

# UNESCO

## **Meeting of the Task Force for IHP-VII (Paris, 15-17 March 2004)**

### **DRAFT CONCEPT NOTE FOR THE SEVENTH PHASE OF THE INTERNATIONAL HYDROLOGICAL PROGRAMME (IHP) (2008-2013)**

#### **I. Introduction and Background**

##### **A. Overview and Point of Departure**

1. In the course of UNESCO's IHP-VIth Phase (2002-2007), water has taken on a central position in the international environmental agenda. The Johannesburg Summit, the Millennium Development Goals, the 3<sup>rd</sup> World Water Forum, the decision by the UN General Assembly to launch in 2005 an International Decade on "Water for Life", and the decision of the UN Commission on Sustainable Development to devote its first two-year cycle to water, sanitation and human settlements in 2004 and 2005, all demonstrate that the concerns of the global community on water resources have been brought to the fore. As stated in the first report (WWDR) prepared by the UN World Water Assessment Programme presented at the 3<sup>rd</sup> World Water Forum in March 2003, "we are in the midst of a water crisis that has many faces". Despite this recognition, there is a serious concern that the water resources of the planet remain at threat due to poor management, fragmented policies and lack of clarity in implementation of urgent actions. The consensus of the Task Force formed by UNESCO to prepare for IHP-VII was that, on the whole, current trends in global water resources management is such that the forthcoming 20 years would mostly likely see a continuing decline in the quality of water resources and therefore all that is associated with it, i.e. human health, food security, livelihoods, environmental degradation and sustainable functioning of the biosphere.

2. The previous six Phases of the IHP since 1975 have shown that the scientific basis of hydrology was essential for the sound management of water. The focus in the early years was on developing techniques, methodologies and approaches for establishing the components of regimes to better define hydrological phenomena. By the early 1990s, the focus of IHP was on the sustainable development of essential water resources in the face of changing natural and built environments. By the mid 1990s, the focus moved to improving the management of water within the planet's recognisably vulnerable environments. In Phase VI, has become clear that water is at the centre of interactions between many planetary systems that have been identified as being under risk and that these interactions have created social challenges.

3. A full review of the achievements of the IHP Phase VI actions is awaited, but in advance of this, it is clear that the science of hydrology has demonstrated that many of the planetary systems (such as the hydrological and the ecological) are strongly **interdependent**; and a quantifiable number are now under identifiable **stress** (from population growth, expanding infrastructure, land conversion and accumulation of pollutants). Stress levels in some regions are sufficiently elevated so that society is prepared to decisively develop and implement **responses** to them. The responses are summed up by some of the challenges posed in the UN WWDR, such as the growing recognition and valuing of the multi-facets of water, ensuring that the water-related knowledge base is accessible to all, and that governance of water includes widespread stakeholder participation and transparency in management.

#### **B. Review of current status**

4. Notwithstanding the widespread predictions of declining global water conditions, the Task Force conducted its own subjective assessment of the next 20, 50 and 100 years, and concluded that water resources management is likely to remain fragmented in the near future leading to continued gradual deterioration especially where global, as well as local, systems are under increasing stress. However, the Task Force was optimistic that, as a result of the achievements of the many themes and focal area activities of the IHP-VI, as well as the other programmes in the UN system, corrective actions are likely to be taken by governments and stakeholders of water resources. The Task Force's perception is that beyond the 20 years, global environmental degradation could stabilise and even possibly be reversed. In this context, the Task Force focussed on actions that would accelerate improvement. The Task Force agreed that contributions from scientific actions under IHP's planned Phase VII would be essential to continue the thrust of the earlier phases, even though IHP also needs to widen its role and actions to effectively address and positively influence the expected outcomes of the next 20 years.

5. Phase VII will become operational from 2008 to 2013. It thus fits squarely within the time frame of several worldwide initiatives such as the Millennium Development Goals (by 2015), and the Water for Life Decade (2005-2014). There is an unparalleled opportunity for IHP to contribute to this worldwide effort, just as it did to the previous milestones, such as the 1977 Mar de Plata Conference, the International Drinking Water & Sanitation Decade (1981-1990) by providing the services of the science of hydrology to the requirements of the planet's needs.

#### **C. Water in the overall UNESCO context**

6. When IHP-VII enters into implementation in 2008, it can be expected that a number of institutional and programming/budgetary parameters will have evolved within UNESCO, in addition to those which have already been mentioned in the broader international context. These expected changes have been taken into account in preparing this draft concept for IHP-VII.

**(i) Water as a principal priority**

7. At the 31<sup>st</sup> session of the General Conference, Member States decided to make water and associated ecosystems a principal priority of UNESCO for the 2002-2003 biennium. The 32<sup>nd</sup> General Conference decided to continue this priority status for the 2004-2005 period. The 33<sup>rd</sup> General Conference will decide on whether to extend the status for another two-year period, i.e. until the end of the Organization's Medium Term Strategy. Whatever happens, it is the assumption of the task force that by 2008, water sciences, and hence the IHP, will no longer benefit from the substantial budgetary reinforcement it has enjoyed as a principal priority, even though it is to be expected that UNESCO will continue to give strong political support to this theme in which it will have invested heavily. It is also assumed that the IHP secretariat will continue to capitalize on the opportunities it had been afforded, and will have set in place a solid institutional and financial basis for IHP and UNESCO as a whole to continue to serve Member States in the field of water sciences and sustainable development.

**(ii) Role of UNESCO-IHE Institute of Water Education**

8. IHE became formally part of UNESCO in 2003. Well before 2008 when IHP-VII goes into effect, the Institute will be fully integrated in programmatic terms with UNESCO's overall effort in water education and research. While it is too early to know exactly how that programmatic integration will take shape, it can be assumed that by 2008 most of UNESCO's work in water education and capacity building will be the responsibility of UNESCO-IHE. It can also be assumed that IHP would continue to work closely with UNESCO-IHE in this regard, while still conducting discrete education and training activities as required in specific contexts.

**(iii) Cooperation within the UN system: WWAP and WWDR**

9. Twenty-four agencies of the UN system have been cooperating, under UNESCO leadership, in the World Water Assessment Programme (WWAP) and its World Water Development Report (WWDR). The second report will be issued in 2006 and every three years thereafter. There are a number of other important initiatives underway that will improve cooperation and joint activities within the UN system, under the aegis of the UN Water group and, presumably, within the framework of the International Decade, "Water for Life". It can therefore be anticipated that by 2008, UNESCO's work in water sciences will fit more tightly with action of the UN system as a whole. IHP-VII should be tailored to the unique role that UNESCO can play in this context, both in terms of building the knowledge base and providing services to Member States.

**II. Summary of contributions from IHP National Committees for IHP-VII**

10. In preparing the draft concept for the IHP-VII, the Task Force took account of contributions from the IHP National Committees (received in March). A summary of suggestions for the 4 themes, and the priority action priorities as expressed by the IHP National Committees is presented in Tables 1 and 2. Numbers in brackets represent the

number of times an issue was mentioned, e.g. climate change was mentioned by eight National Committees.

**Table 1. Proposals by IHP National Committees for themes in IHP-VII**

(i) Climate changes and water resources (4)	(ii) Sustainable water resources and environmental management	(iii) Risk assessment and management of water resources systems for water security
<ul style="list-style-type: none"> <li>• Extreme hydrological events (4)</li> <li>• Extreme dry-period hydrology</li> <li>• Water data-uncertainties and certainties/hydrological modeling (2)</li> <li>• Hydro-hazards and their impacts on society (2)</li> </ul>	<ul style="list-style-type: none"> <li>• Ecohydrology</li> <li>• Compatibility between land use, development and water resources use and the protection of the environment and habitats</li> <li>• Groundwater resources management and use</li> </ul>	<ul style="list-style-type: none"> <li>• Institutional and participation capacity building in real situations and ethical principles of application</li> <li>• Economic and social assessment of externalities in order to analyze different alternatives for using and managing water resources</li> <li>• Economic and social assessment of externalities in order to analyze different alternatives for using and managing water resources</li> <li>• Institutional and participation capacity building in real situations and ethical principles of application</li> </ul>

**Table 2. Proposals by IHP National Committees for lines of action in IHP-VII**

(i) Hydrological research	(ii) Water resources management	(iii) Education
<ul style="list-style-type: none"> <li>• Climate change (8); assessment of current/future state of water resources in context of CC – local effects of CC – rainwater assessment; impact of CC on agriculture, hydro-electric sector, bodies of water</li> <li>• Improve modeling tools (e.g. by coupling meteorological tools with hydrological tools)</li> <li>• Improve modeling of ungauged basins</li> <li>• Improve understanding of hydrological processes, in particular hydrological role of vegetation and wetlands</li> <li>• Forecasting extreme events</li> <li>• Economic and social assessment of externalities in order to analyze different alternatives for using and managing water resources</li> <li>• Rainwater harvesting and artificial recharge (3)</li> <li>• Groundwater and surface water assessment (2). Characterization of the non altered water regime</li> <li>• Groundwater legislation and abstraction rights</li> <li>• Groundwater protection and monitoring</li> <li>• Groundwater storage enhancement (artificial recharge of water)</li> <li>• Adverse effect of sea level on aquifers</li> <li>• Planning for creation of new surface water storages</li> <li>• Reliable assessment of renewable water resources</li> <li>• Analysis of effective freshwater use</li> </ul>	<ul style="list-style-type: none"> <li>• Water resource management in drought situations (2)</li> <li>• Emphasis on human needs</li> <li>• Relationship between water resources and water use</li> <li>• Non-conventional water resources use: desalinization and water re-use (3)</li> <li>• Institutional and participation capacity building in real situations and ethical principles of application</li> <li>• Elaboration and introduction of economic mechanisms into trans-boundary water management</li> <li>• Development of water dispute resolution techniques (2)</li> <li>• Develop international laws for water resources use in international rivers and freshwater aquifers</li> <li>• Demand management, efficient water utilization and pricing</li> <li>• Private sector partnership in water production and distribution</li> <li>• Implementation of EU water framework directive: setting new structures for classification of water bodies, setting ecological targets, planning relevant measures and monitoring</li> <li>• Determination of in-stream flow requirements</li> <li>• Relationship between quantitative hydrology, water quality and ecological</li> </ul>	<ul style="list-style-type: none"> <li>• Promotion of water saving and water supply optimization at every level and sector</li> <li>• Development of attainable training products</li> <li>• Equipping educational institutions with computers</li> <li>• Assisting developing countries in developing hydrometric equipment and calibration systems</li> <li>• More integrated approach to education and capacity building</li> <li>• Specific learning programs for water resources management decision makers acting as users delegates</li> <li>• Development of hydrological database and information system</li> <li>• Integration of water research in the university curriculum</li> <li>• On-job training programs for junior engineers and hydrologists</li> <li>• Increasing public awareness on water related issues (3)</li> <li>• Water pollution costs to society</li> <li>• Water conservation and socio-economic impacts</li> <li>• Municipal and rural wastewater techniques</li> </ul>

<ul style="list-style-type: none"> <li>for different sectors of populations</li> <li>• Development of interpolation methods</li> </ul>	<p>requirements</p> <ul style="list-style-type: none"> <li>• Interaction of groundwater with surface water and marine water</li> <li>• Integrated use of infrastructure (dams, hydraulic structures in rivers)</li> <li>• Long term monitoring for wells and springs</li> <li>• Development of computer models for irrigation/water scheduling at watercourse command level</li> </ul>	
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### III. Proposed Concept and Structure of IHP-VII

#### A. Overall framework

11. In setting out the framework for IHP-VII, the Task Force gave consideration to the key issues expected to be significant in the years 2008-2013. It was concluded that there are three main threads that can be woven into the fabric of IHP-VII: *water dependencies*, *stresses to systems* and *societal responses*. The Task Force suggests that IHP should focus on the strengthening of the existing scientific knowledge to provide new directions for science and research to develop scientific tools and responses to help mitigate and reverse these trends.

12. Various overarching titles to describe the phase were considered, such as ‘Coping with water dependencies under global changes’, ‘Water under global change: science and societal response’ and several others. It would seem that the three threads could be best captured by the following title “**Water Dependencies: Systems under Stress and Societal Responses**”. This framework would ensure continuity with the high quality efforts of the previous phases of IHP, yet expand the arena in which UNESCO would assist and support water-related actions across the UN system as well as other international agencies, governments, Member States and stakeholders.

#### B. Gap Assessment

13. In the course of its deliberations, the Task Force conducted a ‘gap assessment’ of IHP’s activities in relation to perceived global water management needs. It was therefore considered as priority for the IHP programme to support science development directed to solving planetary problems and filling existing gaps. Taking the lead from the strategic evolution of the previous phases of IHP, in which societal aspects of hydrology increased in importance over time, the gap assessment highlighted the need to widen IHP’s future scope in several areas, such as socio-economics, health, groundwater, governance and ecohydrology.

##### (i) Socio-Economics

14. There is a need to ‘mainstream’ *socio-economics* into the scope of hydrology in IHP. One of the chief constraints to the implementation of the scientific principles of integrated water resource management is linked to the sectoral flow of funds. For

example, finance for a flood alleviation project is infrequently linked to finance for integrated watershed management and the affordability levels of the populations. Financing the sustainable management of the hydrological unit, the basin, can be frustrated by the lack of concordance between administrative units (which define socio-economic units) and the river basin, which forms the unit for natural resources. This greatly avoided area for cooperation among hydrological scientists and practitioners and socio-economists urgently needs to be brought together. It will be crucial to define the role of hydrology in providing adequate responses and inputs. Much benefit would result from such cooperation – it would address the sound provision of finances for natural resources management, leading to national socio-economic benefits. It would also ensure a better focus for including the ‘water sector’ in national economic development plans of countries, many of which are now formulated as PRSP’s.

### **(ii) Governance**

15. It is said that the water crisis is essentially a crisis of governance as experienced through the fragmented nature of water management. Institutions lack the capacity to overcome conflicting approaches in the use and allocation of water from within one watershed or aquifer system. The resource is not viewed in holistic terms, but rather as a raw material providing inputs for society’s needs – in conditions of high uncertainty and complexity, where competing demands cannot be met over the long term. The definition of water governance remains elusive, but notions of ethical use, transparency, equity, accountability, etc provide some of the principles. The science of hydrology and its practical application has much to contribute to this developing area of concern. Thus governance should be one of the themes for IHP-VII.

### **(iii) Health**

16. The significance of water consumption and its linkage to human health has been demonstrated in many studies. Less clear is the evolution of watershed water quantity-quality, and its impact on the health of populations. With the anticipated increased use of water within the watershed, an understanding of the health consequences of water ‘before the tap’ is needed. Changes in basin water resources dynamics can lead to health-related issues such as poor basin management. The water logging of communal living areas may lead to health problems. Methodologies are needed for a common structural understanding between integrated river basin water resource management and the health of populations. The fate of contaminants and pathogens passing through the water cycle of basins is another well known issue requiring integrated studies. The scientific knowledge gained would provide insights to help achieve the UN Millennium Development Goals.

### **(iv) Ecohydrology**

17. While previous phases of IHP implicitly recognised ecology as an integral component of water resource management, the Task Force considered the need to have an

explicit *ecohydrology* platform within IHP-VII. This will have a broad range of applicability including development of soft engineering to supplement hard engineering.

(v) **Groundwater**

18. While integrated watershed and aquifer dynamics was one of the themes in the IHP-VI, insufficient attention was given to the management of groundwater resources and its science. Hydrogeology has advanced rapidly over the last 30 years, contributing to the well-being and development of the human population. Its accelerated use, in the absence of good management, has, however, not been without consequence, with local impacts being quite severe. To a large extent, this reflects a serious lack of investment into the transfer of scientific knowledge about aquifers into the development of appropriate groundwater resource management strategies. In Phase VII of IHP, there should be a new emphasis on groundwater. This would include developing science-based policies and principles, preparation of appropriate regulations to curb over exploitation and sustainable management and use. An area for significant attention would be groundwater supported ecosystems.

**IV. Broad Themes for IHP-VII**

19. The Task Force deliberated at length on developing the appropriate themes for IHP-VII from the point of view of critical global issues, the practicality of its implementation and the wish to achieve significant results in the time frame that would make a worthwhile contribution by hydrological science and knowledge to society in the years 2008-2013. Three threads (system interdependencies, stress to the systems and societal responses) run through all the proposed themes.

20. The balance between regional, climatic and thematic areas of the proposed actions was also considered. In view of the need to consolidate the future role of the National Committees of IHP, the Task Force was of the opinion that regional and climatic issues would be more effectively addressed through regional groupings of national committees. Thus the thematic priorities and actions, for example, for the arid or the humid zones, would be better defined at the regional level.

21. The number of themes proposed also reflects to some extent the intention to reach realistic outputs and results in a short-term period, though further consideration of this will be needed in the light of possible IHP networking mechanisms and structural developments.

22. Global change is highlighted as one of the issues that will have a considerable impact on all aspects of life. These changes will continue to affect watersheds and aquifers in many ways, not least from climate change but also human activities including globalisation. Thus it remains a key theme in Phase VII of IHP. The background for the other themes arose from the gap assessment discussed earlier.

23. The following four themes are suggested by the Task Force for IHP-VII:

Theme I:	Global Changes, Watersheds and Aquifers
Theme II:	Governance and Socio-Economics
Theme III:	Water and Environmental Management
Theme IV:	Water Quality, Human Health and Food Security

24. In developing these four themes, the Task Force has taken account of the programmes that are operational under IHP-VI. Thus the Task Force believes that education, training and transfer of technology remain among the most important roles of IHP. However, with the establishment of UNESCO-IHE during IHP-VI, and several other regional and international centres, the IHP capacity to provide education and training has improved. It was felt that the main thrust of training and technology transfer could now be conducted by UNESCO-IHE and the IHP centres. Similarly the study of climate change and its impact on water resources could be conducted by IHP centres such as CATHALAC. The two cross-cutting programme components of FRIEND and HELP would need to continue and could be strengthened. Both components should be considered as the testing grounds for policies and programmes to be developed under Phase VII. Similarly PC-CP and JIHP would continue and be strengthened under IHP-VII.

25. As in Phase VI, the forthcoming Phase of IHP would also consist of a range of 'focal areas' under each theme. A more detailed definition of the focal areas will be carried out as a later exercise, after the views of the IHP Bureau have been received, and considering the feedback process from IHP National Committees and IHP Council.

## **V. Current Initiatives**

26. Many of the initiatives that started in Phase VI have already demonstrated their value in converting science and policy to actions. Thus the ISARM Programme has made progress in linking closely with the development of international water law as applied to transboundary aquifers. It has already initiated, and made operational, the long-term task of conducting an inventory of transboundary aquifers worldwide. The IGRAC that was recently established will act as the repository for data and information related to transboundary as well as other aquifers, vital for the needs of humanity. PC-CP has contributed considerably to the understanding of conflict and the means to convert it to cooperation.

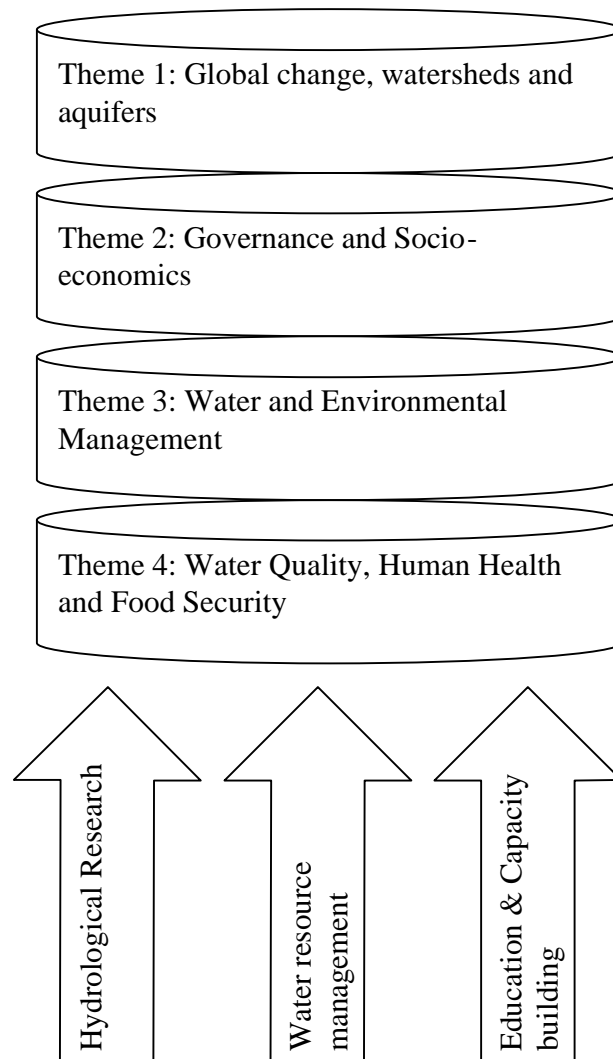
27. The Task Force decided to adopt the IHP's main principle "*to stimulate stronger interrelation between scientific research, application and education*" on order to ensure continuity between the previous phases and IHP-VII. IHP-VII would continue to consolidate scientific knowledge of the hydrological cycle, and address the solution of practical hydrological problems including the various applications of advanced methodologies and technologies to the assessment, development, protection and management of water resources and related environmental issues.



28. It would also provide and direct better focus to water and society interdependency, including water governance, in consideration of the emerging problems posed by the international scientific community and the recent UN summits.

29. Figure 1 shows a schematic representation of the framework proposed for IHP-VII. Table 3 shows a matrix of the themes proposed by the Task Force for IHP-VII and activities ongoing from IHP-VI.

**Figure 1. Schematic representation of framework proposed for IHP-VII.**



**Table 3. Matrix of themes and actions**

		<i>Continuing initiatives</i> HELP/FRIEND ISARM Pc-cP IGRAC ISI Floods	<i>New initiatives (I):</i> <i>Groundwater resources for</i> <i>society's needs</i>	<i>New initiatives (II):</i> <i>Systems under stress:</i> • <i>Urban Areas</i> • <i>Coastal Zones</i> • <i>Drylands</i>	<i>New Initiatives (III):Stimulating</i> <i>social response</i> <i>Education, dissemination of</i> <i>knowledge, capacity</i> <i>strengthening:</i>
Theme 1	<b>Global Changes, Watershed &amp; Aquifers</b> <ul style="list-style-type: none"> <li>• Scale dependent management &amp; policies</li> <li>• Groundwater recharge/discharge rates due to climate changes</li> <li>• Extreme events</li> <li>• Globalisation</li> <li>• Water managements and land cover/use</li> <li>• Groundwater mining and contaminations</li> </ul>	<ul style="list-style-type: none"> <li>• Data collection</li> <li>• Inventories</li> <li>• Indicators</li> </ul>	<ul style="list-style-type: none"> <li>• Declining water levels</li> <li>• Changing recharge for maintaining agriculture schemes</li> <li>• Access to water</li> <li>• Impact of reducing groundwater on land use, land degradation</li> <li>• Salinization related to desertification</li> </ul>	Water supply in megacities	
Theme 2	<b>Governance and Socio-Economics</b> <ul style="list-style-type: none"> <li>• Institutional and participation capacity and ethical principles</li> <li>• Financing for integrated watershed management</li> <li>• Socio-economics benefits from short range &amp; long range investment / affordability / poverty alleviation</li> </ul>	<ul style="list-style-type: none"> <li>• International legislation</li> <li>• Water rights</li> <li>• Equal access to water resources</li> </ul>	<ul style="list-style-type: none"> <li>• Water rights in rural and urban areas, transferable water rights</li> <li>• Financing water supply resources – equitable use</li> </ul>	Provision of services in urban areas /waste water management in urban areas (cost recovery poverty alleviation)	
Theme 3	<b>Water and Environmental Management</b> <ul style="list-style-type: none"> <li>• Ecohydrology:</li> <li>• Over engineering to soft solutions</li> <li>• Sustainable cities / towns and villages</li> <li>• Regulation for sustainable management</li> </ul>	<ul style="list-style-type: none"> <li>• Testing the scientific solution in experimental catchments</li> </ul>	<ul style="list-style-type: none"> <li>• Groundwater dependents ecosystems</li> <li>• Maintenance of low flow</li> <li>• Aquatic communities</li> </ul>	<ul style="list-style-type: none"> <li>• Urban areas</li> <li>• Waste stabilisation ponds</li> <li>• Ecological treatment of waste water, recycling of waste water</li> <li>• Flood alleviation</li> </ul>	
Theme 4	<b>Water quality, Human Health &amp; Food Security</b> <ul style="list-style-type: none"> <li>• Health aspects of integrated water resource management</li> <li>• Flow of pathogens and other contaminats in water cyle of aquifers / watersheds</li> <li>• Non-conventional water resources use: desalinization and water re-use</li> </ul>	<ul style="list-style-type: none"> <li>• Testing the relevant methodologies in experimental and reference catchments areas</li> </ul>	<ul style="list-style-type: none"> <li>• Groundwater protection inventory</li> <li>• Groundwater availability for food security</li> <li>• Drought alleviation</li> </ul>	Urban areas (movement of pathogens, recycling of waste water)	