

Summary of NCR Programme version 2001 - 2002

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A.G. van Os (editor)

Samenvatting

NCR staat voor Nederlands Centrum voor Rivierkunde. Het is een samenwerkingsverband dat op 8 oktober 1998 is opgericht door negen wetenschappelijke onderzoeksinstituten in Nederland.

Het doel van NCR is het bevorderen van samenwerking tussen de belangrijkste wetenschappelijke instituten op het gebied van rivieronderzoek in Nederland door:

- het opbouwen van een kennisbasis van voldoende breedte en diepte in Nederland omtrent rivieren waardoor adequaat kan worden tegemoet gekomen aan de maatschappelijke behoefte, zowel nationaal als internationaal;
- het versterken van het wetenschappelijke onderwijs en onderzoek aan de Nederlandse universiteiten;
- het vaststellen van een gezamenlijk onderzoekprogramma.

NCR wil dit doel op twee manieren bereiken:

- via gecommitteerde samenwerking; hierin komt het daadwerkelijke commitment van deelnemende partners tot uiting;
- via het bieden van een platform; deze functie uit zich in het organiseren van bijeenkomsten, waarop kennis en ervaringen worden uitgewisseld; andere partijen zijn daarbij van harte welkom.

De gecommitteerde samenwerking geschiedt op basis van een programma.

Dit programma is in oktober 2000 voor het eerst in het Nederlands gepubliceerd.

Deze publicatie behelst de geactualiseerde en in het Engels vertaalde versie van het NCR programma.

Summary of NCR Programme

version 2001 - 2002

Edited by A.G. van Os
Programming secretary NCR

August 2001

NCR

 **TU Delft**
Delft University of Technology



Universiteit Utrecht



 **Universiteit Twente**
de ondernemende universiteit



WL | delft hydraulics



ALTEERRA



NITG

Ministerie van Verkeer en Waterstaat

Directoraat-Generaal Rijkswaterstaat



RIZA



Summary of NCR Programme

version 2001 - 2002

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Summary of NCR Programme

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Introduction

The Netherlands Centre for River Studies (NCR) is a co-operation of the major developers and users of expertise in the Netherlands in the area of rivers, with a view to:

- achieving a rivers expertise potential of sufficient breadth and depth in the Netherlands, in order effectively to meet societal requirements, both nationally and internationally;
- establishing and reinforcing the position of Dutch scientific research into rivers, for instance with a view to fund-raising for such research, nationally and internationally;
- strengthening the partners' position; and
- enhancing education and scientific research at Dutch universities.

The extent of the research challenges for the coming decades necessitates co-operation on national and international levels: one single research institute cannot perform the interdisciplinary research needed nowadays on its own, especially where the institutional structure in a country more or less follows methodological lines. In the case of river research in the Netherlands, some institutes focus on field monitoring, some on field campaigns, some on numerical modelling and laboratory experiments, some on behaviour analysis, and some on uncertainty analyses.

Co-operation between the various institutes is therefore essential, making use of the specific expertise and infrastructure of each institute. And this is exactly what has been done in the Netherlands with the establishment of the Netherlands Centre for River Studies (NCR) in October 1998.

NCR partners

The NCR partners are:

- TUD (Delft University of Technology)
- UU (Utrecht University)
- KUN (University of Nijmegen)
- UT (University of Twente)
- IHE (International Institute for Infrastructural, Hydraulic and Environmental Engineering)
- RIZA (Institute for Inland Water Management and Waste)
- ALTERNAT (Dutch centre of expertise on rural areas)
- TNO-NITG (Netherlands Institute of Applied Geoscience)
- WL | Delft Hydraulics.

NCR Functions

NCR has two key functions:

- network or platform function: this function is reflected in the organisation of meetings at which expertise and experience are exchanged; other parties are very welcome to attend; examples are the yearly NCR-days and the different workshops NCR organises
- research-orientated and educational co-operation: in which a real commitment of the partners is reflected.



Spheres of interest

As NCR is based on co-operation, it is logical to focus on

- (i) topics requiring compilation of the participating parties' expertise and/or resulting in synergy, and
- (ii) topics necessitating co-ordination of mono-disciplinary research on account of problems relating to management and planning.

Moreover, the approach to the river basin issue and the emphasis on planning of the region should preferably tie in with the renewed societal interest in rivers. Consequently, NCR chiefly focuses on **planning issues**, and examines the **entire river basin, including the upper course**. We centre on more **multi-disciplinary research**, with only **mono-disciplinary research** having relevance in NCR for management and planning issues, whilst demonstrating a degree of cohesion.

Disciplines of importance for NCR are:

- hydrology (of the river basin),
- fluvial hydraulics,
- geomorphology,
- sedimentology,
- river ecology,
- social sciences and
- spatial planning.

	hydrology	hydraulics	geomorph.	sediment.	ecology	social sc.	Sp.Pl.
RIZA							
WL							
ALTERRA							
TUD							
UU							
KUN							
UT							
IHE							
TNO-NITG							

Each discipline is present in at least two of NCR's partners, thus enhancing the co-operation between the partners. In the figure above the darker shade represents the core disciplines of the specific NCR partner.

NCR Programme

The co-operation within NCR is structured along the lines outlined in the previous sections:

- Platform function
- Research foci
 - River Basin Approach
 - Structuring the River area: River and Floodplain Planning
 - Development of large-scale systems.
- Education & Dissemination function

Network or Platform function

NCR aims to provide an open platform for all people interested in scientific research and communication on River issues.

To that end NCR organises once a year the so-called NCR days, where on two consecutive days scientists present their ongoing River studies. The emphasis is on ongoing studies in order to maximise the exchange of ideas and experience between the participants and to provide the researchers a sounding board for their study approach and preliminary results. Based on these contacts they can improve their approach and possibly establish additional co-operation.

In 1999 NCR has been asked to manage a large research umbrella project in the framework of the EU Structure fund IRMA (Interregional Rhine/Meuse Action Programme). In this umbrella project, IRMA-SPONGE, more than 30 research institutes from six European countries (the Netherlands, Germany, France, Belgium, Luxembourg and Switzerland) co-operate to improve the flood forecasting and prevention possibilities in the Rhine and Meuse catchment areas. The project will be executed before April 2002.

More information on this umbrella project is available on the IRMA-SPONGE Internet site (<http://www.irma-sponge.org>).



NCR also organises on an irregular basis Workshops on special topics.

An example of this are the two workshops in November 1999 and February 2000 respectively mentioned in the section **Results** below.

Research Programme

NCR's research programme is structured thematically on the basis of scale.

1. **River Basin Approach.** This approach comprises areas in which the entire river basin is to be examined. For example: precipitation/discharge ratios, effects of changing land use on discharge, effects of climatological changes, effects of spatial planning measures in the river basin, erosion in relation to river morphology, etc. The research can be characterised as "systems research".
At an NCR workshop in March 2001 two integrative research themes have been identified:
 - 1.1. The Genesis of Floods
 - 1.2. Assessing the multiple value(s) of water.
2. **Structuring the River area: River and Floodplain Planning.** The river is examined as a ribbon in the natural riverbed or between the dikes. Topics for research include the assessment of the various interests (safety, shipping and nature), influence of measures in the river on water levels and morphology, compensatory measures, etc. The research can be characterised as "process and behavioural research".
At the NCR workshop in March 2001 two integrative research themes have been identified:
 - 2.1. Multiple spatial planning: living in harmony with the River
 - 2.2. Cyclic rejuvenation of Floodplains.
3. **Joint Development of large-scale data and modelling systems.** Here co-operation in the development and use of the various large-scale systems of the different partners (e.g. modelling systems, databases) is sought, where each partner contributes with his specific expertise to improve the systems.

NCR's programme is summarised in the table below.

Focus/character	Catchword	Features
Platform function	River Science	NCR days NCR workshops IRMA-SPONGE management
River Basin Approach <i>System research</i>	Genesis of Floods Assessing the multiple value of water	integral approach Multidisciplinary interaction of disciplines Institutional aspects societal footing
Structuring the River area: River and Floodplain Planning <i>Process and behavioural research</i>	Multiple spatial planning: living in harmony with the River Cyclic rejuvenation of Floodplains	disciplinary co-operation: interaction between disciplines research on the interface physics/morphology/ecology
Joint development of large systems	Delft3D; DelftDSS etc. LEDESS, Larch etc. Bore data files (historic) map data files	contribution from different expertise integration with GIS-systems and DMI techniques
Education and Dissemination of Knowledge and skills	Knowledge management learn to use large (modelling) systems	Exchange of lecturers course environmental models Course nature management and development course Delft3D modelling system course integral water management Professional orientation



Education & Dissemination function

As can be seen in the table in the previous section the education & dissemination function focuses on the exchange of expertise through lectures and special courses. Besides we aim to learn the scientist of NCR to use the large-scale systems of the NCR partners.

Finally NCR organises periodically orientation visits to the various partners, especially aimed at MSc and Doctoral student level, to help them in their professional orientation.

Organisation

NCR's organisational structure is that of an alliance between the participating parties.

NCR's organisation exists of:

- a Supervisory Board, comprising the partners' directors, who meet annually and functions as a general steering group;
- a Programme Committee, comprising 1 senior officer from each partner, meeting at least twice a year to draw up the framework programme for planned research and for progress evaluation;
- a programming secretary, making at least 40% of his time available for NCR. He is responsible for the day-to-day management of NCR and contacts with the partners, with respect to planned research, the Programme Committee and the Supervisory Board.

NCR's programming secretary is A.G. van Os

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Of course NCR can also be found on the Internet; please visit www.ncr-web.org.

Results

Since the publication of the previous version of the NCR programme (see the section publications below) some new projects were started and others have been finalised. The latter consequently were omitted in this summary. However, a brief description of the results of these projects is given below.

Project: Lowered floodplain near Ewijk

In 1989 the floodplain on the south bank of the river Waal near Ewijk was lowered. Strong interaction between main channel and floodplain occurred during the floods in the years following. During these floods significant amounts of sand were deposited on the floodplain. This deposition was measured each year. Floodplain lowering is regarded as one of the most important measures for future river-control and Ewijk provides us with valuable data of the morphodynamics of such measures.

A two-dimensional morphodynamic model of Ewijk was made in 2000. Groynes and weirs are accounted for in the model but the sediment is regarded uniform. Dynamic simulations with both bed load and suspended sand transport were executed. Calibration and verification will be executed for main channel and floodplain. Results are expected in June 2001.

Results:

In this case study the NCR partners have further extended their knowledge and understanding of 2D morphology and 2D morphologic modelling. The usefulness and robustness of the Delft3D software package has been tested for -as much as possible- realistic field conditions.



Key features of this case study were:

- the extent and origin of the model (derived from the RWS Baseline database),
- the incorporation of weirs and
- the use of hydrodynamic boundary conditions instead of quasi-stationary ones.

Besides both bed and suspended sediment transports have been computed (in separate actions).

For more information see: <http://rwrz020/riza-site/projecten/2dmorfologie/>

Project: Workshop Strategies in physical River Research

On November 19th, 1999 a workshop was organised where the non-university partners in NCR, viz. RIZA, ALTErra and WL | Delft Hydraulics (TNO-NITG not yet being a partner at that time) presented their vision on River research for the future. This was followed by very lively discussions in three groups focusing on:

1. Structuring the River area
2. Operational River Basin management
3. Basic long-term River research.

Results:

The results of the workshop were published in a series of NCR-publications (N°. 02-2000, see the section ***Publications*** below).

Project: Workshop on Best Practices in River Basin Management

On October 27th - 29th, 1999 a workshop was organised where invited participants and key-note speakers from each continent discussed the issues:

4. Policy and Planning
5. Operational management and analytical tools
6. International co-operation.

This was done with a view to produce recommendations for the 2nd World Water Forum in March 2000 in The Hague.

Results:

The results of the workshop were published in:

River basin management, proceedings of the International Workshop, the Hague 27-29 October 1999, ed. E. Mostert, Unesco IHP-V | Technical Documents in Hydrology | n°. 31.

Towards sustainable river basin management, Recommendations and guidelines on river basin management practices, March 2000, Ministry of Housing, Spatial Planning and the Environment (VROM).

Project: Study of effects of sand extraction for floodplain lowering

The objective of this project was:

- (1) Providing scientific information about the application of modified sand extraction for floodplain lowering in the floodplains of large rivers. The study aimed at the integration of existing knowledge of effects of sand extraction. The sciences involved were: (river)hydrology, geo-hydrology, toxicology and ecology.

To that end five knowledge clusters were appointed, each chaired by a cluster leader responsible for preparing a text using the knowledge of cluster members. The clusters involved were (the leader institute in parenthesis):

- River hydrology (WL | Delft Hydraulics)
- Sand extraction (WL | Delft Hydraulics)
- Geo-hydrology (RIZA)
- (Eco) toxicological effects (RIZA)
- Ecological effects (ALTErra / KUN).



- (2) Bring different stakeholders in contact with each other and initialise discussions.

A workshop was organised on February 5th, 2000, where the results of this study were presented to an audience of stakeholders (about 100 persons from the area).

Results:

The study results and the questions and opinions of the actors were summarised in a final report. This report was published in the series of NCR-publications (N^o. 00-2000, see the section **Publications** below).

Project: Physically based modelling of rainfall-runoff models (PhD study dr. F. Diermanse)

The project was set up with the aim to investigate the possibilities of a physically based approach towards flood frequency analysis. A physically based approach implies that information is required on both the meteorological events, which can be expected in the future, and the hydrological response of river catchments to these events. In modelling terms this means a catchment-runoff model is combined with a meteorological model which generates characteristics of future flood generating events and their probability of occurrence. The research focused on the hydrological aspects of physically based flood frequency analysis, i.e. the meteorological aspects were only a side issue

Results:

Physically based rainfall-runoff models can benefit from a concept of representing spatial variability, based on a notion of the nature of heterogeneity of dominating parameters and processes. The study had two central issues:

1. Which processes and parameters are dominant under (extremely) wet conditions and should therefore be represented on a physically meaningful way in a catchment-runoff model?
2. What model complexity is required to represent the spatial heterogeneity of these parameters and processes?

Since the answers to these questions are catchment-specific, the emphasis was more on the development and application of procedures and techniques than to provide some generally valid answer. The 114 km² Zwalm catchment (Belgium) and the 28152 km² Mosel basin (covering parts of France, Germany and Luxembourg) served as pilot area throughout this study.

The study resulted in the PhD thesis of dr. Diermanse and two other publications:

Diermanse, F and Rientjes, T., 1998: Modelling process controls on floods,

In: R. Casale, G.B. Pedroli and P. Samuels, *Ribamod; River basin modeling, management and flood mitigation, concerted action*, Office for official publications of the European communities, 23-36.

Diermanse, F. L. M., 1999: Representation of natural heterogeneity in rainfall-runoff models, *Phys. Chem., Earth*, 24(7), 787-792.

Diermanse, F.L.M., 2001: *Physically based modelling of rainfall-runoff processes*, Ph. D. Thesis, Delft University Press, 234 pp.

Project: Decision support for management of shared water resources (PhD study dr. P.J.A. Gijsbers)

The objective of this project was the development of a concept for a DSS technology enabling a platform function where various participants can bring in their own models and/or data sources, while minimising additional (programming) efforts required for such an integration process.

Results:

The study resulted in the concept of the Delft Model Data Dictionary/Directory (DelftMDD/D) and of course in the PhD thesis of dr. Gijsbers:

P.J.A. Gijsbers (2000), Decision support for the management of shared water resources, Data management as a cornerstone for joint DSS development, Delft University Press, ISBN 90-407-2034-7.



Publications

NCR has started a series of publications (ISSN 1568-234X). These publications can be obtained for free from the NCR secretary.

Please contact ms. Jolien Mans at the NCR secretariat, Phone +31 15 2858557.

Until the publication date of this programme summary the following NCR-publications have been issued.

NCR-publication n°:

- 00-2000 "Delfstoffenwinning als motor voor rivierverruiming; kansen en bedreigingen", eds. Prof.dr. A.J.M. Smits & G.W. Geerling (in the Dutch language)
- 01-2000 "NCR Programma, versie 1999 – 2000", eds. Dr. R. Leuven & A.G. van Os (in the Dutch language)
- 02-2000 "NCR workshop, de weg van maatschappelijke vraag naar onderzoek", eds. A.F. Wolters & E.C.L. Martejn (in the Dutch language), ISSN 1568-234X
- 03-2000 "NCR dagen 2000, het begin van een nieuwe reeks", eds. A.F. Wolters, dr. C.J. Sloff & E.C.L. Martejn (partly in the Dutch language), ISSN 1568-234X
- 04-2001 "Umbrella Program IRMA-SPONGE, Background, Scope and Methodology", eds. dr. A. Hooijer & A.G. van Os, ISSN 1568-234X
- 05-2001 "NCR Programme, version 2001 – 2002", ed. A.G. van Os, ISSN 1568-234X.



NCR project Summaries

On the following pages the projects within the NCR programme are summarised in a format that enables the reader to see the whole of the project at a glance. We made an effort to summarise objectives, methodology and results (expected and achieved) on one page only.

Of course also project-title, project-leader and participating partners are given, along with sources of finance, period of execution and the NCR theme(s) the project is contributing to.

For more information the reader can contact the project-leader or the NCR secretary.

In total 44 summaries of NCR projects are given.

In the table below the division of the projects over the research-foci and the participation of the NCR partners are given. A project can contribute to more than one research-focus.

The table shows that the emphasis of the research is on River and Floodplain Planning, but that also the River Basin Approach and the Development of large-scale systems are receiving a fair attention.

The two platform oriented projects are the yearly NCR-days and the IRMA-SPONGE management.

This is an underestimation of the platform function since in quite some projects workshops are being organised. However this is not reflected in the table.

As for the Education & Dissemination focus summaries are still few because in its first years NCR directed its efforts on structuring the research foci. Especially since the Research School Hydraulic Engineering (Onderzoekschool Waterbouw) dealt with educational affairs quite adequately. However, this research school ended its activities in December 2000 and NCR (along with NCK, the Netherlands Centre for Coastal research) aims to fill this gap.

To that end an inventory of the various post graduate courses organised by the different NCR-partners will be made. These courses then will be made available for participants from all NCR-partners.

Moreover, once in a while an orientation visit will be organised to one or more of the non-university partners of NCR, where graduates will have the chance to gain some insight in the professional occupation of these partners. This is, however, not summarised in a project-sheet in this programme.

Focus/character	Total	TUD	UU	UT	KUN	IHE	RIZA	ALTERRA	WL	TNO-NITG
Total	44	19	17	5	9	12	28	13	30	7
Platform	2	2	2	1	2	2	2	2	2	1
River basin approach	18	8	3		2	9	11	5	15	
River and Floodplain Planning	30	12	12	4	5	7	21	10	21	3
Large-scale systems	10	4	6	2	2	3	8	4	5	3
Education & dissemination	5	4	2	1	3	3	3	1	4	1
IRMA-SPONGE	14	5	2		4	7	9	7	12	
Delft Cluster	13	9			2	9	4	3	13	

The table also shows that the IRMA-SPONGE and Delft Cluster programmes contribute considerably to the NCR-programme.

Here it is worth mentioning that NCR is not a funding facility. The partners have committed themselves to put at least the equivalent of some € 100.000 each year into the co-operation, but the real added value of NCR lies in putting together projects that are financed within different research frameworks.

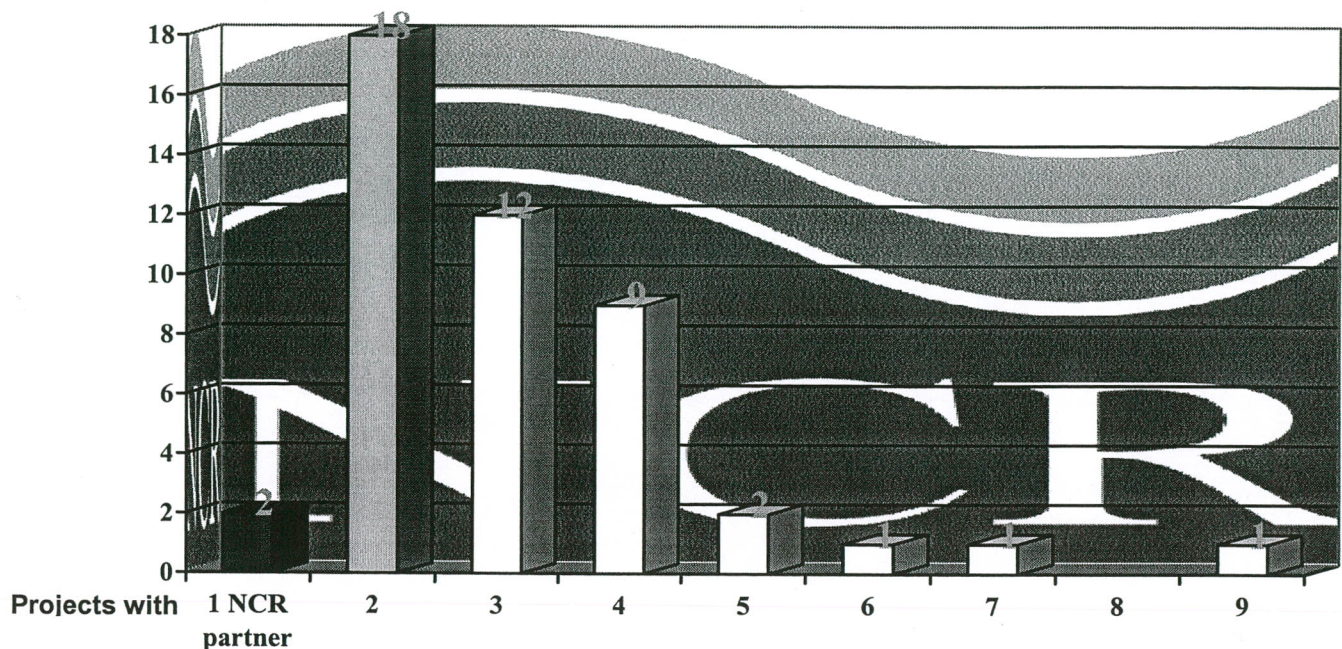
Many of these frameworks provide "shared cost financing" (e.g. EU framework programme, Delft Cluster), meaning that only part of the total costs of the project is funded. Other frameworks (e.g. NWO) only provide financing for University research personnel or instruments.

NCR, being a research co-operation without research funds of its own, provides the platform to bring these frameworks together.

Senior researchers of the NCR-partners provide the capacity to analyse the possibilities, to draft the proposals and to supervise the research.



In the figure below the number of projects as a function of the number of NCR partners participating in one project is given.



Within NCR we adopted the criterion that, since NCR is meant to enhance the co-operation between the partners, only projects with a considerable participation of at least 2 NCR partners can be designated to be an NCR-project.

The figure shows that 2 projects do not meet that criterion. They are given at the end of this programme in the section **Related projects**.

A number of 18 projects have just 2 NCR-participants. However here we should bear in mind that many of these projects have participants outside NCR.

The large number of projects with 3 and 4 NCR-partners is cause for satisfaction. The project with all 9 NCR-partners is the NCR-days.

The project summaries are numbered (NCR-code) by leading institute.

However in this summary they are sorted by focus. In doing so, related projects are mentioned together. Additionally, when possible, within the foci a sorting along the integrative research themes adopted in March this year, (physical) process and scale is performed:

1. Flow and currents
2. Sediment transport and morphodynamics
3. Ecology.
4. Other processes (or methodologies, e.g. stochastics).

Quite some projects have two or even more foci. Where this is the case we have chosen to put them in the focus where the emphasis lies or where related projects (e.g. all projects related to "Living with Floods") are given.





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Platform function

(2 summaries)



NCR project Summary

Projecttitle		NCR days
Leader	Institute	NCR
	Contactperson	ir. A.G. van Os
NCR partner(s) participating and Contactperson(s)		All NCR-partners
Non NCR partner(s)		Various
Primary source of financing		NCR partners
External cofinancing programme ('s)		
Objective(s)		Exchange of information regarding ongoing River research
Methodology		Yearly two-day workshop with scientific presentations, postersessions, discussions; the NCR days are open for participation by all people interested in River research.
Results, expected		State of the art insight in ongoing River research; new contacts between researchers of comparable research; exchange of experience between young and experienced researchers; a stimulus for co-operation; new ideas and approaches
Results, achieved		The first NCR days were on October 26 th and 27 th , 2000 with a participation of more than 80 scientists
Results, References		NCR-publication 03-2000 "NCR dagen 2000, het begin van een nieuwe reeks", eds. A.F. Wolters, dr. C.J. Sloff & E.C.L. Marteiijn (partly in the Dutch language), ISSN 1568-234X
Period of execution		Continuous
NCR code		NCR0
NCR theme('s)		Platform

NCR project Summary



Projecttitle		IRMA-SPONGE
Leader	Institute	NCR
	Contactperson	ir. A.G. van Os; dr. P.G.J. ten Brummelhuis [†] ; dr. A. Hooijer
NCR partner(s) participating and Contactperson(s)		TUD, UU, KUN, IHE, RIZA, ALTERNIA, WL
Non NCR partner(s)		Many others (32 institutes from Germany, France, Belgium, Luxemburg, Switzerland and the Netherlands in total)
Primary source of financing		
External cofinancing programme ('s)		IRMA
Objective(s)		<p>IRMA-SPONGE aims to meet the measures of Theme 3 of the Joint Operational Programme IRMA, Improvement of Knowledge and Co-operation. Therefore, a structure of the Umbrella project is chosen with a subdivision in three objectives:</p> <p>Development of models and spatial planning instruments (linked to IRMA Theme 3.1),</p> <p>Identification of vulnerable areas, comprehensive risk assessment and implications for spatial planning and flood hazard management (linked to IRMA Theme 3.3),</p> <p>Promotion of public awareness and expertise (linked to IRMA Theme 3.2 and 3.3).</p>
Methodology		<p>The IRMA Umbrella project SPONGE is a cluster of innovative, transnational, mutually consistent and complementary projects on flood risk and vulnerability assessment.</p> <p>IRMA-SPONGE consists of 13 projects in which more than 30 institutes from all 7 countries in the Rhine-Meuse basin (the Netherlands, Germany, France, Flanders, Wallonia, Luxembourg and Switzerland) co-operate.</p>
Results, expected		<p>New and/or improved hydrologic and hydraulic models for various river stretches and (sub)catchments of the Rhine and the Meuse basins.</p> <p>Concepts, methodologies for evaluation of scenarios on climate change and measures (creation of detention areas, floodplain lowering and wetland rehabilitation) and the assessment of risk and vulnerability with respect to various river functions.</p> <p>(Risk) maps of various regions in the Rhine and the Meuse basin that are produced in representative case studies.</p> <p>Improved flood early warning system for the river Rhine.</p> <p>Instruments for decision support and raising public awareness and demonstration of these instruments in water management and spatial planning.</p>
Results, achieved		Until now IRMA-SPONGE organised two conferences.
Results, References		NCR publication 04-2001 "Umbrella Program IRMA-SPONGE, Background, Scope and Methodology", eds. dr. A. Hooijer & A.G. van Os, ISSN 1568-234X
Period of execution		2000 – march 2002
NCR code		NCR1
NCR theme('s)		Platform





Summary of NCR Programme

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Research focus River Basin Approach

Themes:

Genesis of Floods

Multiple Value(s) of Water

(13 summaries)



NCR project Summary

Projecttitle		Flood wave prediction (PhD study Tom Rientjes)
Leader	Institute	TUD
	Contactperson	Prof. Cees van den Akker
NCR partner(s) participating and Contactperson(s)		WL
Non NCR partner(s)		LUW (prof. Peter Troch)
Primary source of financing		Own funds TUD
External cofinancing programme ('s)		EC DG Science
Objective(s)		Development of a model to predict floods based on physical characteristics of the area, including automatic calibration to increase the reliability of the flood predictions.
Methodology		Within the research group at TUD a physical based rainfall-runoff model has been developed (FLOWSIM) which will be extended with a module that will automatically calibrate the model when data comes available. This will yield geo-statistical information about the spatial structure and the possibility to identify spatial parameters. The ultimate aim is to improve the reliability of the flood prediction.
Results, expected		Scientific articles Automatic calibration module for FLOWSIM PhD dissertation
Results, achieved		
Results, References		
Period of execution		1996 - 2002
NCR code		TUD6
NCR theme('s)		River Basin Approach

NCR project Summary



Projecttitle		NRP/NOP/IRMA-SPONGE: Integrated water management strategies for the Rhine and Meuse basins in a changing environment
Leader	Institute	UU
	Contactperson	dr. H. Middelkoop
NCR partner(s) participating and Contactperson(s)		WL, RIZA
Non NCR partner(s)		KNMI, Universiteit Maastricht, Carthago Consultancy
Primary source of financing		NRP - IRMA-SPONGE
External cofinancing programme ('s)		
Objective(s)		The objective of the project is to provide an integrated framework for decision making in inland water management in the Rhine and Meuse basins under uncertainty. This uncertainty results from a number of unknown or partly known processes at different scale levels: global, European, national and river basin. These uncertainties determine possible futures that are envisaged, and can be coloured according to different perspectives people may have. Depending on the future perspectives different water management strategies may be adopted to solve future problems.
Methodology		In the proposed study, a set of integrated scenarios of future conditions and associated water management strategies will be identified and further developed for the Rhine and Meuse basins as well as for the Netherlands. These scenarios and strategies will be derived from existing scenarios and policy plans for socio-economic developments, water management and climate change, and they will be categorised using the so-called 'Perspectives' method. This means that existing scenarios will be clustered, and, if necessary, will be complemented with missing elements, into coherent sets that represent a variety of perspectives. Using the modelling instruments that have been developed in previous climate impact studies for the Rhine and Meuse basins and for the Netherlands, the impact of these strategies on hydrology and the consequences for the user functions of the water systems in the Netherlands will be analysed.
Results, expected		Perspective-based scenarios for the Rhine and Meuse basins. and evaluation of different water management strategies under varying futures. The results will outline the risks that result from strategic decisions which are based on assumptions concerning the future that later turn out to be incorrect, and hence enable to identify water management strategies that are robust under uncertain future conditions.
Results, achieved		
Results, References		
Period of execution		1999-2001
NCR code		UU1
NCR theme('s)		River Basin Approach; River and Floodplain Planning



NCR project Summary

Projecttitle		NRP/NOP, Impacts of climate change on the hydrology of the Meuse River
Leader	Institute	WL
	Contactperson	Marcel Ververs
NCR partner(s) participating and Contactperson(s)		UU, ALTERNIA, RIZA
Non NCR partner(s)		WUR, Carthago Consultancy, KMI (B)
Primary source of financing		WL
External cofinancing programme ('s)		NOP, EU-KP5-EESD
Objective(s)		The objective of this project is a further description and analysis of the hydrological system of the Meuse as well as quantification of the effects of Global Change on the water availability and water quality of the Meuse. Although emphasis is mostly on water supply and water shortage, the relations with flood-oriented aspects will also be considered.
Methodology		<ol style="list-style-type: none"> 1. An explorative statistical research of available hydrological Meuse-data, to investigate the drought sensitivity of different sub-catchments. 2. A number of selected sub-catchments (Beerse/Reusel, Noor and 1 or 2 in Belgium to be selected from the SCHEME project) will be hydrologically modelled on a fine/high (temporal and spatial) scale, with sufficient detail and with special emphasis on the ground and surface water storage and possible water management strategies. Existing hydrological models of current research in the various sub-catchments will be used and an analysis will be made of the hydrological behaviour resulting from different data sets and climate scenarios. 3. Results obtained with the high-resolution models will be confronted with results of an existing hydrological model of low resolution of the entire catchment (MEUSEFLOW) and of the river itself (hydraulic model).
Results, expected		Identification and description of hydrological behaviour of drought-sensitive sub-catchments in periods of droughts, after climate change (by high-resolution models); impact of water management; difference between global low- and local high resolution modelresults; analysis of storage strategies; assessment of uncertainties; vulnerability of water supply through the Meuse and impact on various functions.
Results, achieved		
Results, References		M. de Wit, et al., Impact of climate change on the hydrology of the Meuse. NOP Report, 13 March 2001 (to be published in June 2001)
Period of execution		1999 – 2001
NCR code		WL3
NCR theme('s)		River Basin Approach

NCR project Summary



Projecttitle		Decision Support for Integrated Water Resources Management (PhD Hermans)
Leader	Institute	TUD
	Contactperson	Eelco van Beek
NCR partner(s) participating and Contactperson(s)		WL, IHE
Non NCR partner(s)		DGIS, MoWR Egypt
Primary source of financing		Delft Cluster (DC-06.01.05)
External cofinancing programme ('s)		DGIS
Objective(s)		The research focuses on the link between the systems analysis approach of present policy analysis studies and the social and institutional aspects, which often play a major role in the implementation of the resulting plans. The objective is to include those aspects more explicitly in the analysis and the planning in order to increase the possibility of successful implementation of the planning study.
Methodology		The research is carried out by a PhD student of TUD (prof. Thissen). The working hypotheses is that 'Actor Analysis improves the match between policy analysis activities and the decision making practice'. A literature study is carried out to define the relevant aspects involved and the various methods available for the execution of such an actor analysis. These methods will be applied on various case studies, among other on a policy analysis study for the National Water Resources Plan of Egypt.
Results, expected		<ul style="list-style-type: none"> – experiences with actor analysis methods – extension of systems analysis approach for planning with social and institutional dimensions – scientific publications – PhD dissertation
Results, achieved		
Results, References		
Period of execution		November 1999 - October 2003
NCR code		TUD7
NCR theme('s)		River Basin Approach



NCR project Summary

Projecttitle		IRMA-SPONGE: Living with Floods
Leader	Institute	RIZA
	Contactperson	Dr. Ir. M. van Buuren
NCR partner(s) participating and Contactperson(s)		Alterra – Dr. C. Kwakernaak WL – Dr. F. Klijn IHE – Dr. A. Hoekstra TUD – Ir. K. de Bruijn
Non NCR partner(s)		
Primary source of financing		
External cofinancing programme ('s)		IRMA
Objective(s)		Development and assessment of integrated strategies for sustainable river management and physical planning for multiple land use based on resilience. Key items are: reduction of flood levels; reduction of potential damage; development of flood risk management strategies based on resilience; adaptation of land use; multiple land use related to river management.
Methodology		Design of alternative strategies for flood risk management based on resilience; comprehensive evaluation of alternative strategies; comparison with current practice; cost-benefit analysis and analysis of intangibles; combination of hydraulic functions, economic land use and nature restoration; design alternative land use development plans and interviewing stakeholders.
Results, expected		<ul style="list-style-type: none"> - Alternative strategies for flood risk management and computation of hydraulic effects (<i>achieved 95 %</i>); - Combinations of multi-functional land use with flood risk management (<i>achieved 90%</i>); - Visualisation of strategies and multi-functional land use (<i>achieved 95 %</i>); - Evaluation of strategies based on resilience with current practice (<i>achieved 80 %</i>); - Analysis of opinions on strategies amongst stakeholders (<i>achieved 80 %</i>).
Results, achieved		
Results, References		<ul style="list-style-type: none"> • P. Baan and F. Klijn (1998). <i>De Rijn op termijn: een veerkrachtstrategie</i>. WL Delft Hydraulics report R3124.10. Delft. 65 pp. • F. Klijn and J. Dijkman (1998). <i>Living with floods: a change of strategy in The Netherlands</i>. World Water and Environmental Engineering. September 1998: p. 14. • H.J. Opdam (1998). <i>The Rhine River in a long-term perspective. A new approach to river management at the end of the 21st century</i>. Land & Water International 92: pp. 18-21. • F. Klijn and M. Marchand (2000). <i>Veerkracht: een nieuw doel voor het waterbeheer?</i> Landschap 17(2000)/1. • WL Delft Hydraulics (2000). <i>Ruimte voor water: op welke gronden?</i> • Luttik, J. and Rijk, P.J. (1999). <i>Boeren langs de rivier; een verkenning van de mogelijkheden voor landbouw in combinatie met rivierverruiming</i>. Alterra, Wageningen. ISSN 0927-4499 • J. van Bakel et al. (2000). <i>De Aquarel</i>. Achtergronddocument. Uitgave Alterra Wageningen. • C. Kwakernaak, N. van der Windt, 2000: <i>de Aquarel; scenario's voor water in een vitaal platteland</i>. Uitgave Alterra Wageningen. • T. Garritsen, G. Vonk and K. de Vries (2000). <i>Visions for the Rhine</i>. • De Bruijn & Klijn (2001). <i>Resilience strategies in flood risk management</i>. Accepted for presentation on the XXIX IAHR Congress; Beijing (16-21 September 2001).Rhine River on the long term.
Period of execution		1999 – 2001
NCR code		RIZA6
NCR theme('s)		River Basin Approach, River and Floodplain Planning

NCR project Summary



Projecttitle		Land use planning for flood risk management: towards more resilient river systems (PhD study ir. Karin de Bruijn; Delft Cluster)
Leader	Institute	WL
	Contactperson	Frans Klijn
NCR partner(s) participating and Contactperson(s)		TUD, RIZA (IRMA project 'Living with Floods')
Non NCR partner(s)		
Primary source of financing		Delft Cluster (DC-06.01.02) IRMA-SPONGE
External cofinancing programme ('s)		
Objective(s)		<p>The purpose of this research is operationalising and investigating the usefulness of the concept of resilience for flood risk management of river systems by:</p> <ol style="list-style-type: none"> 1. Defining the concept for flood risk management 2. Quantifying the concept by means of indicators, 3. Testing and comparing different possible indicators 4. Developing resilient land use strategies.
Methodology		<ol style="list-style-type: none"> 1. Review on the history and meaning of the resilience concept; 2. Literature review on flood risk management and damage assessment. The current flood risk management and risk- and damage modelling will be studied; 3. Defining resilience in perspective of rivers and flood risk management; 4. Quantifying resilience: development of useful resilience indicators for the river delta; 5. Collection of data for flood and damage modelling of the Rhine river system; 6. Simulation of flooding in the Rhine delta: Selecting discharge scenarios, making schematisations, simulations, etc.; 7. Calculating damage caused by these flooding; 8. Determining the current resilience of the Rhine River system by applying the different resilience indicators; 9. Looking at specific measures in detail: detention ponds, green rivers, peak attenuation, possibilities to forecast discharges, morphology?; 10. Developing resilient land use strategies for the downstream part of the Rhine; 11. Simulating the flooding and calculation of the damage for the strategies; 12. Application of the resilience indicator on the different strategies; 13. Studying the applicability of the concept and indicators of resilience on other comparable river systems; 14. Reflection on the central questions: Is resilience useful? When and how much resilience is needed ?
Results, expected		<p>The project will result in a dissertation.</p> <p>Furthermore, it is expected that intermediate results be published in scientific journals and conferences.</p> <p>A conference paper on the resilience concept and specification for the flood-defence system is to be published in 2001.</p>
Period of execution		2000 – 2004
NCR code		WL4
NCR theme('s)		River Basin Approach; River and Floodplain Planning; Development of large Systems



NCR project Summary

Projecttitle		Impact of land-use changes on hydrology (DC 06.03.04)
Leader	Institute	WL
	Contactperson	Jaap Kwadijk
NCR partner(s) participating and Contactperson(s)		TUD, IHE, RIZA
Non NCR partner(s)		WUR
Primary source of financing		WL
External cofinancing programme ('s)		Delft Cluster
Objective(s)		<p>Main objective of this project is to study the rainfall-runoff relation of the Meuse River basin during meteorological wet conditions. For this research, physically based models are used which are combined with innovative modeltechniques such as data assimilation, inverse parameter estimation, statistical methods and neural networks. Special emphasis will be paid to modelling of hydrological impacts of land use and land-use changes. Furthermore, impacts of large-scale land-use changes to influence water-detention are examined.</p>
Methodology		<p>The project consists of three sub-projects, each to be considered as a separate PhD-study. In the first project computer models and neural networks are used to simulate and verify hydrological impacts of land-use (changes). The second project is aimed to develop data-assimilation techniques and apply them for some physically based run-off models. In the third project a recently developed run-off model (Representative Elementary Watershed concept) is further elaborated and applied, using data assimilation techniques from the second project.</p>
Results, expected		<ul style="list-style-type: none"> – Three PhD-dissertations – Various masters thesis reports – Various scientific publications – Organisation of a special session of the EGS conference (European Geophysical Society) for modelling impacts of land use on rainfall-runoff processes, and/or modelling uncertainties with respect to related parameters and modelstructures. – Contribution to educational program of participating universities.
Results, achieved		
Results, References		
Period of execution		2001 - 2004
NCR code		WL7
NCR theme('s)		River Basin Approach ; River and Floodplain Planning; Development of large Systems; Education & Dissemination

NCR project Summary



Projecttitle		The effect of land-use and human interference on the hydrology of river basins
Leader	Institute	IHE
	Contactperson	Hubert Savenije
NCR partner(s) participating and Contactperson(s)		TUD, Delft Hydraulics, RIZA, IHE
Non NCR partner(s)		W-UR, In co-operation with the DAUFIN project of the EU
Primary source of financing		Delft Cluster, RIZA
External cofinancing programme ('s)		EU
Objective(s)		<p>To investigate the effects of land-use and human interference on the rainfall-runoff processes of the Rhine and Meuse rivers. The project has following derived objectives.</p> <ol style="list-style-type: none"> 1. To analyse the time series for non-homogeneity 2. Fundamental research into rainfall-runoff processes at the scale of sub-basins (100Mm²) 3. Aggregation to the level of tributaries 4. Improve deterministic distributed modelling of catchments 5. Analysing the effects of land use change and water retention
Methodology		<p>The project involves three PhD researchers and postdocs in the following areas:</p> <ol style="list-style-type: none"> 1. Data assimilation from remote sensing and parameterisation 2. Development of integrated algorithms for representative elementary watersheds 3. Time series analysis and analysis of non-homogeneity <p>Phase 1. Literature studies; identification of knowledge gaps Phase 2. Fieldstudies, time series analysis, detailed modelling in small catchments Phase 3. Refinement of the Meuse and Rhine models through deterministic models and statistical techniques. Up-scaling of parameters to larger areas.</p>
Results, expected		<p>Improved deterministic distributed hydrological model. Refinement of the Rhine and Meuse models. Three promovendi, Three dissertations and Several articles in international peer-reviewed journals</p>
Results, achieved		
Results, References		
Period of execution		2000 - 2003
NCR code		IHE1
NCR theme('s)		River Basin Approach



NCR project Summary

Projecttitle		Water management and environmental planning
Leader	Institute	ALTERRA
	Contactperson	Dr. C. Kwakernaak
NCR partner(s) participating and Contactperson(s)		WL, IHE, RIZA (in connection with IRMA-project Living with Floods)
Non NCR partner(s)		Erasmus University, Rotterdam
Primary source of financing		
External cofinancing programme ('s)		Delft Cluster IRMA-SPONGE
Objective(s)		Quantification of the relationship between environmental planning and water management in terms of system-analysis. The project focuses on the effects of changes in environmental planning in The Netherlands on water management (passive) and on environmental measures that should be taken to solve problems in water management (active).
Methodology		<p>A system-analytical approach is used in which the comparison of two scenarios is a major tool:</p> <ul style="list-style-type: none"> – Business as usual (environmental planning hardly takes water into account) – A total change in trend (Water is the steering force from now on!) <p>The comparison must be focussed on long term processes with emphasis on criteria for sustainability as have been identified in the 1999 WL-R&D document "Ruimte voor Water: op welke gronden?" Robustness and flexibility differ greatly when environmental and "usual" measures are compared. Adaptation and sensibility for the foundation of economic rentability on the long term also asks for special attention</p>
Results, expected		<p>The final result is a scientific report. During the project, sections of the report and papers for scientific journals will be produced on the following items:</p> <ul style="list-style-type: none"> – Analysis of the problem and system of the relation between environmental planning and water management – Criteria for evaluation of integrated planning (robustness, flexibility) – Economic considerations of long-term effects and changes in trend – A concept for instrumentation of choices
Results, achieved		
Results, References		
Period of execution		2000 - 2002
NCR code		ALTERRA3
NCR theme('s)		River Basin Approach

NCR project Summary



Projecttitle		Value of Water
Leader	Institute	IHE
	Contactperson	Dr.ir. Arjen Y. Hoekstra
NCR partner(s) participating and Contactperson(s)		WL
Non NCR partner(s)		
Primary source of financing		ICES/Delft Cluster, EU/IRMA
External cofinancing programme ('s)		Netherlands Fellowship Programme (NFP)
Objective(s)		<p>The objective of this research is to develop a methodology for water valuation that can be used to assess the socio-economic, cultural and environmental values of different types of water stocks and flows, accounting for variations in time and space.</p> <p>The methodology will be formalised in the form of a valuation model, to be used to evaluate different management strategies. The methodology will be developed and applied in two case studies, one for the Rhine basin and one for the Zambezi basin.</p>
Methodology		<p>The research consists of two main parts: the methodological part - in which methods are developed that can be used for the proper weighting of the multiple values of water in policy making - and the practical part - the two case studies.</p> <p>Different types and schools of valuation will be listed and evaluated with respect to their characteristics, including pros and cons, particularly with respect to the water field. It will be considered how different types of values can be quantified. In addition, we will analyse how different methods of valuation can apply to different types of use and different forms of water. Next, it will be analysed how the value of water in a certain place puts a value to the water upstream. A method will be developed for the calculation of the value of water as a function of its downstream benefits and costs (e.g. in case of flooding). The methodology of water valuation will be formalised in the form of a computer model and applied to the two cases. In both cases some practical policy questions will be addressed.</p>
Results, expected		The final expected result will be a PhD-thesis (PhD student Seyam) and various scientific articles. So far, three reports in the newly established Value of Water Research Report Series have been published.
Results, achieved		In the period November 2000–March 2001 8 workshops have been organised.
Results, References		<ol style="list-style-type: none"> 1. Chapagain, A.K. (Feb. 2000) 'Exploring methods to assess the value of water: A case study on the Zambezi basin' 2. Hoekstra, A.Y., Savenije, H.H.G., and Chapagain, A.K. (March 2000) 'Water value flows: A case study on the Zambezi basin' 3. Seyam, I.M. and Hoekstra, A.Y. (Dec. 2000) 'The water value-flow concept' <p>The second paper has been accepted for publication in <i>Integrated Assessment</i>.</p>
Period of execution		1999-2003
NCR code		IHE2
NCR theme('s)		River Basin Approach



NCR project Summary

Projecttitle		STORM (Simulation Tool for River Management)
Leader	Institute	IHE
	Contactperson	Jetze Heun, Daniel Schotanus
NCR partner(s) participating and Contactperson(s)		WL, Micha Werner
Non NCR partner(s)		Resource Analysis, Delft: Frank Uithol, Marieke de Groen
Primary source of financing		Delft Cluster
External cofinancing programme ('s)		IRMA
Objective(s)		<ul style="list-style-type: none"> - The development of a simulation tool for river management which provides a platform for various stakeholders to discuss and broaden mutual understanding on goals, policies and actual interventions between the various parties at the various institutional scales. - The evaluation of the effectiveness of this simulation tool in river management in increasing understanding and empathy among stakeholders. - The evaluation of the potential role of such a simulation tool in decision support for policy making related to river and floodplain management and fine-tuning of policies between different regions and countries.
Methodology		<ul style="list-style-type: none"> - Actor analysis of river and floodplain management in Germany and the Netherlands (RA/IHE) - Systems analysis of physical (infrastructural, hydraulic and environmental) and functional variables of the Rhine river and floodplains (RA/IHE) - Inventory and definition of roles, objectives and mandates of stakeholders (RA/IHE) - Development of a functional simulation design based on a simplified, but realistic and recognisable model of river and floodplain parameters (RA/IHE/WL-DH) - Programming, testing and calibrating the hydraulic model (RA/WL-DH) - Developing a simulation interface with the hydraulic model, based on selected scenarios and stakeholder roles (IHE/RA/WL-DH); - Running of simulation tool (roles, interface and model) in various settings to evaluate and modify as necessary for optimal performance (IHE/RA/WL)
Results, expected		<ul style="list-style-type: none"> - Study of the German river management institutional setting, stakeholder interests in floodplains, relationship between discharge and ecology (to be completed April 2001 by 3 TUD & WUR MSc students) - The completion of the development of the simulation tool by August 2001 - The testing and modification of the tool by the end of 2001.
Results, achieved		<ul style="list-style-type: none"> - Identification of and meetings and workshops with various Dutch and German stakeholders (2000) - Systems analysis and Definition Study of Rhine River (February 2001)
Results, References		
Period of execution		1999 – 2002
NCR code		IHE3
NCR theme('s)		River Basin Approach ; River and Floodplain Planning

NCR project Summary



Projecttitle		IRMA-SPONGE: INTERMEUSE – international flood protection and integrated spatial analysis for the river Meuse
Leader	Institute	RIZA
	Contactperson	Drs. N. Geilen
NCR partner(s) participating and Contactperson(s)		ALTERRA / Dr. B. Pedroli (Crosslinks with other IRMA-SPONGE projects, represented by University of Nijmegen (Dr. R. Leuven) and Delft Hydraulics (Drs. H. Duel))
Non NCR partner(s)		University of Metz (F), Institute for Nature Conservation, University of Liège, University of Namur (B)
Primary source of financing		Research funds INTERMEUSE-partners
External cofinancing programme ('s)		IRMA
Objective(s)		<ul style="list-style-type: none"> - Development and application of a methodology for the evaluation of spatial planning alternatives for the Meuse basin, with respect to flood protection and floodplain rehabilitation. The effect assessment will focus on the ecological impacts of flood protection measures or strategies; - co-operation of scientists and spatial planners from the three involved countries in order to improve international co-operation and tuning of management practices and enhance the exchange of knowledge.
Methodology		Flood protection measures will lead to changes in the physical environment and thus influence the ecological quality and development. In the project potential measures are assessed for their effectiveness for both flood protection and flood plain rehabilitation. Promising measures are grouped in a number of fictive flood protection strategies. The analysis will take place globally for the whole Meuse basin using the strategies and detailed within 3 pilot stretches using certain measures. Ecological quality is assessed on the global scale by analysing the spatial cohesion of habitats (as an indication for sustainability of species populations). The detailed analysis in the pilot stretches is performed on a selection of flora and fauna species groups. Habitat requirements are linked to physical parameters and land use. The results form the basis for the development of the evaluation method and guidelines to integrate flood protection and flood plain rehabilitation in the best possible way.
Results, expected		Final report presenting evaluation method (with accompanying tools and background reports (see also achieved). Method and results will also be used for 3-4 papers.
Results, achieved		<p>Intermeuse-reports:</p> <ol style="list-style-type: none"> 1. <i>Survey of types of flood protection measures.</i> 2. <i>Survey of available data.</i> 3. <i>Mapping of river ecological units of the Meuse.</i> 4. <i>Feasibility assessment of measures.</i> 5. (phase 1). <i>Determination of the modified abiotic situation in the Meuse basin, phase 1.</i> 6. Intermeuse-Newsletter 1, 2 and 3;
Results, References		Submitted to Landscape Ecology: <i>Strategies in River Restoration Projects: Design with Nature</i> . Pedroli, B., De Blust, G., Van Looy, K., van Rooij, S.
Period of execution		1999 – 2001
NCR code		RIZA5
NCR theme('s)		River Basin Approach ; River and Floodplain Planning



NCR project Summary

Projecttitle		Food web studies in rivers: the role of exotic species
Leader	Institute	KUN
	Contactperson	Prof. Dr. G. van der Velde
NCR partner(s) participating and Contactperson(s)		RIZA (A. bij de Vaate)
Non NCR partner(s)		
Primary source of financing		RIZA, KUN
External cofinancing programme ('s)		
Objective(s)		To come to a synthesis about food web relations in the River Rhine, determined mainly by dominant, mostly exotic, species. The character of disturbance by continuous invasions, particular those from the Ponto-Caspian region through the Main-Danube channel, has a strong influence on the abundant macrofauna communities.
Methodology		<p>The methodology concerns a combination of field and experimental research. Macroinvertebrates present on stones and sediment are sampled and analysed every month.</p> <p>This biomonitoring gives knowledge about the entering and dispersal of exotics in the Rhine system, on their population development and their influence on other macroinvertebrates and the Rhine food web.</p> <p>The success of the invader depends on the competition with a related native species and predation rate. To get insight in these intraspecific relations, microcosm and mesocosm experiments will be done under stable conditions in climate cells.</p>
Results, expected		<ul style="list-style-type: none"> - A model for invasions, which can be used for predicting the success of an invasion after having investigated measurable qualities of the species and its effect on the Rhine ecosystem and food web. - Answers to the key question whether the increasing amount of invaders and their dominance prevent a revival of indigenous species. Knowledge that can be useful for management, for example concerning effects of reduction of salt and thermal emission in the river Rhine on macro-invertebrate communities. - Several scientific journal papers and a dissertation by Drs. M.C. van Riel
Results, achieved		
Results, References		
Period of execution		2000-2004
NCR code		KUN3
NCR theme('s)		River Basin Approach



Summary of NCR Programme

version 2001 - 2002

Research focus River and Floodplain Planning

Themes:

Multiple spatial planning: living in harmony with the River

Cyclic rejuvenation of Floodplains

(20 summaries)



NCR project Summary

Projecttitle		Working on living rivers
Leader	Institute	TUD
	Contactperson	Huib de Vriend / Fred Havinga
NCR partner(s) participating and Contactperson(s)		RIZA
Non NCR partner(s)		RWS-DON
Primary source of financing		Project Living Rivers
External cofinancing programme ('s)		
Objective(s)		Insight and predictive capability regarding the exchange of sand between the main channel and the floodplains of a river with a compound cross-section
Methodology		Using case studies from the Waal, potentially relevant mechanisms for sediment exchange are identified and investigated. In addition to advection by flow into and out of the floodplains, the occurrence of large coherent vortices over the banks of the main channel turns out to play a role. Via laboratory experiments and numerical models, this phenomenon is investigated in further detail.
Results, expected		<ul style="list-style-type: none"> – Validated models (LES) of the flow around the banks of the main channel during flood conditions – Operational probabilistic methods for 1-D river morphological predictions – Basic parametric modelling of the net effects on the overall water and sediment motion – Dissertation (Fred Havinga) – Scientific publications
Results, achieved		<ul style="list-style-type: none"> – Laboratory experiments carried out for closed banks (various slopes and orientations w.r.t. the mean flow direction) and for groins. – LES-model validated against laboratory data – Pilot-application Waal (Plaat van Ewijk) – Congress publication Genua (1999)
Results, References		
Period of execution		1997-2001
NCR code		TUD8
NCR theme('s)		River and Floodplain Planning

NCR project Summary



Projecttitle		Monitoring hydraulic roughness of floodplain surfaces and vegetation using laseraltimetry
Leader	Institute	RIZA
	Contactperson	ing. P. Jesse
NCR partner(s) participating and Contactperson(s)		UU: Dr. H. Middelkoop WL: Dr. N.E.M. Asselman
Non NCR partner(s)		RWS-MD
Primary source of financing		RWS-DON
External cofinancing programme ('s)		
Objective(s)		<p>The primary objective is to develop a method for mapping and monitoring the hydraulic roughness of the floodplain surface and the vegetation of the embanked floodplains along the Rhine branches in the Netherlands. This information will be important input to hydraulic models to estimate river water levels during extreme peak flows in the river.</p> <p>Subgoals:</p> <p>Estimating effective hydraulic roughness of floodplain vegetation from vegetation characteristics;</p> <p>Developing a method to relate high-resolution elevation data obtained from airborne altimetry laser to vegetation characteristics and hydraulic roughness.</p>
Methodology		<p><i>Field sampling:</i></p> <p>Detailed mapping of vegetation types and structure in selected key-areas along the Rhine branches (IJssel and Waal).</p> <p>Developing (photographic) field methods for rapid measurement of vegetation density.</p> <p>Acquisition of laseraltimetry data in winter season.</p> <p>(Optional during flood: 2-dimensional measurements of water levels and flow fields)</p> <p><i>Image processing:</i></p> <p>Analysis of laseraltimetry data with respect to vegetation structure and patterns.</p> <p>Combining laser data with high-resolution multispectral data.</p>
Results, expected		<p>Standardised methods for field-measurements of vegetation characteristics relevant for hydraulic roughness;</p> <p>Conceptual model for determining effective hydraulic roughness from vegetation characteristics;</p> <p>Operational method for the estimation of hydraulic roughness of floodplain surface using airborne laseraltimetry data.</p>
Results, achieved		
Results, References		
Period of execution		2000 - 2002
NCR code		RIZA8
NCR theme('s)		River and Floodplain Planning



NCR project Summary

Projecttitle		Development and hydraulic roughness of subaqueous dunes
Leader	Institute	UU
	Contactperson	Dr. J.H. van den Berg, Drs A. Wilbers
NCR partner(s) participating and Contactperson(s)		RIZA, Dr. W. ten Brinke
Non NCR partner(s)		
Primary source of financing		UU, RIZA
External cofinancing programme ('s)		
Objective(s)		The objective of the research is to come to a method for predicting dune dimensions in rivers and to create a method for calculating hydraulic roughness caused by dunes in order to predict the hydraulic roughness of the bed in a river.
Methodology		Analysis of detailed bed topography measured with multi-beam echo sounders in the Bovenrijn, Waal and Maas, together with data of bed-material, flow velocities and water surface-slope. In addition measurement data from literature (river and flume) will be used. The analysis will be supported by simulations using a numerical model.
Results, expected		The expected results are a method to predict the dune development and dune roughness in the Rhine and Meuse rivers.
Results, achieved		
Results, References		
Period of execution		2000 – 2003
NCR code		UU2
NCR theme('s)		River and Floodplain Planning

NCR project Summary



Projecttitle		Collaboration of Dutch scientific institutes working on river morphology within the framework of the "Morphological Triangle"
Leader	Institute	RIZA
	Contactperson	Wilfried ten Brinke
NCR partner(s) participating and Contactperson(s)		UT, TUD, UU, WL, TNO-NITG
Non NCR partner(s)		
Primary source of financing		The commitments of the partners is financed within the framework of their own projects.
External cofinancing programme ('s)		
Objective(s)		The "Morphological Triangle" is a collaboration of NCR partners working on river morphology. The Triangle aims at improving the exchange of knowledge between partners and a mutual attunement of research programmes that focus on specific items. These items are chosen such that the expertise of the partners involved can be combined to focus on a morphological study area that has strong societal interest. Thus, the results will serve to support river engineering and nature development. Combining scientific and societal interest in these items leads to a stronger increase of our knowledge of river morphological behaviour than in the case of autonomous working of institutes on their own projects.
Methodology		The collaboration is achieved by choosing research items with strong societal interest, defining the morphological issues that play a role and mapping the research that needs to be done to tackle these issues. In the present case of the Triangle these issues need to be tackled by numerical models (1D and 2D) and these models need to be improved by experiments in the laboratory and in the river itself. Different parts of this work will be done by the partners involved, all within their own expertise, to be integrated within the collaboration of the Triangle. The selected items will be worked out into research programmes for the following years. At present two items have been selected: (1) Morphodynamics of the bifurcation of the Bovenrijn into the Waal and the Pannerdensch Kanaal, and (2) Water and sediment exchange between the river and the floodplain, and the resulting morphological processes in the river bed.
Results, expected		The Morphological Triangle started its activities only recently. The first results will be the research programmes for the two items selected. In the following years the partners will come up with results within their expertise, forming part of the research programmes. These results will focus on understanding sediment transport and morphological processes from field and laboratory measurements, finding and improving quantitative relationships for (graded) sediment transport, bedform dynamics and bed roughness, and improving 1D and 2D morphological models.
Period of execution		2001 and following years
NCR code		RIZA9
NCR theme('s)		River and Floodplain Planning



NCR project Summary

Projecttitle		Sedimentation on floodplains
Leader	Institute	RIZA
	Contactperson	M. van Wijngaarden
NCR partner(s) participating and Contactperson(s)		UU, TNO-NITG, WL
Non NCR partner(s)		Kernfysisch Versneller Instituut / Nuclear Geofysics Division (KVI/NGD), RWS Dir. Limburg
Primary source of financing		RWS budget
External cofinancing programme ('s)		
Objective(s)		<ul style="list-style-type: none"> – To develop a technique to obtain quickly detailed data about floodplain sedimentation (PHAROS) – To gain quantitative information about the historic (past century) sedimentation on floodplains using (PHAROS). – To use these data to calibrate a (simple) model to predict floodplain sedimentation and use them for future scenario analysis. – To increase the knowledge about floodplain development on longer time scales by combining PHAROS data of the 'top-soil' with techniques / information about deeper layers.
Methodology		<ul style="list-style-type: none"> – PHAROS was developed to date sediment cores non-destructively on their ¹³⁷Cs signal. This yields detailed information about the sedimentation over the past 50 years. – Information on a Meuse floodplain near Itteren was obtained through a number of cores. The objective for the coming years is to analyse these results and try to interpolate them spatially. – Another effort will be to combine PHAROS-information with that from techniques surveying at greater depths. This will increase the knowledge about floodplain development considerably, which will be of benefit for all floodplain development programmes – A simple SOBEK-model has already been constructed for the Meuse, but additional calibration data are required. PHAROS offers data for model calibration. Such a model can be used to estimate the effects of future climate change or scenarios for floodplain development.
Results, expected		<ol style="list-style-type: none"> 1. A (field) method to obtain quick and accurate information about floodplain sedimentation and development 2. A calibrated model for the Meuse to calculate sedimentation of suspended sediment on the floodplains.
Results, achieved		<ol style="list-style-type: none"> 1. Construction of PHAROS and core information about 1 Meuse floodplain 2. Simple SOBEK model for the Meuse, only partly calibrated
Results, References		<ol style="list-style-type: none"> 1. Asselman, N.A.M. (2000). Slibmodellering in VVM, WL report Q2749 2. Van der Berg and Van Wijngaarden (2000). Sedimentatie langs de Grensmaas, RIZA report nr 2000.046 3. Rigollet and De Meijer (2001) PHAROS, Assessment of sedimentation and erosion processes in the Meuse floodplain near Borgharen and Itteren by dating ¹³⁷Cs in 21 cores. KVI internal report n P-001.
Period of execution		1999-2003
NCR code		RIZA3
NCR theme('s)		River and Floodplain Planning

NCR project Summary



Projecttitle		Sediment transport in sand gravel bed rivers
Leader	Institute	UU
	Contactperson	Drs. Maarten Kleinhans (PhD study)
NCR partner(s) participating and Contactperson(s)		RIZA, Dr. W. ten Brinke; UT, Ir. A. Blom
Non NCR partner(s)		University of Minnesota, St. Anthony Falls Laboratory, Prof. Gary Parker
Primary source of financing		NWO-ALW
External cofinancing programme ('s)		
Objective(s)		The aim of this study is to describe and quantify the Processes of sediment transport and deposition in rivers in the case of non-uniform material, with emphasis on mixtures of coarse sand and fine gravel.
Methodology		Field measurements (together with RIZA) and With flume experiments (together with UT and together with Parker), as Well as additional field work in the river Allier and additional Experiments in a small flume.
Results, expected		<ol style="list-style-type: none"> 1. Identification of phenomena that must be taken into account when attempting to predict the sediment transport. 2. Strategy for field measurements of sediment transport. 3. Predictor for bedload transport of mixtures. 4. Stability diagram of bedforms in non-uniform sediment. 5. (Conceptual) Model for sediment transport including the effect of vertical sorting in dunes. 6. Conceptual model for prediction of the vertical sorting in dunes. 7. International journal papers, PhD thesis
Results, achieved		
Results, References		
Period of execution		1996 - 2002
NCR code		UU5
NCR theme('s)		River and Floodplain Planning; Development of large Systems



NCR project Summary

Projecttitle		Fluvial sediment transport and morphology in the case of graded sediment
Leader	Institute	UT
	Contactperson	Jan Ribberink / Astrid Blom
NCR partner(s) participating and Contactperson(s)		WL, RIZA, UU
Non NCR partner(s)		University of Minnesota – St. Anthony Falls Laboratory
Primary source of financing		EU-TMR Large Installations Plan
External cofinancing programme ('s)		
Objective(s)		Insight, better model concepts and predictive capability concerning mixing and segregation of graded sediment; role of these processes in fluvial sediment transport and morphology
Methodology		Orientation via field experiments (in collaboration with UU – Ph.D.-project Maarten Kleinhans) Process analyses based on laboratory experiments Model development (in collaboration with University of Minnesota – prof. Parker)
Results, expected		Insight into mixing and segregation processes Improved model concept for graded sediment Predictive capacity concerning gradation-effects, including armouring Dissertation (Astrid Blom) Scientific publications
Results, achieved		Data report on bimodal-sediment experiments data report on trimodal-sediment experiments Congress publications New Zealand (1999), Genua (1999), Obihiro (2001)
Results, References		
Period of execution		1998-2002
NCR code		UT1
NCR theme('s)		River and Floodplain Planning

NCR project Summary



Projecttitle		Behaviour-oriented modelling of braided rivers
Leader	Institute	UT
	Contactperson	Huib de Vriend / Bert Jagers
NCR partner(s) participating and Contactperson(s)		WL
Non NCR partner(s)		
Primary source of financing		
External cofinancing programme ('s)		
Objective(s)		Predictive capability concerning the behaviour of braided rivers at various scale levels (individual channel, channel pattern, river reach)
Methodology		<p>Analysis of satellite images of consecutive years</p> <p>Modelling of observed behaviour (via semi-empirical models, neural nets, etc.)</p> <p>Modelling and analysis of channel formation processes</p>
Results, expected		<p>Evaluation of model concepts according to practical applicability</p> <p>Insight into and modelling of channel formation</p> <p>Dissertation (Bert Jager)</p> <p>Scientific publications</p>
Results, achieved		<p>Congress publications EGS (1998), Genua (1999)</p> <p>Delft3D-MOR model of channel shortcut</p> <p>Concept of dissertation</p>
Results, References		
Period of execution		1996-2001
NCR code		UT2
NCR theme('s)		River and Floodplain Planning



NCR project Summary

Projecttitle		Morphodynamics of rivers and estuaries of compound cross-sectional shape
Leader	Institute	TUD
	Contactperson	Prof.dr.ir. H.J. de Vriend
NCR partner(s) participating and Contactperson(s)		WL
Non NCR partner(s)		Hohai University, Nanjing, China Chiangjiang Water Resources Commission, Wuhan, China
Primary source of financing		Delft Cluster China-DC Water Resources Engineering Project (DGIS)
External cofinancing programme ('s)		
Objective(s)		<p><u>Short term</u>: Modelling the morphological behaviour of rivers and estuaries with a compound cross-section, natural or in response to human interventions.</p> <p><u>Long term</u>: Development of predictive capacity concerning this behaviour, for the design of sustainable and effective measures, or in addition to monitoring data in large, extensively monitored rivers and estuaries</p>
Methodology		<p>The project consists of three interrelated subprojects:</p> <ol style="list-style-type: none"> 1. Intermediate and large scale effects of river improvement measures related to groins (in coll. with DIOC Water, TUD) 2. Migration of secondary channels and the consequent underscoring of dikes and banks in the Yangtze River (part of China-DC project on Water Resources Engineering) 3. Morphological and subsequent effects of construction and maintenance of the navigation channel in the mouth of the Yangtze River (part of China-DC project on Water Resources Engineering)
Results, expected		<p>Predictive capability concerning the morphological effects of floodplain measures and the behaviour of migrating channels in large rivers and estuaries</p> <p>Subproj. 1: dissertation (Mohammed Fahty)</p> <p>Subproj. 2: dissertation (Li Yu)</p> <p>Subproj. 3: dissertation (Chen Wei)</p> <p>Scientific publications</p>
Results, achieved		Research plans Ph.D.'s
Results, References		
Period of execution		2000-2004
NCR code		TUD9
NCR theme('s)		River and Floodplain Planning

NCR project Summary



Projecttitle		Dealing with uncertainties in river morphological predictions
Leader	Institute	TUD
	Contactperson	Huib de Vriend / Hanneke van der Klis
NCR partner(s) participating and Contactperson(s)		WL
Non NCR partner(s)		
Primary source of financing		LWI / Delft Cluster
External cofinancing programme ('s)		
Objective(s)		Development of methods and tools for efficient probabilistic prediction of morphological changes under the influence of river improvement measures, with special attention to the effects of uncertainty in the discharge.
Methodology		Starting from a 1-D SOBEK-model, existing techniques (Monte Carlo simulation, with entirely random or stratified sampling; First Order methods) are implemented and tested. Subsequently, the possibilities of stochastic meta-models will be investigated.
Results, expected		Operational probabilistic methods for 1-D river morphological predictions Exploration of possibilities of stochastic meta-models Dissertation (Hanneke van der Klis) Scientific publications
Results, achieved		Monte-Carlo facilities for SOBEK-models Exploration of applicability of FORM, given a constant discharge and uncertain roughness and grain size Congress publication Beijing (2000) Congress publication Obihiro (2001)
Results, References		
Period of execution		1999-2002
NCR code		TUD2
NCR theme('s)		River and Floodplain Planning