

INEKE MARGÔT KALWIJ, Ph.D.

Dr. Kalwij has her education in groundwater management (water quality and quantity, and systems modeling, analysis and optimization), natural resources and environmental policy, irrigation engineering, and the use of integrative approaches to assess and solve water management problems. She has worked in the U.S.A, Pakistan, Chile, and Thailand.

Her field of interest and expertise are:

- Groundwater management (water quality and quantity)
- Surface irrigation systems (methods and practices)
- Systems analysis and optimization (operations research, heuristic optimizers)
- Numerical modeling (surface water, groundwater, and water quality models)
- Water and development (sustainable land and water use, water conservation)

She has over 7 years research and practical working experience in numerical modeling, systems analysis and optimization, and artificial neural networks. For many years she has a principal role in optimization software design and development for managing groundwater quality and quantity, and conjunctive use. Dr. Kalwij has worked extensively with numerical three-dimensional simulation models such as MODFLOW (U.S. Geological Survey) and MT3DMS (U.S. Army Corps of Engineers).

Dr. Kalwij worked in international development for about 4.5 years. She worked for the Directorate General International Cooperation of the Dutch Ministry of Foreign Affairs, stationed in Pakistan to work with the International Water Management Institute as an irrigation engineer / researcher.

Dr. Kalwij is co-inventor of two filed utility patents, dealing with the robustness of optimized systems and efficiently performing complex optimization computations, respectively.

EDUCATION

Ph.D.	Utah State University (U.S.A.)	2004	Groundwater management; Systems optimization
Grad. Certificate	Utah State University (U.S.A.)	2004	Natural Resource and Environmental Policy
M.Sc.	Wageningen Agricultural University (The Netherlands)	1994	Water management; Irrigation engineering

EMPLOYMENT HISTORY

September, 2007 – present	Sub-contracted by GW Solutions; Hydrogeologist.
January, 2007 – present	Systems Simulation / Optimization Laboratory (SSOL), Utah State University; Adjunct Assistant Professor.
January 2006 – December 2006	Self-employed (part - time); software design and development services for SSOL, Utah State University.
January 2005 – December 2006	SSOL, Utah State University; Research Scientist.
November, 1999 – December 2004	SSOL, Utah State University; Adjunct Research Scientist.
March 1995 – August 1999	Directorate-General International Cooperation, Dutch Ministry of Foreign affairs, The Netherlands; Associate Expert (Irrigation engineer / researcher), stationed Pakistan with the International Water Management Institute.
October 1993 – March 1994	Grupo de Investigaciones Agraria, Chillán, Chile; Intern.
May 1992 – November 1992	Arcadis Euroconsult's field office (NEWMASIP), Khon Khen, Thailand; Intern.

PROFESSIONAL MEMBERSHIP

Member	British Columbia Groundwater Association (BCGWA), since 2007
Member	Canadian Water Resources Association (CWRA), since 2005
Associate Member	American Society of Civil Engineers (ASCE), since 2004
Member	National Ground Water Association (NGWA), since 2003
Member	International Water Resources Association (IWRA), since 2002

PROJECT EXPERIENCE

GROUNDWATER MANAGEMENT

Systems analysis and optimization; solving real-world transport optimization problems (i.e. design of pump-and-treat systems) for the Environmental Security Technology Certification Program of the U.S. Department of Defense:

- Umatilla Chemical Depot (Oregon, U.S.A.): Mathematically solving optimization problem formulations pertaining to the containment and remediation of RDX and TNT contamination;
- Tooele Army Depot (Utah, U.S.A.): Mathematically solving optimization problem formulations pertaining to the containment and remediation of TCE contamination; and
- Blain Ammunition Depot (Nebraska, U.S.A.): Mathematically solving optimization problem formulations pertaining to the containment and remediation of TCE and TNT contamination;

SURFACE IRRIGATION SYSTEMS

In charge of, designed and supervised research, field monitoring (pilot testing), and implementation activities pertaining to irrigation methods and practices:

- Improved on-farm water management (OFWM) research and implementation project in the Fordwah-Eastern Sadiqia Irrigation Sub-System (FSIS) of the Indus Basin Irrigation System, Punjab, Pakistan;
- On-farm water management research and implementation activities in Balochistan, Pakistan;
- Improved OFWM dissemination project. This project involved disseminating improved OFWM research results (use of bed-and-furrow irrigation methods and laser leveling technique) to a larger scale in FSIS, Punjab, Pakistan.

My work in collaboration with colleagues contributed to the wide-spread use of the bed-and-furrow irrigation method in Punjab Province. This technology was successfully transferred to large-scale areas by the Directorate of On-Farm Water Management, Government of Punjab.

FILED UTILITY PATENTS

Robust Optimization System

A general software method to produce a robust solution for a wide range of optimization problems. Filed on December 12, 2006. Co-inventor: R. C. Peralta, Ph.D., P.E.

Intelligent Space Tube Optimizer

Computational method for more efficiently performing complex computer optimization tasks. Filed on January 9, 2007. Co-inventor: R. C. Peralta, Ph.D., P.E.

SELECTED PUBLICATIONS

REFEREED JOURNALS

Kalwij, I.M., and R.C. Peralta, Simulation / optimization modeling for robust pumping strategy design. *Ground Water*, Vol. 44, No. 4 (pages 547 – 582), 2006.

Peralta, R.C., Kalwij, I.M., and S. Wu, Practical Remedial Design Optimization for Large Complex Plumes. Accepted August 2007, *Journal of Water Resources Planning and Management*.

CONFERENCE PAPERS

Peralta, R.C., I.M. Kalwij, and H. Fayad, Optimizing management of nonlinear flow and transport in groundwater and surface water systems, in *Proceedings of FEM-MODFLOW International Conference*, Karlovy Vary, Czechoslovakia, 2004.

Kalwij, I.M., and R.C. Peralta, Effect of optimization problem constraints on pump and treat designs for Tooele Army Depot, in *Proceedings of the 2004 World Water and Environmental Resources Congress*, edited by J. Sehlke and D. F. Hayes, and D. K. Stevens, American Society of Civil Engineers, 2004.

Peralta, R.C., I.M. Kalwij, and B. Timani, Optimizing complex plume pump and treat systems for Blaine Naval Ammunition Depot, Nebraska, in *Proceedings of the 2004 World Water and Environmental Resources Congress*, edited by J. Sehlke and D. F. Hayes, and D. K. Stevens, American Society of Civil Engineers, 2004.

Peralta, R.C., and I.M. Kalwij, Mathematically optimizing water management, in *Proceedings of the 2004 World Water and Environmental Resources Congress*, edited by J. Sehlke and D. F. Hayes, and D.K. Stevens, American Society of Civil Engineers, 2004.

Peralta, R.C., I.M. Kalwij, and S. Wu, Practical simulation / optimization modeling for groundwater quality and quantity management, in *Proceedings of International Conference MODFLOW and More 2003*, edited by E. Poeter, C. Zheng, M. C. Hill, and J. Doherty, pp. 784-788, Colorado School of Mines, Golden, Colorado, 2003.

PROJECT & RESEARCH REPORTS

Peralta, R.C., I.M. Kalwij, I.M., and S. Wu, Optimal pumping strategies for TCE and TNT plumes at Blaine Naval Ammunition Depot, Hastings, NE. Project completion report for U.S. Navy. 72 p, 2002.

Peralta, R.C., I.M. Kalwij, and S. Wu, Optimal pumping strategies for Tooele Army Depot main TCE plume. Project completion report for U. S. Navy. 50 p, 2002.

Peralta, R.C., S. Wu, and I.M. Kalwij, Optimal pumping strategies for Umatilla Chemical Depot RDX and TNT plumes. Project completion report to U. S. Navy. 55 p., 2002.

Kalwij, I. M.; V. Duke, and S.A. Prathapar, Water resources management research issues in the highlands of Baluchistan: Workshop proceedings. International Water Management Institute, Lahore. Pakistan National Program. IWMI-Pakistan research report no.R-92. 36p, 1999.

Munir, S., Kalwij, I. M., and M. Brouwer, Assessment of water distribution at watercourse and minor level of Bahadarwah Minor, International Water Management Institute, Lahore. Pakistan National Program. IWMI-Pakistan research report no.R-91. 57p, 1999.

Alberts, J., and I.M. Kalwij, Disseminating the bed-and-furrow irrigation method for cotton cultivation in Bahadarwah Minor. International Water Management Institute, Lahore. Pakistan National Program. In collaboration with On-Farm Water Management. IWMI-Pakistan research report no.R-82. 86p., 1999.

Kalwij, I. M.; Z.I. Mirza, M. A. Amin, and A. Hameed, Disseminating the bed-and-furrow irrigation method for cotton cultivation in the Hakra-4-R Distributary in collaboration with the Water Users Federation. International Water Management Institute, Lahore. Pakistan National Program. IWMI-Pakistan research report no.R-83. 79p., 1999.

Kalwij, I.M., and S. Sarwar, Surface irrigation methods and practices. 22 p. Chapter in Towards Environmentally Sustainable Agriculture in the Indus Basin Irrigation System, edited by G.V.Skogerboe, and J. Bandaragoda. Final Report. International Irrigation Management Institute, Lahore. IIMI-Pakistan research report no. R-77., 1998.

Kalwij, I. M., Assessing the field irrigation performance and alternative management options for basin surface irrigation systems through hydrodynamic modeling. International Irrigation Management Institute, Lahore. Pakistan National Program. IIMI-Pakistan research report no.R-35. 96p., 1997.

Berkhout, N.M., F. Yasmeen, R. Maqsood, and I.M. Kalwij, Farmers' use of basin, furrow and bed-and-furrow irrigation systems and the possibilities for traditional farmers to adopt the possibilities for traditional farmers to adopt the bed-and-furrow irrigation method. International Irrigation Management Institute, Lahore. Pakistan National Program. IIMI-Pakistan research report no.R-33. 94p., 1997.

Kalwij, I. M., Surface irrigation methods and practices: Field evaluation of the irrigation processes for selected basin irrigation systems during Rabi 1995-96 season, Punjab, Pakistan. International Irrigation Management Institute, Lahore. Pakistan National Program. IIMI-Pakistan research report no.R-24. 129p., 1997.