

Program

Toward Sustainable Groundwater in Agriculture

An International Conference Linking Science and Policy

June, 15-17 2010 • Hyatt Regency San Francisco Airport • Burlingame, California

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Conference Highlights

Groundwater is the lifeline for many rural and agricultural regions and their associated cultures and populations around the globe. Groundwater is a cornerstone of global food production and constitutes nearly half the world's drinking water. The challenges of protecting this resource's quality and ensuring sufficient quantities are the focus of this conference.

Plenary Sessions: The four plenary sessions will highlight the importance of information sharing, management, policy and legal control of groundwater in agricultural regions, and assessment of agricultural practices and associated effects on groundwater quantity and quality. Experts from California, the U.S. and around the world will speak about the important connection between groundwater supply and quality, rural livelihood, and agriculture/food production for local, regional, and global communities.

Concurrent Tracks: Four concurrent tracks offer a wide range of policy and technical presentations on

such topics as irrigation and water use, salinity and nitrates, climate change, agricultural contamination and groundwater scarcity. More than 100 speakers – policymakers, researchers, water district managers, scientists, and others – will address these and other important issues.

Exhibits: Be sure and visit our exhibitors: Instrumentation Northwest, RSI Drilling, Solinst Canada Ltd., The Source Group, Groundwater Resources Association of California and the Water Education Foundation.

Tuesday Reception and Poster Session: More than 25 posters and our exhibitors will be showcased at a hosted reception from 5:30 p.m. until 7 p.m. This is the perfect place to network with colleagues and learn about cutting-edge research and policy issues related to groundwater and agriculture.

Wednesday Poster Session: The posters will continue to be on display for informal get-togethers.

Program Council

Executive Committee:

Thomas Harter, *University of California, Davis*
Cathryn Lawrence, *University of California, Davis*
Rita Schmidt Sudman, *Water Education Foundation*
Sue McClurg, *Water Education Foundation*

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Adriana Bruggeman, *ICARDA, Syria*
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Karen Burow, *U.S. Geological Survey, California*
Dico Fraters, *Dutch Environmental Protection Agency, The Netherlands*
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Tim Parker, *Groundwater Resources Association of California*
David Rudolph, *University of Waterloo, Canada*
Bridget Scanlon, *University of Texas at Austin*
John Selker, *Oregon State University*
Michael Steiger, *Erler & Kalinowski Inc., California*
Jeff Stoner, *U.S. Geological Survey, Minnesota*
Marcel Tchaou, *UNESCO, Zimbabwe*
Karen Villholth, *Geological Survey of Denmark and Greenland, Denmark*
Mike Wireman, *U.S. Environmental Protection Agency and International Association of Hydrogeologists*
MaryLynn Yates, *University of California, Riverside*

Program

Tuesday, June 15, 2010

Plenary Session 1

Global Groundwater in Agricultural/Rural Regions: Livelihoods and Use of Groundwater in Agriculture

8:15 a.m.

Welcome and Opening Remarks

*Rita Schmidt Sudman, Executive Director, Water Education Foundation
Thomas Harter, Robert M. Hagan Chair, University of California, Davis*

8:30

For Want of Food: Groundwater in Agriculture

Thomas Harter, Robert M. Hagan Chair, University of California, Davis

9:00

The Groundwater-Agriculture Nexus in California

Paula Landis, Chief, San Joaquin Valley District, California Department of Water Resources

9:30

Groundwater Irrigation and Small-holder Agriculture: India's Experience and its Implications for sub-Saharan Africa

Tushaar Shah, Senior Fellow, International Water Management Institute

10:00

BREAK

Track A

Session A.1 Groundwater and Global Food Security

*Chair: Jeff Stoner,
U.S. Geological Survey*

Track B

Session B.1 Conjunctive Use of Groundwater and Surface Water

*Chair: Tim Parker,
Layne Christensen*

Track C

Session C.1 Groundwater, Salinization, and Salinity

*Chair: Michael Steiger,
Erler & Kalinowski, Inc.*

Track D

Session D.1 Agricultural Groundwater and Energy Nexus

*Chair: Chris Scott,
University of Arizona*

10:20

Autonomous Smallholder Shallow Groundwater Irrigation Development in Upper East Region of Ghana

*Regassa E. Namara,
International Water
Management Institute*

The Groundwater-Surface Water Connection in California: Balancing Agricultural, Municipal and Ecosystem Needs in Groundwater Management

*Maurice D. Hall,
The Nature Conservancy*

Characterization of Land Cover for Estimating Nitrogen and Salt Losses to Groundwater

*John Dickey,
Plantierra, LLC*

A National View of the Irrigation Resources to Grow Biofuel and the Groundwater Role

*Noel Gollehon, Natural
Resources Conservation Service,
U.S. Department of Agriculture*

10:45

Feeding the World to 2030 and Beyond: The Role of Groundwater

*Siwa Msangi,
International Food Policy
Research Institute*

Evaluation of Numeric and Integrated Models for Applications in Texas

*Susan V. Roberts,
River Systems Institute, Texas
State University-San Marcos*

Offsetting Allochthonous Salinity Increases Threatening Irrigated Agriculture with Managed Recharge

*Jennie Munster,
Balance Hydrologics, Inc.*

Can Electricity Pricing be a Tool for Efficient, Equitable and Sustainable Use of Groundwater in Indian Agriculture?

*Dinesh Kumar,
Institute for Resource Analysis
and Policy*

11:10

Deteriorating Food Security in India

*Cristina Milesi,
California State University
Monterey Bay/NASA Ames
Research Center*

Conjunctive Use: Streamflow Depletion Caused by Pumping Wells on a Nearby Stream

*John Bredehoeft,
The Hydrodynamics Group*

Simulating Hydrologic and Biologic Response to Land Use and Climate Change

*Randall Hunt,
U.S. Geological Survey*

	Track A	Track B	Track C	Track D
11:35	Groundwater Use for Irrigation: A Global Inventory <i>Jacob Burke,</i> <i>Food and Agriculture Organization of the United Nations (FAO)</i>	Analysis and Simulation of Conjunctive Water Use for Agricultural Settings with the Farm Process for Modflow <i>Randall T. Hanson,</i> <i>U.S. Geological Survey</i>		Groundwater and Energy: Emerging Challenges, Directions and Opportunities <i>Michael Hightower,</i> <i>Sandia National Laboratories</i>
NOON	Lunch and Keynote Speaker • Unquenchable: America's Water Crisis and What to Do About It <i>Robert Glennon, University of Arizona, and Author</i>			
	Session A.2 Groundwater and Livelihood <i>Chair: Laurel A. Firestone,</i> <i>Community Water Center</i>	Session B.2 Agricultural Groundwater Management <i>Chair: Vicki Kretsinger Grabert,</i> <i>Luhdorff & Scalmani</i>	Session C.2 Groundwater, Salinization, and Salinity <i>Chair: Vera Nelson,</i> <i>Erler & Kalinowski, Inc.</i>	Session D.2 Groundwater Quality at the Ag-Urban Interface and Agricultural Legacy Contamination <i>Chair: Mike Wireman,</i> <i>U.S. Environmental Protection Agency</i>
1:25	Looming Impact of Groundwater Quality Degradation on Our Rural Municipal Water Supply and Ag Lands: Not a Technical Issue but a Political and Financial Issue <i>José Antonio Ramirez,</i> <i>City of Firebaugh</i>	Water, People, and the Future: Water Availability for Agriculture in the United States <i>Sharon B. Megdal,</i> <i>University of Arizona</i>	Land Clearing, Rainfed Cropping and Increased Groundwater Resources in Semiarid SW Niger, Africa <i>Guillaume E. Favreau,</i> <i>IRD</i>	Factors contributing to the susceptibility of Public-supply Wells to Agricultural Contaminants <i>Leon Kauffman,</i> <i>U.S. Geological Survey, NAWQA program</i>
1:50	Sustainable Groundwater Management: The Role and Performance of Institutions in India <i>Vasant P. Gandhi,</i> <i>Indian Institute of Management</i>	Evaluating Agricultural Water Use with Crop Life Cycle Assessments <i>Richard Joost,</i> <i>United Soybean Board</i>	A Mass Balance Approach to Evaluating Salinity Sources in the Turlock Sub-Basin, California <i>Michael Steiger,</i> <i>Erler & Kalinowski, Inc.</i>	Evidence for Denitrification Processes in Nitrate Polluted Groundwater (Catalonia, NE Spain) Using a Multi-Isotopic Approach <i>Pep Mas Pla,</i> <i>Universidat Girona, Spain</i>
2:15	The California Almond Sustainability Program: An Ag Community's Pro-active Approach to Sustainable Water Management <i>Daniel Sonke, SureHarvest, Inc.</i>	Legal Regimes for Groundwater Regulation: Managing an Increasingly Crucial Resource <i>Stefanie Hedlund,</i> <i>Best Best & Krieger</i>	Agricultural Irrigation Management in Semi-Arid Areas <i>Larry L. Russell,</i> <i>Marin Municipal Water District</i>	Case Study of Groundwater Remediation of Non-point Source Nitrate <i>Ian Bowen,</i> <i>University of Kansas</i>
2:40	Constraints to Small-holder Livelihoods in Irrigated Agriculture in Groundwater-Dependent Parts of Asia <i>Karen G. Villholth,</i> <i>Geological Survey of Denmark and Greenland</i>	Gendered Access to Shallow Wells and Riverine Alluvial Dugouts in the Upper East Region of Ghana <i>Eric Antwi Ofose,</i> <i>UNESCO-IHE</i>	Implications of Past Agricultural Practices on Mobilization and Transport of Selenium and Nutrients from Groundwater to Surface Waters <i>Peter Mangarella,</i> <i>Geosyntec Consultants</i>	Evaluation of Legacy Contamination at the Urban/Agricultural Interface Using Publically-Available Data <i>Eric Suchomel,</i> <i>Geosyntec Consultants</i>
3:05	BREAK			

Track A**Session A.3
Groundwater and
Livelihood**

*Chair: Karen Villholth,
Geological Survey of Denmark
and Greenland*

Track B**Session B.3
Agricultural
Groundwater
Management**

*Chair: Randall T. Hanson,
U.S. Geological Survey*

Track C**Session C.3
Pesticides: Ground-
water Impacts,
Monitoring, BMPs,
and Regulation**

*Chair: Karen Burow,
U.S. Geological Survey*

Track D**Session D.3
Groundwater Use
and Management
at the Ag-Urban
Interface**

*Chair: Pep Mas Pla,
Universidat Girona, Spain*

3:30

**Monterey County
Agricultural Water
Sustainability in the
Salad Bowl of the World:
Generations of Innovation
and Conservation**
*Kathleen Thomasberg,
Monterey County Water
Resources Agency*

**The Impact of Dairy Farms
on the Groundwater
Quality of Israel's Coastal
Aquifer**
*Shahar Baram,
Ben Gurion University*

**Assessment of Pesticide
Leaching to Groundwater
in Germany: Comparison of
Indicator and Metamodel
Approaches**
*Frank Wendland,
Research Center Juelich*

**Trends and Alternatives
to Ag to Urban Water
Transfers in Colorado**
*Reagan M. Waskom,
Colorado State University*

3:55

**Using Groundwater
for Irrigation in Semi-
Arid, Hard-Rock Areas in
Peninsular India and the
Role of UNESCO-IUGS-IGCP
Project GROWNET**
*Shrikant D. Limaye,
Ground Water Institute, India*

**Solar-Powered Drip
Irrigation Systems in the
Sudano-Sahel**
*Jennifer A. Burney,
Program on Food Security
and the Environment,
Stanford University*

**Development of the FOCUS
Groundwater Scenarios
for the Assessment of
the Leaching of Plant
Protection Products in EU
Registration**
*Jos Boesten,
Alterra*

**Innovative Nitrogen
Management Strategies
to Reduce Groundwater
Impacts in Drinking Water
Source Protection Areas**
*Jacqueline M. Brook,
University of Waterloo*

4:20

**Till the Wells Run Dry?
Dealing with Groundwater
Depletion in Victoria,
Australia, and California,
U.S.A.**
*Rebecca L. Nelson,
Stanford University*

**Farmers' Willingness to
Adopt BMPs to Control
Nonpoint Source Pollution
in the Lower Bhavani
River Basin, India**
*Sacchidananda Mukherjee,
National Institute of Public
Finance and Policy*

**Groundwater Vulnerability
Assessments for the
San Joaquin Valley**
*Keith Loague,
Stanford University*

**Groundwater Banking and
Management in Mixed
Agricultural and Urban
Regions**
*Jim Beck,
Kern County Water Agency*

4:45

**Water Supply Enhance-
ment Project for the Poso
Creek Integrated Regional
Water Management Plan,
Tulare Lake Basin**
*Sam Schaefer,
GEI Consultants, Inc.*

**Opportunities and
Constraints to Community
Regulation of Ground-
water: Lessons from a
Grassroots Project in
Andhra Pradesh, India**
*Rama Mohan Venkata
Ramachandrupa,
Centre for World Solidarity*

**Regression Model for
Predicting the Concentra-
tion of Atrazine Residues
in Shallow Agricultural
Groundwater across the
Conterminous United
States**
*Paul E. Stackelberg,
U.S. Geological Survey*

**Social Sustainability of a
Groundwater Allocation
Plan toward the Resolution
of an Allocation Dispute
between Agricultural and
Forest Water Users**
*Virginie Gillet,
Centre for Comparative Water
Policies and Laws,
University of South Australia*

5:10**END SESSIONS****5:30-7:00****Hosted Reception and Poster Session**

Program

Wednesday, June 16, 2010

Plenary Session 2

Managing Groundwater Use and Groundwater Quality

*Moderator: Jacob Burke, Senior Water Policy Officer, Land and Water Division,
Food and Agriculture Organization of the United Nations (FAO)*

- 8:30** **Challenges in Groundwater Supply and Quality in the U.S.**
Bill Alley, Chief of Groundwater, U.S. Geological Survey
- 9:00** **The Global Boom in Groundwater Irrigation: Experience of Reconciling Resource Use and Sustainability**
Stephen Foster, Groundwater Management Team Director, World Bank
- 9:30** **Satellite and Ground-based Approaches for Monitoring Impacts of Agriculture on Groundwater Resources**
Bridget Scanlon, Senior Research Scientist, University of Texas, Austin

10:00

BREAK

Track A

Session A.4

Track B

Session B.4
**Economic Drivers
of Groundwater
Management**

*Chair: Sharon Megdal,
University of Arizona*

Track C

Session C.4
**Nutrients: Ground-
water Impacts,
Monitoring, BMPs,
and Regulation**

*Chair: Dico Fraters,
National Institute for Public
Health and the Environment,
the Netherlands*

Track D

Session D.4

10:20

**Sustainability Economics of
Agricultural Groundwater
Usage and Management**

*Keith C. Knapp,
University of California,
Riverside*

**Groundwater Chemical
Status in Denmark
Based on Environmental
Objectives for Ecosystems
and European Water
Directives and Guidelines**

*Klaus Hinsby,
Geological Survey of Denmark
and Greenland*

10:45

**Managing the Operational
Cost of Groundwater
Production to Sustain
Profits**

*Robert Turnbull,
Roscoe Moss Company*

**Denitrification at a
Dairy Site Supported by
Gas-Liquid Phase Modeling
of Tritium/Helium-3
Groundwater Age**

*Steve Carle,
Lawrence Livermore National
Laboratory*

Track A

Track B

Track C

Track D

11:10

Groundwater or Livelihood? The Case of Al-Ajaz Community in Northern Syria

*Adriana Bruggeman,
The Cyprus Institute*

Trends in Nitrate Concentrations in Agricultural Areas of the United States: Implications for Aquifers and Streams

*Chris Green,
U.S. Geological Survey*

11:35

Groundwater Sustainability – Merely an Illusion?

*David Eaton,
University of Texas, Austin*

Cropping System Model for Integrated Evaluation of Agricultural Activities

*Marco Acutis,
University of Milano*

NOON

LUNCH

**Session A.5
Groundwater and Climate Change**

*Chair: Graham Fogg,
University of California, Davis*

**Session B.5
Agricultural Groundwater Management**

*Chair: Mark Giordano,
International Water Management Institute*

**Session C.5
Nutrients: Groundwater Impacts, Monitoring, BMPs, and Regulation**

*Chair: Chris Green,
U.S. Geological Survey*

**Session D.5
Forecasting of Ag Groundwater Quality and Quantity Trends/Comprehensive Modeling and Assessment Tools**

*Chair: Steven Carle,
Lawrence Livermore National Laboratory*

1:25

Using a Multi-Actor Framework for Simulating the Interaction between Various Actors, Water Supply and Groundwater in Response to Global Change

*Roland Barthel,
Institute of Hydraulic Engineering, University of Stuttgart, Germany*

Groundwater Governance in Spain: Aligning Science with Policy

*Elena Lopez-Gunn,
Marcelino Botin Foundation-Water Observatory*

Bioavailability of Dissolved Organic Carbon and Ambient Redox Processes in Groundwater Associated with Agricultural Land Use

*Frank Chapelle,
U.S. Geological Survey*

Forecasting the Effects of EU Policy Measures on the Nitrate Pollution of Groundwater Based on a Coupled Agroeconomic Hydro(geo)logic Model

*Frank Wendland,
Research Centre Juelich*

1:50

Groundwater and Climate Change: Forcing, Feedbacks, and Integrated Hydrologic Response

*Reed Maxwell,
Colorado School of Mines*

The Use of Reserve Determination in Assessing Groundwater Quantity

*Adaora Unoma Okonkwo,
South Africa, Department of Water Affairs*

Can Groundwater Protection and Agricultural Production Co-exist over Vulnerable Aquifers?

*Cathy Ryan,
University of Calgary*

An Overview of Studies of Agricultural Contaminant Trends in Groundwater in the United States

*Bruce D. Lindsey,
U.S. Geological Survey*

2:15

Rural Water Supply Drought Vulnerability Assessment in the Desert Southwest

*Kristine A. Uhlman,
Water Resources Research Center, University of Arizona*

Managing the Groundwater-Agriculture Nexus in the Largest U.S. Irrigation District

*Tom Glover,
Westlands Water District*

Modeling Agricultural Impacts on Groundwater at Contrasting Spatial Scales

*Bernard Tom Nolan,
U.S. Geological Survey*

Detection of Trends in Groundwater Quality: An Overview of Methods Developed in Europe

*Hans Peter Broers,
TNO Geological Survey of the Netherlands*

	Track A	Track B	Track C	Track D
2:40	<p>Climate Change, Agriculture and Sustainable Groundwater Management: Developing a Strategic Groundwater Reserve to Buffer Extreme Droughts <i>Ruth Langridge, University of California, Santa Cruz</i></p>		<p>In-stream Bioreactor for Agricultural Nitrate Treatment <i>William D. Robertson, University of Waterloo</i></p>	<p>Modeling Seasonal Risk of Deep Drainage for Different Regions of Ontario: Implications for Source Protection Guideline Development <i>Gary Parkin, University of Guelph</i></p>
3:05	BREAK			
	<p>Session A.6 Groundwater and Climate Change <i>Chair: Reed Maxwell, Colorado School of Mines</i></p>	<p>Session B.6 Agricultural Groundwater Management <i>Chair: Adriana Bruggeman, The Cyprus Institute</i></p>	<p>Session C.6 Nutrients: Groundwater Impacts, Monitoring, BMPs, and Regulation <i>Chair: Scott Bradford, U.S. Department of Agriculture</i></p>	<p>Session D.6 Aquifer Recharge in Agricultural Regions <i>Chair: Frank Wendland, Research Centre Juelich</i></p>
3:30	<p>Green Water Management to Sustain Agricultural Production in a Changing Climate <i>David Purkey, Stockholm Environment Institute</i></p>	<p>Framework for the San Joaquin Valley Integrated Regional Water Management Plan <i>Sargent Green, California Water Institute</i></p>	<p>Denitrification and Nitrate Transport in Groundwater Underlying Large Dairy Operations in California's Central Valley <i>Brad Esser, Lawrence Livermore National Laboratory</i></p>	<p>Groundwater Recharge in Eastern San Joaquin County Resulting from the Farmington Program <i>John Green, Stockton East Water District</i></p>
3:55	<p>The Impact of Climate Change on Groundwater Recharge in Karkheh River Basin (Iran) <i>Ahmad Abrishamchi, Department of Civil Engineering, Sharif University of Technology</i></p>	<p>Collaborative, Stakeholder-Driven, Water-Energy-Agriculture-Ecosystems Modeling and Planning for Long-Term Resource Sustainability <i>Howard Passell, Sandia National Laboratories</i></p>	<p>Quantifying the Performance of Regional Scale Reductions in Nutrient Applications for Source Water Protection through Vadose Zone Monitoring <i>David L. Rudolph, Department of Earth and Environmental Sciences, University of Waterloo,</i></p>	<p>Managed Aquifer Recharge as Tool for Sustainable Management of Groundwater Quantity and Quality in Agricultural Basins <i>Calla M. Schmidt, University of California, Santa Cruz</i></p>
4:20	<p>Interannual to Multi-decadal Climate Variability Effects on Sustainable Groundwater for Agriculture <i>Jason Gurdak, Geosciences Department, San Francisco State University</i></p>	<p>Impact of State Regulation on Groundwater Exploitation in the "Hotspot" Region of Punjab, India <i>Bharat Raj Sharma, International Water Management Institute</i></p>	<p>Relationship between Nitrogen Surpluses and Nitrate Leaching on Sandy Soils <i>Dico Fraters, National Institute for Public Health and the Environment</i></p>	<p>Climate Change and Subsurface Storage; or: Groundwater Age Mixing and What it Means to Water Quality <i>Graham Fogg, University of California, Davis</i></p>
4:45	<p>Impacts of Groundwater Pumping and Irrigation on Regional Hydrology and Climate <i>Ian M. Ferguson, Colorado School of Mines</i></p>	<p>Environmental and Socio-economic Implications of Overexploitation of Groundwater Resources in Hassa Oasis in Eastern Saudi Arabia <i>Nasser A. Alsaaran, King Saud University</i></p>	<p>Assessing Potential Nutrient Losses in Tile Drained, Macroporous Soils over an Annual Cycle through Conservative Tracer Tracking <i>Steven K. Frey, University of Waterloo</i></p>	<p>Groundwater Management Program for Yuba County Water Agency: A Conjunctive Use Pilot Project <i>Christian E. Petersen, MWH</i></p>
5:10	END SESSIONS			
5:30-7:00	Poster Session			

Program

Thursday, June 17, 2010

Plenary Session 3

Law and Legal Policy in Groundwater Governance (Use and Quality)

Moderators: Vicki Kretsinger Grabert, Luhdorff & Scalmani, and Chris Scott, Professor, University of Arizona

- 8:30 **Sustainable Development Law via Regional Plans for Groundwater in Australia, USA, and EU – Early Court Decisions and Future Implications**
Jennifer McKay, Director for the Centre for Comparative Water Policies and Laws at the University of South Australia, Adelaide
- 9:00 **A Summary of Laws and Regulations Related to Agricultural Chemicals and Groundwater**
Mike Wireman, Hydrogeologist, U.S. Environmental Protection Agency and Former U.S. Chair, International Association of Hydrogeologists
- 9:30 **Legal Tools for Managing Groundwater Resources – Options, Best Practices, and Issues**
Stefano Burchi, Chairman, Executive Council, International Association for Water Law

10:00

BREAK

Track A

Session A.7 **Groundwater and Environmental Justice**

*Chair: John Selker,
Oregon State University*

Track B

Session B.7 **Policy Drivers of Groundwater Management**

*Chair: David L. Rudolph,
Department of Earth and Environmental Sciences,
University of Waterloo*

Track C

Session C.7 **Animal Farming, Manure Management and Groundwater**

*Chair: Brad Esser,
Lawrence Livermore National Laboratory*

Track D

Session D. **Regional Groundwater Quality Monitoring Approaches**

*Chair: Dinesh Kumar,
Institute for Resource Analysis and Policy*

10:20

Just Water? Environmental Justice and Drinking Water Quality in California's Central Valley
*Carolina Balazs,
University of California, Berkeley*

Municipal/Agricultural Conservation Tools Applied in Central Texas, U.S.
*Meredith A. Blount,
River Systems Institute,
Texas State University-San Marcos*

Central Valley Groundwater Requirements for Dairy Farms
*Paul Martin,
Western United Dairyman Association*

Nationwide Ambient Groundwater Monitoring Approaches in Europe for Monitoring the Effectiveness of the Nitrates Directive Action Programs
*Dico Fraters,
National Institute for Public Health and the Environment, the Netherlands*

10:45

Ag Perspectives on Groundwater
*Jack Rice,
California Farm Bureau*

Groundwater Overdraft in Mexico: Climate, Energy, and Population Drivers
*Christopher A. Scott,
University of Arizona*

Microbial Contamination of Groundwater under Agricultural Fields, Sources and Pathways
*Michael J. Goss,
University of Guelph, Kemptville Campus*

Groundwater Monitoring and Compliance Checking According to WFD and GD
*Esther Wattel-Koekkoek,
National Institute for Public Health and the Environment, the Netherlands*

	Track A	Track B	Track C	Track D
11:10	<p>Socio-Economic Impact of Groundwater Pollution Due to Disposal of Textile Effluent – A Case Study from India <i>Saravanan Ramasamy, Anna University</i></p>	<p>Policy and Economic Drivers in California that Affect Groundwater Management and Sustainability in Agricultural Regions <i>Matt Zidar, GEI Consultants, Inc.</i></p>	<p>Cycling of Organoarsenicals Released from Poultry Litter: Results from a Field Experiment in an Agricultural Watershed <i>Oluyinka Oyewumi, Virginia Tech and State University</i></p>	<p>Development and Pilots for a National Groundwater Monitoring Network in the United States <i>Tim Parker, Layne Christensen</i></p>
11:35	<p>Developing Ground-Up Solutions to Non-point Source Pollution of Groundwater: An Environmental Justice Perspective <i>Laurel A. Firestone, Community Water Center</i></p>	<p>Legal Instruments for Dealing with Agricultural Groundwater Management in the United States <i>John C. Peck, University of Kansas</i></p>	<p>Investigating Long-Term Effects of Manure Management Activities on Groundwater Quality in Alberta <i>Kristen Lorenz, Alberta Agriculture and Rural Development</i></p>	<p>Monitoring Groundwater for the Effectiveness of Action Programs in Denmark, 1988-2009 <i>Lærke Thorling, Geological Survey of Denmark and Greenland</i></p>
NOON	LUNCH			
	<p>Session A.8 Agricultural Groundwater: Regulatory Controls, Compliance, and Monitoring (Use and Quality) <i>Chair: Linda Bond, Consultant</i></p>	<p>Session B.8 Agricultural Groundwater Management <i>Chair: Matt Zidar, GEI Consultants, Inc.</i></p>	<p>Session C.8 Animal Farming, Manure Management and Groundwater <i>Chair: Calla M. Schmidt, University of California, Santa Cruz</i></p>	<p>Session D.8 Groundwater and Agriculture Interfaces <i>Chair: Tom Nolan, U.S. Geological Survey</i></p>
1:25	<p>Nitrate Reduction in a Groundwater Dominated Catchment: How Good Are Our Models? <i>Jens Christian Refsgaard, Geological Survey of Denmark and Greenland</i></p>	<p>Management of Groundwater in California through an Integrated Regional Water Management Plan <i>David Orth, Kings River Conservation District</i></p>	<p>Colloid Transport Behavior in Agricultural Soils: Microbes and Microspheres <i>Edwin Cey, University of Calgary</i></p>	<p>New Developments for Conjunctive Management in Idaho: Why Our Expanding Understanding of Science Should Expand How We Address the Doctrine Against Waste in Idaho Water Right Transfers <i>Dylan R. Hedden-Nicely, University of Idaho, College of Law</i></p>
1:50	<p>Nitrates Directive Compliance: Checking for Nitrate in Groundwater in the Netherlands <i>Arnoud de Klijne, National Institute for Public Health and the Environment</i></p>	<p>Addressing Groundwater Overexploitation: Large Scale Success of Community Management Approaches in Hard Rock Aquifers of Southern India <i>Sanjay Pahuja, World Bank</i></p>	<p>Reuse of CAFO Wastewater on Agricultural Lands: Potential Environmental Contaminants, Transport Pathways, and Treatments <i>Scott A. Bradford, U.S. Department of Agriculture, ARS, U.S. Salinity Laboratory</i></p>	<p>Identification and Quantification of Nitrate Transport in Agricultural Areas <i>Yuri Mun, Korea Environment Institute</i></p>

Track A**Track B****Track C****Track D**

2:15	<p>Can We Determine Background Nitrate Concentration in Groundwater? <i>Kelly L. Warner, U.S. Geological Survey</i></p>	<p>Strategies for Efficient Irrigation <i>John Selker, Oregon State University</i></p>	<p>Relationship between Farm Management, Nitrogen Surplus, Nitrate Concentrations and Economic Performance of Dutch Dairy Farms on Sandy Soils <i>Joan W. Reijs, Wageningen University and Research Centre, Agricultural Economics Research Institute</i></p>	<p>Modeling Crop Water Demand and Root Zone Flow Processes at Regional Scales in the Context of Integrated Hydrology <i>Emin C. Dogrul, California Department of Water Resources</i></p>
2:40	<p>CV-SALTS Initiative: Central Valley Regional Water Quality Control Board Efforts to Tackle Salinity and Nitrate throughout the Central Valley and Who Needs to be Involved <i>Pamela Creedon, Central Valley Regional Water Quality Control Board</i></p>	<p>Groundwater in China: Development, Regulation and Farmers' Responses <i>Qiuqiong Huang, Department of Applied Economics, University of Minnesota</i></p>	<p>An Investigation of Policies for Controlling Groundwater Pollution from Confined Animal Feeding Operations <i>Jingjing Wang, University of California, Riverside</i></p>	<p>Assessing and Forecasting Nitrate Fluxes in Agricultural Aquifers <i>Chris Green, U.S. Geological Survey</i></p>

3:05 **BREAK**

3:20 **Plenary Session 4**
Toward Sustainable Groundwater In Agriculture: Challenges, Observations, and Key Outcomes

Moderator: Margaret Catley-Carlson, *Chair, Canadian Water Network*
Panel: Mark Giordano, *Principal Researcher, International Water Management Institute*
Michael Campana, *Professor of Geosciences, Oregon State University*
Jacob Burke, *Senior Water Policy Officer, Land and Water Division, Food and Agriculture Organization of the United Nations (FAO)*
Jean Fried, *Project Scientist, University of California, Irvine, and Consultant, UNESCO*

5:30 **ADJOURN**

6:00 **Journal Special Issue Author Meeting**

Poster Presenters

Zeinab Shaaban Abou-Elnaga, *Mansoura University*, Challenges of Water sector: Groundwater and Agriculture in Egypt

Alishir Afrous, *University of Azadegan*, Nitrate Leaching in Various Irrigation Methods and Simulating Nitrate Movement and Transport with LEACHN Model

Jocelyn Boudreau for Jean Caron, *Université Laval, Qc, Canada*, Saving Water and Energy Using Spatially Distributed Real Time Water Potential Sensors in Cranberry

Hans Peter Broers, *TNO Geological Survey of the Netherlands*, Implementing the EU Water Framework and Groundwater Directives in the Netherlands: Monitoring and Compliance Regime for Groundwater

Michael V. Callaghan, *University of Calgary*, Investigation of Groundwater Flow Paths During Leaching of Salt-affected Soils

Pennan Chinnasamy, *University of Missouri*, Measuring and Monitoring HydroBiogeochemical Flux in a Forested Riparian Floodplain/wetland

Guillaume Favreau for Ibrahim Maïmouna, *Université Montpellier*, Impact of Irrigation on Soil and Groundwater Salinity in the Komadugu Yobe Valley, Lake Chad Basin.

Tigistu Haile for Wakgari Furi Konchi, *University of Poitiers*, Aquifer Geometry and the Impact of Irrigation Water on Groundwater Level Changes in Main Ethiopian Rift

Thomas Harter for Ryan Hines, *University of California, Davis*, Understanding the Effects of Agriculture-Driven Multiscale Groundwater-Surface Water Interactions on Scott River Baseflow and Stream Temperature in Support of Beneficial Salmon Habitat

Heidar Ali Kashkuli, *Islamic Azad University*, Groundwater Investigation and Modeling of Buchir-Homeyran Plain, Hormozgan Province, Iran

Daniel B. Marcum, *University of California Cooperative Extension*, Groundwater Monitoring in Big Valley in the Northeastern California Counties of Lassen and Modoc

Siwa Msangi, *International Food Policy Research Institute (IFPRI)*, Exploring the Behavioral Dynamics of Groundwater Usage in India: Evaluating the Potential Effectiveness of Community-based Management Schemes

Gene-Hua Crystal Ng, *MIT*, Probabilistic Predictions of Groundwater Recharge Under Climate Change Scenarios in a Dryland Cotton Region of the Southern High Plains

Adaora Unoma Okonkwo, *South Africa, Department of Water Affairs*, Assessment of the Influence of Geology on Groundwater Quality: A Case Study of Kutama and Sinthumule Areas in Limpopo Province

Pep Mas Pla for A. Folch, *Universitat Autònoma de Edifici*, Groundwater in Situ Bionitrification Pilot Test in Fractured Media

Pep Mas Pla for Anna Menció, *Universitat de Girona*, Spring Water Nitrate Content as Indicator of Hydrological Response to Agricultural Fertilization (Osona region, NE Spain).

Rey A. Rodriguez, *H2O R2 Consulting Engineers, Inc.*, Restoring and Maintaining a Lakes Oxygen Supply Using the RezOX gPRO H2O Oxygenator

Bridget R. Scanlon, *University of Texas at Austin*, Comparison of Irrigated Agriculture in the U.S. High Plains and North China Plain

Bridget R. Scanlon, *University of Texas at Austin*, Impacts of Rain-fed and Irrigated Agriculture on Soil Water and Groundwater Salinity

Heejun Suk, *Korea Institute of Geoscience and Mineral Resources*, Model Development for Analysis of Nitrate Leaching and its Field Application in a Rural Area

Kristine A. Uhlman, *University of Arizona*, Predicting and Mapping Ground Water Vulnerability to Nitrate in Arizona

Karen G. Villholth, *Geological Survey of Denmark and Greenland*, Support to Capacity Building within Integrated Groundwater Management in Africa

Esther J.W. Wattel-Koekkoek, *RIVM*, Groundwater Quality in the Netherlands, 1984-2008

Esther J.W. Wattel-Koekkoek, *RIVM*, Monitoring the Effects of Emission Reduction Policy: Groundwater Quality in Forests and Heathland in the Netherlands

Yohannes Woldeyohannes, *La Trobe University*, Characterizing Groundwater Dynamics in Western Victoria Using Menyanthes Software