# MANAGING HUMAN RESOURCES FOR WATER MONITORING: A ROLE FOR THE INTERNATIONAL WATER CENTRE FOR THE BALKANS

R. D. CASANOVA
University of Nice-Sophia Antipolis (UNSA)
*France*

in *J. Ganoulis et al. (eds.), Transboundary Water Resources in the Balkans,* 203-212.
2000 *Kluwer Academic Publishers, Printed in the Netherlands.*

## 1. Introduction

The most important common problem of our planet may well be the quality of its water. Simply saying so however, does not produce solutions. With respect to transboudary water resources management in the Balkans, the concern lies mainly with regional aspects of the issue, however local considerations are equally as important. Based on experience in the management of public water resources, this paper details and illustrates the complexities of the problem, and shows how even a local approach can give satisfaction to collective needs.

This paper also shows that water management requires a multidisciplinary approach with many specialists, meteorologists, geographers, geologists, hydrologists and hydraulic engineers, working together with lawyers, managers, land planners, politicians, and teachers. Problems related to water resource management link the disciplines of physical and natural sciences, sociology, economics, ecology, and development planning, among others. If the approach is global, solutions are necessarily local and should include urban and water resources management with appropriately trained personnel.

To solve an environmental problem a systemic and global approach is needed to define the problem, and a pragmatic and operational approach to achieve an established goal. This paper offers guidelines for the establishment and operation of an International Centre of Water-Environment for the Balkans (INWEB), by promoting training and professional tools to help achieve its goals. It suggests outlines for:

- A post graduate course (to be held in English or another international language) for students and teachers involved in water management policy.
- Related courses to be offered in local language for those involved in the monitoring and resolution of technical issues in water management.

## 2. Training Proposal Requirements

An adequate training proposal requires linkages among water resource and environmental issues as they relate to the goals of sustainable development. A prerequisite of an optimal training programme for water resource management is that the true needs of the field and the desired level of knowledge be clearly specified. This requires attention being paid to the following topics:

- Quality of life should be part of the subject matter and include references to landscapes, aesthetics, cleanliness, security, and public health. The goals of sustainable development provide a paradigm which would include references to its philosophy, considerations regarding the preservation of life, respect for people, solidarity, humanism, general equilibrium, respect for nature, and the assessment and prevention of industrial and natural risks.
- A range of scientific disciplines should be included in determining adequate training goals, including ecology, zoology, botany, biosphere, ecosystems, atmosphere, geology, legal, economics, waste water treatment, hydrogeology and hydraulics.
- The satisfaction of collective needs should be explored through political science and economics including subjects such as individual and collective autonomy, individual freedom and community needs, natural heritage and civic responsibility, amongst others.

Thus, before studying an environmental problem and exploring the need for monitoring of transboundary water resources, the exact nature of common interests should be agreed upon. Every country needs to train people to manage water and the environment for current and future generations. To do this, it is firstly necessary to identify the true needs, the exact field of study and the level of knowledge desired.

### 2.1 METHODOLOGY

The first step in managing human resources necessary for water resource monitoring is to analyse and understanding the problem.

Secondly an appreciation is needed of the community's, or company's intentions with respect to specific problems with water resources, water quality, health, waste treatment, energy, training, and so forth. What goals exist, and what policies could help achieve them? Efficiency requires a pragmatic approach. In this case a permanent forum of all the specialists involved in the project is needed. If it is necessary to train people to fulfil the goals, who should be trained and at what technical level? Should they be regular, full-time students or can some technicians and engineers be re-trained? What are company goals with respect to this question, and what is the market for training?

This review should enable a proposal for a pragmatic working programme to be developed, and provide a follow-up evaluation of the training programme.

In summary there are five main questions:

- What are the laws and rules in the area where the project is conceived?
- What is the market for trained people?
- What is at stake from an economic point of view?
- Where do we start?
- What are scientific and technical problems?

It is suggested that creating an International Centre of Water-Environment for the Balkans (INWEB) would be the best way to train the people needed for monitoring water; as it would provide a focal point where forums could be organised for professionals working together, and would then lead to the creation of an electronic network.

## 3. An International Balkan Water Resource Training Programme

### 3.1 COURSE THEMES

The following course themes are suggested:

- Human activities and their environmental impacts
- Water science: resources, quality, transport, pollution, management
- Watershed hydrology, karsts landforms and applications
- Modelling of hydrology, hydro-informatics
- Business, companies and the environment
- Environmental standards and environmental management (ISO 14 000)
- Environmental laws
- Environmental risks assessment
- Waste treatment technologies, waste management
- Environmental audits
- Soils and water pollution
- Eco-toxicology
- GIS as a tool for urban or land planning

### 3.2 GENERAL APPROACH

The proposed project for applied environmental research and training suggests the need to identify the market for such training in universities, companies and government departments involved in policy making. During their training period students would work as if they were in a firm of experts i.e. several students would work on the same project, but each of them would be in charge of a different part of it, according to his/her own speciality, the needs of the study and the student’s country of origin. The training course would include one semester devoted to courses at the university and a semester during which the students would be trainees in a company or government department.

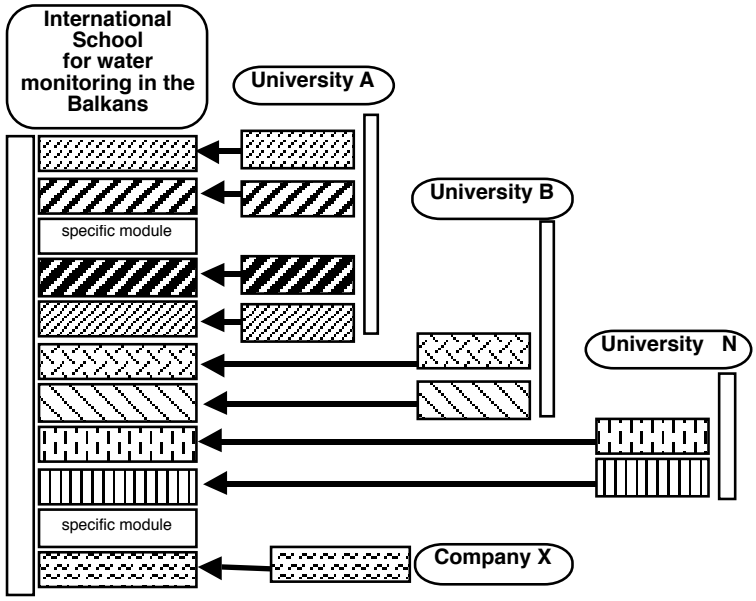
The proposed International School for Water Monitoring in the Balkans would adopt the European Credit Transfer System (ECTS) and be associated with a network of Balkan universities. It would be possible later to exchange students, researchers and teachers as well, but the initial purpose would be to exchange training schemes in order to deliver credits (or diplomas) that would be valid for every country involved. For a regular training programme students could receive credits for a course after an examination according to the ECTS system (European Credit Transfer System). Courses could be completed within the Balkan countries or on the Web.

For suggested course outlines see the Annexes at the end of this paper.

## 4. Conclusions

This paper offers the following conclusions:

- The NATO ARW in Thessaloniki demonstrated the participants' mutual interest in transboundary water resources management in the Balkans, and the feasibility of their now working together to achieve common goals.
- The first step required is to create the tool for such regional co-operation i.e. to formally establish the International Centre of Water-Environment for the Balkans (INWEB).
- Once this has been achieved, then Balkan countries can work together to solve water management problems.
- One of these problems will be how to train, at low cost, water monitoring personnel.
- It will be difficult to organise all the professional training courses needed in the field of water monitoring in the Balkans. The first step, however, is to define the human resources needs of each country, so that courses and professional training can be organised with teachers from various countries, in accordance with the scheme presented below.




## 5. Examples of possible postgraduate level courses concerning the Balkans

### 5.1 ANNEX I. INTEGRATED WATER RESOURCES MANAGEMENT – HYDRO-INFORMATICS

Water resources management today needs to integrate more and more different components, such as water quantity and quality, risks of pollution, scarcity of resource, environmental demands and users. The conflicting demands on the scarce resources of water call for an integrated approach to water resources management.

Using examples from actual experience from case studies or other material the course could cover subjects such as:

- Concepts and tools in water resources management.
- River basin simulation.
- Environmental quality.
- Water use activities.
- Principles of hydrology.
- GIS technology.

The information revolution has fundamentally altered traditional approaches to design, planning and control of hydraulic, hydrological and environmental systems. As the capabilities of computers and communication networks have rapidly expanded, so have the complexity of simulation models and the means of acquiring, storing, retrieving and manipulating vast amounts of information. Its principle goal is to reduce the damage caused by human activity to acquatic ecosystems.

Thus the aim of the course is to introduce participants to hydro-informatics systems applied to different topics, such as urban water management or watershed management. The course combines lectures on the essential theory and the practice of hydro-informatics in several environments: storm and wastewater drainage and flood management.

The course could use as material examples of urban areas, rivers and/or watersheds in different countries. These real life cases, supported by lectures and hydro-informatics, would demonstrate the scientific and technological methodologies compatible with integrated water management.

***Course scheme*** (*Duration: 12 hours)*

| *Topics* | *Description* |
|---|---|
| Hydro-informatics | Concepts and background |
| | Society and the market |
| | New technologies |
| Storm and wastewater drainage | Short and long term |
| | monitoring |
| | Simulation modelling |
| | Case study |
| River impact | Flow and quality processes |
| | Simulation modelling |
| | Real time control |
| | Case study |

## 5.2 ANNEX II. KARST LANDFORMS AND APPLICATIONS

Limestone covers 10% of lands. The action of water on limestone creates particular landforms called karsts. Usually considered as poor places they are in fact of economic importance. Karstic areas are important in the Balkan region.

Karsts are very attractive places for tourism (Guilin in China; Along Bay in Vietnam; Langkawi, Mulu and Niah in Malaysia, and the Adriatic coast), and include very important water resources. Karst springs are useful worldwide for water supply, but there is no filtering in karsts and water is usually contaminated. The study of hydrogeological basins of karstic springs has become increasingly important in order to prevent pollution.

There are often narrow gorges that are good places to built dams in karstic areas. However, as limestone contains caves, important leaks may exist. Some cases have been total failures. Karst areas are natural recorders where it is possible to find information about paleo-environments (seismic hazard, active faulting, past water levels, etc.) The study of karst landforms is complex. Special techniques were developed in France more than a century ago and have been used in Belgium, China, Costa Rica, France, Madagascar, Malta, Sarawak, Turkey, and the USA.

***Course scheme*** *(Duration 6 hours)*

*Presentation*

- Origin and structure of limestone. Action of water.
- Karst landforms and karst systems.
- Worldwide examples of karstic areas in different climate zones.
- The economic importance of tourism.

*Tourism*
- Worldwide examples, economical importance for disinherited areas.
- Main problems in caves open to the public.

*Geotechnics*
- The detection of caves in building areas.
- Protecting building foundations from the effects of caves.

*Natural record-keeping*
- Genesis of cave formations and natural underground damages.
- Dating methods for speleothems and isotopic information.
- Natural recording of seismotectonic effects in endo and exokarst.
- Natural recording of paleoclimates.

*Hydrogeology*
- Karstic hydrological systems and their functioning.
- Study of karstic basins: structural analysis of limestone.
  aquifer measure of water flows.
  physical-chemical parameters at springs.
  different techniques for dye test.
- Different examples of water supply in karst and their problems:
  karstic springs.
  wells and drilling.
  underground dams.
  salt contamination in marine karsts.
- Hydrogeological mapping.

### 5.3 ANNEX III. IMAGE PROCESSING APPLIED TO REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

This course provides an introduction to problems linked to the acquisition, processing and management of digital images with particular focus on applications to the Earth Sciences. It comprises both teaching sessions and laboratory work with hands-on initiation to classification techniques and mapping. It is augmented by a series of conferences offered by application specialists and a visit by a leading company in the field.

The aim is to show the synoptic view of the earth seen from space and the challenging problems generated by the enormous quantity of observation data. The course can offer a clear understanding of the many facets of image processing both in terms of physics of measurements, visualisation techniques and content understanding. Classification methods and digital cartography would also be covered.

The main course is followed by a one day hands-on session with processing satellite data using a Windows based PC software.
*Duration: 12 to 24 hours*

Plate 1: **Distribution of water in the Middle East**

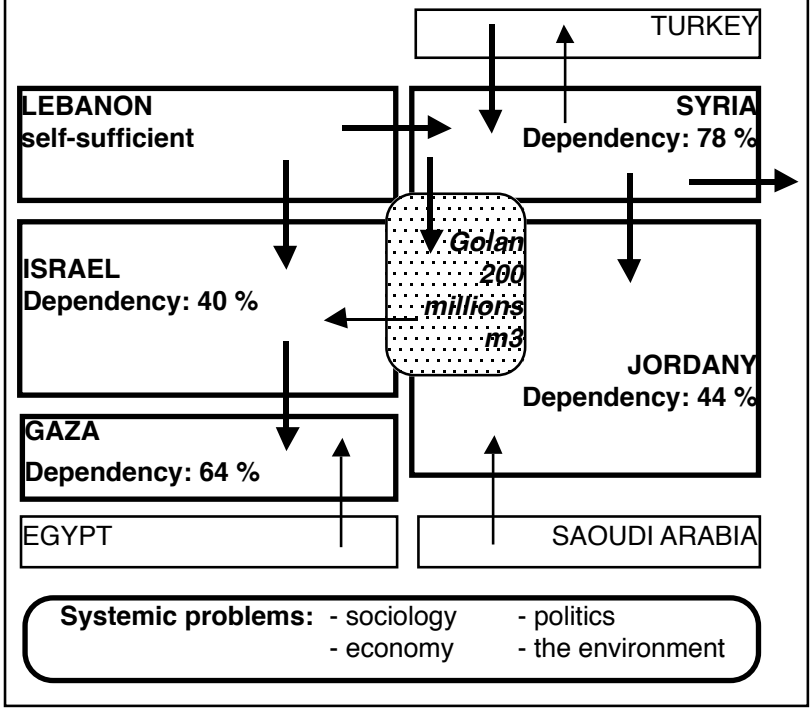


Plate 2 **Water management and health**

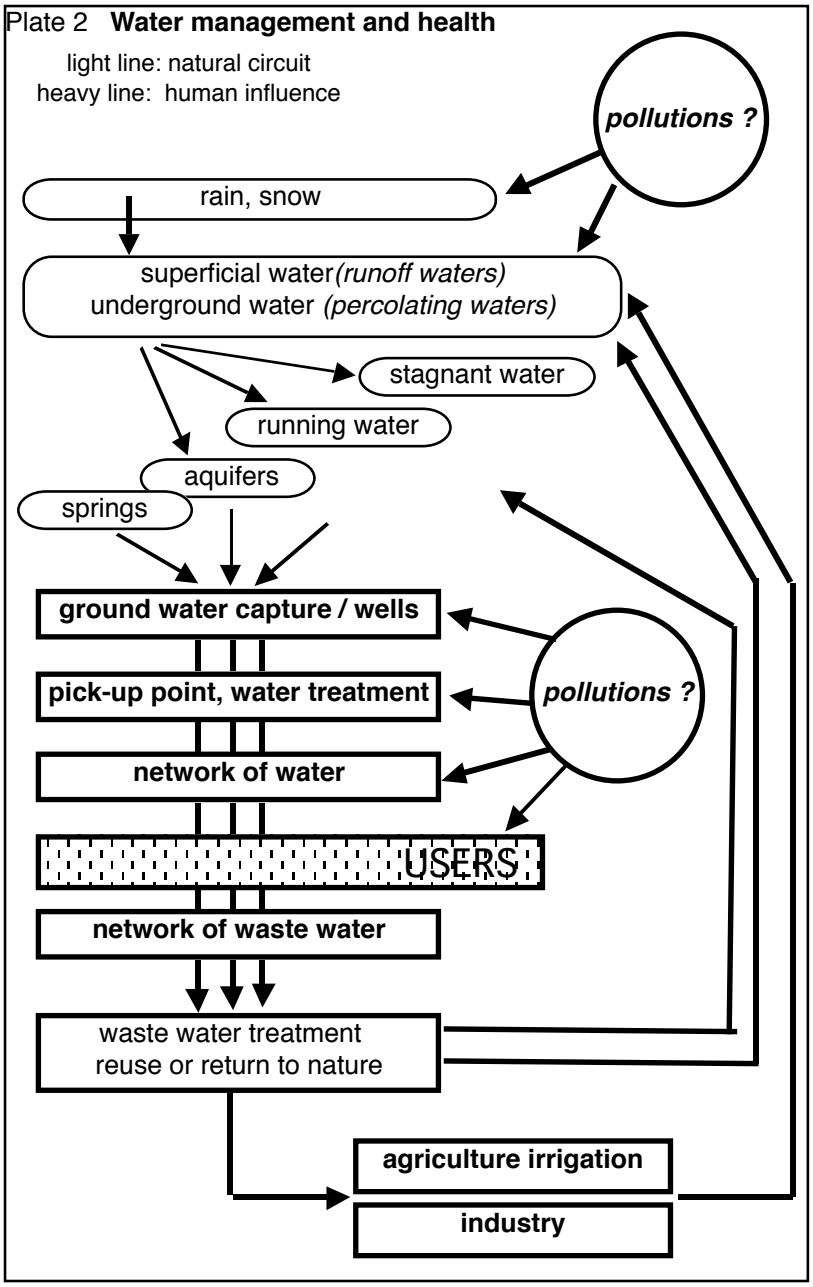


Plate 3 **Public services and risks**