

 **EU Hitachi**
Science & Technology
forum

**Water
Issues
and their
impact on
European
Society**

S U M M A R Y R E P O R T

24-26 May 2002, Budapest

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It is my privilege and great pleasure to present the summary of the proceedings of the 5th EU Hitachi Science & Technology Forum, held in Budapest, centered around the theme "water issues and their impact on European society".

Most of the members of the Forum have been guests of Hitachi in Japan as visiting researchers or business interns. There are currently 120 Forum members from European countries.

The Forum has two objectives. The first is to provide Forum members with a platform where they can meet regularly. The second is to encourage Forum members to actively participate in the debate on the role of science and technology in European society.

This is why, over the last five years, Forum members have selected different issues for discussion, and have assessed the impact of science and technology on these issues and consequently on European society at large.

The speakers and workshop moderators who kindly joined the Forum for its two days of sessions are all recognized experts in their fields.

The proceedings of this 5th EU Hitachi Science & Technology Forum are an excellent illustration of the high quality of the speakers who lead the discussion. This is particularly well reflected in the skills of Dr. József Gayer, who is responsible for drafting the proceedings.

The second part of the proceedings, regarding workshop discussions, exemplifies the fact that scientists, like any of our fellow citizens, take a deep interest in societal issues. They are also, I believe, better prepared to offer valid answers to scientific and technological issues in European society. This is one of the goals of the Forum.

We very much hope that the proceedings will contribute to the European policy debate, because they emphasize the importance the issue has on the society. It is my hope that readers will acquire some new insight, appreciate the broad scope of European legislation and be better tuned in general to the issues concerning water in Europe.

Shojiro Asai

Shojiro Asai, PhD
Chairman
EU Hitachi Science & Technology Forum
Senior Corporate Officer and General Manager,
Corporate Technology Office, Hitachi, Ltd.



Dr. Gábor Szabó, Deputy State Secretary for Research and Development, Hungarian Ministry of Education, gave the opening speech of the 5th EU Hitachi Science & Technology Forum.

The participants during the plenary session.



What is the EU Hitachi Science & Technology Forum?

Since its creation in 1910, Hitachi has kept its founder's commitment to contribute to society through technology. Once more, this long term commitment has been demonstrated by the setting up of the EU Hitachi Science & Technology Forum in 1998 by the Hitachi Corporate Office, Europe.

The Forum gathers together European scientists who have all been part of the Hitachi program called HIVIPS (Hitachi Research Visit Programs) consisting in long term internships in the Hitachi laboratories or plants in Japan. The Forum was designed to meet two objectives. The first one was to provide a yearly occasion to all European HIVIPS to meet friends and colleagues. The second one was to provide a platform where they can address and discuss societal issues related to science and technology in the daily life of their European fellow citizens.

In 1998, the Forum concept was successfully tested with the working theme: "R&D in SMEs, comparison between the EU and Japan". The meeting started the Friday evening to close on the Sunday afternoon with large breaks giving free time to the participants. This format has been kept since then. The 1999 Forum members discussed societal issues related to "Information technology and its benefits to society". Forum members insisted they would welcome a greater personal involvement, especially in the selection of the themes and in the drafting of the subsequent Forum agendas. This led to the creation of a working group appointed for one year, in charge of dealing with these two points. With this development, the Forum was to be run by its members, on topics selected by its members, for the benefit of its members. This was the Hitachi Corporate Office medium term objective.

In September 1999 a newsletter, European Connexion, was launched as a link between Forum members and Hitachi and as a tool to promote the Forum proceedings.

In 2000, the Forum was held in Ireland, following France and Germany, with members coming from France, Germany, Ireland, the Netherlands and the United Kingdom. The theme "Electronic commerce and its impact on society" was covered by scientists, specialists in social sciences and consumers' representatives who all vastly broadened the debate. The full proceedings of the meeting were published and widely distributed.

In 2001, the 4th Forum took place in Brussels to which were invited all European HIVIPS to discuss "Life sciences and their impact on European society". The Forum was chaired by Dr. Shojiro Asai, Senior Corporate Officer, Corporate Executive, who is the former President of Research & Development Group, Hitachi, Ltd. In answer to Forum members request a presentation on current Hitachi R&D developments in life sciences was made. Several Hitachi executives based in the EU and in Japan attended the Forum and answered questions related to Hitachi activities.

The Forum requires the support of experts who have a keen interest in European societal issues, who will be interested in contributing to the overall success of the EU Hitachi Science & Technology Forum through a strong personal commitment. Chaired by Dr. Shojiro Asai (Senior Corporate Officer, Hitachi Ltd.), the Forum Fellows are: Mr. Robert Verrue (Director General, Directorate-General for Taxation and Customs Union, European Commission), Dr. Florian Schmitz (Rechtsanwalt, Clifford Chance Pünder, Frankfurt), Mr. Mark Cantley (Advisor, Directorate-General Research, European Commission) and Mr. Pierre Longin (President, Longin & Associés, Brussels)

Hitachi, with the active participation of the Forum members, is committed to contribute to European Society in helping to shape policies which will improve the daily life of their European fellow citizens. In this respect, the EU Hitachi Science & Technology Forum wants to clearly bring the benefits of new technologies to all Europeans.

“Water Issues and their Impact on European Society”

Introduction

Almost 90 participants attended the 5th EU Hitachi Science & Technology Forum from 24-26 May 2002 in Budapest, Hungary, where they discussed this year's theme of "Water Issues and their Impact on European Society". Mr. Norikiyo Koide, General Manager of Hitachi Corporate Office, Europe, pointed out in his welcome address that Hungary had been selected due to its achievements in science and because of the country's forthcoming entry to the European Union. Water as a timely issue was identified since it is high on the political agenda.

Dr. Gábor Szabó, Deputy State Secretary for Research and Development, Hungarian Ministry of Education, (replacing Minister József Pálkás) expressed in his opening speech his appreciation for the Hitachi Forum and spoke about the significance of this year's topic.

Dr. Szabó mentioned the new elements of national research & development including the priority of quality of life, the threshold value for R&D support of 350,000 euros (average 500,000 euros) making important studies possible without fragmentation, encouraging industry and academia to work together, taxation advantages and other incentives. The major criterion for support is to carry out research in the country.

The scientific capacity available in Hungary is high, and reference was made to the Water Resources Research Center (VITUKI) receiving 1 million euros in support. Finally he emphasized the importance of speeding up activities and the involvement of young scientists, which is regarded as a double investment.

Science and sustainable development

Prof. Norbert Kroó, Secretary-General, Hungarian Academy of Sciences

Prof. Kroó described the limited freshwater supply compared to seawater amounts and called for a multi-sided approach to cope with the looming water crisis. He discussed the roles of the state (legislation, pricing policy), the citizens (law-abiding, moral attitude, environmental sensitiveness) and the scientists (devising new technologies), the problems of minimizing consumption, and gave practical and feasible examples. Water use efficiency in the agricultural sector can be achieved by introducing new techniques, such as drip irrigation, using sprinklers with low pressure and with their head close to the ground, better scheduling, reusing water and in general following the idea "more crop per drop".

Other options for achieving food security include growing "more economical crops" for which further research is needed (early maturing species), changing diet by eating plants situated lower in the food chain, and meat produced by water saving processes. Avoidable reservoir leakage problems, water of low quality (and cheap to produce) for toilet use, recycling, reuse, recharging groundwater aquifers, etc were listed as examples of techniques of sustainable water resources management. The much-debated desalination from seawater (an energy demanding option) and transporting icebergs for freshwater supply from the Antarctic were also touched upon.

In the European context the EU 5th framework programme was mentioned as a promising mechanism for development. The concern regarding the 20% of ecosystems polluted worldwide and the huge investment needs were highlighted by Prof. Kroó. Speaking about Hungary's hydrographical situation he also pointed out the vulnerability of the country situated on the "bottom" of the Carpathian basin, receiving 95% of its surface water resource from abroad; and he also

mentioned the famous cyanide pollution. He expressed his optimism regarding Hitachi's structured foreword, addressing three important topics: agriculture, environment and consumers in the water context.

Water and sustainable development

Mr. Tom Jones, Head of Global and Structural Policy Division, Environment Directorate, OECD

After briefly introducing the OECD, Mr. Jones explained the sustainability aspects related to water.

For many countries, the availability of water may become a major determinant of economic growth. Even in nations with adequate water resources, economic activity can be severely limited in areas affected by drought and restricted supplies. Achieving sustainable water consumption objectives will fundamentally depend on changes in the pricing and management of water demand and supply.

The OECD has recently reviewed water-pricing practices in member countries. It has completed a three-year project on sustainable development in which more efficient use of water infrastructure was recommended. The OECD is currently examining the social aspects of water pricing, public/private partnerships in the water sector, water rights and trading. Co-operating with non-member countries the OECD runs programmes on urban water sector reform in the Newly Independent States (NIS), on financing of wastewater collection and treatment in China, and on urban water issues in Official Development Assistance (ODA).

The recent OECD Council meeting at ministerial level addressed the issue of sustainable development in connection with the forthcoming World Summit on Sustainable Development (<http://www.johannesburgsummit.org>), and encouraged all countries to play an active role to ensure its success. On the definition of this frequently used term Mr. Jones gave the following explanation: "Sustainable development is ... development that lasts - a path along which the maximization of human well-being for today's generation does not lead to declines in future well-being" (after Pearce and Barbier, 2000). The pillars of sustainable development are:

- Economic dimension: benefits greater than costs, maximum cost effectiveness, delivery of public goods, international cooperation;
- Environmental dimension: regeneration, substitutability, assimilation, avoiding irreversibility;
- Social dimension: political economy concerns, developing country needs, human and social capital, transparency, accountability, democracy and justice;
- Temporal dimension: growth and development pathways, long-term environmental irreversibilities (groundwater problems), intergenerational equity (tomorrow's preferences), technology change (e.g. drip irrigation).

The framework for sustainable development policy includes:

- Wider use of markets: eco-taxes, user fees, tradable permits, limiting earmarking and other exemptions, increasing market efficiency (e.g. information)
- Stronger decision making: sectoral policy integration, local, national and international policy integration, targets for measuring progress, wider participation of civil society, access to information;
- Harness science and technology: market incentives to innovation, supporting long-term basic research, supporting applied research when a clear public interest exists, addressing unintended effects of technology change, co-operating with the private sector, improving technology competition
- Linkages to the global economy:
 - Strengthening coherence among environmental, social, trade and investment policies: reform of environment-damaging subsidies, assessing environmental and social implications of economic liberalization, promoting environmental and social codes of conduct in the private sector,
 - Support capacity building for sustainable development in developing countries: increasing market access, linkages to poverty reduction, increase aid, local benefits.

The International Conference on Freshwater in Bonn, Germany December 2001, developed Recommendations for Action in three important cross-sectoral areas: governance, management and partnerships; mobilizing financial resources; capacity building and sharing knowledge. Mr. Jones presented to the Forum "The Bonn Keys" summarizing the main areas of necessary political attention, thus making them more substantial for the public:

1. Meet the water security needs of the poor – for livelihoods, health and welfare, production and food security and reducing vulnerability to disasters. Pro-poor water policies focus on listening to the poor about their priority water security needs.
2. Decentralization. The local level is where national policy meets community needs. Local authorities – if delegated the power and the means, and if supported to build their capacities – can provide for increased responsiveness and transparency in water management.
3. The key to better water outreach is new partnerships. From creating water wisdom, to cleaning up our watersheds, to reaching into communities – we need new coalitions. Energized, organized communities will find innovative solutions. An informed citizenry is the frontline against corruption.
4. The key to long-term harmony with nature and neighbour is cooperative arrangements at the water basin level, including across waters that touch many shores. We need integrated water resource management to bring all water users to the information sharing and decision-making tables.
5. The essential key is stronger, better performing governance arrangements. Effective regulatory arrangements that are transparent and can be monitored are the way to effective, responsive, financially sustainable services. Within these we will welcome both improved public sector and private sector delivery arrangements.

Applying the framework for sustainable development policy in the water sector requires respect of basic economic principles (accounting for all externalities, marginal cost pricing, flexible trading and competition), strengthening the institutional frameworks, encouraging active participation of stakeholders and transition strategies.

At the end of his presentation Mr. Jones called attention to the high stakes, quoting data, that 47 countries with one third of the world's population face water stress, 17 countries withdraw more water than is recharged, leakage rate of supply systems even in industrialized countries is unaffordable high, 1.2 billion people lack access to safe water supply, 2.4 billion live without appropriate sanitation and about 90% of wastewater in developing countries is discharged to receiving water without treatment.

Integrated water management

Session I:

Protecting Europe's waters, the EU Water Framework Directive

Dr. Helmut Blöch, Head of Sector, Water Protection, DG Environment, European Commission

Dr. Blöch referred to the pollution problems prevailing in Europe's groundwater, rivers, lakes and regional seas, to the floods which strike also the most developed countries within the continent, but mentioned also the water scarcity problem (droughts). Over-abstraction of groundwater in certain areas results in lowering the groundwater table, pesticides pollution threatens subsurface waters, seawater intrusion represents another problem, the destruction of ecosystems and wetlands reduce habitat, erosion and desertification can also be observed. He presented pictures showing evidence of marine pollution of the Baltic Sea (showing signs of eutrophication and the consequences of a tanker disaster). On top of this the challenge of EU enlargement to Central and Eastern European countries as well as to Malta and Cyprus is an additional aspect to be tackled.

Dr. Blöch discussed then the history and tradition of environmental protection at EU level leading in the field of water to the entering into force of EU Water Framework Directive (WFD) end of 2000. The key elements of the WFD (which starts with the statement "Water is not a commercial product like any other, but, rather, a heritage, which must be protected...") are:

- protecting all waters - rivers, lakes, coastal waters and ground waters;
- good quality ('good status') to be achieved by 2015;
- water management based on river basins, across administrative and political borders;
- combined approach of emission controls and water quality standards;
- economic instruments supporting environmental objectives: economic analysis and water pricing;
- getting the citizen involved: public participation.

Perhaps the most debated item, the 'good status', was then defined through the example of rivers: this has biological quality elements (phytoplankton, macrophytes and phyto-benthos, benthic invertebrate fauna, fish fauna); hydromorphological quality elements (quantity and dynamics of

flows, river continuity, morphological conditions like width and depth variations, flow velocities etc); physico-chemical quality elements (e.g. temperature, oxygen balance, nutrient concentrations, specific synthetic and non-synthetic pollutants). Good status is to be derived in each basin from very good (untouched) status, specific for the particular eco-region and water type. It has to be achieved or kept in all waters by a certain deadline, 15 years after coming into force, i.e. 2015. Certain limited derogations will be possible.

The Framework Directive will rationalize the Community's water legislation by replacing seven of the "first wave" directives. The operative provisions of these directives will be taken over in the Framework Directive, allowing them to be repealed. The WFD is ambitious and binding on objectives, but flexible on tools. It requires the respect of a tough time schedule and represents an important challenge for all involved parties. The implementation will be unprecedented effort of Member States, the Commission, NGOs and stakeholders. The Common Implementation Strategy (CIS) was agreed within four months of publication of the WFD. It includes

- Focus on key principles – guiding documents, sharing information, capacity building and creating a common technical and scientific basis, and ensuring coherence;
- European stakeholders and NGOs participating at steering and working level;
- Involvement of the science and research community, and close cooperation with EU research institutions;
- Series of seminars in Member States and Candidate Countries.

The EU Water Framework Directive will reshape water protection and water management across Europe, based on comparable principles and objectives. It is a predictable long-term basis for decision making (technical, financial and political). It represents incentives not only for the environment, but also for research, services and goods related to water protection and water management. The CIS is already now an example of Good European Governance. For its implementation the continuing involvement of the research and science community will be indispensable.

Session II: **The Danube**

Dr. Peter Literathy, Former Director, Institute for Water Pollution Control, Water Resources Research Center, VITUKI Plc., Budapest, Hungary
Present: Senior Advisor, Program Manager, Kuwait Institute for Scientific Research

Dr. Literathy presented first the Danube river basin and the international co-operation within the catchment. There are important differences in terms of water infrastructure especially wastewater treatment facilities within the basin due to GDP differences referred to above. Besides the untreated wastewater from cities, the load of nutrients (N and P) of agricultural origin is important. Three sections of the river can be distinguished: the upper is from the headwaters to the Devin contraction (near to the Austrian, Slovakian, Hungarian triple border), the middle reach from here to the Iron Gate (at the Yugoslavian, Romanian border), and the lower one to the mouth.

The speaker gave a historical review of the development of water quality monitoring in the basin. Bilateral agreements had existed earlier between neighbouring countries, but the Bucharest Declaration issued in 1985 presented a clear general agreement on the monitoring sites at borders. In 1992 an EU/PHARE Environmental Programme for the Danube River Basin was launched and resulted in a monitoring redesign. The co-operation under the International Convention for the Danube River Basin (ICPDR) started in 1995 (with ratification in 1998). The expert groups (EGs) of ICPDR are: Monitoring, Laboratory and Information Management (MLIM), Accident Emergency Warning System (AEWS), Emission (EMIS) and River Basin Management (RBM). The determinants monitored by the Trans-national Monitoring Network (TNMN) include general, physical and chemical parameters, nutrients, inorganic components (major ions, trace elements, organic components, radioactivity) and biological indicators. The Quality Assurance and Analytical Quality Control scheme provides performance testing for the Danubian laboratories implementing the TNMN, the evaluation of laboratory performance and method performance.

The main activities of the EMIS expert group are the pollutant inventory in each Danubian country, dealing with priority pollutants, while the RBM EG

focuses on the implementation of EU WFD and river basin management planning. Two other expert groups' activities were demonstrated through two case studies and an expeditionary survey as follows.

The first accident case happened in May 1998 when pesticide spilled into the Danube at river km 1621. The actions taken by the Hungarian unit of the Principal International Alarm Centers (PIAC) under the framework of AEWS were the evaluation of data coming from the field authorities, a warning message sent to Croatia and Romania, the assessment of transboundary impacts and measurements and sending "end of alert" message. The system worked well and proved successful.

The second case was the frequently cited cyanide/metal complex spill, which occurred in January 2000 in Romania, affecting mainly the Szamos and Tisza rivers in Hungary. Dr. Literáthy reported on the accident, the counter measures taken by Hungarian authorities in order to mitigate the consequences (the use of Tisza lake and the proper flow control at Kisköre dam, to maximize dilution of the "toxic plug") and the actual concentration of dissolved copper and cyanide at different river sections. Load calculations along the Tisza river revealed that the total amount of the spilled cyanide (estimated at 110-120 tons) left Hungary for the Federal Republic of Yugoslavia together with the complexed metals (copper). Although possible accumulation of the metals in the sediment was questioned, the results showed even dissolution of the sediment-bound copper. The quality assured monitoring results allow the reliable assessment of the chemical fate of the spill, however, the evaluation of the damage to the ecology, fish population and the macrozoobenthos community needs further investigations.

A Joint Danube Survey was initiated in 1995 with the objectives to collect homogeneous data sets on different pollutants along the Danube (collection and field analysis of samples by a Core Team; analysis of samples in a single laboratory) and to provide "training" for national teams and samples for intercomparison. After years of preparation the Survey was implemented under the auspices of MLIM EG in August-September 2001 between Ulm, Germany and the Danube delta over a 2581 km length. Along the Danube samples were collected at 74 stations and from the tributaries at 24 stations. Yugoslavia was also involved (first time after the embargo period). Temperature, pH, dissolved oxygen, conductivity, copper-concentration in sediment and mussel samples, and nickel con-

centration values were presented along the longitudinal profile of the river. It was an important observation that although use of DDT was banned in the 1960s residues can still be detected downstream of Vienna. The presentation was finished with a series of pictures taken during the 6 week long expedition. The analytical boat was provided by Germany and the logistical one by Hungary.

Session III: **Industry's views**

Part 1: **'PPP'; Water tariffing & water quality**

Mr. Jacques Letondot, Regional Director, Ondeo Services

Mr. Letondot presented first the SUEZ organization, which includes three units: TRACTEBEL (energy), ONDEO (water) and SITA (waste collection). In Hungary the company is present with ONDEO Services in Budapest (drinking water), Pécs and Kaposvár, (two important Transdanubian cities) with both drinking and wastewater services, and two offices (Nalco and Degrémont).

Mr. Letondot gave an overview of the co-operation models, describing the level of private investment as function of time, listing options where the assets are owned by the municipality (management support, infrastructure agreements, delegated management, concession) and partial or full privatization. The characteristics of the Public Private Partnership (PPP) as co-operation model are that it differs from privatization, the assets are owned publicly. It assumes a long-term partnership between the municipality and a private company based on reciprocal trust and shared benefits. The advantages of PPP are:

- Higher service level with lower risk due to the global size of the partner, know-how sharing etc.;
- Clear responsibility and task sharing (the contractual relation is simplifying problems and accounting controlling);
- Compulsory maintenance and efficiency program;
- Opportunities for planned reconstruction, financing new investments, keeping the lowest water rates.

In France the private partner involvement has been practiced since the mid 19th century, while in the UK a full privatization wave occurred from in 1989 according to prime minister Mrs. Thatcher's

idea. In Spain it has been developing gradually since the early 1990s and there are certain examples in Germany as well. Italy witnessed recent changes in PPP policy and rapid development is foreseen. In the EU candidate countries the important investment needs in water infrastructure triggered great development and Hungary as an example has six PPP in operation, representing more than 40% of the market.

Regarding the key water issues of the EU (urban wastewater management, water resources management, nitrate problems), the huge investment needs of the candidate countries and the advantages Public Private Partnership can offer led to the conclusion of Mr. Letondot's presentation: a clear-cut opinion, "go for a PPP".

Part 2:

For a sustainable water management system

Dr. Koichi Tsuzuki, Mechanical Engineering Research Laboratory, Hitachi Ltd.

Dr. Tsuzuki started his presentation with an overview on water in Japan. Since Japan will host the 3rd World Water Forum in 2003 it is of especial interest to see the water related problems of the country. The water budget shows 400 billion m³/year input in the form of rainfall from which 60 billion m³ is used by agriculture, while the industrial and domestic water use are 14 billion and 16 billion respectively. The resources are 85% surface water and 15% groundwater in total, but two-thirds of the municipal use (industry and homes) comes from surface water bodies. It is interesting to note that 78% of the industrial demand is recycled, a fact that helped Japan to become an industrialised country. The same value in domestic use is only 1%.

The major problem is eutrophication leading to water quality degradation. It has been recognized that a single measure is not enough to tackle the situation and the idea of sustainable water management has been adopted. The Hitachi group contributes to this endeavour by providing its products and services, like Geographic Information Systems (GIS), monitoring systems, water treatment systems and pumping systems.

GIS with simulations are powerful tools for water resource management. High-resolution images taken by satellite and analyzed make it easy to update geographical data. The system is based on Quick Bird II launched in October 2001.

The continuous monitoring of water is crucial for water resource management. Hitachi devotes much of its R&D effort to developing technology to enable continuous sensing of those parameters in the field which otherwise could only be measured in laboratory. One of the examples of the monitoring is the plankton monitor system. The change of algae concentrations in a pond during a summer day was presented as measured by Hitachi equipment. The second application showed was the Compact Water Analysis System (Hitachi Type-AN 570). With this seven quality parameters are measured in the drinking water supply network by a micro flow cell which can also be applied to monitor toxic chemicals. The third application example was a bio-monitoring system in which a TV camera image is processed to identify any evidence of unusual behaviour in shrimps or fish, which are sensitive to toxic materials.

The last example was taken from the water treatment technology. The magnetic separation system, which has a superconducting magnet, as its name suggests, separates flocs magnetically instead of by the conventional flocculent setting process. It needs a few ferrite particles added to make the floc magnetically separable, requires short retention time (less than 5 minutes) and saves energy. The size of the prototype plant is 875 x 430 x 470mm with a daily capacity of 100m³. The result is low water content (i.e. small amount of) sludge.

One of the most important environmental issues to be solved in the 21st century is water scarcity. Water management with reliable technology is the key to solving this problem.

As Dr Tsuzuki concluded, the Hitachi Group contributes to building sustainable water management systems through its products and services.



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Working Sessions

Three parallel working groups discussed timely topics related to water the first day afternoon and presented their findings in the plenary session of the second day.

Group 1:

Water and Agriculture

Chair: Prof. Helmut Fleckseder, Austrian Federal Ministry for Environment and Water management

Reporter: Dr. Pascal Lutz, Forum Member

In the context of water and agriculture the group identified two main areas of interest, i.e. water supply and pollution. Considering that agriculture is the most important water user, water withdrawals for irrigation are 70% of the total withdrawn for human uses, the infrastructure of this immense system is of crucial importance. Irrigation raises agricultural productivity and thanks to this fact food production in developing countries has kept pace with population growth in the past 40 years. The supply problem entails quantity and quality concerns as well. The pollution problem associated with agriculture is due mainly to the wide use of pesticides and herbicides and presents a threat in diffuse form. Investigating the relationships between different actors connected to the food field can be very instructive. Consumers in the center, then farmers, governments, the food industry, the whole embedded into the environment show obvious interdependence and interactions. Consumers as constituency can influence decision makers and governments to create laws and determine subsidies, incentives and appropriate taxation systems in order to influence industry and farmers to produce healthy food at affordable prices, while the consumption trends, habits and behaviour of consumers on the market can have their impact on industrial decisions. Providing appropriate infrastructure and sound land management is of high importance, since mismanagement can be harmful for the environment through soil erosion, and pollution of receiving waters as well as the sea. It must be kept in mind that every land use decision is also a water management decision. Dams are often the subject of fierce debate and their role must be found in harmony with sustainable development principles. It is regrettable that farmers have practically no contact with end-users.

The group identified key questions (admitting that there are more questions than answers), such as:

- How critical is the problem, and how fast do

we need to react?

- What is the level of involvement of actors to get solutions?
- Are there global solutions to water problems? Seemingly not, because water issues are not identical everywhere (no blueprint to copy, but lessons can be learned both from good and bad examples);
- Are there global solutions to food problems? It raises market and solidarity issues. Should over-productive areas share their production? With trade the non-self-reliant countries can procure food, but this requires trust and peaceful international circumstances;
- Are there solutions in a context of worldwide competition? This is doubtful because of different labour costs, and different environmental laws valid in different countries.

Water and agriculture represent a complex multidimensional problem. It involves many actors, the necessity of maintaining rural landscape, and the fact that consumption is not adapted to sustainable development. An example was presented on the negative ecological impact of anthropogenic interfering with the natural nitrogen cycle. The essential uptake of protein for the organism can be provided either by animal or vegetal origin. Finding the sound balance can result in less N discharge to the environment (vegetarian movement).

The inhomogeneous situations prevailing in different regions might demand case by case solutions. There is a danger of adverse effects of certain actions (in case of subsidies, overproduction). A general trend experienced is the industrialization of agriculture, which entails labour cost and availability problems. There is a change in consumption habits, which again has a societal impact on the sector. Demand management might have a beneficial influence if carried out carefully. The expectations of consumers are high regarding quality aspects.

Solutions proposed by the group include:

- Education of actors, awareness raising. Farmers could be taught about resources, optimization, and the environmental impact of their activities. Consumers must be informed on healthy diet and food implications as well as the environmental impact of their consumption habits. Governments and officers often need to be briefed on the scientific results or simply the implications of new regulations, like the new

Water Framework Directive (WFD). In accession countries there is a tremendous demand on the administrations as a consequence of joining the EU in the foreseeable future (WFD, common agricultural policy, etc).

- Better use of rules and law enforcement. Subsidies, incentives and disincentives if appropriately applied can encourage sustainable practice (ecotax).
- Research efforts must be better oriented. E.g. plant biology research needs to be funded. (EU Framework Programme 6 was debated in this context).

The general conclusion was that there is no global solution, developed and developing countries differ so much that no blueprint can be applied. We are in a stage when definitely there are more questions than answers.

Group 2:

Water and Environment

Chair: Dr. Philip Weller, Director Danube-Carpathian Programme, WWF International
Reporter: Dr. Mike Butcher, Forum Member

The issue in the water and environment context is if we can use and manage water resources in a manner that does not destroy or damage the environment on which we depend.

As agreed by the group members, mankind has not managed freshwater resources in an effective, economic, responsible manner. This has led to various types of damage, like:

- channelization of rivers and lakes, where rivers were diverted, natural line altered;
- destruction of wetland and floodplain areas;
- release of pollutants which either cannot be assimilated fast enough or not at all (e.g. toxic heavy metals) accumulate along entire length of food chain affecting water quality, reproductive health, agriculture;
- accidents of significant size and frequency;
- war (e.g. bombing of manufacturing facilities along the Danube).

This has resulted in a dramatic decrease in the number of water borne organisms, a significant decrease in freshwater biodiversity (as evidenced by the sturgeon population in Danube, down from six to a single species only found in the downstream section of the river).

Based on the above the group formulated the

following key questions and tried to answer some of them:

- How can corporations be persuaded/coerced to adopt environmentally responsible policy?
- What role does/should technology play?
- What role should legislation have in directing environmental policy? How can we support 'clean' Third World development where current water consumption is low but the potential for inefficiency is great?
- To what extent does 'western life-style' govern attitude to environmental issues? (Examples are Spanish strawberries and New Zealand lamb.)
- What influence can we have through our personal choice?

The group outlined a "carrot and stick" solution with a strong emphasis on severe penalties in case of failure. This was however disputed during the plenary, where the advantages of the "carrot" were underlined and suggested as a first option. In this context the use of market pricing was supported instead of cost pricing.

It was agreed that technology is only one tool in a portfolio of tools, which consists also of legislation, financial incentives, education of consumers, process change and corporate governance. Technology in isolation is not a 'white knight'. Focus on technology alone can mask 'real' issues.

The discussion concluded that legislation should set clear limits/targets and timeframes; address funding issues; provide explicit benchmarks; ensure effective verification and enforcement and apply penalties that are swift and serve their purpose. Legislation should be driven by consultative process (e.g. Water Framework Directive, where countries were part of the success).

The drivers for change can be either top down, where EU and governments are driving legislation and regulatory environment, or bottom up, where consumer education is driving awareness and demanding accountability (e.g. food labelling, Green funds). In between lies the operational implementation: corporate embrace (e.g. executive driven, adoption by employees, credible to stakeholders, persistence beyond trend/hype)

Surprisingly there was little corporate responsibility evident in the group. Members were not aware of the environmental impact of their institutions. We are living in a fragile ecosystem where every action has a consequence and sustainable development solutions must reflect this living dynamic character.

Economic and political interests imply early involvement of stakeholders and seeking for consensus (avoiding 'not invented here' syndrome). Key is the philosophical understanding of our living planet. Water resources are not isolated, but attached to living systems (of which we are a part) and we must not undermine the basis we depend on. Although many mistakes have been made, one can be optimistic if the multitude of ideas are analyzed carefully and adopted properly.

Group 3:

Water and Consumers

**Chair: Mr. Maurice Terry,
Chairman WaterVoice (UK)**

Reporter: Dr. Chris Marsh, Forum Member

The chair set the tone for the group discussion with introducing WaterVoice, an independent representative of customers in England and Wales. WaterVoice promotes customers' interest in respect of price, service and value for money, therefore has a lot of experience in customers' behaviour, their expectations and rights, and also in the endeavours of utility companies, the relationship of the two sides, and last but not least in the market situation.

Recent market research shows that in the UK nine out of ten consumers are satisfied with the service they receive and two-thirds believe their bills represent good value for money. It was concluded that there is a general lack of awareness amongst consumers on metering rights, bill reduction options and efficiencies. They are not critical enough of water supply and sewerage services. Average people do not have any knowledge about the composition of the price (treatment and pumping costs represent 35% and 65% of the total cost respectively, and the supply/disposal cost ratio is around 40 to 60 in both the UK and Germany). The discussion revealed that the probable reason is that most people in Europe can easily afford to pay water bills without thinking about it. They take water for granted and do not pay much attention, which is regrettable, because better informed consumers are more powerful and this is in their interest.

Listed among consumers' priorities were water of high quality, continuous supply, responsible waste management, trouble free service, low price and environmental friendliness. People definitely look for a sound balance of cost, quality and environment protection. Consumers' concerns include water pressure, leakage of the network and sewer flooding, while less attention is paid to environmental impact caused by the service provider.

The next topic discussed was the impact of eventual competition. Can it improve level of service for consumer benefit? The question is rather hypothetical due to the monopolistic situation of service providers within a particular settlement. There is no direct competition in Europe, the lack of national grid restricts free competition between different companies (it would be too expensive to construct parallel networks) and EU legislation is missing in this field.

On the ownership issue three different schemes were reviewed, like privatization, which is typical for UK; Public Private Partnership (PPP), widely accepted in France and examples exist in Central and Eastern Europe; and public utilities, present in the rest of Europe. All three alternatives have their legal, financial, technical regulatory and institutional requisites for successful operation. Experience shows that in the UK privatization increased water quality, but also put up prices. There is no plan to privatize in the Netherlands, and Germany is suspicious of this solution. There was agreement that if privatized with only one provider, the supply and disposal of water has to be closely regulated to prevent abuse of monopoly power. Debate was conducted on selecting the best option, but remained inconclusive. Consensus however developed on the necessity of consumer information on advantages and disadvantages in order to enable better decisions.

The group addressed the problem of additives to water (e.g. fluoride) and found that there are different practices in Europe. In the UK prior permission is requested from a governmental body, while in France there is no need for consultation (as a recent example in Paris showed). There is no European country, which directly consults with consumers before adding chemicals to drinking water. While consumers should be responsible with water use, and education plays an important role here, people should hold water supply and sewerage companies responsible for optimizing water consumption. There was general agreement on the importance of public information and awareness raising which would help consumers to understand that water should not be taken for granted. This could lead to a constructive debate involving all players and stakeholders in the field.

The discussion ended with the illuminating quotation from Leonardo da Vinci: "With time and water: anything is possible".

Conclusion

During the Forum it has been generally agreed that the availability of water may become a major determinant of economic growth. Yet even where supplies are sufficient or plentiful, they are increasingly at risk from pollution and rising demand. Europe's waters are in need of more protection, in need of increased efforts to get them clean or to keep them clean.

By developing principles and methods to efficiently and ethically manage this resource while respecting related ecosystems, scientists can make a step to get closer to the goal of sustainable development. Forum participants identified several priority areas/recommendations, including

- The support of innovative, long-term basic research, and of applied research when a clear public interest exists;
- Wider use of markets including eco-taxes, user fees, tradable permits, limiting earmarking and other exemptions;
- Integrated water resource management including natural and human systems integration;
- Stronger, better performing governance arrangements. Water governance adds a political dimension to water resources development and management;
- Public involvement bringing all water users to the information sharing and decision making tables;
- Rivers and lakes need to be managed by river basin - the natural geographical and hydrological unit - instead of according only to administrative or political boundaries;
- Food production can be secured by more efficient water use in the agricultural sector introducing new techniques. The pollution problem associated with agriculture is needed to be addressed;
- Appropriate water pricing should contribute to the wise use of this limited resource;
- Public Private Partnership (PPP) as co-operation model for long term partnership between the municipality and private company, based on reciprocal trust and shared benefits;
- International co-operation within catchments shared by more countries should be encouraged;
- Technology is only one tool in a portfolio of tools, which consists also of legislation, financial incentives, education, etc.



From left to right: Mr. Tom Jones, Dr. Helmut Blöch, Dr. Peter Literathy



From left to right: Dr. Pascal Lutz (Forum Member), Prof. Hellmut Fleckseder, Dr. Peter Literathy, Mr. Maurice Terry, Dr. Chris Marsh (Forum Member), Dr. Philip Weller, Dr. Mike Butcher (Forum Member)

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