Chapter 8
Floods Monitoring

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ABSTRACT

Romania experiences severe flooding problems almost every year. Within the last decade, floods have resulted in more than 200 deaths and estimated economic damages of $92 million per year. Also, between 1992 and 2012, there were 700 reported accidental chemical spills in Romania, some of them resulting in trans-boundary impacts. In this chapter is described the Romanian flood early warning system concept realized by the National Institute of Hydrology and Water Management (INHGA) under the auspices of Ministry of Environment and Climate Change (in former time Ministry of Environmental and Waters – MoEW) and DESWAT project. Beginning with 2014, DESWAT (Destructive Waters Abatement and Control) flood monitoring system is functional in all Romania.

INTRODUCTION

Before 2006 Romanian flood early warning system, referred to as the "legacy" system, relied largely on manual monitoring and data collection methods. Data are not maintained in computer databases, nor does the system currently have the capabilities to share electronic data among users. Flooding forecasts relied on the experience of managers to interpret hydrologic data, combine with weather forecasts, and make decisions based on their knowledge of the topography of river basins and sub-river basins. The existing system utilized a variety of communication modes to transmit data including fax, telephone, dedicated land line, line-of-sight radio and GSM.

The cornerstone of the proposed DESWAT (Destructive Waters Abatement and Control) project investment to improve the legacy system was the real-time hydrologic data provided by automated stations. Instead of data collected once or twice a day, automated stations provide observation data continuously. To maximize the benefits of this enhanced monitoring capability, reliable, high-speed communications was set-up to transmit data to a network of computers that are used to manage hydrological and meteorological databases. Under DESWAT, managers are able to complement their forecasting experience with the predictive power of computer-based forecasting models.

Finally, improvements will be needed to broadcast flood warnings to the public to enable them to take appropriate actions. It is important to recognize that implementation of DESWAT – like automated systems in the U.S. and many

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European countries – will significantly enhance the capabilities of the existing institutions in Romania to increase the advance notice of flooding and assure the possibility to save lives and reduce property damage.

The distinguishing features of the DESWAT (Destructive Waters Abatement and Control Project) are:

1. A comprehensive system of automated hydrological observation stations, complemented by rain gauge stations to enhance forecasting accuracy and speed;
2. Multi-mode communications featuring satellite communications and, where possible, LOS radio and GSM;
3. Hydrologic modeling capabilities to cover both flash floods in small and medium-sized basins and river forecasting in larger basins;
4. Interface DESWAT with SIMIN (National Integrated Monitoring System) products and other data sources.

FLOOD MONITORING AND EARLY WARNING SYSTEM

To assist Romanian authorities in assessing the investment required in terms of upgrading monitoring, data management, communications, and modeling capabilities, USAID contracted Development Alternatives, Inc. (DAI) under the Integrated Water and Coastal Resources Management Indefinite Quantity Contract to address four issues: 1) confirm the feasibility of the DESWAT concept (legal, institutional, functional); 2) determine the system requirements for implementation; 3) analyze the costs; and 4) provide recommendations on how the investment could be financed and elaborate an implementation plan. The DAI team has conducted a thorough analysis of the data collection and transmission components of the DESWAT concept, together with INHGA (National Institute of Hydrology and Water Management) and ANAR (National Administration "Romanian Waters"). The other important components of DESWAT – hydrological modeling and decision support system, and the interface or linkage between DESWAT and SIMIN (National Integrated Monitoring System) meteorological data and forecasts, as well as other data – were analyzed by Burgess and Niple (beneficiary of an USTDA grant) and Lockheed Martin, respectively, which got the responsibility for the DESWAT system implementation. The description of the DESWAT system is based on the concept INHGA described getting support through the USAID and USTDA (United States Trade and Development Agency) grants and the design the contracted companies elaborated under the Feasibility Study and Pilot activity in Lapus Basin, as well as of the experience INHGA got under the DESWAT implementation period.

It was confirmed that the technical specifications for the Automated Hydrological Observation Stations (AHOS) and proposed communications systems meet the standards for automated systems in the United States and other European countries, and the performance of the DESWAT system is similar with the ICPDR Danube survey system requirements and some elements could be integrated in the Danube Early Warning System. In collaboration with INHGA and ANAR, the AHOS network has been configured to include 581 stations and in Romania's twelve river basins. Romanian Company Aquaproiect has examined the proposed locations for these stations and prepared preliminary costs to design and construct the infrastructure to house the data communications platforms and suite of hydrological and water quality sensors (for 73 stations). Also, Interactive has conducted an analysis of each AHOS location to determine the feasibility of connecting the AHOS site to one of 57 Water Management