

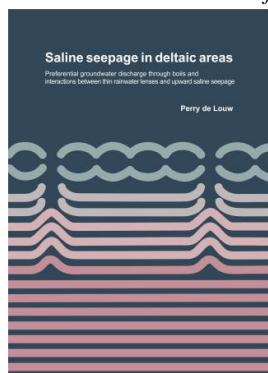
# Symposium

## Zout grondwater in kustgebieden: van probleem tot oplossing

5 december 2013, bij Deltares, Princetonlaan 6, Utrecht.

Op 6 december 2013 zal Perry de Louw van Deltares op de VU zijn proefschrift verdedigen met de titel:

*Zoute kwel in delta's. Preferente kwel via wellen en interacties tussen dunne regenwaterlenzen en zoute kwel.*



In het kader van Perry's promotie organiseert Deltares een symposium over grondwater verziltingsprocessen en oplossingen voor een duurzame zoetwatervoorziening. In de ochtend zullen 5 presentaties worden gegeven vanuit het onderzoek. Een korte samenvatting van de presentaties is gegeven op de achterzijde. Speciale gast is Clifford Voss van de United States Geological Survey (USGS) die als eerste spreker zal ingaan op het gebruik van grondwatermodellen voor grondwaterbeheer in kustgebieden. In de presentaties van Pieter Stuyfzand en Theo Olsthoorn worden naast de problemen, ook de kansen van zout grondwater belicht. Op de dag van dit symposium publiceert Nature een review artikel over het voorkomen van offshore zoetwatervoorkomens in de wereld. Medeauteur Koos Groen deelt met ons de belangrijkste feiten. Perry de Louw presenteert zijn belangrijkste bevindingen van zijn promotieonderzoek over zoute kwel en zal kort ingaan op de consequenties voor de zoetwatervoorziening in de Nederlandse delta. Vóór de lunch zullen zeven PhD-studenten in 1-2 minuten hun poster introduceren die tijdens de lunch wordt

gepresenteerd. Na de lunch komen de landbouw, waterbeheerders en beleidsmakers aan het woord. Aan hen wordt gevraagd hoe het onderzoek bijdraagt aan hun beleid en beheer en waar mogelijk nog kennishiaten zitten.

Ochtendprogramma is in het Engels, middagprogramma in het Nederlands.

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|-------------|---|
| 9:00-9:25   | Registratie, koffie en thee   |
| 9:25-9:35   | Opening door dagvoorzitter Toon Segeren.  |
| 9:35-10:00  | <b>Clifford Voss</b> (USGS): Using groundwater models for coastal aquifer management: Why simple modeling is best.  |
| 10:00-10:20 | <b>Pieter Stuyfzand</b> (VU, KWR): Problems and solutions when storing fresh water in brackish aquifers and when applying BWRO (Brackish Water Reverse Osmosis).  |
| 10:20-10:40 | <b>Theo Olsthoorn</b> (TU-Delft, Waternet): Salt-water may not always be negative.  |
| 10:40-11:15 | Pauze   |
| 11:15-11:35 | <b>Koos Groen</b> (VU, Acacia): Offshore groundwater.   |
| 11:35-11:55 | <b>Perry de Louw</b> (Deltares): Saline seepage in deltaic areas.   |
| 11:55-12:15 | Pitches door <b>7 promovendi</b> waarin ze kort hun onderzoek en poster introduceren. Joost Delsman, Marloes van Ginkel, Sebastian Huizer, Leanne Morgan, Pieter Pauw, Frank Smits, Koen Zuurbier. Tevens wordt een pitch gegeven over het gebruik van zout grondwater voor aquacultuur (HZ University) en zoutmonitoring met de SlimFlex en glasvezel (Deltares) |
| 12:10-13:10 | Lunch & poster presentaties   |
| 13:10-14:20 | <b>Van onderzoek naar praktijk</b> (inleiding door Gualbert Oude Essink, Deltares).   |
| 13:20-13:40 | <b>Mark Kramer</b> (Hoogheemraadschap van Rijnland). Omgaan met verzilting in Rijnland.   |
| 13:40-14:00 | <b>Vincent Klap</b> (Provincie Zeeland). Zouttolerantie 2.0.  |
| 14:00-14:20 | <b>Peter Prins</b> (LTO-noord): De uitdagingen van More Crop per Drop.  |
| 14:20       | Afsluiting en aansluitend een borrel  |

Deelname aan het symposium is geheel gratis. Opgave deelname via een email aan [perry.delouw@deltares.nl](mailto:perry.delouw@deltares.nl)

## ABSTRACTS

### **Using groundwater models for coastal aquifer management: Why simple modeling is best**

*Clifford I. Voss*

U.S. Geological Survey, Menlo Park, California, USA

No single simple or complex model is a true or complete representation of an aquifer system. Complex models include large amounts of irrelevant data, and, despite their enticing visual appearance, do not answer pertinent aquifer management questions better than strong simple models. Success of hydrologic modeling analysis depends more on the hydrologist's insight, experience and judgment in creating a strong model than on the elaborateness of details included in a model. Hydrologists who employ insightful approaches based on simple groundwater models can provide robust answers to well-formulated coastal-aquifer management questions.

### **Problems and solutions when storing fresh water in brackish aquifers and when applying BWRO**

*Pieter Stuyfzand en Koen Zuurbier*

KWR Watercycle Research Institute, VU University Amsterdam

Storage of fresh rain or river water in brackish aquifers and Brackish Water Reverse Osmosis (BWRO) are among the various solutions to overcome water scarcity and bad water quality periods. Such periods are expected to become more frequent and more severe due to climate change. The following solutions will be discussed together with their specific implementation problems in the Netherlands (and abroad): ASR (Aquifer Storage Recovery), Fresh-keeper and BWRO.

### **Salt-water may not always be negative**

*Theo Olsthoorn, Frank Smits, Naveed Alam*

TU-Delft, Waternet

The following subjects related to salt groundwater will be presented: 1) The brackish water below polders with saline seepage may provide a long-lasting source for impeccable drinking water; 2) The density of natural salt and brackish groundwater may protect wells of farmers in the Punjab under certain management conditions and. 3) What happens if we ignore natural density gradients when storing thermal energy?

### **Offshore groundwater**

*Koos Groen*

Acacia Water BV, VU University Amsterdam

Throughout geological times coastlines have been shifting to and from as a result of sea level changes, sedimentation or land subsidence. Groundwater is slow in responding to these relatively rapid changes. As a consequence we often find old marine brackish groundwater onshore in low lying coastal areas, like the Netherlands. However, there is also evidence for the reverse effect of these shifting coastlines: the preservation of old fresh groundwater below the seafloor, even far offshore. On this very day Nature Geosciences publishes an article on this phenomenon from which Koos Groen is one of the co-authors.

### **Saline seepage in deltaic areas**

*Perry de Louw*

Deltares

In low-lying coastal areas that lie below mean sea level, saline groundwater may reach the surface by upward groundwater flow. This process is referred to as 'saline seepage' and is the main subject of my PhD-thesis. The main objective was to describe and quantify the spatial variability and temporal dynamics of salinization processes involving saline seepage in deltaic areas. Two important salinization processes were analyzed in detail: (i) Preferential saline seepage through boils which is the dominant salinization source in most Dutch deep polders, and (ii) interactions between thin rainwater lenses saline seepage which leads to the salinization of shallow groundwater and soil water in the root zone. The main findings and implications of saline seepage for a sustainable freshwater supply will be presented.