

International Urban Drainage Research Database

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ABSTRACT

The RIONED Foundation (www.riool.net) is the national not-for-profit knowledge centre on sewer systems and urban drainage in The Netherlands. RIONED contracted the University of Leuven and the Delft University of Technology to develop a database on the published results of research projects in the field of urban drainage. The database must give insight in the state of the art of the research in this field, the centres of knowledge on specific themes and must open up the literature to support desk studies. RIONED aims at avoiding double research and better accessibility of literature and centres of specific knowledge.

The database will be accessible through the Internet and should be updated regularly to ensure the actuality of the database. To be able to use the database for programming research ongoing research projects should be added too. Therefore a plea is made for the development of a structure for collaboration of knowledge centres. Within this structure the database can be extended and kept up-to-date. Organisations interested to join the development of such a structure should give notice on the RIONED website www.riool.net by following the 'English'-link.

KEYWORDS

Collaboration; Internet; Knowledge centres.; Research database; Urban drainage.

INTRODUCTION

The RIONED foundation is the Dutch national centre of knowledge and research in the field of sewerage and urban drainage. The RIONED programming committee has to evaluate all submitted research proposals on its significance and uniqueness. However, RIONED is lacking a good insight in recently published results of research projects world wide as well as ongoing research projects that might be of interest. RIONED has started an investigation in co-operation with the Delft University of Technology and the University of Leuven. This investigation incorporates an overview of the most relevant centres of excellence, results of recent research projects and projects in progress. The result is a database that can be used as a tool for a quick scan of published results in order to avoid repetitive work and as a source for literature studies. The database will be made available on the Internet.

Problem

As sewerage and urban drainage are developing continuously there is always a need for new research. In submitting new proposals for research projects there is a risk that the topic is

already covered abroad. Although most information is available through the Internet the programming committee aims at a structured and easy accessible database.

Objective

Objective of the project is an overview of global research in the field of urban drainage in general and sewer systems in particular. The overview should contain the results of relevant research projects, the contact addresses of research centres and ongoing or programmed research projects. From this overview the programming committee of the RIONED foundation should be able to define on which topics of intended research projects useful results are already available. Such results can be incorporated in future projects or might even be decisive in granting or rejecting a research proposal. On the other hand the database can identify interesting research groups for collaboration or exchange of knowledge. In this matter the international efforts on research in urban drainage can get an efficiency boost.

In the future the database has to be kept up to date on a regular base.

METHODS

The project started at the development of an adequate structure for the database. The main entrance is a list of 69 thematic subjects of research in the field of urban drainage and sewerage. These subjects are called sub themes and assigned to 8 main themes. The sub themes and themes of research subjects are listed in table 1. The structure of the database enables to store all relevant data on the publication, the authors and the research centre. An example of an input form is shown in figure 1.

Sources

The database is filled up with data from several sources: scientific journals, conference proceedings, (existing) electronic databases, etc. Most of the journals on hydrology, urban drainage and water, environmental science, engineering and technology can be screened electronically. The largest group of resources are the proceedings of (international) conferences as the international conferences on sustainable techniques and strategies in urban water management (NOVATECH), on sewer processes and networks (SPN), on urban drainage (ICUD), on hydro-informatics, on urban drainage modelling (UDM), as well as the IAHR congresses and the IWA world water congresses and the numerous international workshops on specialized topics. The third resource consists of electronically accessible libraries like the system of the Technical University of Delft: the dissertations abstracts database is one of the sources of scientific publications. Publications are selected based on their relevance to the research field of interest and on their scientific content.

RESULTS AND DISCUSSION

The result of the 'International Urban Drainage Research Database' project consists of a database, an interface and a proposal for extension and development of a structure to keep the database up-to-date.

The database will contain relevant publications on urban drainage within the last decade. It is structured around a list of 69 sub themes (see table 1). In figure 1 the main input forms of the database are shown with the different data fields. Publication records consist of the publication title, up to six authors, where it is published (journal, conference proceedings, ...), additional information (such as journal volume and number) and the year of publication. Each publication can be connected to maximum 3 sub themes.

Table 1. Sub themes and corresponding main theme(s)

Sub theme	Main theme(s)
Rainwater quality	RAIN, MON
Rainfall data analysis	RAIN
Design storms	RAIN, DES
Rainfall quantity measurements	RAIN, MON
Rainfall models	RAIN, MOD
Treatment of rain water	RAIN, SOURC
Wash-off (incl. first flush)	RAIN, PROC
Reduction of run-off pollutants	SOURC
Maintenance of SUDS (incl. infiltration devices)	SOURC, OPAS
SUDS (incl. infiltration devices, ...)	SOURC
Pervious pavements	SOURC
Foul flow - storm water flow separation	SOURC
Green roofs and vegetated roofs	SOURC
Rain water retention	SOURC, RAIN
Rain water utilization	SOURC, RAIN
Ditches	SOURC
Air and gas inclusions	PROC
Sediment transport	PROC
Erosion	PROC
Sedimentation / settling	PROC
Hydraulic transport	PROC
Gross solids transport	PROC
Biogenic sulphuric acid corrosion	PROC
Flushing effect (incl. first flush)	PROC
Biochemical processes	PROC
Sewer system - ground water interaction	PROC, MOD
Foul flow quantification	MON, PROC
Parasitic water	MON, PROC
CSO spill frequency, flow rate and volume measurements	MON, CSO's
Pump flow rate measurements	MON
Flow rate measurements	MON
Sewer sludge quality	MON, PROC
Sewer flow water quality	MON, PROC
CSO spill water quality	MON, CSO's
Water level measurements	MON
Measurement data analysis	MON
Pressure systems	DES
Design of pumping stations and pressure mains	DES
Sediment transport and self-cleansing capacity	DES
Design of storm and combined sewer systems	DES
Design of foul flow sewer systems	DES
Spill reduction (regarding emissions)	CSO's, DES
Underground infrastructure	DES, OPAS
Materials and stability	DES, OPAS
Construction and planning	DES, OPAS
Sewer system - Treatment plant - Surface water interaction	MOD, CSO's
Emission modelling	MOD, CSO's
Ancillary structures modelling	MOD, CSO's

Pollutant transport modelling	MOD
Sediment transport modelling	MOD
Biochemical processes modelling	MOD
Hydrodynamic sewer flow modelling	MOD
Wash-off modelling	MOD
Run-off modelling	MOD
Source control modelling (incl. SUDS)	MOD, SOURC
Efficiency of ancillary structures	CSO's, PROC
Design of ancillary structures	CSO's, DES
Impact of CSO's on surface waters	CSO's
Maintenance of ancillary structures	CSO's, OPAS
Renovation en rehabilitation	OPAS
Operational models	OPAS, MOD
Inspection of sewer systems	OPAS
Damage classification	OPAS
Maintenance of sewer systems	OPAS
Maintenance of pumping stations and pressure mains	OPAS
Sewer system database	OPAS
Real time control	OPAS
Life cycle analysis	OPAS
Maintenance of roads and gully inlets	OPAS

Filling the database is done with an input form. This form has restricted choices for a consistent database. The figure below gives an example (in Dutch).

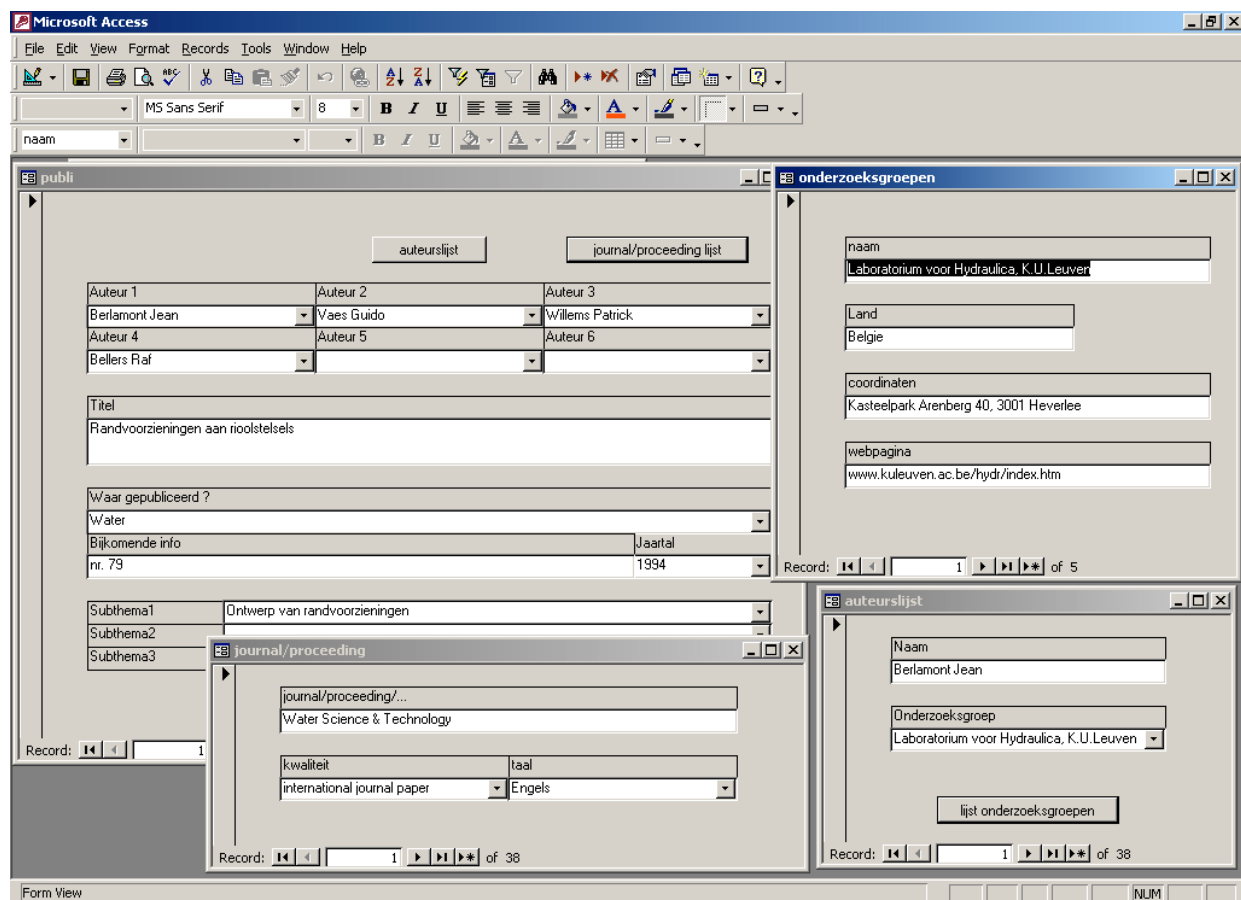


Figure 1. Input forms for the database.

Interface

An interface is build in order to easily access the information. The user interface consists of a web application. The list of sub themes is the link between the interface and the database. Therefore the interface is build in such a way that the proper sub theme with the relevant publications can be found by two mouse clicks.

In order to enhance the accessibility by different types of users, three different routes are created to reach the proper sub theme :

1. by means of an selection based on the main themes;
2. by means of a thematic selection based on the type of drainage system (foul, storm or combined) or with respect to management aspects;
3. by means of an alphabetic index of keywords.

The main themes were introduced in order to incorporate a intermediate level of complexity in the list of themes, because it is not feasible to perform a search in the complete list 69 sub themes. The optimal number of main themes is the square root of 69, i.e. approximately 8. Therefore eight main themes were defined:

- Rainfall (RAIN),
- Source control (SOURC),
- Monitoring (MON),
- Processes in sewers (PROC),
- Design (DES),
- Modelling (MOD),
- Combined sewer overflows (CSO) and
- Operational aspects (OPAS).

These main themes were chosen so that the whole field could be covered and an overlap was tolerated. Therefore some of the sub themes are connected to two main themes. E.g. the sub theme 'design storms' is allocated to both the Rainfall and the Design main theme.

DISCUSSION

The currently developed database aims at first at use in the Dutch research programming. On the other hand it is quite easily converted to an international overview of relevant publications and centres of excellence in the field of urban drainage.

The most important issue on databases on the Internet is keeping them up-to-date. To that end a structure needs to be developed among several research and knowledge centres. By an easily to use content management system appropriate centres can regularly update the database on a special website at which the International Urban Drainage Research Database is to be accessed. In this way the urban drainage research community as a whole can benefit from the insight what is done and going on in the broad field of developments, innovations and fundamental results of urban drainage research.

RIONED has opened a link at her website www.riool.net (follow the English-link) where appropriate organisations can give notice of their interest in joining this structure.

CONCLUSIONS

The main conclusions are:

- For programming research in the field of urban drainage and sewerage the RIONED foundation lacks insight in results of research abroad the Netherlands as well as an overview on the centres of excellence in certain subjects in those fields.
- A list of 69 sub themes assigned to 8 main themes covers the research subjects in urban drainage and sewerage.
- The database is accessed in three ways for different use: by the main themes, by type of sewer system or managerial aspects and by an alphabetical index of keywords.
- To extend and keep actuality in order a structure should be developed among the research and knowledge centres in the field of urban drainage.
- A special website with an easy to use content management system is needed for a world wide accessible overview of published and ongoing research projects in the last decade.
- Interested centres of excellence can give notice of their intention to join in this structure on the website of the RIONED Foundation via the 'English'-link on www.riool.net and will be contacted.

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