

**UNESCO-IAHS Sixth Kovacs Colloquium**  
*The Fifth Phase of the International Hydrological Programme (1996-2001):  
The balance sheet from a scientific perspective*  
Paris, 13-15 June 2002 – Fontenoy salle XXII

***DISCUSSER***

**Theme 5:  
INTEGRATED WATER RESOURCES MANAGEMENT IN ARID  
AND SEMI-ARID ZONES**

*By*

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## **Contribution...**

I first of all would like to thank the organizers of this colloquium, which are the IHP and the IAHS for inviting me as a discussor of this topic about the integrated water resources management in arid and semi-arid zones. I also thank Mrs. ATTIA Fatma for her brilliant presentation about the work accomplished within the framework of this theme 5. It is true that many conferences were organized during the 6 years of IHP-V, it is the occasion for researchers to make acquaintance, exchange ideas and to publish papers, but the subjects presented at these conferences were not always directly linked to the objectives of the Theme 5 and remained in the major part rather general. An effort has thus to be done for targeting more the presentations, so that these ones, although being case studies, answer more precisely the objectives of the themes proposed. Findings of these conferences need to be synthesized in order to make a state of the art of researches. This was the task of different Working Groups. It would also be necessary for the continuation, to draw lessons from the dysfunctions caused throughout this program IHP-V Theme 5, in particular at the level of the organization of the working groups. Some of them did not work because of the retirement of their coordinator, and I think that in the future, it would have to be made sure that the coordinators who are selected would remain throughout the entire program. One can also notice that a financial shortage prevented certain groups from meeting regularly, and I find that a little bit regrettable for a

program of such a great scale and importance. More financial supports need to be provided.

Nevertheless, the work presented remains considerable and of the utmost importance, when we know that more than one third of the land surface of the Earth is arid or semi-arid, and that the population of these zones is soaring. These areas face today with a water crisis, which compromises their development seriously. Among these problems, it is necessary to note the control of the water resources, their exploitation, their supply in quality and sufficient quantity, as well as the vulnerability of ecosystems. Which problems will be from year to year worsened by the climate changes, the droughts, the advance of the desert and the human pressures (land-uses). It would be necessary to add to these physical environment-related problems, all the other political, economic issues and social conflicts, which make difficult any concept of integrated management of the rare water resources available.

Concerning the architecture of the Theme, I found the sequence of the various projects logical and relevant insofar as we designate hydrologically by arid or semi-arid regions, zones where the ratio of annual precipitation and evapotranspiration ranges between 0.05 and 0.50; it is thus of capital importance to understand the distribution of the rains between surface runoff and infiltration, which remains very variable in time and space. Considering the rapidity and

brevity of processes involved, it is thus essential to be interested in the very fine mechanisms going from small plots scale to the large basins. This would make it possible to largely improve our knowledge and comprehension of groundwater recharge processes. This question of the aquifers recharge must be treated with meticulousness by developing and perfecting new methodologies adapted to the specificities of the arid and semi-arid areas. A promising way is the wide use of chemical and isotopic tracers ( $^{18}\text{O}$ ,  $^{32}\text{Si}$ ,  $^3\text{H}$ ,  $^2\text{H}$ , etc..), as geophysical technologies showed some limitations in these areas. A particular emphasis must be put on the soil properties (hydraulic conductivity, structural heterogeneity, macro porosity, vegetation cover, surface characteristics) and on the role of the unsaturated zone, which ensures the transition between surface and underground phenomena.

Once all these processes analysed, understood and quantified, it is then possible to develop methodologies for estimating and drawing up assessments of potential water resources, as much at land scale, country scale, as at regional scale. Such were the objectives of the Project 5.2., which we all regret the failure of its Working Group, but fortunately, most of this Project was included in the Theme 3 of the IHP-VI relating to "*Land Habitat Hydrology*", and we hope that it will be a success and will make it possible to fill the bibliographical gaps about the question.

In hostile such environments which are arid and semi-arid regions, where any water drop must be regarded as a vital element, a rare species, it is necessary to build strategies of optimal management if we want to ensure a sustainable and steady development of local populations. These strategies necessarily pass by a social dialogue around water or what I call the *Hydro-democracy*, i.e. a democracy of water, by water and for water, which calls for a dialogue and an integration of the precious water resources. These problems are well mentioned in Project 5.3 on the "water resources management for sustainable development in arid and semi-arid zones. **BUT**, it's no good making recommendations, proposals, organizing symposiums on integrated water resources management, if all these measurements are not applied or we do not have the means, nor the competences to apply them, or to make them applied, all these will remain a sight of the spirit, a simple intellectual game.

I think and I believe that the IHP, as a program of UNESCO and itself an organ of the United Nations, can find the means to get implemented (one way or another) the recommendations taken, for a harmonious development of local communities, so that the slogan "*water knows no frontier*" becomes a reality. This supposes many things: an integration and a harmonization of water policies for the different concerned countries, which supposes a settlement of frontier conflicts and ethnic hatreds, which supposes political and economic guarantees of stability, which supposes reducing of foreign debt and increasing of foreign aid in Less developing Countries, which supposes... which supposes... and

which supposes. Ok, I think we are leaving the framework and the sphere of activity of the IHP.

For this reason, I think and I believe that such scientific programs (I refer to the IHP-V but also to the coming IHP-VI), in order to guarantee their success, must integrate political, social and sociological dimension, based on endogenous and participative approaches. The empirical, old and traditional knowledge of local populations, their mystical relations with water, must be made profitable use to transmit the scientific message and serve as bases for information and awareness campaigns of these populations, in order to cope with water scarcity by a optimised management of the little water available. In this way, I find the Project 5.3 on "*coping with water scarcity*" of capital and undeniable importance. **BUT**, is the only willpower to cope sufficient? Is the only fact of preserving, treating and re-using water sufficient? What can be done concretely against climate aggressiveness? Droughts? High evaporations? Desertification? Keeping in mind that any solution suggested today must be viable and durable for the next generations! But which next generation is it about? A generation that we don't even know! A generation, which the needs, the requirements, the attitude toward water, are poorly known and non controlled! Who can tell me in this room, what water quantity do I have to drink today so that the following generations have also enough to drink? When we try to deeply think, aren't we a voice in the wilderness? Isn't aridity or semi-aridity a fate?

I let you think to these questions....!

OK! Let be more optimistic about the future...

I think and I believe that all the problems raised in the various Projects of this Theme 5, are of the highest importance, but they still remain burning issues; because one can't solve in 6 years, problems dating from more than 10 000 years. It is thus necessary to ensure a continuity of these themes within the framework of the IHP-VI, on the one hand, by widening the reflection and research fields, on the other hand, by maintaining close connections with other disciplines (new technologies, sociology, ...). I Think that it would be to the advantage of the IHP-VI which will start soon, to be directed towards operational and multidisciplinary Research programmes, which would lead to put in place at country and/or regional scale, experimental sites and teams of researchers to complete successfully its defined Topics, as you know, in many arid and semi-arid regions, there are also many poor countries which have neither financial means, nor technical capabilities to undertake and maintain research programmes. The examples of FRIEND and WADI Hydrology programs have to be followed and extended.

A special emphasis on training and awareness of:

- Local populations, students and policy makers if we don't want KIT transfer becoming a "*water drop in the desert*"!

The IHP Headquarters has to play a key role in gathering and disseminating material.

A Close link with other programmes (ex: SAHRA: *Sustainability of semi-Arid Hydrology and Riparian Areas in the USA*).

***I thank you for your attention!***



