

Transboundary groundwater training: why, who, what?

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Introduction

The UNESCO Training Programme in Transboundary Groundwater Resources Management aims at assisting the Member States in building the knowledge and abilities necessary for the best integration of these shared water resources into their national water budget, and, from the UN point of view, their contribution to the achievement of the Millennium Development Goals, essentially MDG 7 “ensure environmental sustainability” and MDG 8 “develop a global partnership for development”.

To achieve these objectives, UNESCO has set up a Think Tank, chaired by the author, and convened a workshop in November 2006 to answer the following questions: why do transboundary groundwater issues necessitate a specific training? Which target groups should be addressed? What should be taught?

Applying the classical methodology used in Physics, i.e. intuitively creating a system, designing experiments to test the assumptions underlying the system, and adapting the system to the results of the experiments, the Think Tank decided to design a practical course, with two main objectives:

- To be an experiment, i.e. a pilot course, for the contents and the teaching method of the training program;
- To be of immediate use to the participants.

A training program: why?

Why training? The usual water management activities, like the allocation of quantities or the prevention of pollution, become rather complex as they concern transboundary watersheds and aquifers because these watersheds and aquifers come under two or more different decision-making processes, as well as institutional, administrative and legal systems. Besides their managers are affected by language and cultural differences, and, often, have different political priorities. Up to now, these issues have been treated case by case and practitioners and policy makers have not benefited from education and training specifically in the area of transboundary groundwater and its many complex factors. Those concerned have acquired their experience in the field, trying to make the best use of their classical education in water problems. As transboundary waters issues are becoming more frequent, this is not enough and a systematic approach will be more efficient, which means training and capacity building that would provide the added benefit of identifying best practices while also focusing on methodology and management tools essential to their work. A comprehensive curriculum that extends from the scientific to the policy and legal aspects of managing transboundary groundwater is essential not only to those who now, or in the future will, manage these resources but to those who study them, teach about them and provide leadership in our communities from local to national and international.

Why a specific groundwater course and not a more general course concerning the hydrological cycle which groundwater is part of? The logical integrated water management approach would be to address all aspects of the cycle, but the very specific characteristics of groundwater, such as its vulnerability to pollution and especially diffuse pollution on large time-scales, combined with an almost impossible rehabilitation due to its geological conditions, the uncertainties over its physical, biochemical and flow dynamics properties due to the difficulties of its monitoring, do encourage us to propose specific groundwater courses. Yet the Think Tank has estimated that a general introduction to the hydrological cycle should

be part of the syllabus, emphasizing the quantitative and qualitative interactions between surface and ground water, mentioning wastewater and agricultural return flow. Then the courses would focus on groundwater and its specificities related to the transboundary conditions. The pilot course has followed that idea.

A training program: who?

Two levels of water management activities have been identified, the **policy level** and the **practitioners' level**.

Activities at policy level consist in having a very general vision of the transboundary groundwater problems, including language problems, in taking part in negotiations, in making political and managerial decisions, and in creating the institutions and instruments necessary to transboundary management, especially joint institutions and partnerships. The corresponding target group is comprised of **future decision-makers and planners, intergovernmental negotiators**: graduate students of political science, public policy, human science in general aiming at a political career, business and management with an interest in resources economics and policies, among others.

Activities at practitioner's level consist in implementing the political, institutional and managerial decisions, from the scientific, legal and economical points of view. The corresponding target group is comprised of **confirmed practitioners**, e.g. civil engineers, environmental scientists, geographers, political scientists, human scientists in general (e.g. historians, anthropologists, sociologists, linguists, translators and interpreters, among others), lawyers, and economists.

Other groups of population have also, at present, some role in the management of water and should not be neglected in a general water education program. Specific transboundary groundwater education may not be necessary in these cases but should at least be a clear part of an overall program of education to water issues. The Think Tank has identified three target groups:

- 1) Considering the necessary involvement of the population in participating in the decision-making and implementation of its own development, in application of the UN sustainable development principles, and the role of the elementary and high school teachers in educating the population, the **education colleges** and similar institutions are a first target group.
- 2) Considering the significance of the role of the media in public and, also, decision-makers information, **schools of journalism** are a second target group.
- 3) Considering that the United Nations system of intervention worldwide, to rebuild regions devastated by conflicts, has given the armed forces new responsibilities, the **military academies and schools** are a third target group.

A training program: what?

Although a major issue in water management in general, communication is a most important factor in the case of transboundary water management: we have one object which has to be handled by very different people at the same time. Within a given country, the relationships between those who conceive and plan the policies, those who have to implement these policies scientifically and technically, those who operate and maintain the systems and those who legally ensure their good operation and protection, among other stakeholders, are already difficult and often not efficient. When the situation is complicated by language differences and the historical and cultural heritages, water management can be a real challenge unless a big effort is made on communication.

Two levels of communication have been identified:

- communication between practitioners coming from different disciplines

- communication between practitioners with different languages and cultural heritages

A training program dealing with all these aspects would be ideal but very ambitious and rather non realistic. Therefore it has been decided to focus on the first communication level and adopt a pluridisciplinary approach involving hydrogeology, water management, economy, law, engineering, political science, and search for a common professional language by training the various actors together. The second communication level will be empirically approached by having participants and lecturers from different countries work together.

In order to ensure the best efficiency, it has been decided that the courses would be comprised of two stages:

1) A **levelling stage**, ensuring that the participants become familiar with the basic concepts and terminology of each others' disciplines. It was suggested that this part should represent 10-20% of the course. The levelling stage could be organised in parallel sessions, according for instance, to the focus areas of ISARM, or in sessions where the participants of the discipline in focus could assist the lecturer with respect to the other participants.

2) An **integration stage**, integrating different backgrounds and addressing all participants in the same way and dealing with the specific transboundary groundwater issues. It was suggested that there may be one interdisciplinary class in this common part, using the examples collected by the programme ISARM, for instance.

To illustrate what possible contents could be studied, here is the draft table of contents of a general course:

1. Transboundary groundwater concepts, including monitoring and modelling
2. Environment: ecosystems, biodiversity, climate change, human activities including contamination
3. Legal, institutional and policy framework (including state of the art)
 - international law between states, human rights law, domestic comparative laws, transfrontier laws between local authorities
 - institutional capacity building
 - joint mechanisms for institutional coordination
 - institutional and political mechanisms for decision-making
 - communication between policy-makers, decision-makers and scientists (bottom-up and top-down approaches)
4. Economic and social aspects
5. Public participation: communication, networking, human perceptions
6. Transboundary management instruments for cooperation
7. Integrated Water Resources Management (IWRM)

The pilot course program has been chosen among these topics.

Conclusion

The experimental (or pilot) course, announced in the introduction, has been organized as a side event of the IVth Symposium on Transboundary Waters Management, with idea that it will facilitate the awareness raising of many professionals all over the world. Conversely, to preserve its experimental character, it was decided to have a rather small number of participants, which implied the limitation of the number of treated domains. The selected domains have been hydrogeology and law.

Its evaluation with respect to the criteria established during the Think Tank workshop of November 2006 will help design a second pilot course, this time aimed at participants of a given region but of a broader range of disciplines and professional origins. The design of a more systematic transboundary groundwater training program will then follow.