

**CURRICULUM VITAE**  
**INEKE MARGÔT KALWIJ**

MAILING ADDRESS:

P.O. Box 2476 Station A  
Abbotsford, V2T 4X3  
British Columbia, Canada  
Phone: 1.604.625.6843  
E-mail: [ikalwij@gwsolutions.ca](mailto:ikalwij@gwsolutions.ca)  
[Kalwij.gwsolutions@gmail.com](mailto:Kalwij.gwsolutions@gmail.com)

**EDUCATION**

---

Ph.D.	Utah State University, U.S.A.	2004	Groundwater Management (contaminant transport; systems analysis and optimization)
Grad. Certificate	Utah State University, U.S.A.	2004	Natural Resource and Environmental Policy
M.Sc.	Wageningen Agricultural University, The Netherlands	1994	Tropical Land & Water Use (water engineering & management)

**PROFESSIONAL EXPERIENCE AND EMPLOYMENT HISTORY**

---

September, 2009 – December 2009	University of the Fraser Valley. Sessional Instructor (Hydrology)
September, 2007 – present	GW Solutions, Inc. Hydrogeologist.
January, 2007 – present	Systems Simulation / Optimization Laboratory (SSOL), Utah State University; Adjunct Assistant Professor.
January 2006 – December 2006	Self-employed; software design, development and technical support services for SSOL, Utah State University.
January 2005 - December 2005	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 in Lahore, Pakistan with the International Water Management Institute (a CGIAR centre).
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.

## **PROJECT EXPERIENCE**

---

I have professional project experience from Canada, The United States of America and Pakistan. I have classified my project experience by topic (in alphabetical order):

- ▶ Desertification through groundwater exploitation (depletion)
- ▶ Extension, dissemination and technology transfer
- ▶ Water users' perceptions on improved water management practices
- ▶ Groundwater contamination remediation (numerical simulation modeling combined with systems analysis and optimization)
- ▶ Groundwater quality assessment
- ▶ Hydrogeologic assessment & aquifer characterization
- ▶ Improved on-farm irrigation water management
- ▶ Pressurized irrigation systems
- ▶ Water demand assessment
- ▶ Water distribution and allocation
- ▶ Water stewardship planning and implementation
- ▶ Well rehabilitation and development

Through these projects I have gained experience in research, practical applications, project management and planning, leading and supervising research teams, developing collaboration activities, report writing, and presenting and disseminating project / research results.

List of projects is available upon request.

## **COMPUTER MODELING / PROGRAMMING SKILLS**

---

### **SIMULATION MODELS**

CROPWAT, an analytical simulation model for calculating reference evapotranspiration, crop water requirements and crop irrigation requirements, Food and Agriculture Organization (FAO).

MODFLOW, a modular three-dimensional finite-difference groundwater flow model, United States Geological Survey (USGS), United States of America (USA).

MT3DMS, a modular three-dimensional multi-species transport model, United States Army Corps of Engineers.

SEAWAT, a three-dimensional variable-density groundwater flow model, USGS.

SIRMOD, a modular two-dimensional surface irrigation software, using hydrodynamic, zero-inertia, and kinematic-wave modeling approaches, BIE, USU.

### **OPTIMIZATION SOFTWARE**

SOMOS (Simulation / Optimization Modeling System), BIE, USU, USA, for managing groundwater, tr. Simulation / Optimization software using operations research and heuristic optimization

GAMS (General Algebraic Modeling System), a high level language; GAMS Development Corporation, Washington DC, USA.

LINGO (VHLL – very high level language), released by Lingo Language, USA.

GWM (Ground-Water Management), an optimization module linked with the USGS MODFLOW-2000 (MF2K) to solve linear, nonlinear, and mixed-binary linear ground-water management formulations.

### **MAPPING / PROCESSING SOFTWARE**

ArcGIS®, Geographic Information System software (version 9.1), developed by Environmental Systems Research Institute (ESRI), USA (good working knowledge of the software)

AQUIFERTEST, a groundwater software for pumping test & slug test data analysis (Schlumberger Water Services).

GROUNDWATER VISTAS, a three-dimensional groundwater flow and transport modeling (with a graphical user interface), developed by Environmental Simulations International

MODPATH, a particle-tracking post processing model for MODFLOW, USGS.

SURFER, Surface Mapping System, Golden Software, Inc., USA.

### **PROGRAMMING LANGUAGES**

Microsoft Visual (MV) C# .NET and Visual C++ .NET, MV C/C++ and MV Basic, FORTRAN, MATLAB by MathWorks, Inc.

## **UNITED STATES PATENTS**

---

### **ROBUSTNESS OPTIMIZATION SYSTEM**

A general software method to produce a robust solution for a wide range of optimization problems. United States Patent No. US 7,653,522 B2; Date of Patent: Jan. 26, 2010. Co-inventor: R. C. Peralta, Ph.D., P.E.

### **INTELLIGENT SPACE TUBE OPTIMIZER**

Computational method for more efficiently performing complex computer optimization tasks. United States Patent Application No. 60/756,307 filed on January 5, 2006. Co-inventor: R. C. Peralta, Ph.D., P.E.

## **PROFESSIONAL MEMBERSHIP**

---

- ❖ Member International Association of Hydrogeologists (IAH), since 2010
- ❖ 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

## **ACTIVE INVOLVEMENT IN A PROFESSIONAL ORGANIZATION**

---

Leading role in designing and coordinating the technical sessions and workshop on operating water systems for the 39<sup>th</sup> British Columbia Groundwater Association Annual Trade Show and Convention, March 3 – 6, 2009 (in Penticton).

## **COMMUNITY INVOLVEMENT**

---

Since 2009, member of the Abbotsford Environmental Committee, the Abbotsford-Sumas Aquifer Stakeholders group and Abbotsford-Sumas Aquifer Science group.

## **AWARDS**

---

- Student of the month award, USU (September 2001).
- 2003 Outstanding Graduate Student Award. Department of Biological and Irrigation Engineering, USU.

## **SELECTED PUBLICATIONS**

---

I have written or co-authored research papers for peer reviewed journals, conference papers, consulting reports, technical and research reports, dissemination and extension reports, technical notes, a workshop proceeding, lecture notes, and sections in a technical manual.

### **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. *Journal of Water Resources Planning and Management (ASCE)*, September / October 2008.

Kalwij, I.M., and R.C. Peralta, Non-Adaptive and Adaptive Hybrid Approaches for Enhancing Water Quality Management. *Journal of Hydrology*. Vol. 358, issue 3 – 4, September 2008.

Kalwij, I.M., and R.C. Peralta, Intelligent Space Tube Optimization for Speeding Ground Water Remedial Design. *Ground Water*. Vol 46, No. 6 (pages 829 – 840), November – December 2008.

### **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.

## **CONSULTING REPORTS**

Hydrogeologic Assessment. For: Ms. Jacqui Du Frayer 27214 27 A Avenue Aldergrove, B.C. Prepared by GW Solutions Inc., July 2009.

Test Well TW09-1 (*In-situ* soil characterization, aquifer identification and monitoring well installation). For: Clearbrook Waterworks District, 2564 Clearbrook Road, Abbotsford, BC, V2T 2Y5. Prepared by GW Solutions Inc., June 2009.

Water Demand Assessment. For: Clearbrook Waterworks District, 2564 Clearbrook Road, Abbotsford, BC, V2T 2Y5. Prepared by GW Solutions Inc., April 2009.

Potential Impact of Coal Bed Methane Extraction on Salmon and Salmon Habitat in the Skeena River Headwaters. For: The Pembina Institute, 606 - 55 Water Street Vancouver BC V6B 1A1, Canada. Prepared by GW Solutions Inc., February 29, 2008.

Well identification and verification study. For Clearbrook Waterworks District 2564 Clearbrook Road, Abbotsford, BC, V2T 2Y5. Prepared by Timur Yessilbayev, Kathy Abraham, and GW Solutions. Inc., September, 2008.

Well rehabilitation and development of Drinking Water Supply Wells 7-00 and 3-93. For Clearbrook Waterworks District 2564 Clearbrook Road, Abbotsford, BC, V2T 2Y5. Prepared by GW Solutions. Inc., July 2008.

Water Quality Analysis of Drinking Water Supply Wells 7-00 and 3-93. For: Clearbrook Waterworks District, 2564 Clearbrook Road, Abbotsford, BC, V2T 2Y5. Prepared by GW Solutions Inc., January 31, 2008.

## **PROJECT AND 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.

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

Kalwij, I.M., S. Munir, M. Khatri, and Z. Hashmi, Evaluation of Pressurized Irrigation Systems in Baluchistan. International Water Management Institute, Internal Research Report, 1999.

Khan, A.H., Vehmeyer, P.W., Reichert, A.P., Ejaz, M.S., Kalwij, I.M., Lashari, B, and G.V. Skogerboe, Water supply and water balance studies for the Fordwah Eastern Sadiqia (South) Project Area. Research support for the Fordwah Eastern Sadiqia (South) Irrigation and

Drainage Project. International Water Management Institute, Lahore. Research Report No. R-88. 84 p., 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., and M. A. Amin, Pilot-testing the bed-and-furrow irrigation methods on selected fields during Kharif 1997: an evaluation of cultural and irrigation practices, surface irrigation hydraulics, cost-benefits, and farmers' perceptions and feedback. International Water Management Institute, Lahore. Internal Research Report. 93p., 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. Maqsoo\*, 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.

Kalwij, I.M., Surface irrigation practices: A first assessment of the surface irrigation performance at the field / farm level, Kharif 1995. International Irrigation Management Institute, Internal Research Report, 1996.

### **TRAINING, EXTENSION, DISSIMINATION, TECHNOLOGY TRANSFER**

Developing educational and training material on water management and groundwater source protection for watershed and community planning. Prepared for the Canada Mortgage and Housing Corporation International. Prepared by GW Solutions Inc., April 2008.

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., M.T. Iqbal, M. N. Asghar, The application of the bed-and-furrow irrigation method for cotton crop in Southern Punjab, International Water Management Institute, Pakistan National Program, extension pamphlet (translated into Urdu), 1998.

### **TECHNICAL NOTES**

Kalwij, I.M., and R.C. Peralta, Comparing a standard genetic algorithm to an advanced genetic algorithm with tabu search, technical note. Simulation / Optimization Laboratory, Utah State Univ., 2005

Kalwij, Evaluating ANN performance: REMAXIM (BIE) versus NeuralSIM™ versus Neuroshell, technical note. Simulation / Optimization Laboratory, Utah State Univ., 2001

### **WORKSHOP PROCEEDING**

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.

### **LECTURE NOTES**

Environmental Hydrology. Lecture notes for Geography 303 (Principles of Hydrology). University of the Fraser Valley. Course developed and taught from September to December 2009.

Coastal Geomorphology. Lecture notes prepared for Geography 304. University of the Fraser Valley; Fall 2008.

Linear Programming and the Simplex Algorithm. Lecture notes prepared for BIE 6550 class (Utah State University) (Wells and Well Systems) in 1999, and 2001.

### **SECTIONS IN A TECHNICAL MANUAL**

*Ground water pumping with constrained stream – aquifer seepage.* Section on nonlinear programming using operations research, in: *SOMOS, Simulation / Optimization Modeling System for Optimal Groundwater and Conjunctive Water Management.* User's Manual Confidential Draft. Systems Simulation/Optimization Laboratory. Software Engineering Division. Department of Biological and Irrigation Engineering, Utah State University, 2004.

*SOMO3 using SEAWAT.* Section in: *SOMOS, Simulation / Optimization Modeling System for Optimal Groundwater and Conjunctive Water Management.* User's Manual Confidential Draft. Systems Simulation/Optimization Laboratory. Department of Biological and Irrigation Engineering, Utah State University, 2003.

*Plume Management (III) via transport optimization.* Section in: *SOMOS, Simulation / Optimization Modeling System for Optimal Groundwater and Conjunctive Water Management.* User's Manual Confidential Draft. Systems Simulation/Optimization Laboratory. Software Engineering Division. Department of Biological and Irrigation Engineering, Utah State University, 2002.

*Plume Management (II) via transport optimization.* Section in: *SOMOS, Simulation / Optimization Modeling System for Optimal Groundwater and Conjunctive Water Management.*

User's Manual, Systems Simulation/Optimization Laboratory, Department of Biological and Irrigation Engineering, Utah State University, 42 p., 2001.

### **DISSERTATION**

The Design of simulation / optimization modeling techniques for nonlinear dynamic groundwater systems. Ph.D. dissertation, Department of Biological and Irrigation Engineering, Utah State University, 161 p., 2004.

\* identifies student or junior researcher as co-author.

### **PEER REVIEWER FOR A JOURNAL**

---

- ❖ Ground Water, National Ground Water Association
- ❖ .Journal of Hydrology, Elsevier