

**COST ACTION 626 EUROPEAN AQUATIC MODELLING NETWORK
MID-TERM REPORT
Trondheim, 29 March 2004**

1 Title and duration

COST Action 626, European Aquatic Modelling Network (EAMN), started 15 September 2000. The COST Action 626 entered into force 22 June 2000 and will end 21 June 2005 after a recent decision on the extension of the Action. The first Management Committee meeting was organized 15 September 2000.

2 Objectives and work plan

The main objective of COST 626 is to define and develop integrated methods and models of assessing the interactions between aquatic flora and fauna and riverine habitats on reach scale and provide transferability to a catchment scale.

In order to ensure the successful conclusion of the study, the research programme breaks down the overall objective into three important Action tasks in the Working Plan:

- A. Defining research needs in methods and models of assessing the interactions between aquatic flora and fauna and riverine habitats. The state-of-the-art will be the basic framework for scientists and end-users to apply in their national research or operational functions. A World Wide Web site will be made available to serve this framework. This task requires Action participants to collate information on a broad scale, including participation from non-COST countries where important research and application have taken place (i.e. USA, Canada, Australia, and New Zealand). The first workshops and publications in the Action will focus on task A.
- B. Improve and develop new methods and models of assessing the interactions between aquatic flora and fauna and riverine habitats. The national research programs will focus on improvement and developments of methods and models on the basis of needed development defined in the Action with special emphasis on the implementation of habitat modelling methodologies in catchment management.
- C. Provide end-users with the best available methods, models and tools for assessing the interactions between aquatic flora and fauna and riverine habitats on reach and floodplain level. Through national funded research and co-ordination by the Action, end-users will participate and receive an updated framework for their operational and research needs.

Detailed knowledge of hydrology, hydraulics, geomorphology, river and fish ecology is needed in order to achieve the objectives of the Action. To ensure the integration of different scientific disciplines, all Action tasks will contain three Working Groups:

WG 1: Raw data

WG 2: Modeling

WG 3: Model applications

The table illustrates the overall Working Plan and the Working Groups:

Working plan	Working Group I: Raw data	Working Group II: Modelling	Working Group III: Application
Task A: Defining research needs	Raw data needs Statistical methods	Model description	Application background
Task B: Developing methods and models	Need for new data Data acquisition methods	Model developments	What do we need? Degree of details Limitations
Task C: Making methods and models available	Data requirements Instruments and methods Raw data examples	Model availability Documentation Validation	User friendliness Operator requirements Application examples Documentation

3 Meetings pr 29 March 2004

Meeting dates	Meeting place	Type of meeting
15 September 2000	Brussels, Belgium	Initial MC meeting
8-9 March 2001	Stuttgart, Germany	Joint WG meetings
10-11 May 2001	Trondheim, Norway	Joint MC and WG meetings
8-9 November 2001	Vigo, Spain	Joint MC and WG meetings
30-31 May 2002	Oulu, Finland	Joint MC and WG meetings
17-19 October 2002	St Pée sur Nivelle, France	Small Group Meeting
11-14 December 2002	Ghent, Belgium	WG 3 meeting
29-31 October 2003	Aix-en-Provence, France	Joint MC and WG meetings
24-26 March 2004	Salzburg, Austria	Joint MC and WG meetings

4 Short Term Scientific Missions pr 29 March 2004

Helmut Mader at the Agricultural University of Vienna administrated the Short Term Scientific Mission program in 2002. The following exchange of scientists were conducted:

Name of scientist	Affiliation		Visiting (host)	
Veronique Adriaenssens	University of Gent	BEL	Alterra	NED
Javier Sanz Ronda	University of Palencia	SPA	SINTEF	NOR
Inigo Rebollo	University of Lleida	SPA	University of Stuttgart	GER
Monica Rivas Casado	University of Lleida	SPA	Center for Ecology and Hydrology	UK
Avner Kessler	Water Resources Engineering	ISR	Center for Ecology and Hydrology	UK
Gregory Egger	Institut für Ökologie und Umweltplanung	AUS	University of Stuttgart	GER
Hannes Badura	University of Agricultural Sciences	AUS	SINTEF	NOR
Gernot Koboltschnig	University of Agricultural Sciences	AUS	Nortek	NOR
Péter Borsányi	Norwegian University of Science and Technology	NOR	Center for Ecology and Hydrology	UK

5 Publications pr 29 March 2004

All relevant documents and information about COST 626 are available at www.eamn.org

The output of Task A in the Working Plan is the report:

Harby, A., Baptist, M., Dunbar, M.J. and Schmutz, S. (editors). 2004. State-of-the-art in data sampling, modeling analysis and applications of river habitat modeling.

6 Participating Countries

The countries who applied for COST 626 are: Austria, Finland, France, Germany, Netherlands, Norway and United Kingdom.

At the first Management Committee meeting the following countries also joined: Belgium, Denmark, Hungary, Luxembourg, Spain and Sweden.

After the start of COST 626, some additional countries have joined: Greece, Israel and Slovenia.

7 Results

The main result of COST 626 can be found at www.eamn.org. The most important output so far is the report described in paragraph 5.

In WG 1, the results give an insight in how biotic and abiotic data are sampled for habitat models. State-of-the-art physical habitat measurement techniques and instrumentation are described. Special focus is given to collecting fish data for micro- and mesohabitat modelling, community orientated models, experimental channel studies, bioenergetic and population models. Another focus is on macrobenthos where information was compiled on field sampling, sampling data at different scales, sampling protocols, species identification, relation between macrobenthos and physical factors, data quality assurance and data base maintenance.

In WG 2, the results include a comprehensive description of modelling techniques in use for habitat modeling. An inventory of modelling tools used by the COST626 members has resulted in a detailed listing for 27 different tools. An inventory of the most important research needs has also been carried out. Some adaptations to the Casimir software from University of Stuttgart has been done to fit with the Delft3D-model from WL Delft Hydraulics.

In WG 3, the first results included a summary of how and to whom river habitat models are useful. The main result has been a database of descriptions of 28 applied habitat modelling studies. These mainly cover hydrological impacts to rivers (e.g. hydropower, water abstraction) but also river rehabilitation and mitigation. These have been summarised and provide a valuable resource for potential users of habitat models. Two special topics describe examples of tools for assisting end-users in involvement with modelling studies. Some case studies have since been published by other organisations, e.g. www.waterfornature.org

After discussions in the Working Groups, 7 topics have been identified as the most important issues to conduct collaborative research in:

1. Abiotic and biotic data management
2. Fuzzy logic and other statistical methods for fish and invertebrates
3. Flow variations and hydropeaking
4. Scaling issues
5. Winter conditions for fish
6. Floodplain vegetation modelling

7. Modelling for the Water Framework

Several research programs and collaborations between COST 626 partners are under work in each topic. Please see attachments for details.

8 Meeting the objectives and timetable

By 29 March 2004, the main objectives of COST 626 are being fulfilled almost according to the plan. The progress of the Working Plan has suffered from low budgets and administrative problems at COST leading to no large meeting activities between May 2002 and October 2003. However, after the re-establishing of more favorable working conditions, the partners of COST 626 are catching up with the Working Plan. Recently we also received a positive answer from COST CSO to our application of a one-year extension of COST 626. We believe that all objectives can be accomplished within this new extension of the Action.

9 Further work

The joint MC and WG meeting organised in Salzburg, Austria, 24-26 March 2004, discussed and outlined the integrated framework for the quantitative assessment of the effect of human influences on aquatic ecosystems. The framework will be an Internet-based framework where to find knowledge and information.

10 Scientific papers

Baptist, M.J., Van der Lee, G.E.M., Kerle, F. and Mosselman, E., 2002. Modelling of morphodynamics, vegetation development and fish habitat in man-made secondary channels in the River Rhine, The Netherlands. Environmental flows and 4th Int. Symposium on Ecohydraulics, Cape Town, South Africa, March 3-8, 2002

Dangelmaier, G. 2004. Importance of flow variability for fish in the regulated river Surna, Mid-Norway, with emphasis on habitat conditions for salmonids. An attempt of setting sustainable management guidelines by using indicators of hydraulic alteration. Diploma thesis at Institute of Hydraulic Engineering, University of Stuttgart, Germany.

Halleraker, J.H., Saltveit, S. J., Harby, A., Arnekleiv, J.V., Fjeldstad, H.P. and Kohler, B.2003. Factors influencing stranding of wild juvenile brown trout (*salmo trutta*) during rapid and frequent flow decreases in an artificial stream. *Journal of Rivers Research and Application* **19**: 589-603.

Harby, A., Dunbar, M., Jorde, K. and Schmutz, S. 2002. European Aquatic Modelling Network. *Poster at Environmental flows and 4th Int. Symposium on Ecohydraulics, Cape Town, South Africa, March 3-8, 2002.*

Harby, A., Alfredsen, K., Fjeldstad, H.P., Halleraker, J.H., Arnekleiv, J.V., Borsányi, P., Flodmark, L.E.W., Saltveit, S.J., Johansen, S., Vehanen, T., Huusko, A., Clarke, K. and Scruton, D. 2001. Ecological impacts of hydropeaking in rivers. *Proceedings, Hydropower-2001, Bergen, Norway.*

Harby, A., Clarke, K., Pennell, C., Scruton, D.A., Stephenson, E., Ott, T., Haugland, S. & Heggenes, J. 2001. Habitat use and movement patterns of Atlantic salmon parr (*Salmo salar*) during rapid variations in discharge. The Fourth Conference of Fish Telemetry in Europe. Trondheim, 26-30 June 2001.

Jorde, K., M. Schneider, A. Peter & F. Zöllner. 2001. Fuzzy based Models for the Evaluation of Fish Habitat Quality and Instream Flow Assessment, Proceedings of the 2001 International Symposium on Environmental Hydraulics, Tempe, Arizona, USA.

Kerle, F., Zöllner, F., Schneider, M., Kappus, B. and Baptist, M.J., 2002. Modelling of long-term fish habitat changes in restored secondary floodplain channels of the River Rhine. Environmental flows and 4th Int. Symposium on Ecohydraulics, Cape Town, South Africa, March 3-8, 2002.

Rivas Casado, M. 2003. Geostatistical techniques for river hydromorphology: monitoring ecological status for the Water Framework Directive. MSc Thesis, Cranfield University.
Schneider, M. and Peter, A. 2001. Neue Methode in der Gewässerökologie – Habitatmodellierung mit Fuzzy-Logik. *Ingenieurbiologie / Genie Biologique*, Nr. 4/01, 11. Jahrgang, Langnau, Schweiz.

Scruton, D.A., Ollerhead, L.M.N., Clarke, K.D., Pennel, C., Alfredsen, K., Harby, A. and Perry, D. 2003. The behavioural response of juvenile Atlantic salmon (*salmo salar*) and brook trout (*salvelinus fontinalis*) to experimental hydropeaking on a Newfoundland (Canada) river. *River research and applications* **19**: 577-587.

Scruton, D.A., Clarke, K.D., Ollerhead, L.M.N., Perry, D., McKinley, R.S., Alfredsen, K. and Harby, A. 2002. Use of telemetry in the development and application of biological criteria for habitat hydraulic modeling. *Hydrobiologia* **483**: 71-82.

Vehanen, T., Bjerke, P.L., Heggenes, J., Huusko, A. and Mäki-Petäys, A. 1999. Shelter type selection and behavioural responses by Brown trout under variable flow conditions: A laboratory experiment. *Presented at 3rd International Symposium on Ecohydraulics, Salt Lake City, USA.*