

**BIENNIAL REPORT (1992-1993) 'ECOLOGICAL REHABILITATION OF THE  
RIVERS RHINE AND MEUSE'**

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## **CONTENTS**

### **Chapter 1. GENERAL**

1.1	Introduction	5
1.2	Conclusions and recommendations of the international conference on rehabilitation of the River Rhine March 15-19, 1993, Arnhem, The Netherlands.	6
1.3	Staf and financial management	10

### **Chapter 2. PRODUCTS**

2.1	EHR-reports 1992-1993	11
2.2	Publications 1992-1993	12
2.3	Reports 1992-1993	15
2.4	Presentations at conferences 1992-1993	17

## CHAPTER 1. GENERAL

### 1.1 Introduction

The years 1992 and 1993 marked the first two years of the second phase (1992-1995) of the research Programme 'Ecological Rehabilitation of the Rivers Rhine and Meuse' (EHR). The activities in these two years focused on summarizing and evaluating the results of the first phase (1987-1991), and formulating and starting up the second phase of the programme. As the second phase also included the floodplains, with its nature development projects, the EHR research team was extended in 1992 to include the IBN-DLO and the SC-DLO research institutes.

The results of the first phase of the Dutch research and prospects for the implementation of the Rhine Action Programme were summarized in an EHR report (Van Dijk & Martelijn, 1993). In 1993 the international conference on 'Rehabilitation of the River Rhine' (15-19 March, Arnhem), organized by RIZA, RIVM and RIVO-DLO, was a major event. This conference presented a review of the efforts made to improve water quality and restore river habitats. The conclusions and recommendations of this conference are given in section 1.2. The proceedings of the conference will be published in the IAWQ international journal *Water Science and Technology* in the first half of 1994. At the conference the film 'The Rhine, rehabilitation of a river' commissioned by the Ministry of Transport, Public Works and Water Management in the Netherlands was shown publicly for the first time.

The EHR research programme of the second phase (Anonymous, 1992) also includes the ecological rehabilitation of the River Meuse. In 1992 a start was made on ecological research on the River Meuse as a basis for an ecological rehabilitation programme for the Meuse. Worth mentioning here is the scientific meeting on 23 November 1993 on the 'Ecological State and Perspective of the River Meuse' held in Amsterdam (organized by the Netherlands Society of Aquatic Ecology and the Netherlands Society of Ecology, and supported by the EHR research team). The results of this meeting will be published in a special issue of the *Netherlands Journal of Aquatic Ecology*. This meeting illustrated the importance of a Meuse Action Programme and the rather limited availability of ecological information on the River Meuse.

In the period 1992-1993 floodplain research was strengthened. The activities focus on the biological availability of PAHs and the design of nature development projects using a modelling approach. On 10 February 1993 a scientific meeting entitled 'Nature development of floodplains' was organized by the EHR research group.

Internationally, efforts have been made to implement the 'Stepping Stones Concept'. The 'Kerngruppe Ökologie' of the Rhine Commission is preparing a document on this subject for the ministers conference in December 1994.

## **1.2 Conclusions and recommendations of the international conference on rehabilitation of the River Rhine March 15-19, 1993, Arnhem, The Netherlands.**

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### **1. Introduction.**

The conference focused on the ecological rehabilitation of the river Rhine, one of the four objectives of the Rhine Action Programme. Although the scope of this theme may appear to be limited, considering the many functions the Rhine has, it was shown that this is not so. All aspects of river management are involved in this theme.

Information on the subject of the conference was presented and discussed in six sessions and in poster presentations. Each of these sessions gave a good insight in the state of the art of the various fields of research, necessary for the definition and application of measures aiming at ecological rehabilitation of rivers.

From the presented information a few conclusions may be drawn and some remarks can be made on future developments.

### **2. Conclusions on ecological rehabilitation of the river Rhine.**

The last decades the chemical composition of the river water and the composition of the biological communities of the river have improved remarkably. Moreover, the information presented showed that we made progress in establishing relationships between emissions and water quality, chemistry and organisms and in establishing the general conditions necessary for the settlement and development of a variety of organisms.

Several presentations showed that we see progress in the number of autochthonous species inhabiting the river. This is a very important development. The overall development though is an increase in the number of rather general species and a large increase in the number of immigrants. This shows that the condition of the river is still far from what we may want, considering the ecological objective of the Rhine Action Programme. It seems that some organisms originally found in the river ecosystem are more sensitive for the changes in the quality of water and river sediments than immigrants.

Therefore they cannot compete successfully in the quality conditions we have today. So further improvement of the water quality may turn out to be necessary when we evaluate the progress of the Rhine Action Programme in 1995.

Also it seems that, although the species diversity has increased, the development of rheophylous species is lagging behind. Clearly we must pay more attention to the improvement of the habitat structure, especially in relation to flow velocities. As to monitoring, the question may be put forward whether we should focus our monitoring more on groups of organisms showing especially these conditions.

As for the water quality of the river, much attention has been paid to the analysis of

risks and the prevention of accidental spills, which may hazard the ecosystem of the river even more as the improvement of the ecosystem proceeds. However, accidental spills still occur. During this conference it was shown that soon methods will be available, to be used in waste water permit procedures. With these methods possible causes of accidental spills and the necessary measures to prevent them can be analyzed. These methods could be discussed in the International Commission for the Protection of the Rhine against Pollution (ICPR).

Progress is made in developing more refined methods for monitoring and surveillance of water quality. Also a variety of methods of biological surveillance are being tested and some of these are already used. Considering the large number of chemical substances, the additional use of these methods is inevitable in monitoring the river water quality and in the surveillance of industrial discharges. It is good to notice that industry itself takes an active part in these developments. For the monitoring of both surface water quality and effluents the countries participating in the ICPR should try to choose jointly a limited set of biological monitoring methods, which then can be implemented in the next years.

Looking at the input of pollutants to the Rhine one thing was made clear and this does not come as a surprise. For the years to come diffuse, nonpoint sources of pollution will become very important when we want to make further progress in the improvement of the quality of Rhine water. A first analysis indicates that mainly because of the diffuse pollution we may not be able to reach the preliminary limit values set by the ICPR for a significant number of chemicals, listed as priority substances in the Rhine Action Programme.

Although field investigations spotting ecotoxicological effects on organisms are scarce and complicated, the material presented at the conference indicates that effects of chemicals certainly can be expected on both lower and higher trophic levels. This kind of research needs further attention.

For some pollutants, i.e. some heavy metals, the sources may be found in our households, our cities, the use of various products and in transportation systems. Agriculture is to a large extent responsible for nutrients and pesticides. For the water manager and for the ICPR this means a considerable widening of their scope and an adaptation of working-methods. Measures will be necessary far beyond the jurisdiction of the water manager. These measures have to be accepted and taken by groups traditionally not represented in the ICPR. It will be important for the ICPR to develop an effective way to deal with this.

Many authors stressed the vital importance of the improvement of the habitat structure of the river, its tributaries and floodplains, for the rehabilitation of the ecosystem. Some examples of actual measures and their results were presented at the conference, not only in the oral presentations but also in the posters and during the field trips. These presentations showed that we have to consider much more than the salmon alone. The international ecological infrastructure, symbolised by the salmon, is not solely important. More attention should be paid to ecological goals for river stretches and to the

interrelation between the river and its floodplains. Here lies the biggest challenge for the future. The river Rhine has a densely populated catchment area and is highly important as part of the economic infrastructure of Western Europe. This means that flood protection will have as high a priority in the future, as it ever had in the past. Also transport over water may even increase in the future, considering the limitations of the transport by road, rail and air. Hydropower generation will remain important too, as well as the use of the river for drinking water production.

Any improvement in the ecology of the river system, especially improvements in the habitat structure, must be balanced against the impact on these functions.

This definitely does not mean that we can forget our ecological objectives. However, obviously there is no point in trying to get back the river we had a century ago. The past may be used as a reference for the habitat elements that should be part of a healthy ecosystem though. The heavy task will be to fit these elements into a river system with new constraints. Necessarily this will be a process of trial and error. This means that we need river managers who are willing to give these developments a chance. First of all they have to develop practical ideas for improvement of the habitat structure. When these are put into practice, their implementation has to be evaluated to search for further improvements. Clearly research on these topics is important to enhance further developments towards an ecological rehabilitation of the Rhine and of other rivers.

Improvement of the habitat structure, considering the many functions the river has and will have in the future, makes a close cooperation between ecologists and river engineers necessary. Experience thus far shows us that this is not easy to realise. There are only a few groups of scientists working together in the field of ecological river engineering. From the managerial point of view this lack of interest may be explained by the fact that the integration of various functions of the river is also a new theme: the first steps were made only very recently, for instance in southern Germany, Nordrhein-Westphalia and the Netherlands. It is necessary to find ways to stimulate research and practical implementation of results in this field.

### **3. Further recommendations on future developments.**

Clearly the research necessary for ecological rehabilitation and the monitoring of the results demands considerable efforts. These efforts follow directly from the politically chosen ecological objective for the Rhine in the Rhine Action Programme and support the work of the ICPR. Society expects us to use the scarce means available for research as efficiently as possible.

Therefore, a further strengthening of international coordination and cooperation is necessary. Several scientists and research institutes of Rhine bordering states expressed a willingness and readiness to participate in such an international programme or network. Such initiatives may be welcomed and stimulated by the ICPR and its representatives.

The involvement of all aspects of river management in the ecological rehabilitation of the Rhine does not only implicate a widening of the scope of research. Such a widening of the scope is necessary also at the institutional level. The Dutch minister of

Transport, Public Works and Water Management, Mrs. Maij-Weggen, touched upon this when she suggested that we might need a new legal instrument for the complete and integrated protection of the Rhine, dealing among other subjects with transport, water quality and ecology. She suggested that a new Rhine convention might be necessary as a sound institutional basis for the international management of the river Rhine in the next century.

Although progress has been made in the improvement of the quality of the Rhine water and sediments and steps have been set towards ecological rehabilitation, we have to continue our efforts for two reasons:

1. to realise the goals we have set for the year 2000;
2. because the Rhine can be regarded as a full scale demonstration project for other rivers.

### 1.3 Staf and financial management

The staf and financial input per institute, summarized below, is distinguished into internal and external bodies (internal/external).

Institute	1992		1993	
	staf (no. posts)	financial (NLG)	staf (no. posts)	financial (NLG)
RIZA	8.6/ -	1101/ -	9.3/ -	1292/ -
RIVM	3.0/2.0	- /50	3.0/2.0	- /50
RIVO-DLO	3.0/2.0	490/230	4.0/2.0	750/270
IBN-DLO	- / -	- / -	0.1/0.3	- /20
SC-DLO	1.8/1.7	- /110	1.9/1.6	- /50



## CHAPTER 2. PRODUCTS

### 2.1 EHR-Reports 1992-1993

- 38 - 1992 J.W. Dogger, F. Balk, L.L. Bijlmakers & A.J. Hendriks (RIZA).  
Schatting van risico's van microverontreinigingen in de Rijn voor groepen organismen van de rivier-AMOEBE.
- 39 - 1992 H.C. Dudok van Heel, H. Smit & S.M. Wiersma (RIZA).  
Macrofauna in de diepe waterbodem van het noordelijk Deltabekken.
- 40 - 1992 Anonymous (RIZA, RIVM, IBN-, RIVO-, SC-DLO).  
Ecological rehabilitation of the Rivers Rhine and Meuse: Netherlands research programme (1992-1995).
- 41 - 1992 J. Botterweg & W. Silva (RIZA).  
Projekt Ecologisch Herstel Maas.
- 42 - 1992 M. de la Haye (RIZA).  
Groei en overleving van Vlottende waterranonkel (*Ranunculus fluitans* Lam.) in de Maas: transplantatie en semi-veldexperimenten.
- 43 - 1992 B. van Hattem & S. Dirksen (RIZA).  
Microverontreiniging in Blankvoorns en schelpdieren uit de Maas en Maasplassen, 1991.
- 44 - 1992 D. de Boer (RIZA).  
Vegetaties en het oevermilieu van de Grensmaas: I Veldopname en verwerking van gegevens.
- 45 - 1992 B. Paffen, P. van Avesaath & W. Overmars (RIZA)  
Waterplanten en de Maasplassen: inventarisatie 1990 - 1991.
- 46 - 1992 T. Vriese (RIZA).  
De visstand in de Grensmaas.
- 47 - 1992 Anonymous (RIZA).  
Methode voor de schatting van milieurisico's in de Gelderse uiterwaarden.
- 48 - 1993 A. Klink & H.C. Dudok van Heel (RIZA).  
Macro-evertebraten op de bodem van het Hollandsch Diep - Haringvliet.
- 49 - 1993 R.F.B. Isarin & H.J.A. Berendsen (RIZA).  
De morfodynamiek van rivierduinen langs de Waal en de Lek.
- 50 - 1993 G.M. van Dijk & A.C.L. Martijn (eds) (RIZA, RIVM, IBN-, RIVO-, SC-DLO).  
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- 51 - 1993 B. van Zanten & P. Leentvaar (RIVM).  
Zooplankton documentation on the Lower River Rhine. RIVM 73401001.
- 52 - 1993 A. bij de Vaate & M. Greijdanus-Klaas (RIZA)  
Monitoring macroinvertebrates in the River Rhine. Results of a study executed in the Dutch part in 1990.
- 53 - 1993 M.A.A. de la Haye (RIZA).  
Worden groei, overleving en kieming van de Vlottende waterranonkel (*Ranunculus fluitans* Lam.) in Maaswater beïnvloed door waterstandfluctuaties ? Semi-veldexperimenten.
- 54 - 1993 S. Semmekrot & F.T. Vriese (RIZA).  
Paai- en opgroeigebieden voor vis in de Maas.
- 55 - 1993 D.A. Stouten, F. Noppert, F. Balk & A.J. Hendriks (RIZA).  
Biologische bewaking van Rijn en Maas: ervaringen met vissen en watervlooiën (1988-1992).

## 2.2 Publications 1992-1993

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- Admiraal, W., S.D. Mylius, E.D. de Ruyter van Steveninck & D.M.J. Tubbing, 1993. A model of phytoplankton production in the lower River Rhine verified by observed changes in silicate concentration. *J. Plankton Res.* 15: 659-682.
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- Cazemier, W.G., 1993. Kansen voor de visfauna in de Rijn. *De Levende Natuur* 94: 54-58.
- Coops, H. & H. Smit, 1992. Effects of various water depths on *Scirpus maritimus* L.: Field and experimental observations. *Verh. Internat. Verein. Limnol.* 24: 2706-2710.
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