

**International PhD Course**

**GROUNDWATER MANAGEMENT IN A GLOBAL  
CONTEXT**

*Time*

**May 11-15, 2009**

*Venue*

**Geocenter Denmark, Øster Voldgade 10, 1350 Copenhagen K.**

*Lecturers*

**Professor Adolfo Chávez, University of Chihuahua, Mexico**  
**Senior Researcher Karen G. Villholth, Geological Survey of Denmark and Greenland**  
**Senior Researcher Hans J. Henriksen, Geological Survey of Denmark and Greenland**  
**Senior Researcher Berit Hasler, Aarhus University**

**Objectives**

The aim of the course is to give the students a broad overview of groundwater management in a global perspective, with focus on theories and practical approaches to groundwater management, both quantitative and qualitative aspects, in various contexts. An important goal is to sensitize the students to non-technical aspects of groundwater management, and the integration of technical/scientific/economic methods into policy-driven and participatory methods for groundwater management. Tools for integrated management of groundwater will be introduced and applied in the course, specifically Bayesian networks and economic valuation methods.

**Topics covered**

Day 1	<ul style="list-style-type: none"> <li>▪ GW in a global perspective (extent of resource, occurrences, various settings, uses)</li> <li>▪ GW as a strategic resource (drinking water, MDGs, climate change)</li> <li>▪ Management challenges in various contexts</li> <li>▪ Approaches and paradigms for GW management (direct/normative/formal, indirect/normative, informal)</li> <li>▪ Concepts in groundwater management (capture, availability, sustained yield, over-exploitation, mining)</li> <li>▪ Groundwater quality management</li> </ul>	Karen G. Villholth Adolfo Chávez-Rodríguez
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	<ul style="list-style-type: none"> <li>▪ Different cases and management experiences in various contexts (DK, EU, Mexico, Australia, India, China)</li> </ul>	
Day 2	<ul style="list-style-type: none"> <li>▪ The dialogue applied to GW management</li> <li>▪ Applied GW modelling (models, conceptualization, calibration, prediction and uncertainty)</li> <li>▪ The auditing of GW-flow models (a protocol and case studies)</li> <li>▪ The use of models for GW management</li> <li>▪ Cooperative modelling and adaptive management</li> <li>▪ Exercise on GW modelling applied in management</li> </ul>	Adolfo Chávez-Rodríguez Karen G. Villholth
Day 3	<ul style="list-style-type: none"> <li>▪ Bayesian networks (BN) applied to GW management (theory, illustration with case from Spain)</li> <li>▪ Hands-on exercise of BN</li> </ul>	Hans Jørgen Henriksen
Day 4	<ul style="list-style-type: none"> <li>▪ Valuation of groundwater (theory, example of valuation of groundwater protection versus water treatment in Denmark by choice experiments and contingent valuation)</li> </ul>	Berit Hasler
Day 5	<ul style="list-style-type: none"> <li>▪ Hands-on exercise of valuation of groundwater</li> </ul>	Berit Hasler

### Organizer

Karen Villholth, Geological Survey of Denmark and Greenland ([kgv@geus.dk](mailto:kgv@geus.dk)).

### Background of participants

Students applying should have basic knowledge on hydrogeology, groundwater flow and transport processes, and numerical modelling.

### Work load and credit points

Approximately 125 hours in total including lectures and exercises during the course and preparatory reading before and during the course.

The work load corresponds to 5 ECTS.

A course diploma will be issued upon satisfactory completion of the course.

### **Study material**

Notes and copies of references papers will be provided during the course.

### **Registration and admission**

Registration on FIVA's website: [www.fiva.dk](http://www.fiva.dk).

Deadline: April 14, 2009. Information on admission to the course will be forwarded shortly after.

The total number of participants is limited to 20. PhD students are given first priority but depending on the number of registrants we also welcome post-graduate participants.

International students are requested to provide a very short description of their research interests and background when they register. Additionally, a letter of recommendation needs to be forwarded from the research advisor.

### **Fee**

The course is free for PhD students enrolled at universities. Post-graduate participants will be charged a course fee of DKK 5.000 (€675).

### **Accommodation and travel**

FIVA will provide accommodation for PhD students near the university free of charge. Participants are requested to cover travel expenses and per diem from their own funding.

Other participants are requested to make their own arrangements. Hotel suggestions:

1. CAB INN Scandinavia (cheap)

<http://www.cabinn.com/english/kbh/scandinavia/sca.html>

Transport via metro from the airport to "Forum metro station"

2. Comfort Hotel Østerport (a little more expensive)

<http://www.choice.no/html/da247048.jsp>

Transport via regional train from the airport to Østerport station. Book a superior room if you are sensitive to the sounds of the railway tracks. Hotel Østerport is within walking distance of the Geocenter.

### **Further information**

Please contact the course organizer or Frederik Uldall (email: [fu@geo.ku.dk](mailto:fu@geo.ku.dk), phone: +45 3532 2414).



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elev 8 m

Apr 25, 2005

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Eye alt 2.51 km

55°41'09.28" N 12°34'22.70" E

O2

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Hotel Cab Inn Scandinavia

Forum Metro Station

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