

RECOMMENDATIONS OF EURAQUA'S FIRST TECHNICAL REVIEW INSTITUTE OF HYDROLOGY, WALLINGFORD, UK, 2-4 NOVEMBER 1994

1. Summary of Discussion Session

The discussions which followed the presentation of country papers were structured so as to allow one hour for the examination of each of three themes. This allowed all delegates to participate in each discussion, rather than splitting the Technical Review into three separate workshop groups. The themes for discussion were selected on the basis of the most important issues raised in the Country Papers. Chairmen and rapporteurs were chosen from those countries which appeared to have a significant level of concern with issues relating to each of the three themes. Delegates were given the opportunity to comment on the proposed themes and to make alternative suggestions for the discussions. The Technical Review was satisfied with the proposed themes and the suggested chairmen and rapporteurs were happy to undertake these roles. The themes, chairmen and rapporteurs are given in table 1.

TABLE 1 Discussion themes, chairmen and rapporteurs

Themes	Chairman	Rapporteur
1. Flood plain and wetland management issues	Oberlin (France)	A. Hoeks (Netherlands)
2. Changing impacts of agriculture on water resources	K. Jensen (Denmark)	L. Beroud (France)
3. Climate change effects on land use and water resources	T. Lüllwitz (Germany)	M. Benedini (Italy)

The chairmen and the rapporteurs of each of the three themes were asked to present a summary of the discussions on the final morning of the conference. The aim of each summary presentation was to provide an overview of the main research priorities at the European level relating to the three selected themes and to indicate a ranking of these priorities in accordance with the views expressed by delegates during the discussion sessions.

These presentations provided a basis from which the chairman of the final session could present a general overview of the Technical Review and lead to the formulation of the *EurAque* position on land use change and water resources. Summaries of the discussions under each of the three themes are given below.

Theme 1 : Flood plain and wetlands management issues

The discussion focused on land use vulnerability in the river flood plain, on optimal allocation of resources within this environment and on the benefits of integrated catchment management especially for the conservation of aquatic ecosystems. In particular two overriding aims were emphasised.

The first aim is that of developing a common tool for the integrated management of water resources and land use. This could involve mapping of vulnerability, hazard and demand within the floodplain or wider catchment so as to define appropriate land uses and allocate water accordingly. A multi-disciplinary approach should be adopted in the development of this method so as to ensure as comprehensive a coverage of environmental, economics and social interests and effects as possible.

The second aim identified by the discussion was the need of a common "golden rule" for water resource management. The thrust of this rule is a reversion of past and current practices such as river training and over-exploitation of resources so as to increase the residence time of water in the land phase of the hydrological cycle. This will enhance the sustainable use of water resources, taking into account uncertainty over future climate, and help to improve water quality and the status of fresh water ecosystems.

Within the framework of these two overall objectives the discussion was able to identify a number of specific research tasks. These include research into the effects of integrated management strategies on water quality, on the conservation and creation of wetlands and on flood control in mountainous areas. Another line of enquiry is to investigate the consequences of such integrated approach of catchment management on flood forecasting and warning systems.

Theme 2 : Changing impacts of agriculture on water resources

The discussions identified two important trends in agricultural land use, both of which are likely to result from changes in the EU's Common Agricultural Policy (CAP). These are, firstly, the increase in non-farmed land whether due to set-aside, afforestation or the restoration of natural habitats and, secondly, changes relating to the development of sustainable systems of agricultural production. These latter changes include the development of new crops, extensification and reduced application of fertilisers and pesticides. In addition the growing problem of dry land degradation was raised as being of particular concern for agricultural land use in southern Europe.

Given these changes and taking into account the current level of knowledge described in the individual country papers the discussion was able to identify research priorities to improve our ability to predict the effects of agricultural land use change. At the forefront of these priorities is the need to develop better physically based models which in turn rely on improved techniques for measuring and estimating components of the hydrological cycle on an areal rather than point basis.

A second priority area is that involving research into water quality and in particular the leaching and reaction of nutrients and pesticides in the unsaturated and groundwater zones. In the context of both water quantity and quality these investigations should pay attention to improved monitoring techniques and instrumentation and the problems of upscaling and parameterization.

As an overall objective the discussion concluded that in order to fully take account of changing agricultural (and other) land use there is clearly a need for the development of integrated catchment models of water quantity and water quality. This should lead to development of optimisation models and decision support systems for improved planning of agricultural land use that takes proper account of water resource concerns.

Theme 3 : Climate change effects on land use and water resources

The discussion on climate change identified as a central theme the need to improve the prediction of water resources availability under different climate change scenarios at the regional, national and European scales. This should include both the direct effects related to climate change through variations in precipitation and temperature and also indirect effects related to changes in land and water use.

Within this framework the main priority for research is the development of hydrological models which can be linked in with both climatological models and land use databases through the technology of GIS and remote sensing. Models should be developed which allow prediction of effects of climate change in both spatial and temporal dimensions. In addition they should provide coverage of both changes in water quantity, especially ground water recharge and variations in drought seasonality, and water quality.

2. The EurAqua Position - Research Priorities

In the final session of the Technical Review an attempt was made to isolate the most important points of the preceding summary presentations to arrive at *EurAqua* position or overview on priorities for research in the broad area of land use and water resources. This position is summarised below as a hierarchical framework of three levels within which specific research needs can be identified.

Level One - A Strategic Objective

EurAqua proposes as a strategic objective the development of a common integrated catchment management system to support decision making on land use and water resources. This should allow simulation of future water resource availability and land use under changed social, economic and environmental conditions or practices including climate change hypotheses.

Level Two - Improvements in Theory and Method

EurAqua has identified the need for theoretical and methodological improvements in several areas of land use water resource research. Amongst these the following priorities have been identified.

- measurement and estimation of large scale mass and chemical transfers
- techniques for upscaling and model synthesis
- interfacing of disciplines (water sciences with water concerned ones)
- parameter identification
- monitoring and instrumentation
- ecotoxicology
- mapping respecting the spatial diversity

Level Three - Problems and Sensitive Areas

EurAqua has identified several specific problems and sensitive areas where the current level of knowledge or management practices in use are of particular need of improvement. Amongst these the following priorities have been identified.

- areas susceptible to major flood hazard, including mountainous regions
- wetlands and areas of biological diversity
- water resource transfer schemes

Last words

If water and land management have both to respect a basin scale and an adapted subsidiarity level they also need a co-ordinated approach of same or comparable concepts, rules, variables, models, etc... at European and continental levels. Research in this field must take these objectives into consideration.