Netherlands National Committee for the
International Hydrological Programme (IHP) of UNESCO and the
Hydrology and Water Resources Programme (HWRP) of WMO

Conference

Water and World Society

The role of the Netherlands in the Water Programmes of UNESCO and WMO

Thursday 17 January 2002

Programme and Abstracts

Location: UNESCO-IHE Institute for Water Education
Westvest 7
Delft, The Netherlands

Convenor: Netherlands National Committee IHP-HWRP

Preface

New phases of UNESCO's International Hydrological Programme (IHP) and WMO's Hydrology and Water Resources Programme (HWRP) will commence in 2002. In addition, the Netherlands-based International Institute for Infrastructural Hydraulic and Environmental Engineering (IHE) will start to fulfil its mission as the UNESCO-IHE Institute for Water Education.

In response to these activities, the Netherlands National Committee IHP-HWRP is convening this one-day conference entitled 'Water and World Society'.

The objective of the conference is to stimulate interest from scientists, managers and decision-makers in the water sector in the important catalytic role of the IHP and HWRP programmes.

The National Committee highly appreciates that the State Secretary of Transport, Public Works and Water Management presents the Netherlands vision on international water issues, including the national policy on participation in international science-orientated programmes. Future challenges in water science knowledge transfer and hydrological assessment will be addressed by the Programme directors of IHP and HWRP and the Rector of IHE.
In addition, speakers will review selected IHP and HWRP projects with Dutch input followed by presentations and debates on new initiatives by the Netherlands National Committee IHP-HWRP and future contributions of the Netherlands scientific community to both programmes.

Programme

9h30 Registration

10h00 Welcome
Reinder Feddes,
Chairman Netherlands National Committee IHP-HWRP

Addresses
Vision on international water issues and the Netherlands policies
Monique de Vries,
State Secretary of Transport, Public Works and
Water Management

Future challenges in international water sciences and knowledge transfer issues
Andras Szöllösi-Nagy,
Deputy Assistant Director General UNESCO, Secretary of IHP

The future of hydrological assessments – the bases for understanding and management
Arthur Askew,
Director Hydrology and Water Resources Department WMO, Director of HWRP

The role of the UNESCO-IHE Institute for Water Education
Wim van Vierssen,
Rector UNESCO-IHE Institute for Water Education

11h30 Coffee Break

12h00 Presentations and discussion

Contributor to science: 'Development of hydrology in the Netherlands and its international impact'
Co de Vries,
VUA
Convener of conferences: 'Agricultural effects on ground- and surface water'
Joop Steenvoorden,
Wageningen UR - Alterra

Contributor to cross-cutting themes: Flow Regimes from International Experimental and Network Data (FRIEND)
Henny van Lanen/Piet Warmerdam,
Wageningen UR - Environmental Sciences

13h00 Lunch

14h00 Presentations and discussion

Stimulator of world-wide initiatives: International Groundwater Resources Assessment Centre (IGRAC)
Jan Anne Boswinkel,
TNO-NITG

Initiator of inter-active research: 'Weather and Water in the 21st century'
Bart van den Hurk, KNMI
Hendrik Buiteveld, RIZA

Contributor to debates on new focal areas: The socio-economic value of water
Ton Bresser, RIVM
Arjen Hoekstra, IHE

Promotor of networking: Netherlands Hydrological Platform
Pieter de Laat,
IHE

Closure
Reinder Feddes

15h30 Drinks

Contents

Vision on international water issues and the Netherlands policies

Monique de Vries
State Secretary of Transport, Public Works and Water Management

At the Ministerial Conference of the Second World Water Forum in the Hague, March 2000 seven challenges for common world wide actions on water has been formulated. They are linked to the three main themes of the Forum: Water for Food, Nature and People.
The Netherlands Government is using these challenges as starting point for its international water policy. Yearly extra funds (€ 91 million) are available, most of it directed to developing countries, and further to water related problems in special sectors, such as environment, agriculture and public health.

Other tools for the implementation of the Netherlands policy are the Memoranda of Understanding with other countries in order to cope with their problems by offering our knowledge and experience on flood disasters and river basin management.
A special programme "Partners for Water" is supporting initiatives that may have a future spin-off on development and knowledge. For example, the "World Dialogue on Water and Climate" as a Netherlands contribution to the Third World Water Forum in Kyoto, March 2003. Also funding of the first phase of the International Groundwater Resources Assessment Centre at TNO Delft is being considered out of this programme.

Based on the seven challenges the Netherlands international water policy is being implemented at various scales: nearby with countries on common water management issues of the rivers Rhine, Meuse, Scheldt and Eems. And with North Sea bordered countries on sea pollution, shipping and fisheries. The wider scope concerns all activities in the framework of the United Nations.

This year the World Summit on Sustainable Development in Johannesburg will ask our special attention. The goal of the Netherlands Government is to achieve also sustainable agreements at the Summit. Further, our support to UNEP's Global Action Plan and UN-ECE activities on water is continued. A recent important milestone is to be mentioned: after intensive negotiations between UNESCO and the Netherlands IHE-Delft will continue its world wide mission as UNESCO-IHE Institute for Water Education.

The water programmes of UNESCO (IHP) and WMO (HWRP) have an excellent reputation and play a renewing role with regard to societal aspects and assessment studies. The Dutch input from research and education institutes, among others on integrated water resources management, climate change and water, groundwater and lessons from the past may contribute to successful products.

The Netherlands policy is directed to stimulate development and exchange of knowledge by participation in international research and education programmes. In this respect the Netherlands Government will take its responsibility by steering the programme implementation at international and national level and will continue its support.

Future Challenges in International Water Sciences and Knowledge Transfer Issues

Andras Szöllösi-Nagy
Deputy Assistant Director General United Nations Educational, Scientific and Cultural Organization, Secretary International Hydrological Programme

There is a growing consensus that water is going to be one of the main issues of the 21st Century. Given the projected demands for water, the present use is clearly not sustainable. The presentation attempts to identify the likely major scientific challenges in hydrology and water resources development that must be addressed to establish sustainable water development and management practices. It is also, *inter alia*, proposed that a new international co-operative research programme in the field of experimental hydrology be launched to help develop new theories as well as policy relevant applications. The talk will be concentrating on four areas, namely: (1) The role of scales and scale transitions in hydrology; (2) Environmental vulnerability under various climatic and socio-cultural conditions; (3) Integrated water resources management as a precondition for sustainable development; and (4) The transfer of knowledge. The presentation concludes that the water issue, and the relevant conflict potential will also likely force one to re-think the notions of security and interdependence.

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The future of hydrological assessments – the bases for understanding and management

Arthur Askew
Director, Hydrology and Water Resources Department, World Meteorological Organization

In a world where demands on our limited supplies of freshwater are constantly rising and the vulnerability to floods and droughts increases by the day, there is a greater-than-ever need for data and information as a basis for decision making.

Such information is vital to planning future urban or industrial development or selecting the location of some new irrigation scheme. Data are also required for the design of water-related projects and, once constructed, these need a continual flow of data to ensure their efficient operation.

In the past, emphasis was on technical and geophysical data. New concerns over the environmental consequences of development and the need to consider its broader socio-economic impact call for the compilation for a wider range of data and related information. Rarely was one national agency responsible for the collection of all hydrological data within a country. With the new data needs, extending far beyond the hydrological, the diversity of national agencies involved has increased considerably.

The challenge is not only to collect the data, but to compile them in such a way that they can be assimilated and analyzed to provide the complete picture required by the decision maker.

While new technologies have opened up the prospect of the more efficient and comprehensive collection of data, these have had only limited impact in many developing countries. Even in developed countries, their introduction has often been accompanied by a reduction in the use of more traditional data collection techniques which, despite their cost, still provide essential inputs to hydrological assessments.

Key to this effort is the manner in which freshwater affairs are administered within a country and the level of resources made available for information management. The extent to which services are commercialized and/or privatized can have a major impact on the availability of data and information, as can the general policy regarding freedom of information.

A truly global community needs truly global data as a basis for its assessments and advice to decision makers. The meteorological community has struggled over the past ten years with questions concerning the free and open exchange of meteorological data and information, and the hydrological community is now faced with a similar challenge, though from a different perspective.

All of these questions are of importance to the World Meteorological Organization as it strives to meet its goal of applying hydrology to meet the needs for sustainable development and the use of water and related resources; to the mitigation of water-related disasters; and to ensure effective environmental management at national and international levels.

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The UNESCO-IHE: a new type partnership for the UN system

Wim van Vierssen, IHE – Delft

From 2002 on, IHE-Delft will become part of UNESCO under the name UNESCO-IHE Institute for Water Education.

Its vision is a world in which people control their water and environmental resources in a sustainable manner, and in which all sectors of society, particularly the poor, can enjoy the benefits of the basic services. To that end IHE's mission is that it wants to be the centre of a pre-eminent global network for the generation and sharing of knowledge in integrated and sustainable water and environmental resources systems relevant to the developing world.

It strives to take the position of an Institute operating across the spectrum of the UN, with the objective of helping to establish demand-based, independently operating knowledge institutions in the field of Integrated Water Management (Water, Environment and Infrastructure) in developing countries. The UNESCO-IHE will be a lean, broad-based, networking UN project organisation in which many institutional partners from industrial nations and developing nations will co-operate. The partnership will link up with the well-established Water Sciences Division of UNESCO and its associated IHP partners around the world. The organisational setting is an example of an innovative public-private partnership within the UN system.

In the development and provision of education, the internationally mandated UNESCO-IHE will collaborate with a number of institutional partners in developing countries which are supported as 'future' educational providers. These are envisaged to grow within that role during the partnership with the UNESCO-IHE through increasing participation in the provision of regional, dually accredited education. Through long-term co-operation programmes, the relevant educational components are adapted and passed on to the region, step by step. Additionally, well-established knowledge institutions throughout the world are invited to pass on their expertise to the UNESCO-IHE system through seconded staff arrangements, part-time professorships and staff exchange programmes. At present, work is underway to establish this worldwide partnership and to provide it with a set of operational rules and regulations.

In summary, the UNESCO-IHE partnership programmes aim at providing the bulk of the post-graduate water education that is needed in developing countries in the domain of Integrated Water Resources Management. More specific aims are to

- validating regional institutional knowledge (quality) and securing it institutionally (ability to take root, sector 'memory');
- increasing the appeal of regional educational programmes through the international accreditation of these education modules and programmes (status of diplomas with regard to the 'West');
- accelerating the above by generating critical educational mass through the stimulation of regional partnerships (regional anchoring and sharing ideas);
- increasing the total share of education provided by regional knowledge centres in the international provision of education in the field of Integrated Water Management (from education in Delft to regional education);
- increasing cost-effectiveness in education (increased educational output through the deployment of local institutions at the same cost);

In summary, the UNESCO-IHE is moving away from being a traditional, one-location education provider towards a UN-based international network organization

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Development of hydrology in the Netherlands and its international impact

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Dutch hydrologists have played a considerable role in the development of many aspects of the hydrological sciences. Since hydrological research is mainly societal driven, a major part of this scientific work is related to the specific conditions and problems that we face in this densely populated coastal lowland. It is notably in connection with these conditions that Dutch hydrologists made fundamental and original contributions to the emergence of hydrology as a science between the late 19th - and early 20th century. Hydrological investigations focused in that period on groundwater in the western part of the country in relation to: (a) the search for healthy drinking water in an environment that was dominated by brackish and polluted ground- and surface water, and (b) the need to control groundwater in deep polders and in excavations for the building of infrastructure works.

Suitable groundwater resources for public water supply in the western part of the Netherlands was restricted to the belt of coastal dunes, and was accordingly prone to depletion and salinisation. A proper and sustainable exploitation thus required a sound knowledge of the origin and replenishment of the fresh water reserves as well as understanding of the dynamics of the fresh-salt water interface and the flow towards extraction means. Several Dutch pioneers performed outstanding work during this inception phase. Willem Badon Ghijben developed - in the 1880s - his well-known principle of a fresh dune water lens, floating on the surrounding salt water. Johan Pennink - at the turn of the century - demonstrated by ingenious field and laboratory experiments the existence of upward bending groundwater flow lines below partially penetrating wells and drainage canals. His experiments definitely proved that groundwater flow could be described by the same physical-mathematical principles as other transport processes, like electrical currents and heat conduction.

This combination of theoretical and experimental work eventually resulted in a basic theory of groundwater flow, which enabled to simulate a groundwater flow field by a mathematical differential equation and to solve groundwater flow problems as a boundary value problem. The Netherlands hydrogeological situation, which is characterized by relatively homogeneous aquifers and simple and artificially maintained boundary conditions, proved to be very suitable for this theoretical approach. This favourable situation led to several original Dutch contributions to the solution of groundwater flow problems for the typical Netherlands situation, were groundwater and surface water are closely related under leaky aquifer conditions. The first Dutch contribution in this field was J. Kooper's approach of steady radial flow to a well, a deep polder or an excavation in a leaky aquifer, that was published in 1914. Further research in the Netherlands maintained this 'environmental-specific' focus on the interaction between groundwater, surface water and land use under shallow aquifer conditions.

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Convenor of conference: 'Agricultural effects on ground- and surface water. Research and Policy at the Edge of Science and Society'

Joop Steenvoorden, Wageningen UR – Alterra

The conference was organized in October 2000 by the IHP/OHP National Committees of the Netherlands and Germany. The conference was a contribution by both National Committees to fulfil the UNESCO call for an interdisciplinary approach to water resources management, as the conference was aimed to deal with:

- Integration of water science and water policy
- Integration of ground and surface waters management
- Integration of water quantity and water quality
- Integration of land use and water management.

The goal of the conference was to present the themes of water scarcity and water pollution caused by agriculture in the moderate humid areas of the northern hemisphere, and to indicate the possibilities for protection of the water resources by improved management methods.

In my presentation attention will be paid to the following items:

- The conference has been jointly organised by two National IHP/OHP Committees. What are the benefits of this joint organisation and are there any drawbacks?
- A very important goal for activities organized by UNESCO and WMO is to stimulate the involvement of scientists from different countries and cultures. To what extent has this been realised in this conference?
- The conference was aimed at linking the sociological with the hydrological aspects and the environmental policy decision-making process. How successful was the conference in dealing with these interdisciplinary approach?
- What role do the available data bases of addresses play in the conference organisation and needs the system be improved to ensure that the first announcements are received by a sufficient number of organisations?
- Does the conference programme play a role in stimulating the exchange of research experience between scientists during the conference?
- What is and what will be the impact of the conference and its products? (products: the Conference Declaration, the Wageningen Statement, the pre-conference and final Proceedings)

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Flow Regimes from International Experimental and Network Data (FRIEND): Cross Cutting Programme Unesco-IHP-VI

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The FRIEND project aims to ease the problem of water resources assessment and management through research, targeted at regional problems. It is an international collaborative study with the objective of developing a better understanding of hydrological variability and similarity across time and space through mutual exchange of data, knowledge and techniques at regional level. The advanced knowledge of hydrological processes and flow regimes gained through FRIEND contributes to the reduction and mitigation of droughts and floods, and anticipates on projected environmental changes (e.g. climate and land use change). FRIEND also supports researchers and operational hydrological services in developing countries to manage their own water resources (capacity building), which is essential for poverty alleviation. FRIEND has been identified as a cross cutting programme because it interacts with all five themes of IHP-VI.

The FRIEND project was initiated in 1985 in Europe within IHP-III on the premise that significant progress could be made if hydrologists were to exchange data and experiences with their counterparts in neighbouring countries. Currently, eight regional FRIEND projects have been established in Northern Europe, in the Alpine and Mediterranean region (AHMY), in Southern Africa, in Western and Central Africa (AOC), in the Hindu Kush – Himalayan (HKH) region, in the Asian Pacific region, in the Nile basin, and in the Caribbean (AMIGO). A regional FRIEND project has study groups on, for example, low flows, floods, streamflow generation, sediment transport and snow and glacier melt. Besides several regional workshops, each four years an International Conference is organised where the whole FRIEND community exchanges knowledge and experiences with other interested participants. The main findings of the conference are disseminated through the International Association of Hydrological Sciences (IAHS).

After the presentation of the objectives of FRIEND, the history, the organisational structure and the links with the other IHP-VI themes, results of recent Dutch input will be presented. This will include main results of a study on the regional impacts of droughts in Europe. The importance of the European Water Archive will be demonstrated. Temporal and spatial distribution of groundwater droughts will be presented, as well as the issue if streamflow droughts have become more severe and frequent. Streamflow generation in small experimental catchments will be discussed. The presentation will be concluded with the main issues that will be addressed at the 4th International Conference "FRIEND2002-Regional Hydrology: Bridging the Gap between Research and Practice" in Cape Town (18-22 March 2002). The Netherlands IHP/OHP Committee sponsors the conference, and the selected papers have been reviewed and edited in Wageningen.

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International groundwater resources assessment centre (IGRAC)

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Groundwater is the largest source of freshwater on our planet, representing over 90% of the readily available freshwater reserves. The use of groundwater resources has increased dramatically in the last 20-30 years, as a result of their widespread distribution, high reliability during drought and modest development cost. While there have been enormous investments in exploiting groundwater resources for human use, not much attention has been paid to monitoring the condition of the resource and assessing its sustainability in terms of quantity and quality.

There is a general lack of information and awareness about the status of groundwater, and this situation needs to be corrected if more rational decisions on the use and conservation of this precious and strategic resource are to be taken. For this reason, a clear need has been identified for an international centre to be established under the auspices of UNESCO and WMO. This centre, the International Groundwater Resources Assessment Centre (IGRAC), should act as a catalyst for stimulating and focussing national efforts in groundwater system monitoring and assessment. Its objective is to include groundwater fully in the assessment of freshwater resources of the world in order to encourage and enhance the conjunctive and sustainable utilisation of both groundwater and surface water.

Key functions of IGRAC have been identified as (1) to create a global information system on groundwater resource assessments with key supporting data, (2) to prepare guidelines and tools for groundwater data collection and aquifer monitoring, together with dissemination and training of appropriate methodologies, (3) to process and assess monitoring data and (4) promote public awareness about the importance of groundwater and the threat of resource deterioration.

Key outputs required of the international centre include an overview of the major world aquifers, including their distribution, level of exploitation, and their general functioning with respect to surface waters and a diagnosis of trends in water-table levels and groundwater quality for the major world aquifers.

The principal benefits of IGRAC will be to provide (1) reliable information for multinational and bilateral cooperation agencies to facilitate the prioritisation of their investments in the water sector, (2) sound data on groundwater systems for scientists involved with global environmental assessments and (3) improved data on groundwater system status and behaviour for local and regional water resource managers.

The 14th Intergovernmental UNESCO-IHP Council (June 2000) adapted Resolution XIV-11 and the 11th Session of the WMO Commission for Hydrology (November 2000) adopted the Recommendation Chy-XI-1 regarding the establishment of an International Groundwater Resources Assessment Centre (IGRAC), for which the Netherlands Institute of Applied Geoscience TNO has been proposed as the focal point. The Dutch government is considering to support financially the establishment of IGRAC.

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Weather and water in the 21st century

Bart van den Hurk, KNMI
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The Third Assessment Report (TAR) of the Intergovernmental Panel on Climate Change (IPCC), which was recently published, provides additional scientific basis for an enhanced greenhouse effect in the recent past. The surface temperature – a combination of near-surface air temperature and sea surface temperature – has increased by 0.6 °C and the average sea level rose 10 to 20 cm during the past century, partially by an enhanced greenhouse effect. The length of many glaciers decreased, and a wide range of additional changes to climate parameters, biological or ecological variables were reported. Observation records also showed an increase of annual precipitation by 5 to 10% in mid- and high latitudes of the Northern Hemisphere, partially due to an increased contribution of heavy precipitation events to the annual average.

These observed changes have been analysed carefully, and many model and data analysis studies were devoted to determining the mechanisms behind the changes. Model studies have also been used to make climate projections for the coming century, and the TAR reports on many aspects of these projections. Significant uncertainty is caused by a combination of uncertainty in the development of emission scenarios, the limited physical validity of the climate models that were used to produce these scenario's, and the lack of understanding of a number of key components in the climate system. These include the role of atmospheric chemistry, aerosols and the non-linear behaviour of the coupled components forming the climate system. Future climate projections give rise to suspect that global mean temperature will rise by 1.4 to 5.8 °C in the 21st century, whereas the sea level is expected to rise by 0.1 to 0.9 m in the same episode. In the TAR the upper limit of the possible temperature rise during the 21st century is larger than reported in the previous assessment report, published 5 years ago.

The uncertainty of these future scenarios increases even further with decreasing spatial and temporal scales. Climate projections for continents as Europe or even for individual European countries are more uncertain than global projections. Also changes in the frequency of extreme events are more uncertain than changes in the mean state. Unfortunately, for most climate change impact assessments changes in these extremes are equally or even more relevant than changes in the mean climate.

In spite of this considerable uncertainty, regional climate scenario studies have been and are being carried out. In order to separate the noise from the signal, many of these studies use an ensemble of emission scenarios, projection methods, and numerical climate models. Stronger consistency in the results of the individual members gives rise to stronger confidence in the anticipated changes.

A general picture emerges from a range of scenario studies carried out for the late 21st European climate, albeit this picture is strongly depending on the greenhouse gas emission scenarios. Strong increases in atmospheric CO_2-concentration seem to lead to an increased precipitation in the winter season at high latitudes. South Europe will be confronted with a decreased precipitation and enhanced droughts in summer. Variability between the various model projections is high, and results strongly depend on the assumed emission scenarios. However, these effects imply that the annual discharge for the Rhine river will change accordingly: an increased discharge in the winter period, a reduction in summer, and a reduced impact of snow related processes on the seasonality of the flow.

Based on the findings of the IPCC, KNMI produces climate change scenarios for the Netherlands, expressed in terms of changes in annual and seasonal temperature, frequency distributions of precipitation, and sea level rise. Using statistical relationships between observed precipitation and large scale meteorological parameters, precipitation changes are expected to be similar to the general response of North European areas: an increased precipitation, particularly during the winter season, and an increased likelihood of extreme

precipitation events. Scenarios for the Netherlands deduced from for instance climate model projections from the UK Hadley Centre give rise to suspect that the precipitation regime will change more according to the South-European regime: a reduced summer precipitation and increased risk of droughts. The position of the Netherlands at the (broad) transition zone between Northern and Southern European climate regimes makes a firm conclusion on expected local climate change effects even more difficult.

The KNMI climate scenarios are used in studies that analyse the impact of climate change on the water management in the Netherlands. Partly these studies were carried out in the NRP-programme by RIZA in cooperation with University Utrecht, Delft Hydraulics and Carthago Consultancy. Further these scenarios were input to water policy studies; 4th National Policy Document on water management and Water Management 21st Century.

Based on the used scenarios it is expected that the discharge of the river Rhine will shift to a regime determined more by rain. Simulations with a streamflow model called RHINEFLOW show that the average discharge in the winter will increase and the average discharge in summer will decrease. Due the increase in winter discharge it is expected that the extreme discharges will also increase, which leads to a higher design discharge in future. Analyses of the regional water system showed that beside the impact of climate change also the water management is important for the groundwater levels and water availability. Analysis of the response of the IJsselmeer demonstrated that sea level rise has the greatest impact on the discharge capacity. Without measures the lake levels would increase, which affects the public safety.

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The socio-economic value of water

Arjen Hoekstra, IHE – Delft
Ton Bresser, RIVM

Water should be considered an economic good. Ten years after Dublin this sounds like a mantra for water policy makers. The sentence is repeated again and again, conference after conference. It is suggested that problems of water scarcity, water excess and deterioration of water quality would be solved if the resource 'water' were properly treated as an economic good. The logic is clear: clean fresh water is a scarce good and thus has an economic value. Economists that jump into the discussion immediately see the problem: the water sector consists of technocrats that obstruct free competition in a market setting. Why is water not treated as an economic good as any other valuable resource, like for instance land or oil? Water managers know the answer: water has a very typical combination of characteristics, which makes it unlike other resources.

First, fresh water is vital to life and non-substitutable in many uses. Is then 'willingness to pay' the appropriate criterion in deciding on allocation? Second, water is a public good, and establishment of property rights is difficult if not impossible. Third, there is a (natural) allocation of water over space and time largely *independent* of human demands. Fourth, water forms a complex dynamic system in which every use causes effects (externalities) elsewhere. Fifth, water is not a homogenous good, so at one moment different drops of water can have different prices. Thus from the mere fact that irrigation water is cheaper than industrial water it is nonsense to conclude – as many economists do – that water should be reallocated from agriculture to industry. Sixth, water as a bulky good cannot be traded over large distances as most other goods. Trade over large distances can only be in 'virtual form' (in the form of water-intensive products). Seventh, water has many values that cannot easily be expressed in monetary units. And so water managers can continue in their argument that economists have nothing to offer than the wrong tools.

But the principle still holds: water is a scarce good and thus should be treated economically. There is an urgent need to develop appropriate concepts and tools to do so. A bridge should be built between water management practice and economic thinking. In allocating and using water in an efficient way, there are three levels of decision-making: how to achieve national water security (e.g. through virtual water trade, international water convenants, etc.), how to allocate between various types of use (considering both economic efficiency, equity and sustainability), and how to use water efficiently within a certain use (the level where technology plays a key role). The first two levels have received the least attention so far and deserve most attention in future research.

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Promotor of networking: Netherlands Hydrological Platform

Pieter J.M. de Laat, IHE – Delft

Hydrological research in the Netherlands is carried out by a large variety of institutes, such as universities, research organisations, consultants, ministerial and provincial services, waterboards, etc. Already in the nineteen forties it was felt that these research activities should be co-ordinated. To this end the heads of public services dealing with hydrological research established in 1946 the Committee of Hydrological Research (Commissie Hydrologisch Onderzoek) under the auspices of TNO (CHO-TNO). CHO stimulated hydrological research by setting up study/work groups dealing with current hydrological research topics. The results were disseminated through technical meetings and published in the well-known series *Proceedings and Information* and *Rapporten en Nota's*. The Organisation ceased to exist after the Ministry of Transport, Public Works and Water Management decided not to continue the financing of the secretariat in 1994. At that time virtually all organisations in the Netherlands dealing with water were a member of CHO-TNO. The tasks of co-ordination and dissemination of information were taken over partly by the Netherlands Hydrological Society (NHV) and the Foundation for Applied Water Research (STOWA). This holds in particular for activities in the field of applied research. The co-ordination of research on hydrological processes that is undertaken without the intention of immediate application, is however, not sufficiently covered. The initiative to establish the Research School Hydrology was meant to fulfil this need. Five universities and three international graduate schools drafted a report in 1995 to apply for recognition of the Research School from the Netherlands Academy of Sciences. The application was, finally, not submitted owing to a difference in opinion between the participating universities on the future of hydrological education in the Netherlands. Hydrological research was then scattered over various other research schools in the field of earth sciences, which strengthened the opinion that hydrology was to be considered a supporting science for other disciplines.

This development and the continuing lack of co-ordination of fundamental research in the field of hydrology led to the foundation of the Netherlands Hydrological Platform (NHP) in 2001. The participating organisations include four universities, two international graduate schools and seven research institutes. The NHP started with an inventory of current fundamental hydrological research in the Netherlands and an exploration of areas where a breakthrough in hydrological research is to be expected. Possibilities to obtain additional funding were also explored. Moreover, the existing Hydrology AIO-network, which had been initiated during the early 1990s, is to be revived and extended to enhance contacts among the researchers and between the PhD students and their supervisors. An internet-based platform is set up to fulfil the need for a focal point on hydrological research in the Netherlands. The main aim of this internet-based platform is to be a meeting place of all researchers in the field of water, to exchange information, ideas, plans, viewpoints, proposals, comments, etc. It is to become a Community of Practice of all those involved in hydrological research in the Netherlands.

The presentation at the seminar will focus on the internet-based platform and the establishment of a Community of Practice of researchers in the field of in hydrology.

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The International Hydrological Programme (IHP) of UNESCO is a science and educational programme in the field of hydrology and water resources. Its sixth phase (2002 – 2007) is especially directed on water interactions: systems at risk and social challenges.
The programme constitutes a framework in order

- to promote studies on the complex relationships between water and society
- to stimulate interdisciplinary approaches and research in integrated water resources management
- to improve knowledge, information and technology transfer.

Within the Hydrology and Water Resources Programme (HWRP) of WMO for the period 1996 – 2005 special emphasis is given to

- world's limited resources of fresh water and water related hazards
- variability in space and time of the world water resources
- integrated activities of meteorological and hydrological services on national, regional and global levels, including transfer of technology.

The programmes of UNESCO and WMO are closely co-ordinated and have collaboration with intergovernmental and non-governmental scientific organizations.

The task of the Netherlands National Committee IHP-HWRP is to promote the input to both programmes by the Netherlands scientific community and hydrological and meteorological services and to co-ordinate the Netherlands efforts into the programme activities.

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