



## NCR project Summary

<b>Projecttitle</b>		Probabilistic prediction of river behaviour
<b>Leader</b>	<b>Institute</b>	TUD
	<b>Contactperson</b>	Huib de Vriend / Saskia van Vuren
<b>NCR partner(s) participating and Contactperson(s)</b>		RIZA, WL (through users' group)
<b>Non NCR partner(s)</b>		HKV
<b>Primary source of financing</b>		STW
<b>External cofinancing programme ('s)</b>		
<b>Objective(s)</b>		Capability to quantify the uncertainties in predictions concerning the large-scale effects of river improvement measures
<b>Methodology</b>		Using case studies from the Rhine branches, it is attempted to classify uncertainties by type and source, and to quantify them via Monte Carlo simulations. Subsequently, more or less case-specific stochastic meta-models will be formulated and investigated.
<b>Results, expected</b>		<ul style="list-style-type: none"> <li>– Insight into the uncertainties in predictions of the effects of river improvement measures</li> <li>– Practicable models for the quantification of uncertainties</li> <li>– Dissertation (Saskia van Vuren)</li> <li>– Scientific publications</li> </ul>
<b>Results, achieved</b>		Research plan
<b>Results, References</b>		
<b>Period of execution</b>		2000-2004
<b>NCR code</b>		TUD10
<b>NCR theme('s)</b>		River and Floodplain Planning



## NCR project Summary



<b>Projecttitle</b>		Application of historic data in modern river management PhD study
<b>Leader</b>	<b>Institute</b>	UU
	<b>Contactperson</b>	Drs. A.W. Hesselink (dr. H. Middelkoop)
<b>NCR partner(s) participating and Contactperson(s)</b>		WL ~ dr. J.C.J. Kwadijk RIZA ~ drs. M.M.Schoor Alterra ~ drs. H.P. Wolfert
<b>Non NCR partner(s)</b>		
<b>Primary source of financing</b>		Dutch Organisation of Scientific Research (NWO)
<b>External cofinancing programme ('s)</b>		
<b>Objective(s)</b>		<p>The main objective of the project is to study the applicability of historic data in modern and future river management. The main objective is divided in three topics:</p> <p>1) application of simulated and historic flow velocities in estimating floodplain rehabilitation potential, 2) application of old river maps in reconstructing the development of embanked flood plains and identifying man-induced changes of the embanked floodplain, 3) application of historic data in the calibration and validation of a physically based inundation model (Delft-FLS). Due to the expected climatic change and uncertainty of the climate impact studies on hydrology and the consequences for the user functions of the water systems in the Netherlands, knowledge of historic development of the river area is essential.</p>
<b>Methodology</b>		<p>Historic data contains a wealth of information on the development of the river area and it's management. Before the development of the river area is studied the historic data needs to be critically analysed before it is transformed. Then, four types of transformation are discriminated:</p> <ul style="list-style-type: none"> <li>– Transcription of written sources,</li> <li>– Reformation of old calendars to the present day calendar,</li> <li>– Transformation of maps to uniform scales, and</li> <li>– Transformation of measurement series to metric units relative to the Dutch Ordnance Datum.</li> </ul> <p>Although most of the data do not include quantitative information on the historic hydraulics, after combining different data sources a quantitative overview of history can be given. Combination of different data sources also increases the validity of the results. Finally, the results are used to analyse present floodplain rehabilitation plans and the inundation model Delft-FLS.</p>
<b>Results, expected</b>		<p>First, the results outline the risks that present floodplain rehabilitation plans based on insufficient (historic) data provide incorrect floodplain dynamics, and hence an incorrect basis of the floodplain rehabilitation plans. Second, the results were used to calibrate and validate Delft-FLS. Simulation results outline a strong correlation between floodplain topography, floodplain friction coefficient, and inundation characteristics.</p>
<b>Period of execution</b>		1996 – 2002
<b>NCR code</b>		UU4
<b>NCR theme('s)</b>		River and Floodplain Planning





## NCR project Summary

<b>Projecttitle</b>		IRMA-SPONGE: A spreadsheet application of BIOSAFE
<b>Leader</b>	<b>Institute</b>	KUN
	<b>Contactperson</b>	Dr. R.S.E.W. Leuven
<b>NCR partner(s) participating and Contactperson(s)</b>		RIZA: Drs. N. Geilen
<b>Non NCR partner(s)</b>		Baf (Koblenz), Institute for Nature Conservation (Brussels), Universities of Rouen and Metz
<b>Primary source of financing</b>		KUN
<b>External cofinancing programme ('s)</b>		IRMA
<b>Objective(s)</b>		The goal of the project is to develop a Spreadsheet Application For Evaluation of impacts of flood prevention measures on BIOdiversity in floodplains of the rivers Rhine and Meuse (BIO-SAFE). BIO-SAFE will be implemented in a stand-alone version for water management, spatial planning and research purposes. It will be constructed in such a way that it can be easily linked to other river models and management tools, which comprise species or ecotope variables. Moreover, BIO-SAFE will be applied in a number of case studies, i.e. floodplain areas for which flooding risk reduction plans have already been drawn up.
<b>Methodology</b>		<ul style="list-style-type: none"> <li>- Construction of a transnational database on flora and fauna species characteristic for riverine ecosystems of the Rhine and the Meuse;</li> <li>- Determination of ecological and policy based valuation criteria for biodiversity (i.e. the flora and fauna species selected);</li> <li>- Development of a transnational ecotope typology and linking of riverine ecotopes, biodiversity and valuation criteria in a model;</li> <li>- Implementation of the model in a spreadsheet application;</li> <li>- Application of BIO-SAFE in case studies (evaluation and improvement of the model).</li> </ul>
<b>Results, expected</b>		<ul style="list-style-type: none"> <li>- User friendly spreadsheet application in a stand alone version</li> <li>- User guide.</li> <li>- Report and scientific journal papers</li> </ul>
<b>Results, achieved</b>		
<b>Results, References</b>		Lenders, H.J.R., R.S.E.W. Leuven, P.H. Nienhuis, R.J.W. de Nooij & S.A.M. van Rooij, 2001. BIO-SAFE: a method for evaluation of biodiversity values on the basis of political and legal criteria. Landscape and Urban Planning (in press).
<b>Period of execution</b>		1999-2001
<b>NCR code</b>		KUN6
<b>NCR theme('s)</b>		River and Floodplain Planning



## NCR project Summary



<b>Projecttitle</b>		Dynamic modelling of river physiotopes
<b>Leader</b>	<b>Institute</b>	ALTERRA
	<b>Contactperson</b>	Drs. H.P. Wolfert
<b>NCR partner(s) participating and Contactperson(s)</b>		UU, RIZA
<b>Non NCR partner(s)</b>		
<b>Primary source of financing</b>		
<b>External cofinancing programme ('s)</b>		
<b>Objective(s)</b>		Extension with a dynamic module for physiotopes of the Landscape Ecological Decision Support System (LEDESS), in order to include the results of geomorphologic processes (erosion, sedimentation of sand and sludge and the effects thereof on vegetation succession) in the evaluation of different designs in the system of the large rivers
<b>Methodology</b>		<p>Production of model-scheme with inclusion of ecosystem processes and problems with respect to different designs</p> <p>Evaluation of existing models, search for necessary basic data and possibilities for co-operation</p> <p>Choice of pilot area and schematisation of data: input of model runs and run of scenario</p> <p>Validation of results, improvement of model instruments</p> <p>Writing of the manual and information on the product</p>
<b>Results, expected</b>		LEDESS is being used for different designs in the river area. The model is based on classification of ecotopes and knowledge-rules on the relation between (1) physiotopes and design measures, (2) physiotopes and ecotopes and (3) management and vegetation succession. Along the large rivers, new physiotopes can originate from erosion and sedimentation processes and/or the vegetation succession can be set back. Nature development strives after recurrence of these natural processes. LEDESS is not able to analyse these processes. Extension with a dynamic module for physiotopes enables a better analysis of various design plans. The possibilities of the model are given in a model and information of the product.
<b>Results, achieved</b>		
<b>Results, References</b>		
<b>Period of execution</b>		1999-2001
<b>NCR code</b>		ALTERRA2
<b>NCR theme('s)</b>		River and Floodplain Planning





## NCR project Summary

<b>Projecttitle</b>		Ecology and Water Management
<b>Leader</b>	<b>Institute</b>	IHE
	<b>Contactperson</b>	Dr.ir. Jan E. Vermaat / Dr. Harry Olde Venterink
<b>NCR partner(s) participating and Contactperson(s)</b>		WL Alterra
<b>Non NCR partner(s)</b>		
<b>Primary source of financing</b>		ICES/Delft Cluster, EU/IRMA
<b>External cofinancing programme ('s)</b>		
<b>Objective(s)</b>		<p>The project has the following research objectives:</p> <ul style="list-style-type: none"> <li>– To assess the effect of wetlands in the floodplain cross-section on downstream N and P contents over annual time scales and large (10-100 km) spatial scales.</li> <li>– To assess the significance of physical, chemical and (micro-) biological processes.</li> <li>– To evaluate the significance of potential feedback loops between wetland vegetation and water quality.</li> <li>– To evaluate ecological rehabilitation of floodplains and the policy to increase biodiversity in the light of the above.</li> <li>– To improve the capability of predicting the development and functioning of floodplain wetlands.</li> </ul>
<b>Methodology</b>		<p>Experimental manipulation of river floodplain stretches is logistically and economically beyond the scope of the present proposal. Therefore, the approach combines a detailed mass balance analysis of fluxes and sinks of the main nutrients N and P in a selected number of floodplain stretches (5x10 km), over several annual flooding cycles, with a comparative, more superficial survey of a large number (&gt;30) of floodplain stretches along the course of the river Rhine and its tributaries. The comparative survey should include floodplain stretches that vary widely in the proportion of wetland in the cross section, but also in water residence time. The work is being carried out over four years by a postdoc and technician.</p>
<b>Results, expected</b>		<p>The project will provide a first global overview of the relevance of Rhine floodplain wetlands for nutrient retention. The results will be laid down in a project report and 1-2 papers in peer-reviewed journals. Also, a mass balance model will be available for scenario evaluation.</p>
<b>Results, achieved</b>		The first sampling campaign was successfully completed in February 2001.
<b>Results, References</b>		
<b>Period of execution</b>		2000-2003
<b>NCR code</b>		IHE4
<b>NCR theme('s)</b>		River and Floodplain Planning



## NCR project Summary



<b>Projecttitle</b>		IRMA-SPONGE: Cyclic rejuvenation of floodplains; assessment of the sustainability of floodplain lowering as flood risk management
<b>Leader</b>	<b>Institute</b>	KUN
	<b>Contactperson</b>	Prof. Dr. A.J.M. Smits
<b>NCR partner(s) participating and Contactperson(s)</b>		TUD: Drs. M. Baptist WL: Drs. H. Duel Alterra: Drs. H. Wolfert
<b>Non NCR partner(s)</b>		RWS-DON, BfG, WWF, Univerity of Stuttgart
<b>Primary source of financing</b>		RWS-DON
<b>External cofinancing programme ('s)</b>		IRMA
<b>Objective(s)</b>		Assess the sustainability of a flood management strategy based on floodplain lowering with respect to flood risk management and nature restoration (biodiversity); Explore the compatibility of managing flood risk (lowering floodplains, controlling hydraulic roughness) and enhancing the biodiversity; Promotion of public awareness and expertise.
<b>Methodology</b>		Derivation of expert rules on interrelations between morphological, ecological and hydraulic parameters and inclusion of these rules in 2D hydromorphological and ecological models; - Calibration of models; - Case studies (floodplain lowering); - Evaluation floodplain lowering measures.
<b>Results, expected</b>		Report and papers in scientific journals
<b>Results, achieved</b>		
<b>Results, References</b>		
<b>Period of execution</b>		1999-2001
<b>NCR code</b>		KUN5
<b>NCR theme('s)</b>		River and Floodplain Planning





## NCR project Summary

<b>Projecttitle</b>		Biogeomorphological development of floodplains (Delft Cluster)
<b>Leader</b>	<b>Institute</b>	WL
	<b>Contactperson</b>	Harm Duel
<b>NCR partner(s) participating and Contactperson(s)</b>		IHE, Alterra, KUN, TUD
<b>Non NCR partner(s)</b>		RWS-DON
<b>Primary source of financing</b>		Delft Cluster, IRMA-SPONGE
<b>External cofinancing programme ('s)</b>		
<b>Objective(s)</b>		<p><u>Short term</u>: Extending knowledge on the interaction between morphological and biological processes in flood plains, with special emphasis on the influence of vegetation and vegetation-succession on sedimentation and erosion of sediment and vice versa, by means of monitoring and mathematical modelling.</p> <p><u>Long term</u>: Development of a strategy for cyclic rejuvenation of flood plains, i.e., planning nature development in space and time, including cyclic rejuvenation, such that safety against flooding and that durable nature conservation is guaranteed.</p>
<b>Methodology</b>		Core of the project is co-operation between two promovendi: one at TUD (morphological modelling, given the vegetation) and one at KUN (vegetation modelling, given the sedimentation). There is a close co-operation with the IRMA-SPONGE project 'Cyclic Rejuvenation of flood plains'.
<b>Results, expected</b>		<p>Concepts for morphological modelling including the effects of vegetation.</p> <p>Vegetation model for flood plains, given the sedimentation.</p> <p>Method of approach for cyclic rejuvenation of flood plains.</p>
<b>Results, achieved</b>		Contributions of M. Baptist and G.J. Geerling at the NCR-dagen 2000.
<b>Results, References</b>		
<b>Period of execution</b>		2000 – 2004
<b>NCR code</b>		WL5
<b>NCR theme('s)</b>		River and Floodplain Planning



## NCR project Summary



<b>Projecttitle</b>		Fate of sediment-associated pollutants in the Rhine-Meuse delta PhD study
<b>Leader</b>	<b>Institute</b>	UU
	<b>Contactperson</b>	Drs. I. Thonon (dr. H. Middelkoop)
<b>NCR partner(s) participating and Contactperson(s)</b>		RIZA: Ir M. van Wijngaarden Alterra: drs. H.P. Wolfert; Dr. B. Makaske
<b>Non NCR partner(s)</b>		
<b>Primary source of financing</b>		Utrecht University
<b>External cofinancing programme ('s)</b>		
<b>Objective(s)</b>		Quantitatively relate deposition of sediment-associated contaminants to floodplain characteristics in order to predict spatial distribution of floodplain contamination and to assess the role of floodplains in contaminant retention in the Rhine-Meuse delta. To develop GIS-embedded models to simulate the dispersal and fate of sediment-associated pollutants in the delta at different spatial and temporal scales. The modelling results will serve as a scientific basis and inputs for a DSS
<b>Methodology</b>		<i>Field sampling:</i> (1) From selected undisturbed floodplains along the rivers Meuse, Nederrijn and IJssel floodplain soil profiles will be sampled from sediment cores to analyse the long-term accumulation of heavy metals accumulated in the floodplains at a time scale of tens of years. (2) During periods of large river discharge, sediment samples will be collected in selected, representative floodplain areas using sediment traps. These samples will be analysed for grain size distribution, heavy metal content, and - if possible- organic micropollutants (PAKs PCBs). <i>Modeling:</i> Development of GIS-embedded models: from event-based models to predict sediment and pollutant transport and deposition on a single floodplain area to long-term models to estimate the retention of pollutants along the three mentioned rivers at the scale of the entire delta.
<b>Results, expected</b>		Identification of the key factors controlling sediment deposition and floodplain contamination; Prediction of both the amount of sediment-associated pollutants deposited on the floodplains; Prediction of the impact of dynamics in river discharge and land use on the dispersal of pollutants in the delta.
<b>Results, achieved</b>		
<b>Results, References</b>		
<b>Period of execution</b>		2001 – 2005
<b>NCR code</b>		UU6
<b>NCR theme('s)</b>		River and Floodplain Planning





## NCR project Summary

<b>Projecttitle</b>		Dealing with heterogeneity of polluted floodplain soils
<b>Leader</b>	<b>Institute</b>	KUN
	<b>Contactperson</b>	Dr. R.S.E.W. Leuven (KUN)
<b>NCR partner(s) participating and Contactperson(s)</b>		RIZA: Dr. J. Vink TNO: Drs. T. van Teunenbroek
<b>Non NCR partner(s)</b>		WUR: Dr. A.A. Koelmans
<b>Primary source of financing</b>		KUN, RIZA, TNO, WUR
<b>External cofinancing programme ('s)</b>		
<b>Objective(s)</b>		<ol style="list-style-type: none"> <li>1. Characterisation of spatial and temporal variability of soil properties and consequences of soil heterogeneity for bio-availability of metal pollution in river floodplains;</li> <li>2. Elucidating impacts of changing environmental conditions (floodplain excavations, land use, flooding regime, sedimentation) on bio-availability of metal pollution in river floodplains;</li> <li>3. Incorporating spatial and temporal variability of metal exposure in ecological risk assessment;</li> <li>4. Development of procedures for biogeochemical and ecotoxicological evaluation of metal pollution in floodplains.</li> </ol>
<b>Methodology</b>		<ul style="list-style-type: none"> <li>- Field and laboratory studies on the fate and bio-availability of metal pollution under various environmental circumstances;</li> <li>- Development and application of analytical and non destructive methods (remote sensing) for characterisation of spatial and temporal variability of metals;</li> <li>- Stochastic and GIS-based modelling of ecological risks for typical food webs of floodplains.</li> </ul> <p>Most of the fieldwork is located in the Afferdensche and Deestsche Waarden and Gamerensche Waard along the Waal and some floodplains along the Meuse. The research activities are mainly performed by three PhD-students (KUN Ir. L Kooistra; WUR: Ir. C. van Griethuizen and Ir. T. Schröder). Co-operation yields mutual attuned working programmes, sampling sites and monitoring procedures, and joint use of research facilities, data and available expertise.</p>
<b>Results, expected</b>		<ul style="list-style-type: none"> <li>- Three PhD theses and joint scientific publications;</li> <li>- Contributions to the development and validation of biogeochemical and ecotoxicological modules (e.g. BIOCHEM) of decision support systems for physical reconstruction and management of polluted river floodplains.</li> </ul>
<b>Results, achieved</b>		
<b>Results, References</b>		Kooistra, L., R.S.E.W. Leuven, R. Wehrens, L.M.C. Buydens & P.H. Nienhuis, 2001. A procedure for incorporating spatial variability in ecological risk assessment of Dutch river floodplains. Environmental Management 28/3 (in press).
<b>Period of execution</b>		1999-2002
<b>NCR code</b>		KUN1
<b>NCR theme('s)</b>		River and Floodplain Planning



## NCR project Summary



<b>Projecttitle</b>		Seismic data acquisition methods on rivers
<b>Leader</b>	<b>Institute</b>	TNO-NITG
	<b>Contactperson</b>	W.W. Westerhoff
<b>NCR partner(s) participating and Contactperson(s)</b>		TUD
<b>Non NCR partner(s)</b>		Free University Amsterdam (VUA)
<b>Primary source of financing</b>		Kennisinvesteringsprogramma TNO-NITG, TUD, VUA
<b>External cofinancing programme ('s)</b>		NWO, NEESDI research program,
<b>Objective(s)</b>		The aim of this study is to modify, adjust and apply high-resolution seismic acquisition methods on rivers for a two or three-dimensional identification and characterisation of heterogeneous fluvial deposits.
<b>Methodology</b>		<p>The research program is split up in two phases.</p> <p>The aim of phase 1 is focussed on the development of a system of high-resolution seismic acquisition methods covering the total range of subsurface strata from surface up to approx. a depth of 1000m. This phase includes an experimental survey on the river Meuse. Emphasis will be given in enhancing the resolution power of seismic data.</p> <p>The aim of the second research phase is to analyse the seismic data in order to optimise the acquisition and processing methods and the information yield. With information in this respect is meant data on the tectonic structure, the variability and properties of the subsurface and the sedimentation processes in the shallow and deep subsurface.</p>
<b>Results, expected</b>		New opportunities for river seismics
<b>Results, achieved</b>		
<b>Results, References</b>		
<b>Period of execution</b>		2001-2002
<b>NCR code</b>		NITG1
<b>NCR theme('s)</b>		River and Floodplain Planning









## **Summary of NCR Programme**

**version 2001 - 2002**

### **Research focus Development of large scale Systems**

***(6 summaries)***





## NCR project Summary

<b>Projecttitle</b>		IRMA-SPONGE: Interactive Flood Management and Landscape planning in River Systems: Development of a Decision Support System (DSS) and analysis of retention options along the Lower Rhine River
<b>Leader</b>	<b>Institute</b>	RIZA
	<b>Contactperson</b>	Dr. R. Schielen
<b>NCR partner(s) participating and Contactperson(s)</b>		WL - Drs. C.A. Bons Alterra - Dr. W. Knol
<b>Non NCR partner(s)</b>		Bundesanstalt für Gewässerkunde Landes Umwelt Amt – Dipl. Ing. B. Maul Kötter
<b>Primary source of financing</b>		IRMA-SPONGE
<b>External cofinancing programme ('s)</b>		Regional Directorates of the Ministry of Transport, Public Works and Water Management of the Netherlands
<b>Objective(s)</b>		The main goal of the project is to develop and apply the DSS in close contact with the end users. Emphasis is directed towards application of the DSS in (international) river systems. Additional development will focus on interactive design and planning process (including communication of results), with ecological and habitat analysis, network evaluation and landscape evaluation. The DSS will be used to analyse options for retention ponds along the Lower Rhine River. The project will be carried out in close co-operation with local authorities, in order to improve the quality of the study and increase acceptance of results.
<b>Methodology</b>		Starting with interviews with possible end users, a functional design of the DSS will be made, which fits closely to their needs and working methods. The functional design will be translated into a technical design, which will be implemented. Special attention will be on the redesign of the measure-module (emphasising on robustness), which transforms the measures on GIS-maps into the consequences towards the hydraulic schematisations. Furthermore, the link between hydraulic and ecological consequences of measures will be improved. After the development phase, the DSS will be used to analyse retention-measures in the Lower Rhine. A comparison between 2D-retention calculations (using an off-line link to Delft-FLS) and the basic 1D-retention option of the DSS is intended. For these calculations, an inventory of available and needed data in Nordrhein Westphalia will be performed.
<b>Results, expected</b>		The DSS is expected to be fully operational in the third quarter of 2001. Before that, data collection for the preparation of the retention calculations will be performed, such that the analysis of retention measures can take place in the third quarter of 2001. A thorough test of the 1D and 2D features (hydraulic as well as ecological) of the DSS is foreseen, to be executed by the regional directorates.
<b>Results, achieved</b>		The conceptual ideas were presented at the EGS-XXVI General Assembly, which was held in Nice, France, from 25-30 March 2001.
<b>Results, references</b>		1. Functional and technical design of the DSS (both in Dutch) 2. User- and system documentation
<b>Period of execution</b>		1999-2001
<b>NCR code</b>		RIZA4
<b>NCR theme('s)</b>		River Basin Approach; River and Floodplain Planning; Development of large Systems



## NCR project Summary



<b>Projecttitle</b>		Production of stand-alone version LARCH-river
<b>Leader</b>	<b>Institute</b>	ALTERRA
	<b>Contactperson</b>	Drs. S.A.M. van Rooij
<b>NCR partner(s) participating and Contactperson(s)</b>		UU, RIZA
<b>Non NCR partner(s)</b>		
<b>Primary source of financing</b>		DWK and RIZA
<b>External cofinancing programme ('s)</b>		
<b>Objective(s)</b>		Stand-alone application of LARCH-river (version 1.0). This application can be used independently for analyses of ecological networks and as part of model-trains such as DSS-structures (f.e. RvR/IVB-instruments)
<b>Methodology</b>		<p>The application LARCH-river has been developed in the framework of the program "Ecological networks of rivers". It is necessary to produce user-friendly version for PC. The methodology to do so is as follows:</p> <ul style="list-style-type: none"> <li>– Computerising of pretreatments</li> <li>– Standardisation of analysis and interpretation steps</li> <li>– Development of a user interface</li> <li>– Production of a manual</li> <li>– Juridical measures</li> <li>– Instalment of a help-desk</li> </ul>
<b>Results, expected</b>		<ul style="list-style-type: none"> <li>– Stand-alone application LARCH-river on CD-ROM (version 1.0)</li> <li>– Digital and analogous manual</li> <li>– Exchange of knowledge/plan of communication</li> <li>– Website</li> <li>– Papers</li> </ul> <p>The application is the basis for use in other watersystems like lakes and/or analyses on a national scale. For these purposes, adaptations of the mathematical rules can be necessary.</p>
<b>Results, achieved</b>		A number of research-reports have already been issued, and a pamphlet, together with hand-outs have been produced
<b>Results, References</b>		
<b>Period of execution</b>		1999 – 2001
<b>NCR code</b>		ALTERRA1
<b>NCR theme('s)</b>		River and Floodplain Planning; Development of large Systems





## NCR project Summary

<b>Projecttitle</b>		IRMA-SPONGE: Improvement and extension of the flood forecasting model FloRIJN
<b>Leader</b>	<b>Institute</b>	RIZA
	<b>Contactperson</b>	Ing. E. Sprokkereef
<b>NCR partner(s) participating and Contactperson(s)</b>		WL
<b>Non NCR partner(s)</b>		Federal Institute for Hydrology, Coblenz Germany Federal Office for Water and Geology, Bern Switzerland Swedish Meteorological and Hydrological Institute, Norrköping Sweden
<b>Primary source of financing</b>		
<b>External cofinancing programme ('s)</b>		IRMA
<b>Objective(s)</b>		One of the agreements in the IRC Action Plan on Flood Defence, that was drawn up after the flood on the Rhine in 1995, was an extension of the forecasting period for reliable flood forecasts in the entire Rhine basin. For the Dutch gauging station Lobith on the German Dutch border the forecasting period should be expanded from 2 days to 3 days in the year 2000 and to 4 days in the year 2005.
<b>Methodology</b>		Active co-operation will take place with the national Swiss (LHG) and German (BfG) Hydrological Institutes. For activities concerning the HBV-model, co-operation will take place with the Swedish Meteorological and Hydrological Institute (SMHI). Meteorological Offices in the Rhine basin will be contacted to obtain the necessary data for model calibration and verification. RIZA co-operates with other hydrological institutes in the International Commission for the Hydrology of the Rhine basin (CHR). Data from the CHR digital database can be used in the FloRIJN project.
<b>Results, expected</b>		Improved forecasting model for a reliable 4 day forecast for the gauging station Lobith
<b>Results, achieved</b>		<ul style="list-style-type: none"> <li>- Operational model for a 3 day forecast</li> <li>- Prototype of the new forecasting system</li> </ul>
<b>Results, References</b>		<ul style="list-style-type: none"> <li>- BfG (2000): Hydrological Modelling in the River Rhine Basin, Part2 – Interim Report</li> <li>- WL   Delft Hydraulics (2001): Technical Design FEWS Rhine</li> <li>- Terralimaging (2001): Sobek schematisation of the Mosel stretch Cochem-Coblenz</li> </ul>
<b>Period of execution</b>		1999 – 2001
<b>NCR code</b>		RIZA7
<b>NCR theme('s)</b>		River Basin Approach; Development of large Systems



## NCR project Summary



<b>Projecttitle</b>		Quantifying neotectonics in the Rhine – Meuse delta
<b>Leader</b>	<b>Institute</b>	UU
	<b>Contactperson</b>	Drs. K.M. Cohen - PhD student; Dr. H.J.A. Berendsen - project leader
<b>NCR partner(s) participating and Contactperson(s)</b>		TNO-NITG
<b>Non NCR partner(s)</b>		Free University Amsterdam
<b>Primary source of financing</b>		NWO-ALW
<b>External cofinancing programme ('s)</b>		
<b>Objective(s)</b>		<p>The Roer Valley Graben – Peel Horst system, widely studied in the southern Netherlands, was active during the Quaternary is still active today. This study focuses on activity along this tectonic structure in the central Netherlands, where it is underlying Late Weichselian and Holocene Rhine-Meuse deposits.</p> <p>The aim of this study is to quantify neotectonic activity (vertical displacement during the last 15,000 years) and its effect on fluvial systems of the Rhine-Meuse delta.</p>
<b>Methodology</b>		<p>Fieldwork</p> <ul style="list-style-type: none"> <li>- Regional paleogeographic reconstruction (geomorphology, sedimentology, longitudinal profiles, cross sections, mapping) of Rhine and Meuse channels using descriptions of shallow boreholes (hand corings) and <math>^{14}\text{C}</math> dating of organic material.</li> <li>- Palaeo floodbasin groundwater level reconstruction using <math>^{14}\text{C}</math> dating of basal peats</li> <li>- Local detailed profiling, pin pointing displacements along individual faults</li> </ul> <p>Data processing</p> <ul style="list-style-type: none"> <li>- GIS analysis (mapping, time-series, geostatistics, 3D interpolation)</li> <li>- Modelling</li> </ul>
<b>Results, expected</b>		<ul style="list-style-type: none"> <li>– More results reflecting Spatial and Temporal variability and (non-) linearity of tectonic events.</li> <li>– More results reflecting interplay of fluvial systems and neotectonic controls.</li> </ul>
<b>Results, achieved</b>		<ul style="list-style-type: none"> <li>– Peel Boundary faultzone traced in shallow subsurface of Rhine-Meuse delta</li> <li>– Quantified vertical displacements in older deposits (6000-15000 year) along individual faults.</li> <li>– Rough estimate of average vertical displacement of central RM delta relative to western RM delta: 1 cm / 100 yr.</li> </ul>
<b>Results, References</b>		
<b>Period of execution</b>		1999 – 2003.
<b>NCR code</b>		UU3
<b>NCR theme('s)</b>		Development of large Systems





## NCR project Summary

<b>Projecttitle</b>		Delta evolution
<b>Leader</b>	<b>Institute</b>	UU
	<b>Contactperson</b>	Dr. H.J.A. Berendsen
<b>NCR partner(s) participating and Contactperson(s)</b>		TNO-NITG Dr. J.W.A. Dijkmans
<b>Non NCR partner(s)</b>		Earth Sciences, Utrecht University; University of Binghamton, NY, USA; NAM?
<b>Primary source of financing</b>		UU and TNO-NITG
<b>External cofinancing programme ('s)</b>		NOW
<b>Objective(s)</b>		<p>Avulsion (abandonment of a part or the whole of a channel belt by a stream in favour of a new course) is important in delta building. Alluvial architecture models are used to enhance our understanding of delta formation, but are also of practical significance, for example in the exploration of natural resources, which are often found in ancient fluvial deltaic deposits. The aim of this project is:</p> <ol style="list-style-type: none"> <li>1) To construct a 4D-(time-space) process-based alluvial architecture model, simulating delta evolution, and</li> <li>2) To test this model against real world alluvial architecture data.</li> </ol>
<b>Methodology</b>		<p>Concepts proposed by Mackey &amp; Bridge (1995) are used as a starting point to develop a new 4-D (time-space) model. The detailed avulsion history of the Rhine-Meuse delta will be used to incorporate the factors that are known to have influenced the avulsion process in time and space.</p> <p>The model will be tested and calibrated against real world alluvial architecture parameters.</p>
<b>Results, expected</b>		a 4D-(time-space) process-based alluvial architecture model, simulating delta evolution.
<b>Results, achieved</b>		A reconstruction of the paleogeographic development and the avulsion history of the Rhine-Meuse delta was recently completed. The Mackey & Bridge model has been reorganised for use in PCRASTER. Further progress awaits funding by NWO.
<b>Results, References</b>		<ol style="list-style-type: none"> <li>1) Berendsen, H.J.A. &amp; E. Stouthamer (2000), Late Weichselian and Holocene palaeogeography of the Rhine-Meuse delta (The Netherlands). Palaeogeography, Palaeoclimatology, Palaeo-ecology 161 (3/4), p. 311-335.</li> <li>2) Berendsen, H.J.A. &amp; E. Stouthamer (2001), Palaeogeographic development of the Rhine-Meuse delta. Assen: Van Gorcum, 250 pp.</li> <li>3) Stouthamer, E. (2001), Holocene avulsions in the Rhine-Meuse delta, the Netherlands. Netherlands Geographical Studies 283, 209 pp.</li> </ol>
<b>Period of execution</b>		2001 – 2005
<b>NCR code</b>		UU7
<b>NCR theme('s)</b>		Development of large Systems



# NCR project Summary



<b>Projecttitle</b>		Vanes & Screens (Delft Cluster)
<b>Leader</b>	<b>Institute</b>	WL
	<b>Contactperson</b>	ir. T.H.G. Jongeling
<b>NCR partner(s) participating and Contactperson(s)</b>		TUD
<b>Non NCR partner(s)</b>		Haskoning BV
<b>Primary source of financing</b>		WL
<b>External cofinancing programme ('s)</b>		Delft Cluster, Haskoning
<b>Objective(s)</b>		<p><u>Short term:</u> Implementation and testing of results of recent experimental and numerical research on bottom vanes and extension to flow-guiding screens.</p> <p><u>Long term:</u> Predictive capability concerning the effects of vanes and/or screens on flow and morphological processes in rivers, and their effectiveness for the regulation of these processes.</p>
<b>Methodology</b>		<p><u>Short term:</u></p> <ul style="list-style-type: none"> <li>A. Report and publication of the 'state-of-the-art' knowledge on bottom vanes (type I) with small angle to the main flow direction;</li> <li>B. Implementation of type I bottom vanes, development and implementation of type II surface and bottom screens (with large angle to the main flow) in Delft3D-Mor.</li> <li>C. Application of Delft3D-Mor with type I / II vanes and screens on flume tests, simple bifurcation problem and Gorai River Project (Bangladesh).</li> <li>D. Evaluation and reporting of computational experiences with vanes and screens.</li> </ul> <p><u>Long term:</u></p> <ul style="list-style-type: none"> <li>A. Improvement of the description of hydraulic and morphological processes induced by vanes and screens and implementation in Delft3D-Mor.</li> <li>B. Application of improved vanes and screens on (i) flume tetsts, (ii) bifurcation problem (bottom screens and surface screens) and Gorai River Project.</li> <li>C. Evaluation and reporting of computational experiences with improved vanes and screens. Identification of needs for further development.</li> </ul>
<b>Results, expected</b>		<ul style="list-style-type: none"> <li>– Existing knowledge published (and claimed)</li> <li>– Existing knowledge implemented into the Delft3D-Mor software environment</li> <li>– Experience with the application of this knowledge.</li> </ul>
<b>Results, achieved</b>		
<b>Results, References</b>		Flokstra, C. and T.H.G. Jongeling (2000) Bodemschermen: stromingskrachten en snelheidsveld bij variatie van de schermhoogte. WL   Delft Hydraulics, Rapport Q2677/Q2849
<b>Period of execution</b>		2000 – 2002
<b>NCR code</b>		WL6
<b>NCR theme('s)</b>		River and Floodplain Planning; Development of large Systems









# Summary of NCR Programme

**version 2001 - 2002**

## **Education & Dissemination function**

***(3 summaries)***





## NCR project Summary

<b>Projecttitle</b>		Caput lectures 'Ecology and management of large rivers'
<b>Leader</b>	<b>Institute</b>	KUN
	<b>Contactperson</b>	Prof. Dr. G. van der Velde
<b>NCR partner(s) participating and Contactperson(s)</b>		RIZA (A. bij de Vaate, Dr. H. Coops, Dr. T. Buise, Drs. M.Schoor, Dr. J. Hendriks) UU (Dr. H. Middelkoop) Alterra (A. Corporaal)
<b>Non NCR partner(s)</b>		RIVO RWS
<b>Primary source of financing</b>		KUN and participating institutes
<b>External cofinancing programme ('s)</b>		
<b>Objective(s)</b>		The lectures give insight into results of research on ecology and management of large river systems and actual developments within different domains of river science and management.
<b>Methodology</b>		<p>The course is primarily developed for MSc-students Biology and Environmental Sciences at the University of Nijmegen, but can also be attained by students and junior staff members of NCR-partner institutes. The course will be organised once every two years (period September-December). The invited lectures focus on morphology, discharge, sedimentation, water and soil quality, biodiversity and the structure and functioning of riverine ecosystems, eco(toxico)logical risks, ecological recovery and management of the river basins.</p> <p>The coming years the KUN aims at a further dissemination of relevant expertise of NCR partners in lectures and incorporation of the course in education programmes of partner institutes.</p>
<b>Results, expected</b>		Dissemination of NCR-expertise on the ecology and management of large river in undergraduate education programmes (e.g. Biology and Environmental Sciences). The syllabus of the course will be upgraded (Editing of a textbook is intended).
<b>Results, achieved</b>		
<b>Results, References</b>		
<b>Period of execution</b>		2001-2003
<b>NCR code</b>		KUN2
<b>NCR theme('s)</b>		Education & Dissemination



## NCR project Summary



<b>Projecttitle</b>		Seconding Gerrit Klaassen at the TUD
<b>Leader</b>	<b>Institute</b>	WL
	<b>Contactperson</b>	Eelco van Beek
<b>NCR partner(s) participating and Contactperson(s)</b>		TUD
<b>Non NCR partner(s)</b>		
<b>Primary source of financing</b>		WL
<b>External cofinancing programme ('s)</b>		
<b>Objective(s)</b>		Assistance to education and research at the Faculty of Civil Engineering (CITG) of the TUD
<b>Methodology</b>		Adaptation of educational program ('more water quality, ecology and river ecosystems'), lectures and lecture-notes. Possibly development of educational modules for 'River (flood-plain) ecosystems and river dynamics'. Possible organisation of lectures for PAO and/or EGS (European Graduate School) on the subject of river studies. Programming of river research for TUD/NWO/STW, and supporting PhD students.
<b>Results, expected</b>		Expected <ul style="list-style-type: none"> <li>• Master theses</li> <li>• PhD dissertations</li> <li>• Research publications</li> </ul>
<b>Results, achieved</b>		
<b>Results, References</b>		
<b>Period of execution</b>		1999 - 2002
<b>NCR code</b>		WL2
<b>NCR theme('s)</b>		Education & Dissemination





## NCR project Summary

<b>Projecttitle</b>		Yellow River Watersystem Reseach (DC-06.02.06)
<b>Leader</b>	<b>Institute</b>	TUD
	<b>Contactperson</b>	Eelco van Beek and Toine Smits
<b>NCR partner(s) participating and Contactperson(s)</b>		WL, IHE, KUN
<b>Non NCR partner(s)</b>		DGIS, various Chinese institutes : Hohai University, IWHR-Beijing, NHRI-Nanjing, Yellow River and Jangtze Riverbasin Commissions
<b>Primary source of financing</b>		Delft Cluster
<b>External cofinancing programme ('s)</b>		DGIS
<b>Objective(s)</b>		<p>The underlying DGIS project has 3 components:</p> <p>Improvement of curriculum of Chinese Universities</p> <p>Exchange of staff</p> <p>Joint research</p> <p>in the field of: Integrated Water Resources Management, Flooding, Dikes, Dredging, Hydrodynamics/Morphology and Ecology.</p> <p>Delft Cluster and NCR are only involved in the second and third component.</p> <p>The objective of the activities is to improve our understanding of the Yellow River, in particular with respect to the change in management approach that is currently implemented, i.e. a change from 'harnessing the river' to 'IWRM'.</p>
<b>Methodology</b>		<p>For each of the 6 above mentioned fields Principal Resources Persons from both Hohai University and TUD are appointed (from TUD: prof. Van Beek, Vrijling, Vlasblom, de Vriend and Smits (KUN)). The research is carried out by visits of Chinese fellows to the Netherlands (2 times 3 months), short visits by the Netherlands Resource Persons to China (weeks) and by Chinese 6 PhD students (TUD and KUN) and 10 MSc students (IHE).</p>
<b>Results, expected</b>		<p>Research reports of Applied Research Fellows</p> <p>Scientific articles of PhD students</p> <p>Thesis reports of PhD and MSc students</p> <p>Improved knowledge on the Yellow River Basin</p>
<b>Results, achieved</b>		
<b>Results, References</b>		
<b>Period of execution</b>		October 1999 - September 2002
<b>NCR code</b>		TUD5
<b>NCR theme('s)</b>		Education & Dissemination, River Basin Approach





## **Related projects**

***(2 summaries)***





## NCR project Summary

<b>Project-title</b>		Management of the River Maas
<b>Leader</b>	<b>Institute</b>	UT
	<b>Contactperson</b>	Prof. Dr. C.B. Vreugdenhil, J. Gerretsen, Mrs. A. Wesselink
<b>NCR partner(s) participating and Contactperson(s)</b>		
<b>Non NCR partner(s)</b>		RWS Directorate Limburg (W. van Hengel)
<b>Primary source of financing</b>		None
<b>External cofinancing programme ('s)</b>		
<b>Objective(s)</b>		<ol style="list-style-type: none"> <li>(Gerretsen) A large amount of observations in the Maas River is available. These can be used more extensively than today to extract information for design conditions and management rules. The main topics are peak levels and shapes of flood waves, sediment transport and prevention of ice formation.</li> <li>(Wesselink) Flood control on the Maas River. Interactions and conflicts with other functions such as navigation and nature development.</li> </ol>
<b>Methodology</b>		<ol style="list-style-type: none"> <li>A careful analysis of recorded water levels and discharges, together with historic information about extreme floods produces a more complete picture of exceedance frequencies, such that extrapolations to design conditions can be made with less uncertainty. The shape of flood waves will be investigated in terms of moments, about which statistical information will be collected. For sediment transport, the approach still needs to be worked out. For ice formation, a prediction method for water temperatures will be developed.</li> <li>The problems with and possible management options for flood control in the entire Maas Basin will be investigated. possible interactions with other functions will be made clear and quantified. The control space for the manager will be explored and recommendations about possible (combinations of) measures will be made.</li> </ol>
<b>Results, expected</b>		<p>Statistical information about peak discharges/water levels and shapes of flood waves.</p> <p>The same for sediment transport particularly at high discharge.</p> <p>A calibrated and validated method to predict water temperatures at critical locations in order to handle ice formation.</p>
<b>Results, achieved</b>		
<b>Results, References</b>		
<b>Period of execution</b>		2000-2005
<b>NCR code</b>		UT3
<b>NCR theme('s)</b>		River Basin Approach



## NCR project Summary



<b>Project-title</b>		Management of multireservoir systems and flood forecasting for Chinese and Dutch Rivers
<b>Leader</b>	<b>Institute</b>	UT
	<b>Contactperson</b>	prof. Dr. C.B. Vreugdenhil, prof. dr. H.G. Wind, Dong Xiao Hua, Mrs. Xu Yue Ping
<b>NCR partner(s) participating and Contactperson(s)</b>		
<b>Non NCR partner(s)</b>		Three Gorges University, Yichang, China
<b>Primary source of financing</b>		Royal Dutch Academy of Sciences
<b>External cofinancing programme ('s)</b>		
<b>Objective(s)</b>		<p>(Xu) Design support systems for the operation of multipurpose river systems (dam operation, flood management, etc.)</p> <p>(Dong) Improve forecasting of river discharge and water level, both in respect of forecasting period and reduced uncertainty</p>
<b>Methodology</b>		<p>Using Rapid Assessment techniques, the design of a system for decision support will be investigated, which includes relevant phenomena, actors and other system properties in a consistent way. Application will be made to dam operation in the Qiang Jang and the Yang Tse systems in China and to operation of flood control in the Maas River.</p> <p>The requirements for several purposes of flood forecasting will be drawn up in terms of prediction period and accuracy. Various techniques for improving flood forecasting will be tested and applied to actual rivers (Qiang Jang and Yang Tse in China, Maas River): neural networks, physical models, use of remote sensing data, use of stochastic weather forecasts, data assimilation techniques.</p>
<b>Results, expected</b>		<p>A design for a rapid assessment systems description for the rivers mentioned, calibrated and validated</p> <p>One or more semi-operational forecasting methods which have been tested and verified for particular cases.</p>
<b>Results, achieved</b>		
<b>Results, References</b>		
<b>Period of execution</b>		2000-2004
<b>NCR code</b>		UT4
<b>NCR theme('s)</b>		





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(NCR) is a co-operation of the major developers and users of expertise in the Netherlands in the area of rivers, viz. the Universities of Delft, Utrecht, Nijmegen and Twente, IHE, ALTERNIA, TNO-NITG, RIZA and WL | Delft Hydraulics.

NCR's goal is to build a joint knowledge base on rivers in the Netherlands.

The co-operation will also strengthen the national and international position of Dutch scientific research and education.

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