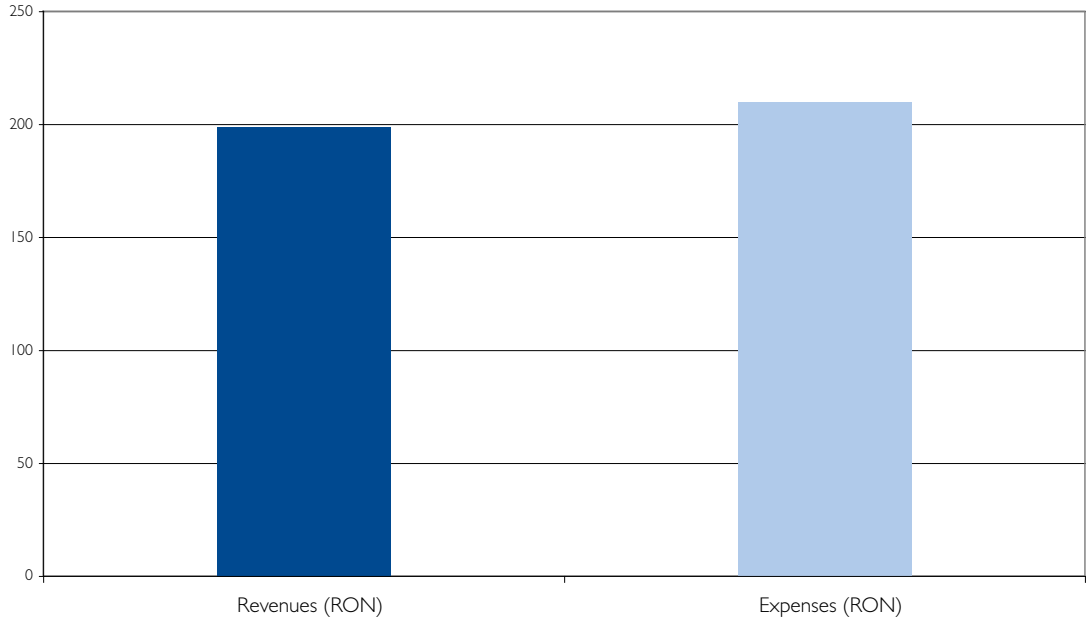
First, the team analyzed revenues, costs, arrears, and other financial data for two River Basin Directorates. This yielded data indicative of circumstances nationwide. Next, a review of EU and U.S. water and pollution pricing policies was used to develop a computerized financial model tailored to ANAR's unique circumstances.

It was clear that water tariffs, pollution charges, and penalties might vary from river basin to river basin, would need to be changed in response to changing requirements and circumstances, and would have to be set differently for different policy objectives. With this in mind, the team developed a financial model as a strategic decision-making tool. It allowed ANAR to enter values for different variables, such as direct and indirect costs

WATER SUPPLY TARIFFS MODEL

These charts are samples of the computerized model developed by the SEPIC team as a tool to analyze water supply tariff data. When the length of any horizontal bar (tariffs RON/m³)[1] is changed to reflect a different price for the variable, the vertical bars change accordingly to show the resulting overall revenue/expense relationship in ANAR finances.





1. In 2005, the RON (leu) replaced the ROL as the official currency of Romania. 1 RON = 10,000 ROL; 2.5 RON = US $1.

of producing clean water or the target quality of water, and then calculate the tariffs, charges, and penalties that would be consistent with different policy objectives.

The technical report SEPIC produced illustrated the use of the tool in four policy areas:

- Different degrees of cost recovery
- Different levels of asset externalization
- Different amounts of reduction in payment arrears to ANAR
- Different incentive levels for pollution reduction

ANAR used the financial model to develop and negotiate new water tariffs, pollution charges, and penalties that were incorporated into national law. This work by SEPIC experts helped ANAR move toward financial self-sufficiency while improving emergency preparedness, reducing water consumption, lessening water pollution, and enhancing water quality.

Readers will find more detail on the financial model developed by SEPIC experts in the report entitled "Toward Setting Water- and Wastewater-Related Contributions and Penalties in Romania" on the accompanying CD. "Contributions" is the Romanian regulatory term for water tariffs and pollution charges. "Penalties" are applied in the event water users draw off amounts that exceed allocated volumes or discharge contaminants in excess of pollution limits.

PROVIDING GUIDANCE FOR EXTERNALIZATION

ANAR has been gradually externalizing its non-core assets and activities in an effort to reshape itself from an organization with broad responsibilities, a legacy of the communist era, into a specialized water management institution. In 2005, ANAR reached the point where further externalization required careful analysis and planning to ensure that it retains essential technical skills and achieves financial self-sufficiency. USAID asked SEPIC to assist ANAR in this process.

The team began by collecting and processing data on the externalization activities of ANAR's 11 RBDs and on their plans for future externalization. Simultaneously, the team began a wide-ranging survey of the Romanian legal framework to catalogue all relevant requirements and limitations regarding the shedding of assets and activities by public institutions, particularly in the water sector. A third element was a study of similar experiences in other sectors in Romania, and in the water sector worldwide. The analysis led to a report, "Externalizing ANAR's Non-Core Activities and Assets," which provided ANAR with critical information and guidance and continues to serve ANAR as a basic reference and tool for further externalization planning.

The report summarizes an array of externalization options and contract vehicles as practiced

SEPIC

Mamaia beach on the Black Sea coast is a prime tourist destination and an example of ANAR's externalization efforts. Umbrellas and beach chairs, formerly rented out directly by ANAR, now are rented out by concessionaires, who pay a fee to ANAR.

worldwide that are consistent with Romanian law. Options range from management contracts to outright sale of assets. The report details the steps of an externalization process and provides a decision tree ANAR can use to determine the course it should take with respect to externalizing any particular asset or activity, depending on the objectives of the deal. It offers guidance on transitioning assets and activities to a new entity created from a former ANAR department, when that course is appropriate, ensuring the sustainability of the new entity and facilitating its cooperation with ANAR. It provides ANAR with practical recommendations for handling the major consequences of externalization and streamlining, such as an altered operating framework and a smaller but more highly trained staff. Finally, through a case example, the report illustrates how its information and recommendations can be used for practical externalization purposes.

The results of this USAID/SEPIC effort will serve ANAR for many years to come as Romania continues its progress toward a European-style administration. For example, ANAR and its parent ministry used the report to develop a legal framework for operating beach services on the Black Sea shore on a concession basis.

Readers will find more information on the different approaches to externalization, and the advantages and disadvantages of each, in "Externalizing ANAR's Non-Core Activities and Assets" on the CD. The CD also offers more photographs related to SEPIC water management activity under the photo gallery heading "Water Management."

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A water supply pipe in a Bihor village is fed directly from a nearby stream. This system is representative of many areas of rural Romania, where access to potable water has been limited. The SEPIC project worked to upgrade water and wastewater services by "microregion"— a cluster of settlements around a rural town.

ENSURING QUALITY WATER AND WASTEWATER SERVICES IN RURAL AREAS

The Romanian government is struggling to improve the quality of life and the environment by extending access to potable water and suitable wastewater treatment in rural as well as urban areas. Various sources of funding are available to assist with this, especially EU "cohesion funds" for improving Romania's infrastructure, and Romanian government funds. However, Romania has had problems absorbing financing in rural areas, primarily due to the lack of local government capability to develop bankable projects. MEWM asked USAID/SEPIC to help address this problem.

Project experts developed an approach that called for addressing rural water and wastewater needs on a "microregion" basis. A microregion is a cluster of small settlements ("communes") surrounding a rural town.

SEPIC first collected and analyzed data in a pilot county, Bihor, on water and wastewater needs, existing facilities, economic opportunities, population growth expectations, and related circumstances for each settlement and the central urban area in each microregion. The team analyzed the most efficient and effective way to address those needs, whether with centralized water and wastewater systems, dispersed smaller scale facilities, or a combination of centralized and decentralized facilities. Ultimately, in collaboration with local officials and citizen groups, the team developed a single financing strategy that the local population could support in each case, conducted feasibility studies, and prepared the required financing documents.

By the end of the project, SEPIC had completed the process of applying the financing strategy for six microregions in Bihor county. Implementation of investments in the six rural towns began in the first half of 2007; implementation of investments in the communes is planned for the second half of 2007.

The total value of the initial Bihor county rural water and wastewater investments is about 105 million euros. All the investments are included in the National Development Plan developed by the Romanian government and support the fulfillment of commitments made by Romania during EU accession negotiations. Through this technical assistance, USAID/SEPIC helped:

- Improve the health of the population, particularly children, by reducing exposure to infectious diseases and harmful chemicals in surface water.
- Improve living standards by improving access to clean tap water.
- Enhance regional development by providing needed infrastructure to encourage investors.
- Improve the quality of surface water by reducing uncontrolled discharge of wastewater.
- Avoid international disputes with Hungary, which borders Bihor county, related to cross-boundary pollution.
- Fulfill Romania's commitments undertaken as part of EU accession negotiations.

The CD offers more photographs related to SEPIC rural water management activity under the photo gallery heading "Water Management."

SUPPORTING INVESTMENT TO MITIGATE BLACK SEA COASTAL EROSION

More than 50 percent of Romania's Black Sea coast is affected by serious erosion. Two of the worst affected areas are southern Mamaia and North Eforie. Both towns are heavily dependent on tourism, together accounting for around one-sixth of Romania's tourist lodging capacity.

Tourism, besides representing around 5 percent of Romania's GDP, contributes significantly to local and national public revenues. Alarmed at the rate of erosion of its Black Sea beaches and the possible consequences, the Romanian government asked USAID/SEPIC to participate in a study with other partners.

The Japan International Cooperation Agency (JICA) would study the causes of erosion, forecast future physical effects, determine technical solutions for restoring Black Sea beaches and keeping erosion under control, and assess the cost of implementing and maintaining erosion mitigation infrastructure; MEWM would undertake environmental impact and strategic assessments for implementing erosion prevention works

recommended by JICA; and SEPIC, working with tourism data developed by Romania's National Institute for Tourism Research and Development, would perform an analysis to demonstrate the need for reversing the erosion from a socioeconomic perspective and also prepare an application for funds from the EU to secure financing of erosion mitigation works recommended by JICA.

The SEPIC socioeconomic study found that if the present course of coastal erosion is allowed to continue, Mamaia will lose approximately 0.79 hectares of beach each year. Beginning in 2015, the beach will have eroded so much that there will be hotel rooms for more people than can be allowed on the beach, according to national regulations. Hotels and other buildings in southern Mamaia will be in danger of collapse due to loss of stability, hotels will suffer massive business losses, and local budgets will suffer.

In North Eforie, all beach surface will disappear by 2025 and the seafront area will slide into the sea, effectively terminating tour-

JICA

JICA

SEPIC studies indicate that if erosion continues at its current pace, Mamaia's hotel room capacity will exceed beach capacity by 2015. These schematics show the Mamaia shoreline at present (left) and how it is projected to look after erosion mitigation investments are undertaken (below).

ism, the main source of revenue for the town, with massive losses of private property and elimination of any further incentive for private investment.

Put slightly differently, SEPIC experts determined that Mamaia will probably disappear as a tourism destination and the town of Eforie, with 10,000 inhabitants, may physically disappear in the next 25 years, with disastrous socioeconomic and fiscal consequences and a need for the government to pay enormous poverty mitigation subsidies, particularly in Eforie. Restoring the beaches and mitigating erosion will make Mamaia and North Eforie viable for the long run as prospering tourism destinations with healthy socioeconomic and fiscal consequences.

The report "If Erosion Continues on the Black Sea Coast: The Case of Mamaia,"on the CD, provides more information on the socioeconomic impact of coastal erosion and the benefits of mitigation. The CD also offers more photographs related to SEPIC's coastal erosion analysis activity under the photo gallery heading "Coastal Erosion."

JICA

JICA

All beach surface on the North Eforie coast will disappear by 2025 unless erosion is mitigated sharply. These schematics of the North Eforie coast show how the shoreline (left) could be widened by proposed erosion mitigation measures (below).

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Participants practice spill intervention techniques during a drill held at Rausor Reservoir in October 2006. The drill was one of SEPIC's activities designed to help create a modern system for flood and pollution spill preparedness and response.

CHAPTER FOUR

CONCLUSIONS

The SEPIC project aimed to improve management and enhance privatization, investment, and competitiveness in the water sector of the Romanian economy by engaging in a variety of tasks, clustered into three broad areas of activity:

Activity Area 1: Implementing and promoting environmental management systems (EMS) and pollution prevention (P2) among Romanian factories and water/wastewater utilities, including:

- Working with partner enterprises to help them plan and implement EMS and P2 measures.
- Helping water/wastewater utilities and their upstream commercial polluters to establish P2 Action Groups.
- Providing training and presentations on EMS and P2 to different audiences.
- Developing Web materials to promote EMS and P2.

Activity Area 2: Helping to create a modern national system for flood management and pollution spill preparedness and response, including:

- Designing, pilot-testing, and preparing financing documentation for a national preparedness, early warning, alarm, and response system.
- Developing and disseminating a flood intervention plan (FIP) template for use by local authorities for flood management.
- Preparing flood management manuals for prefecture and municipal officials.
- Providing flood management expert advisory services to the Ministry of Environment and Water Management (MEWM).

- Supplying emergency flood response equipment to selected local areas.

- Organizing and supporting three U.S. study tours on water and flood management. for Romanian water officials.

Activity Area 3: Rationalizing and obtaining financing for water resource management operations, including:

- Providing institutional development support to the Romanian National Waters Administration (ANAR), especially to help it conform to EU standards.

- Developing a tool for ANAR to set water tariffs, pollution charges, and penalties at levels that enabled it to become self-sufficient while taking account of policy priorities.

- Conducting an assessment of ANAR assets and activities that could and should be externalized.

- Developing an approach for assuring quality water/wastewater services in rural areas and implementing the approach in an initial county, including preparing financing documentation.

- Supporting investment to mitigate Black Sea coastal erosion.

ACHIEVEMENTS

In response to emerging and emergency needs, SEPIC took on tasks not in the original scope of work. As a result, the project achieved far more than was originally anticipated. For example, developing EMS and P2 guidance for the Web, preparing an FIP template, providing ongoing expert advisory services to MEWM, preparing flood management manuals for local authorities, developing a tool for ANAR to help determine appropriate water tariffs and pollution charges, developing a model and financing documentation for rural water and wastewater facilities, preparing Black Sea coastal erosion mitigation financing documentation, conducting U.S. study tours, and other activities were not anticipated under the SEPIC contract. *Thanks to the flexibility of USAID and the responsiveness and dedication of the SEPIC team, the project contributed much more to improving water management and promoting investment in the water sector in Romania than was originally expected.*

The dedication, creativity, and just plain hard work of SEPIC staff, consultants, and subcontractors resulted in impressive achievements and direct benefits for Romania. Ultimately no less important, the development, demonstration, and dissemination of methodologies, tools, systems, and procedures associated with the direct benefits will have enduring indirect benefits for the Romanian people for generations to come. *Beyond improving present circumstances, the focus on institutionalizing methods and systems to serve the future showed that with a relatively small investment of project funds, USAID created a lasting legacy of benefits.*

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SEPIC project activities included supporting investment in measures to mitigate erosion along the Black Sea coast. Investment will be particularly important in North Eforie, a popular tourist destination and one of Romania's most threatened coastal areas.

The collaboration and close working relationships among many Romanian partners on the SEPIC project produced enormous synergies and cross-fertilization. P2 experts learned about EMS, energy rate experts learned about and applied their skills to water tariffs, finance experts learned about the intricacies of financial planning for water and wastewater facilities, computer systems specialists brought their knowledge to the dynamics of flooding, and civil engineers learned about dealing with coastal erosion, among other examples. *Relying on a broad base of Romanian staff and consultants for implementation multiplied the benefits of SEPIC by significantly expanding the base of experience and expertise residing in the country.*

Water is a key element of the enabling environment for economic growth. At the core of the SEPIC project was the aim of rationalizing and stabilizing the water sector. By helping to greatly improve the management of water resources and laying the groundwork for a surge in water sector investment, SEPIC went a long way toward enabling Romania to finance further improvements on its own. *By focusing successfully on improving water management — with respect to flooding, spills, pollution, pricing, infrastructure, distribution, conservation, and treatment — USAID/SEPIC helped improve health, sanitation, and property protection for Romania's citizens and also helped ensure sustainability of one of the essential elements of long-term economic growth.*

PERFORMANCE INDICATORS

This table details the project's performance indicators as laid out in the SEPIC contract and the corresponding project achievements. The team is very proud of SEPIC's accomplishments, only some of which are reflected by the contract-based performance indicators.

NO.	ACTIVITY AREAS AND RELATED INDICATORS	ACHIEVEMENTS
ACTIVITY AREA 1: EMS & P2		
1	Pilot enterprises document substantial cost savings as a consequence of P2 actions undertaken.	All pilot organizations reported substantial cost savings as a consequence of P2 actions undertaken, amounting to a total of $1,700,000 each year.
2	Pilot enterprises document significant reduction in polluting effluents as a consequence of P2 actions undertaken.	Due to P2 actions undertaken, the following indicative pollution reduction was achieved: • Wastewater flows reduced by 435,000 m3/year • pH reduced from 13 to 10.5 at Novatex • BOD reduced by 60% at Alprom • pH adjusted to within the allowed limits of 6.5-8.5
3	Pilot enterprises document improvements in (i) spill prevention and (ii) emergency preparedness and response capabilities.	• All partner organizations revised and completed their emergency preparedness and response plans to comply with the latest Romanian regulations. • Due to low-cost P2 measures undertaken, all partner enterprises documented improvements in onsite spill prevention.
4	Pilot enterprises document improved regulatory compliance.	• All partner organizations updated their environmental legal databases. • Regulatory compliance of partner organizations improved for indicators like effluent pH and organic compounds.
5	P2 Action Groups document significant reductions in polluting effluent as a consequence of P2 actions undertaken.	Due to P2 actions undertaken, the following indicative pollution reduction was achieved: • Wastewater flows reduced by 420,000 m^3/year • Phosphorous and nitrogen loads in wastewaters reduced by 60%
6	P2 Action Groups are permanent in pilot sites and have expanded beyond the initial enterprises.	P2 Action Groups are permanent in pilot sites and expanded from three initial enterprises in each site to more than 10. By late 2005, P2 Action Groups included 150 enterprises in Pitesti and 25 enterprises in Braila.
ACTIVITY AREA 2: Flood Management		
1	Romanian government prepares decision for WATMAN investment.	Government approved the entire WATMAN investment, valued at $180 million, and the related technical and financial indicators.

2	Romanian government secures financing for $80 million investment.	Government allocated $80 million from special funds for flood management.
3	Romanian government takes decision to implement Rapid Response Centers (RRCs).	• Implementation began in 2007 with procurement of RRC equipment. • In the second half of 2007, detailed RRC building design and installation of dam safety sensors was to be contracted.
4	ANAR River Basin Directorates (RBDs) prepare emergency response communication plans.	• Assessment of the existing alarm systems and means of communication was carried out as part of the feasibility study, and recommendations for the needed equipment were provided. • Subsequently, emergency response communication plans were being incorporated into WATMAN implementation.
5	Water management procedures developed for the pilot river basin.	• Procedures were designed, equipment and software installed, and operators trained. • Procedures were adopted and are in use by the Arges RBD.
6	ANAR RBDs develop specific spill prevention and containment procedures.	Building on pilot guidelines prepared as part of the feasibility study work, a spill prevention and containment manual was prepared for the use of ANAR's RBDs.
ACTIVITY AREA 3: Water Resource Financing and Management		
1	MEWM approves ANAR structure for EU accession.	ANAR was set up as public institution through Urgent Government Ordinance 73/2005, approved by Law 400/2005.
2	Business plans developed by pilot RBDs.	• SEPIC provided tools and guidance on business plan development in the report "Toward Setting Water- and Wastewater- Related Contributions and Penalties in Romania" in the form of a financial model and scenarios. • RBD staff were trained at ANAR headquarters on using the financial model.
3	New methodologies for price determination applied in pilot river basins.	Pricing policies formulated in the report cited above were included in Urgent Government Ordinance 73/2005, setting up ANAR.
4	New effluent pollution charges tested and approved at the pilot level by ANAR.	Pricing policies formulated in the report cited above were included in Urgent Government Ordinance 73/2005, setting up ANAR.
5	At least three projects developed and financed by the Water Fund.	Law 310/2004, modifying the Water Law, cancels the Water Fund. Funds previously funneled into the Water Fund now constitute regular ANAR revenue.
6	ANAR externalization processes completed.	• An externalization report with recommendations was prepared by SEPIC and accepted by ANAR. Partially on the basis of that report, the government developed and adopted procedures for contracting out beach tourism concessions on the Black Sea. • Owing to the distractions of massive floods in 2005 and 2006, political turmoil, and a change of ANAR leadership, the externalization process has slowed.

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During a flood preparedness exercise in 2006, a member of the Arges RBD flood response team pinpoints on a risk map the area of reported major flooding along the Arges River.

ACKNOWLEDGMENTS

PRINCIPAL IMPLEMENTERS

Chemonics International Inc. implemented the SEPIC project on behalf of USAID/Romania. Chemonics received major assistance from its subcontractor, the International Resources Group (IRG), and IRG's principal for SEPIC, Glen Anderson, and IRG consultants Phil Brown and Daene McKinney. A second U.S. subcontractor, Crimson Capital, and its consultant Dillon Coleman helped with institutional analysis work.

USAID Cognizant Technical Officer (CTO) Gianina Moncea managed the project, working very closely with SEPIC staff and contributing considerable expertise to achieving project objectives. Rodger Gardner was USAID's mission director in Romania for most of the implementation period.

A field-office team headquartered in Bucharest carried out the day-to-day work. Principal among the team members were:

- Liviu Ionescu, Romanian chief of party and technical specialist for ANAR and financial packaging
- Mary-Jeanne Adler, technical specialist for flood management
- Ionut Dobre, assistant to the chief of party and technical specialist for privatization
- Andreea Milea Ionescu, technical specialist for EMS/P2 and financial packaging
- Rodica Stefanescu, senior technical expert
- Gratzia-Felicia Vascencu, office manager

A home-office project management team in Washington, D.C. supported the SEPIC field staff technically and administratively. Those who were in this role for the longest periods of time were:

- Avrom Bendavid-Val, project director and EMS/P2 expert
- Maria Navia, project manager and water utilities expert
- Christopher Perine, project manager and environmental impact expert
- Katie Queen, project administrator
- Shadrach Ludeman, assistant project administrator

In addition, SEPIC was assisted in its early stages by Chemonics EMS and P2 consultant James Gallup.

PARTNERS

These institutions and individuals worked closely, collaboratively, and productively with the SEPIC field staff. The principal Romanian counterpart institutions for the SEPIC project were:

- The Ministry for Environment and Water Management (now the Ministry of Environment and Sustainable Development), of which Sulfina Barbu was minister, Lucia Ana Varga was state secretary for water, and Gheorghe Constantin was director for water management during much of the project.
- The Romanian National Waters Administration, of which Madalin Jorj Mihailovici was general manager, Ovidiu Gabor was deputy general manager, and Petru Serban was director of international programs.

The project team also worked with other Romanian national and local government entities, including:

- The Environmental Guard
- The Environmental Protection Agency
- River Basin Directorates
- Bihor County Prefecture and municipal and commune governing bodies

Several Romanian nongovernmental organizations also partnered with SEPIC on certain initiatives. Principal among the team members were:

- The Romanian Water Association
- The General Union of Romanian Industrial Associations

The SEPIC project benefited from partnering with Romanian enterprises that worked closely with staff to learn about EMS and P2, adapt EMS and P2 principles to their circumstances and needs, implement EMS and P2 measures in their facilities, and share the lessons of their experiences with others. These included:

- APA CANAL 2000 S.A., the water and wastewater operator for the city of Pitesti

- RA APA, the water and wastewater operator for the city of Braila
- Compania de Apa Somes S.A., the water and wastewater operator for the city of Cluj-Napoca
- ALPROM S.A., a particle board and furniture maker in Pitesti
- NOVATEX S.A., a textile manufacturer in Pitesti
- PROMEX S.A., an industrial metallurgical and machine-building complex in Braila
- Terapia S.A., a pharmaceutical manufacturer in Cluj-Napoca
- 160 large and small companies that send their effluent for treatment to the Pitesti or Braila water/wastewater operators

The SEPIC team was very fortunate to be able to work with an array of exceptionally skilled Romanian subcontractors and consultants as they carried out their EMS and P2, flood management, and water resources management activities. Principal among them were:

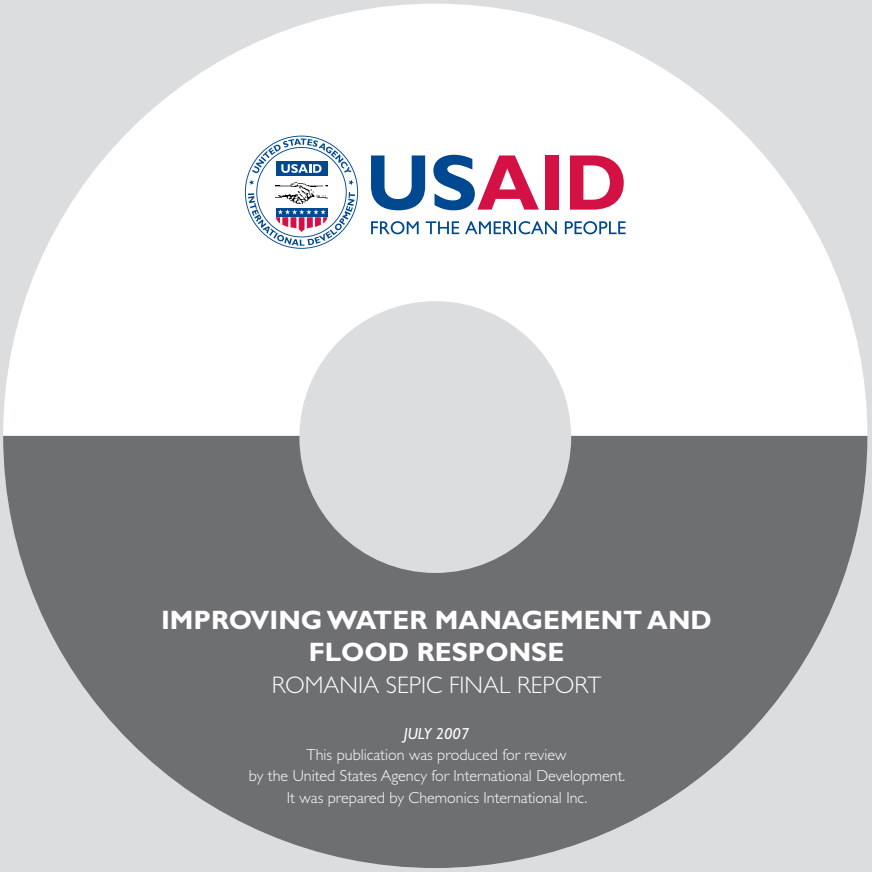
- SC AUDITECO SRL, Dr. Cicerone Ionescu, director
- SC ECEROM GROUP SRL, Dr. Radu Dornean, director general
- SC AQUAPROIECT SA
- Interactive Communications Systems and Business Consulting
- Technical University of Civil Engineering of Bucharest
- Black Sea University Foundation
- INCDT, the National Institute for Tourism Research and Development
- IRCM, the National Institute for Marine Research and Development "Grigore Antipa"
- Sala Consult

In the United States, in addition to its two subcontractors, Chemonics was assisted by the U.S. Army Corps of Engineers (USACE) Engineer Research and Development Center and the U.S. Department of Agriculture (USDA). Our work with USACE was coordinated through Robert H. Kennedy, and with USDA through Scott Goldman.

The enormous range, depth, and sheer number of partners in the SEPIC endeavor brought an unprecedented richness of experience and expertise to bear cooperatively on the ultimate objective of the project: improving management of Romania's waters and water emergencies. Many governmental, nongovernmental, private, and individual partners both contributed to and learned from SEPIC activities.

Through this broad and inclusive collaboration, the SEPIC project leaves a lasting legacy of stronger institutions and seasoned water sector professionals who will continue working for the benefit the Romanian people, economy, and nation for years to come.

CD ROM INDEX



IMPROVING WATER MANAGEMENT AND FLOOD RESPONSE

ROMANIA SEPIC FINAL REPORT

JULY 2007

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