

## PERSONAL DATA

NICHOLAS KOUWEN      Department of Civil Engineering  
University of Waterloo  
Waterloo, Ontario, Canada

Degrees:                      B.A.Sc., University of Waterloo, 1966  
PhD., University of Waterloo, 1970

### Employment

2004-                              Adjunct Professor – Professor Emeritus  
1990-2004                      Professor  
1997-1999                      Professor and Associate Chair  
1980-1990                      Associate Professor  
1979-1984                      Associate Professor and Associate Chair  
1970-1979                      Assistant Professor  
Department of Civil Engineering  
University of Waterloo  
Waterloo, Ontario, Canada

### Visiting Appointments

1986 (3 months)              Visiting Scientist  
Alberta Research Council  
Edmonton, Alberta  
1978-1979                      Visiting Assistant Professor  
Department of Civil Engineering  
Colorado State University  
Fort Collins, Colorado, U.S.A.  
1972 (8 months)              Engineer  
Conservation Authorities Branch  
Ministry of Natural Resources

### Memberships in Societies

Association of Professional Engineers, Ontario  
Canadian Association for Professional Engineers  
Canadian Water Resources Association  
American Society of Civil Engineers (Member)  
American Geophysical Union

### Awards

Outstanding Journal Paper Award, Journal of Irrigation  
and Drainage Engineering, ASCE, July, 1993

## PUBLICATIONS

### Refereed Publications (Journals)

1. Bingeman, A.K, N. Kouwen, M. ASCE and E. D. Soulis, 2006, “Validation of the hydrological processes in a hydrological model.” *Journal of Hydrologic Engineering*, ASCE. 11 (5),451-463.
2. Toth, B., A. Pietroniro, F.M. Conley and N. Kouwen. 2006. “Modelling climate change impacts in the Peace and Athabasca catchment and delta I – hydrological model application. Hydrological Process 20, Special Northern Rivers Ecosystem Initiative Issue. In Print
3. Pietroniro, A., R. Leconte, B. Toth, D.L. Peters, N. Kouwen F.M. Conley and T. Prowse. 2006. “Modelling climate change impacts in the Peace and Athabasca catchment and delta III – Integrated model assessment Hydrological Process 20, Special Northern Rivers Ecosystem Initiative Issue. In Print
4. Fassnacht, S.R., Z.-L. Yang, K.R. Snelgrove, E.D. Soulis and N. Kouwen. 2006. “Effects of Averaging and Separating Soil Moisture and Temperature in the Presence of Snow Cover in a SVAT and Hydrological Model for a Southern Ontario, Canada, Watershed”. *J. of Hydrometeorology*, AMS. 7, 298-304.
5. Stadnyk, T., N. St.Amour, N. Kouwen, T.W.D. Edwards, A. Pietroniro and J.J. Gibson. 2005. “A groundwater separation study in boreal wetland terrain: The WATFLOOD hydrological model compared with stable isotope tracers”, *Isotopes in Environmental and Health Studies*, 41(1), 49-68.
6. Kouwen, N, M. Danard, A. Bingeman, W. Luo, F.R. Seglenieks and E.D. Soulis. 2005. “Case Study: Watershed Modeling with Numerical Weather Model Data”, *Journal of Hydrologic Engineering*, ASCE. 10 (1), 23-38
7. Fassnacht, S.R., F. Yusuf, and N. Kouwen. “Paralysing January 1999 Snowstorms Produced Minimal Streamflow for Southern Ontario”. *Canadian Water Resources Journal* 29 (1), 1-12.
8. L.F. León, E.D. Soulis, N. Kouwen, and G.J. Farquhar, “Modeling Diffuse Pollution with a Distributed Approach”, *Journal Water Science and Technology*, IWA 9(45), In Print.
9. Benoit, R., N. Kouwen, W. Yu, S. Chamberland and P. Pellerin. 2004. “Hydrometeorological Aspects of Real-time Ultrafine Forecast Support during the Special Observing Period of the MAP”. Special Issue Hydrology and Earth Systems Sciences 7(6), 877 - 889
10. Benoit, R., C. Schär, P. Binder, S. Chamberland, H.C. Davies, M. Desgagné, C. Girard, C. Keil, N. Kouwen, D. Lüthi, D. Maric, E. Müller, P. Pellerin, J. Schmidli, F. Schubiger, C. Schwierz, M. Sprenger, A. Walser, S. Willemse, W. Yu and E. Zala. 2002. “The real-time ultrafinescale forecast support during the Special Observing Period of the MAP” *Bulletin of the AMS (BAMS)*. Jan. 85-109.
11. Samani, J.M.N. and N. Kouwen, 2002. “Stability and Erosion in Grassed Channels”, *Journal of Hydraulic Engineering*, ASCE. 128(1), 40-45.
12. Cranmer, A, Kouwen and S.F. Mousavi. 2001. “Proving WATFLOOD: Modelling the Non-Linearities of Hydrologic Response to Storm Intensities”, *Canadian Journal of Civil Engineering*. 28, 837-855.

13. Fassnacht, S.R., N. Kouwen, and E.D. Soulis. 2001. "Surface temperature adjustments to improve weather radar representation of multi-temporal winter precipitation accumulations." *Journal of Hydrology*, 253(1-4):148-168.
14. Arora, V., F. Seglenieks, N. Kouwen, and E.D. Soulis. 2001. "Scaling Aspects of River Flow Routing", *Hydrological Processes* 15, 461-477.
15. L. Leon, E.D. Soulis and G.J. Farquhar. 2001. "Non-point Source Pollution: A Distributed Water Quality Modeling Approach", *Water Research*, Elsevier Science. 35(4), 997-1007.
16. Kouwen, N. and M. Fathi-Moghadam, 2000. "Friction Factors for Coniferous Trees along Rivers", *Journal of Hydraulic Engineering*, ASCE. 126(10), 732-740.
17. Soulis, E.D., K.R. Snelgrove, N. Kouwen, F. Seglenieks and D.L. Verseghy, 2000. "Towards closing the vertical water balance in Canadian atmospheric models: coupling of the land surface scheme CLASS with the distributed hydrological model WATFLOOD", *Atmosphere-Ocean*. 38(1). 251-269.
18. Benoit, R., P. Pellerin, N. Kouwen, H. Ritchie, N. Donaldson, P. Joe and E.D. Soulis, 2000. "Toward the use of Coupled Atmospheric and Hydrologic Models as Regional Scale", *Monthly Weather Review*. 128(6), 1681-1706.
19. McKillop, R., N. Kouwen and E.D. Soulis, "Modeling the Rainfall-Runoff Response of a Headwater Wetland", *Water Resources Research*, Am. Geophysical Union. Vol. 35, No. 4, 1165-1177. 1999
20. Fassnacht, S.R., E.D. Soulis, and N. Kouwen, 1999. "Algorithm application to improve weather radar snowfall estimates for winter hydrologic modelling." *Hydrological Processes*, **13**(18): 3017-3039.
21. Fassnacht, S.R., J. Innes, N. Kouwen, and E.D. Soulis, 1999. "The specific surface area of fresh dendritic snow crystals." *Hydrological Processes*, **13**(18): 2945-2962.
22. Hamlin, L., A. Pietroniro, T. Prowse, E.D. Soulis, and N. Kouwen, "Application of indexed snowmelt algorithms in a northern wetland regime", *Hydrologic Processes*, Vol. 12, pp. 1641-1657. 1998.
23. Pietroniro, A., D.T. Prowse, L. Hamlin, N. Kouwen and E.D. Soulis, "Application of a grouped response unit hydrologic model to a northern wetland region", *Hydrological Processes*, Vol. 10, pp. 1245-1263. 1996.
24. Fathi-Moghadam and N. Kouwen, "Nonrigid, Nonsubmerged, Vegetative Roughness on Floodplains", *Journal of Hydraulic Engineering*, Vol. 123, No. 1, 1997, pp. 51-57.
25. Rotunno Filho, O.C., P.M. Treitz, E.D. Soulis, P.J. Howarth and N. Kouwen, "Texture processing of synthetic aperture radar data using second-order spatial statistics", *Journal of Computers and Geosciences*, Vol. 22, No. 1, 1996, pp. 27-34.
26. Pietroniro, A., T.D. Prowse, L. Hamlin, N. Kouwen and E.D. Soulis, "Application of a grouped response unit hydrologic model to a northern wetland region", *International Journal of Hydrologic Processes*, Vol. 10, 1996. pp. 1245-1261.
27. Rotunno Filho, O.C., E.D. Soulis, A. Abdeh-Kolachi, N. Kouwen, T. Pultz and Y. Chevier, 1996, "Soil Moisture in Pasture Fields using ERS-1 Synthetic Aperture Radar: Preliminary Results", *Canadian Journal of Remote Sensing*, Vol. 22, No. 1, pp. 95-107.
28. Joe, P., C. Crozier, N. Donaldson, D. Etkin, S. Clodman, J. Abraham, S. Siok, H-P. Biron, M. Leduc, P. Chadwick, S. Knott, J. Archibald, G. Vickers, S. Blackwell, R.

- Drouillard, A. Whitman, H. Brooks, N. Kouwen, R. Verret, G. Fournier and B. Kochtubajda, "Recent Progress in the Operational Forecasting of Summer Severe Weather, *Atmosphere-Ocean: International Decade for Natural Disaster Reduction*, Special Volume, 33(1), 1995, 249-302.
29. Donald, J.R., E.D. Soulis, N. Kouwen, A. Pietroniro, "A land cover-based snow cover representation for distributed hydrologic models", *Water Resources Research*. 31(4) April 1995, 995-1009.
  30. Joy, D.M., W.C. Lennox, N. Kouwen, "Stochastic Model of Particulate Transport in a Porous Medium", *ASCE J. of Hydraulic Engineering*, 119(7), July, 1993, 846-861.
  31. Kouwen, N., E.D. Soulis, A. Pietroniro, J. Donald and R.A. Harrington, "Grouping Response Units for Distributed Hydrologic Modelling", *ASCE J. of Water Resources Management and Planning*, 119(3), May/June, 1993, 289-305.
  32. Donald, J.R., F.R. Seglenieks, E.D. Soulis and N. Kouwen, "Mapping Partial Snow Cover During the Melt Season using C-Band SAR Imagery", *Can. J. of Remote Sensing*, 19(1), Jan. 1993, 68-76.
  33. Pietroniro, A., E.D. Soulis, N. Kouwen, O. Rotunno and D.W. Mullins, "Extracting Soil Moisture Information From C-Band Wide Swath SAR Imagery", *Can. J. of Remote Sensing*, 19(1), Jan. 1993, 77-82.
  34. Kouwen, N., "A Modern Method for the Design of Grassed Channels", *J. of the Irrigation and Drainage Engineering*, ASCE, Vol. 118, No. 5, Oct. 1992. pp. 733-743. (Outstanding Paper Award)
  35. Kite, G.W. and N. Kouwen, "A Semi-Distributed Model for a Mountain Watershed", *Water Resources Research*, 28(12), Dec. 1992, 3193-3200.
  36. Joy, D.M., W.C. Lennox and N. Kouwen, "Particulate Transport in a Porous Media under Non-linear Flow Conditions", *J. of Hydraulic Research*, IAHR, 1991, 373-385.
  37. Dalezios, N.R., N. Kouwen, and P.C. Linardis, "Modeling and Navigating Space-Time Drift if Digitized Radar Rainfall Patterns", *Journal of Remote Sensing*, 1990, pp. 1055-1064.
  38. Dalezios, N.R. and N. Kouwen, "Radar Signal Interpretation in Warm Season Rainstorms", *Nordic Hydrology*, 1990, pp. 47-64.
  39. Tao T., and N. Kouwen, "Remote Sensing and Fully Distributed Modeling for Flood Forecasting", *Journal of Water Resources Planning and Management*, ASCE, Vol. 115, No. 6, November 1989, pp. 809-823.
  40. Kouwen, N. and G. Garland, "Resolution Considerations in Using Radar Rainfall Data for Flood Forecasting", *Canadian Journal of Civil Engineering*. Vol. 16, June 1989. pp. 279-289.
  41. Kouwen, N. "Field Estimation of the Biomechanical Properties of Grass" *Journal of Hydraulic Research*. Vol. 26, No. 5, 1988, pp. 559-568.
  42. Kouwen, N., "WATFLOOD: A Micro-Computer based Flood Forecasting System based on Real-Time Weather Radar", *Canadian Water Resources Journal*, Vol. 13, No. 1, 1988, pp. 62-77.
  43. Puskas, J., E. McBean and N. Kouwen, "Behaviour and Transport of Oil Under Ice", *Canadian Journal for Civil Engineering*, Vol. 14, 1987, pp. 510- 518.
  44. Kouwen, N., and M.F.N. Mohsen, "Increased Sump Capacity - A Model Study", *Canadian Journal of Civil Engineering*, CSCE, Vol. 10, No. 2, 1983, pp. 232-240.

45. Kouwen, N., R.M. Li and D.B. Simons, "Flow Resistance in Vegetated Waterways", Transactions, ASAE, Vol. 24, No. 3, May-June 1981, pp. 684-698.
46. Kouwen, N. and R.M. Li, "Biomechanics of Vegetative Channel Linings", Journal of the Hydraulics Division, ASCE, Vol. 106, No. HY6, June 1980, pp. 1085-1103.
47. Mohsen, M.F.N., G.J. Farquhar and N. Kouwen, "Gas Migration and Vent Design at Landfill Sites", Water, Air and Soil Pollution, Vol. 13, 1980, pp. 79- 97.
48. McBean, E., G.J. Farquhar, N. Kouwen, and D. Dubec, "Predictions of Ice Cover Development in Streams and its Effect on Dissolved Oxygen", Canadian Journal of Civil Engineering, Vol. 6, No. 2, 1979, pp. 197-207.
49. Harrington, R.A., N. Kouwen and G.J. Farquhar, "Behaviour of a Hydrodynamic Finite Element Model", Finite Elements in Water resources, Vol. 1, No. 6.
50. Mohsen, F.N., G.J. Farquhar and N. Kouwen, "Modelling Methane Migration in Soil", Journal of Applied Mathematical Modelling, Vol. 2, Dec. 1978, pp. 294-301.
51. Weaver, D.S., F.A. Adubi and N. Kouwen, "Flow Induced Vibration of a Hydraulic Valve and their Elimination", Journal of Fluid Engineering, ASME, Vol. 100, No. 2, June 1978, pp. 239-245.
52. Kouwen, N., R.A. Harrington and S.I. Solomon, "Principles of a Gradually Varied Flow Model", Journal of the Hydraulics Division, ASCE, Vol. 103, No. HY5, May 1977, PP. 531-542.
53. Constable, T.W., N. Kouwen and S.I. Solomon, "A Square Grid Model for Assessing the Environmental Impact of Alternative Land Uses", Canadian Journal of Civil Engineering, Vol. 3, No. 2, 1976, pp. 209-218.
54. Mohsen, F.N., P.E. Wisner and N. Kouwen, "Removal of Air from Waterlines by Hydraulic Means", Journal of the Hydraulics Division, ASCE, Vol. 101, No. HY2, Feb. 1975, pp. 243-257.
55. Kouwen, N. and T.E. Unny, "Flexible Roughness in Open Channels", Journal of the Hydraulics Division, ASCE, Vol. 99, No. HY5, May 1973, PP. 713-728.
56. Kouwen, N., T.E. Unny and H.M. Hill, "Flow Retardance in Vegetated Channels", Journal of the Irrigation and Drainage Division, ASCE, Vol. 95, No. IR2, June 1969, pp. 329-342.

#### **Discussions in Refereed Journals**

57. Kouwen, N., Discussion on "Effect of Riparian Vegetation on Flow Resistance and Flood Potential" by Stephen Darby. *ASCE Journal of Hydraulic Engineering*. Accepted for publication. Feb. 2000.
58. Kouwen, N., Discussion on "Flow Capacity Through Wide and Submerged Vegetal Channels" by Abdelsalam, M.W., A.F. Khattab, A.A. Khalifa, and M.F. Bakry, *ASCE J. of the Irrigation and Drainage Engineering*, Vol. 120, No. 1, Jan-Feb. 1994, pp. 229-231.
59. Kouwen, N., Discussion on "Velocity Distribution Coefficients for Grass Lined Channels", by Darrel Temple, *Journal of Hydraulic Engineering, ASCE*, Vol. 113, No. 9, Sep. 1987, pp. 1221-1224.
60. Harrington, R.A. and N. Kouwen, "Discussion of Transverse Dispersion in Rectangular Channels", Y.L. Lau and B.G. Krishnappen, *Journal of the Hydraulics Division, ASCE*, Vol. 104, No. HY9, Sept. 1978, pp. 1365-1366.

#### **Refereed Journals - under review**

61. Pietroniro, A., Hayashi, M., Quinton, W.L., N. Kouwen, E.D. Soulis and J.J. Gibson, "Application of Distributed Hydrological Model in a Discontinuous Permafrost Region during CAGES.", *Hydrometeorology*, (Submitted)
62. Sarah M. Dorner, W. B. Anderson, R. M. Slawson, N. Kouwen, P. M. Huck, "Hydrologic Modeling of Pathogen Fate and Transport". *Environmental Science and Technology*. Submitted.
63. Snelgrove, K., E. D. Soulis, N. Kouwen, F. Seglenieks and A. Pietroniro, "A Framework for Hydrological Modelling in MAGS" . *Hydrometeorology*, (Submitted)
64. Bingeman, A.K., P. Pellerin, N. Kouwen, E. D. Soulis, and R. Benoit, 2002, "Using an Atmospheric model to generate significant theoretical storms over the Columbia River Basin: Preliminary Results", Submitted to the *J. of Hydrometeorology*.
65. Leon, L.F., N. Kouwen, E.D. Soulis and G.J. Farquhar, (1999) "WATFLOOD/Water Quality Model Integration in a Decision Support System", *Journal Water Science and Technology*. Dec. 2001.
66. McKillop, R., N. Kouwen and E.D. Soulis, "A Conceptual Model for Simulating the Water Balance at a Headwater Swamp", Submitted to the *ASCE J. of Hydrologic Engineering*. 1999.
67. Pietroniro, A., E.D. Soulis, N. Kouwen, "Statistical Model for Deriving Soil Moisture Estimates with Application to a Distributed Hydrologic Model", *Transactions on Geoscience and Remote Sensing*, IEEE, 34 p.
68. Pietroniro, A., E.D. Soulis, N. Kouwen, O. Rotunno, and D.W. Mullins, "The Feasibility of Using Wide Swath C-Band SAR Imagery for Basin-wide Soil Moisture Mapping", *Canadian Journal of Remote Sensing*.<<
69. Pietroniro, A., E.D. Soulis and N. Kouwen, "Deriving antecedent moisture conditions from airborne SAR for input into a flood forecasting model", 4 pages<<

**Refereed Journals - in preparation**

70. Fassnacht, S.R., N. Kouwen and E.D. Soulis, "Weather Radar Representation of Seasonal and Monthly Snowfall Accumulations". For *J. of Applied Meteorology*.

**Conference Proceedings (based on refereed full paper)**

71. Kouwen, N., A., Bingeman, A., Bellon, I., Zawadzki, 2004. "Operational issues: Real-time correction and hydrological validation of radar data". Sixth International Symposium on Hydrological Applications of Weather Radar. Melbourne, Australia 2-4 February. 8 pages.
72. Fassnacht, S. R., E. D. Soulis & N. Kouwen, 2003. "Radar precipitation for winter hydrological modelling" In: *Weather Radar Information and Distributed Hydrological Modeling* (Edited by Y. Tachikawa, B. E. Vieux, K. P. Georgakakos & E. Nakakita) (Proc. Sapporo Conference). IAHS Publ. 282. 37-42.
73. Mousavi, S-F. and N. Kouwen, 2003. "Coupling of MODFLOW and WATFLOOD in Hydrological Modeling of a Small Watershed". In: *Weather Radar Information and Distributed Hydrological Modeling* (Edited by Y. Tachikawa, B. E. Vieux, K. P. Georgakakos & E. Nakakita) (Proc. Sapporo Conference). IAHS Publ. 282. 301-307.
74. Kouwen, N. and R. Benoit, 2002. "Regional Forecasting of River Flows using a High Resolution Numerical Weather model coupled to a Hydrological Model." Proceedings, International Conference on Flood Estimation, Bern, Switzerland, March 6-8, 2002. In print.

75. Pietroniro, A., Soulis, E. D., Snelgrove, K. R. & Kouwen, N. (2001) A Framework for Coupling Atmospheric and Hydrological Models. In: Soil-Vegetation-Atmosphere Transfer Schemes and Large-Scale Hydrological Models (eds. A.J. Dolman, J.W. Pomeroy, T. Oki & A. Hall) (Proc. Maastricht Symp. S5, July 2001), IAHS Publ. No. 270:27-34.
76. León, L.F., E.D. Soulis, N. Kouwen, and G.J. Farquhar, 2001. Modeling Diffuse Pollution With A Distributed Approach, 5th Diffuse Pollution Conference, June 10-15.
77. Fassnacht, S.R., F. Yusuf, and N. Kouwen, 2002. "January 1999 storms dumped snow on southern Ontario yet limited streamflow resulted." *Proceedings of the Eastern Snow Conference* (Stowe VT, June 2002), **59**: 11pages.
78. Fassnacht, S.R., E.D. Soulis, and N. Kouwen, 2001. "Enhancing weather radar winter precipitation accumulation estimates." *Remote Sensing in Hydrology 2000* (Proceedings IAHS Remote Sensing and Hydrology Conference 2000, Santa Fe, April 2000), IAHS, 267: 46-49.
79. S.R. Fassnacht, E.D. Soulis and N. Kouwen. 1999. "Shape Characteristics of freshly fallen snowflakes and their short-term changes". *Proceedings of IUGG 99 Symposium HS2*, IAHS Pub. no. 256.
80. R. McKillop, N. Kouwen and E.D. Soulis, 1999. "Modelling the Hydrologic Response of a Wetland from an Urban Perspective", CSCE Annual Conference, June. 2-5, Regina. 1999.
81. Leon, L.F., N. Kouwen, E.D. Soulis and G.J. Farquhar, (1999) "WATFLOOD/Water Quality Model Integration in a Decision Support System", *Proceedings, 3<sup>rd</sup> International Symposium on Environmental Software Systems, ISESS 1999*, Dunedin, New Zealand, Kluwer Academic Publishers, August, 187-194.
82. Fassnacht, S.R., E.D. Soulis and N. Kouwen, "Algorithm application to improve weather radar snowfall estimates for winter hydrologic modelling", *56<sup>th</sup>. Eastern Snow Conference*, New Brunswick, Canada. 1999.
83. McKillop, R., N. Kouwen and E.D. Soulis, "Storage-Outflow Modeling of a Headwater Wetland", *Proceedings, International Water Resources Engineering Conference*, Memphis, Tenn. July 1998, pp. 514-519.
84. McKillop, R., N. Kouwen and E.D. Soulis, "Modelling the Flood Modification Effects of a Mid-Sized Unregulated Wetland", *Conference on Stormwater and Related Modelling: Management and Impacts*, Feb. 19-20, 1998, Toronto, Canada.
85. Seglenieks, E.D. Soulis and N. Kouwen, "Determination of Snowcovered Area using RADARSAT Imagery on Two Small Ontario Test Sites", *Proceedings, 54th. Eastern Snow Conference*, Banff, Alberta. 1997. pp. 329-337.
86. Kouwen, N. and M. Fathi-Moghadam, "Friction Factors for Vegetation", *Proceedings, 2<sup>nd</sup> International Symposium on Habitat Hydraulics, Ecohydraulics 2000*, IAHR/INRS-EAU, Quebec, June 1996. pp. A251-A267.
87. Seglenieks, F., S. Dyke, E.D. Soulis and N. Kouwen, "Determination of Snowcovered Area using ERS-1 C-VV SAR Imagery on Two Small Test Sites in Southern Ontario", *Proceedings, 52nd. Eastern Snow Conference*, Toronto, Ontario. 1995. pp. 11-20.
88. Kite, G.W., E.D. Soulis and N. Kouwen, "A Hierarchical Approach to the Connection of Global Hydrological and Atmospheric Models", in "Space and Time

- Scale Variability and Interdependence in Hydrological Processes”, International Hydrology Series, Ed. R. A. Feddes, Cambridge University Press, 1995. pp. 111-118.
89. Samani, J.M. and N. Kouwen, “Erosion in vegetative Channel Linings”, Proceedings of the XXVIth Congress of the Intl. Association for Hydraulic Research, London, U.K., 11-15 September, 1995. 123-128.
  90. Sheppard, B.E., M.M. Oleskiw, P.I. Joe, and N. Kouwen, "Measurement of Radar Reflectivity Factor and Snow Mass Concentration Using the POSS and ASCME", *9th. AMS Symposium on Meteorological Observations and Instrumentation*, Charlotte, NC., Mar. 27-31, 1995. 6p.
  91. Benoit, R., P. Pellerin, Jocelyn Mailhot, V. Lee, N. Kouwen, E.D. Soulis and G. Kite, "Modélisation Fine Des Pluies Orographiques Intenses sur la Bassin de la Rivère Columbia et Còuplage avec un Modèle Hydrologique Distribué", *Atelier de Modelisation de l'Atmosphere 1994*, Paris, France, Nov. 29 - Dec. 1, 1994
  92. Krauss, T.W., F.J. Eley, D. Lettenmaier, N. Kouwen and E.D. Soulis, "The Role of Weater Radar in Support of Hydrological Climate Studies", *2nd. International Workshop on Hydrological Applications of Remote Sensing*, Saskatoon, October, 1994, 13 pages.
  93. Kouwen, N. and E.D. Soulis, "Weather Radar and Flood Forecasting" in *Current Practices in Modelling the Management of Stormwater Impacts*, ed. by William James, Lewis Publishers, Chapter 16, 1994, 257-270.
  94. Treitz, P.M., P.J. Howarth, O. Rotunno, E.D. Soulis and N. Kouwen, "Classification of Agricultural Crops Using SAR Tone and Texture Statistics", *Proceedings, 16<sup>th</sup> Canadian Symposium on Remote Sensing*, Sherbrooke, Qu., June, 1993. 343-347.
  95. Kouwen, N. and E.D. Soulis, "Remote Sensing Inputs for Flash Flood Forecasting in Urban Areas", Chapter 8, *New Techniques for Modelling the Management of Stormwater Quality Impacts*, Ed. William James, Lewis Publishers, 1993.
  96. Seglenieks, J.R. Donald, E.D. Soulis and N. Kouwen, "Application of SAR Snowcover Mapping to Hydrologic Modelling of Snowmelt in Southern Ontario", *Proceedings, 50<sup>th</sup> Eastern Snow Conference*, June 8-10, 1993, 399-405.
  97. Kouwen, N and E.D. Soulis, "Scaling Radar Data Using Streamflow Data", *Proceedings, AMS 26<sup>th</sup> International Conference on Radar Meteorology*, May 24-28, 1993, Norman, Okla. 3 p.
  98. Pietroniro, A., E.D. Soulis, N. Kouwen, R. Leconte and D.W. Mullins, 1992, "The Feasibility of Using C-Band SAR Imagery for Basin-wide Soil Moisture Mapping", *15<sup>th</sup> Canadian Symposium on Remote Sensing*, Toronto, 1992.
  99. Donald, J.R., F.R. Seglenieks, E.D. Soulis and N. Kouwen, "Mapping Partial Snowcover During Melt Season using C-Band SAR Imagery", *15<sup>th</sup> Canadian Symposium on Remote Sensing*, Toronto, Ont., June, 1992.
  100. Donald, J.R., E.D. Soulis, F. Seglenieks and N. Kouwen, "Snow Depth Estimates for Shallow Snowpacks From GOES Visible Imagery", *Proceedings, 48th Annual Eastern Snow Conference*, Guelph, Ontario, June 6-7, 1991, 17 p.
  101. Kouwen, N., E.D. Soulis, A. Pietroniro and R.A. Harrington, "Remote Sensing to Assess Vegetative Cover Effects for Flood Forecasting", *Proceedings, International Conference on Flood Hydraulics*, Wallingford, UK., Sept 1990, 437-446.



102. Kouwen, N., E.D. Soulis, A. Pietroniro and J. Donald, "Flash Flood Forecasting with a Rainfall-Runoff Model Designed for Remote Sensing Inputs and Geographic Information Systems", *Proceedings*, International Symposium on Remote Sensing in Water Resources, Enschede, Netherlands, August 1990, 805-814.
103. Kouwen, N., E.D. Soulis and A. Pietroniro, "Remotely Sensed Input Data Real-Time Flood Forecasting", *Proceedings*, ASCE National Conference on Hydraulic Engineering, San Diego, California, July 1990, 980-985. (invited paper).
104. Kouwen, N., E.D. Soulis and A. Pietroniro, "The Role of Remote Sensing in Hydrologic Simulation" *ASCE Irrigation and Drainage Division Symposium on Watershed Management*, Durango, July 1990.
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216. Kouwen, N., "*Dynamic Wave Flood Routing Sensitivity Study*", Waterloo Research Institute, Final Report, Project No. 403-18, University of Waterloo, Waterloo, Ontario, 1986, 60 pages.
217. Kouwen, N., "*Flood Routing Sensitivity Study*", Waterloo Research Institute, Final Report, Project No. 111-11, University of Waterloo, Waterloo, Ontario, 1983.
218. Kouwen, N., R.M. Li and D.B. Simons, "*Velocity Measurements in a Channel Lined with Flexible Plastic Roughness Elements*", Technical Report No. CER79-80-NK-RML-DBS11, Dept. of Civil Engineering, Colorado State University, Fort Collins, Colo. 1979.
219. Kouwen, N., R.M. Li and D.B. Simons, "*Annotated Bibliography on Resistance to Flow in Vegetated Channels*", Technical Report No. CER79-80NK-RML-DBS11, Dept. of Civil Engineering, Colorado State University, Fort Collins, Colo. 1979, 28 pages.
220. Simons, D.B., R.M. Li, V.M. Ponce, D.M. Hartley, K.G. Eggert, J.N.H. Ho., J. Wedman, T.J. Ward and N. Kouwen, "*Literature Review on Effectiveness of Vegetation Buffer Strips*", Dept. of Civil Engineering, Colorado State University, 1979.
221. Kouwen, N., "*Oakville Water Treatment Plant Low Lift Pump Pit Model Test*", Waterloo Research Institute, Final Report, Project No. 708- 10, University of Waterloo, Waterloo, Ontario, 1978.
222. Kouwen, N., "*Flood Mapping for Raewood Estate Subdivision*", Waterloo Research Institute, Final Report, Project No. 708-08, October, 1977, 5 pages.
223. James F. MacLaren Ltd. Environmental Consultants, "*Studies of Sedimentation and Water Quality at the Humber River Mouth*", Final Report to the Metropolitan and Region Conservation Authority, August 1975, 33 pages.
224. Kouwen, N., "*Testing of Transition Sections, Butterfly Valves and Couplings*", Waterloo Research Institute, Final Report, Project No. 1103, April, 1972, 28 pages.
225. Kouwen, N., "*Hydrant Rating*", Waterloo Research Institute, Final Report, Project No. 0102, March 18, 1971, 9 pages.

#### **Users Manuals**

226. Kouwen, N., "***SIMPLE*** - *A Watershed Model for Flood Forecasting*", Users Manual, Department of Civil Engineering, University of Waterloo, Waterloo, Ontario. March 1986, 92 pages.
227. Kouwen, N., "*Design and Analysis of Grassed Channels*", Users Manual, Department of Civil Engineering, University of Waterloo, Waterloo, Ontario, Dec. 1985, 14 pages.
228. Kouwen, N. and G. Garland, "*HYMO-BASIC, An adaptation of HYMO: Problem-Oriented Computer Language for Hydrologic Modelling*", Dept. of Civil Engineering, University of Waterloo, Waterloo, Ont. January 1984, 88 pages.

#### **Software**

**WATFLOOD** Flash Flood Forecasting System - A set of menu driven computer programs to provide flood forecasters a user-friendly micro-computer environment for

processing weather radar precipitation data in real-time for the purpose of flood forecasting.

Under development since 1972.

Water Utilities - A set of programs to perform about 30 common tasks in hydraulic and hydrologic engineering. Primarily for instructional use.

### **Workshops**

WATFLOOD Workshops – Environment Canada, Fredericton, Toronto (twice), Vancouver, Oct. 1999-March 2000, Introduce meteorologists and hydrologists to real-time flood forecasting.

WATFLOOD Workshop – National Hydrologic Research Centre, Environment Canada, Saskatoon, Sk. July 1999

Workshop on Environmental System Modelling of Severe Precipitation Events, Sponsored by CERCA (Centre de Recherche en Calcul Appliqué, Montreal, December, 1996. By Invitation.

WATFLOOD Training Workshop, BC HYDRO, Burnaby, B.C., March 25-29, 1996.

Radar Workshop - Radar and Remote Sensing, Sponsored by the Communications Research Laboratory of McMaster University, the Telecommunications Research Institute of Ontario, the Institute for Space and Terrestrial Science and The Atmospheric Environment Service, Nov. 3-4, 1992, Toronto, Ontario. By Invitation.

Flood Damage Reduction Workshop (FDRP), Sponsored by the Water Conservation and Management Branch, Ontario Ministry of Natural Resources, November 2-3, 1989, Toronto, Ontario. One of four speakers to present studies carried out under the FDRP. Topic: "WATFLOOD - A real-time flood forecasting model using radar rainfall and satellite land use data. Audience: Conservation Authorities personnel dealing with flood plain management and flood forecasting.

### **Panel Participation**

Nextrad Hydrology Symposium, Sponsored by the US National Weather Service, US Geological Survey, US Army Corps of Engineers, the UNISYS Corp., and the University of Oklahoma. By invitation sat on a panel to discuss the "Methodologies for Radar-Raingauge Analysis" for hydrologic applications. October, 1988

International Conference on Channel Flow and Catchment Runoff, By invitation sat on a panel of experts to discuss the future of Manning's formula, University of Virginia, Charlottesville, Virginia, USA, May 22-26, 1989

### **Training Seminar**

WATFLOOD/Simple Flood Forecasting Demonstration and System Description Seminar, Environment Canada, Hull, Quebec, June 11-12, 1992.

### **Seminars (by invitation)**

"Coupling of Numerical Weather Prediction Models and Hydrological Models"

Meso Scale Alpine Project Operations Centre, Innsbruck, Sept. 1999.

ETH, Zurich, January, 2000.

"Hydrological Modelling - The Efficient Way"

McGill University, December, 1996

"Resistance/Drag characteristics of vegetation: Analytical Approaches"

HYDRA 2000 - IAHR Congress, London U.K., 1995.

"Remote Sensing for Flood Forecasting"

School of Engineering, University of Guelph, November 1990.

- "Flood Forecasting based on Weather Radar Precipitation Measurements"  
U.S. Dept. of Agriculture, ARS, Fort Collins, Colo. June 1988  
Environment Canada, Ottawa. April 1988  
Conservation Authorities and Water Management Branch, Ministry of Natural Resources, Ontario. May 1987.  
Grand River Conservation Authority, Cambridge, 1987.  
Alberta Research Council, March, 1986
- "Flow Resistance and Stability of Grassed Channels", Agricultural Research Service, U.S. Department of Agriculture, Stillwater, Oklahoma, July, 1986.
- "Design of Grassed Channels", Dept. of Civil Engineering, University of Alberta, February, 1986
- "Flow Resistance in Grassed Channels", Engineering Research Center, Colorado State University, Fort Collins, Colorado, November, 1978
- "Hydraulic Models - Case Histories", School of Engineering, Lakehead University, January, 1980.
- "A computer Program for Hydrologic Simulation of Storm Runoff in Southern Ontario", Toronto Hydrology Group, October, 1972

## PROFESSIONAL ACTIVITIES

### Thesis Examiner or Reader

1990-1991 Examiner of the Association of Professional Engineers of Ontario

### Consulting and Technology Transfer Activities

Environment Canada

2004-2007 Consultant – Integration of WATFLOOD in Environment Canada research and operational software.

1996-2002 Numerical weather models and hydrological model coupling real-time flood forecasting Participated in the Mesoscale Alpine Project (MAP) and RAPHAEL.

1992- Flow forecasting demonstration system and personnel training

Abitibi-Price Inc.

1999-2002 Physical Model study of the Grand Falls NF. hydropower intake canal and fish diversion structure.

BC Hydro

1992-2000 Numerical weather models and hydrological model coupling for dam safety studies

Ministry of Natural Resources, Ontario

1996- Flood forecasting system for Northern Ontario rivers

Ministry of Transportation, Ontario

1988-1989 Study of Silt Fences and Barriers

Conservation Authorities and Water Management Branch

Ministry of Natural Resources, Ontario

1989 Applied the WATFLOOD flood forecasting system to three test watersheds, namely, the Saugeen River, the Humber River, and the Rouge, Duffen, Lynde and Oshawa Creek Areas.

1984-1985 Studied the applicability of dynamic wave flood routing models to Southern Ontario rivers.

1983-1984 Conducted a study to investigate the applicability of the Variable Storage Coefficient Routing Technique on Ontario Rivers.

1972 Employed to introduce watershed simulation models for flood forecasting.

George Wimpey Canada Ltd

1982 Assessment of the Hydraulic Design of the Henry Sturm and Sandrock Greenways in Kitchener, Ontario.

Paragon Engineering Ltd., Kitchener, Ontario

1987 Model study for Colonial Creek, Waterloo

1979-1982 Acted as a consultant to company personnel on water resources studies and flood mapping projects

James F. MacLaren Ltd., Willowdale, Ontario

1973-1978 Carried out a number of hydraulic model studies for projects being designed by James F. MacLaren Ltd. The following studies were undertaken through the Waterloo Research Institute:

- 1978 1:5 model of the pumping pit of the Halton Region low lift pumping pit. This study resulted in a novel approach to house 5 large pumps, which could not have been satisfactorily installed in the pit otherwise.
- 1976 Model of the forebay of the cooling water pumping station for the Lepreau Nuclear Power Generating Station in New Brunswick. This study led to major alterations in the planned layout of the pumping station.
- 1975 An air model of a section of Humber Bay to study the effect of a proposed island constructed from landfill on the circulation patterns in the vicinity. This work led to the thesis topic of Dr. R.A. Harrington.
- 1973 Model study of the intakes for the highlevel pumping station of the Easterly Filtration Plant in Metropolitan Toronto.
- 1973 Model Study of the Etobicoke Creek energy dissipater in Brampton, Ontario.
- Shully I. Solomon & Assoc.  
1973 Involved with the development of a hydrologic simulation model for assessing the Environmental Impact of the proposed Pickering airport and community development.
- Victaulic Co. Ltd.  
1971 Conducted laboratory tests to determine the headloss characteristics of pipe couplings, pipe laterals and butterfly valves produced by Victaulic.
- Canada Valve Ltd., Milton, Ontario  
1970-1983 Conducted laboratory tests to determine head losses and flow characteristics of check valves, globe valves, and fire hydrants. The tests on check valves uncovered serious hydrodynamic instabilities which resulted when damping was introduced during the closing cycle of the valves. Tests on prototype valves were conducted at the University of Waterloo while physical and mathematical models were developed at McMaster University.

**Private Professional Engineering Activities**

- 1975-1978 Prepared a number of flood hazard maps for small urban developments.
- 1969 Design of a 2'x 1.5' x 30' tilting flume at Conestoga College, Kitchener, Ontario

## TEACHING ACTIVITIES

### Thesis Supervision - PhD.

#### Completed

E. Rodriguez	2005
K. Snelgrove	2001
A. K. Bingeman	Improving Dam Safety Analysis by using Physically-Based Techniques to Derive Estimates of Atmospherically Maximum Precipitation. 2001
R. McKillop	Modelling the Rainfall-Runoff Response from a Headwater Wetland. 1997
M. Fathi-Moghadam	Momentum Absorption in Non-Rigid, Non-Submerged, Tall Vegetation along Rivers. Completed July, 1996.
O.C. Rotunno Filho	Soil Moisture Mapping using Remote Sensing and Geostatistics applied to Rainfall-Runoff Models. 1995.
J.M. V. Samani	Stability and Erosion of Vegetative Channel Linings. 1995.
A. Pietroniro*	Basin-wide Remotely Sensed Soil Moisture Estimates with Application to a Distributed Hydrologic Model. 1993.
J.R. Donald*	Snowcover Depletion Curves and Satellite Snowcover Estimates for Snowmelt Runoff Modelling. 1992.
D.M. Joy*	Particulate Transport Through a Porous Medium, August, 1989
N. Dalezois	Real Time Radar Rainfall Measurements for Hydrologic Modelling, 1982.
R.A. Harrington*	Physical and Numerical Modelling of Hydrodynamics and Diffusion, June 1978.
M.F.N. Mohsen*	Gas Migration from Sanitary Landfills and Associated Problems, August 1975.

### Thesis Supervision - M.A.Sc.

#### Completed

R. Jenuja	
M. Liu	
J. Innes	
S. Carlaw	Soil Moisture Accounting in Distributed Hydrological Modelling, Dec. 2000.
A. Cranmer	Modelling the Non-linearities of Hydrologic Response to Storm Intensities using WATFLOOD, 1998.
T. Neff*	Mesoscale Water Balance of the Boreal Forest Using Operational Evapotranspiration Approaches in a Distributed Hydrologic Model, (completed S/96) (cosupervised)

L.Hamlin*	Snowmelt Hydrologic Modelling of Northern Wetland Dominated River Basins, 1996 (completed S/96) (cosupervised)
K Snelgrove*	Combining WATFLOOD and CLASS - Including River Hydrology in Land Surface Process Models, 1996 (completed S/96) (cosupervised)
T. Tao	Use of Remotely Sensed Data for Improving Flood Forecasting, 1988
T. Cooper	Measuring the Enhancement Weather Radar Provides a Rain Gauge Network for Streamflow Forecasting, 1988
G. Garland	Resolution Considerations in using Radar Rainfall Data for Hydrologic Modelling, 1986.
W. Schutzman*	Sediment Trapping by Vegetation, May 1981.
T. Mereu	Velocity Profiles of Vegetative Flow, October 1981.
P. Scott*	Numerical Modelling of Moisture Movement through Landfills, May 1980.
E. Alade	Mathematical Model of Monthly Flows in SemiArid Regions, June 1978.
John E. Gorrie	Radar Precipitation Measurements in Hydrologic Modelling for Reservoir Operation, January 1977.
Oleh Dubec*	Prediction of Ice Cover Formation, Extent and Effect on Dissolved Oxygen, January 1977.
T.W. Constable	A Distributed Quantity-Quality Runoff Model for Assessing Potential Impact of Alternative Land Use Configuration, December 1974.
R.A. Harrington*	Dispersion Effects on Deoxygenation in Streams, December 1974.
D.B. Hodgins*	The Forces on an Unconsolidated Breakup Ice Jam at a Boom, March 1974.
M.F.N. Mohsen*	Clearing Velocity of Air Pockets in Water Lines, November 1972.

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\* Co-Supervisor

### **Teaching responsibilities**

The following is a list of courses I have taught from one to 25 times since joining the University of Waterloo Engineering Faculty:

GenE 121 Digital Computation  
CivE 223 Computer Workshop  
CivE 280 Fluid Mechanics  
CivE 291 Survey Camp  
CivE 381 Hydraulics



Nicholas Kouwen – Nov. 9/99

CivE 383/583 Water Distribution and  
Collection Systems  
CivE 483 Design of Urban Water Systems  
CivE 400 Civil Engineering Project 3  
CivE 486 Hydrology  
CivE 589 Open Channel Hydraulics  
CivE 682 Free Surface Hydraulics  
Undergraduate Projects - 2 to 3 per year

### **Administrative Appointments**

1979-1985, 1996-1998 Associate Professor and Associate Chairman  
for Undergraduate Studies  
Department of Civil Engineering  
University of Waterloo  
Waterloo, Ontario, Canada

### **Committee Memberships**

1969/70	Presidential search and nominating committee Graduate student representative
1971	Senate Committee on a Common Grading System
1971	Student Advisory Council to the Department of Coordination
1974	Task force to revise "Guidelines for Writing a Work Report"
1974	Civil Engineering Graduate Studies Committee
1975-	EMS Library Users Committee for Civil Engineering
1980-2004	Senate Library Committee for Engineering
1979-85	Engineering Undergraduate Affairs Committee
1979-85	Civil Engineering Examinations and Promotions Committee
1979-85	Engineering Examinations and Promotions Committee (Alternate)
1984-85	Civil Engineering Curriculum Committee, Chairman
1996-98	Engineering Undergraduate Affairs Committee
1985-2004	Civil Engineering Computing Committee, Chairman

## **EMPLOYMENT HIGHLIGHTS**

Department of Civil Engineering, University of Waterloo

1970-Present      Employed as an Assistant, Associate and Professor with Undergraduate teaching responsibilities in Fluid Mechanics, Hydraulics, Hydrology and additional lower level courses of a general nature. Also responsible for a Graduate course in Hydraulics and Graduate Student Supervision. Additional duties include serving as Associate Chairman for Undergraduate Studies, Library Representative of the Department of Civil Engineering and the Engineering Computer Committee.

Has conducted research into the use of Radar and Numerical Weather model data for use in Hydrologic Simulation Models. The objective of the research was to improve estimates of precipitation for storms in a real time, distributed format for flood forecasting purposes. A summary of current research topics and research objectives is given elsewhere.

Acted as Library Representative for the Department of Civil Engineering and as such was responsible for the acquisition of Civil Engineering Library material for the University Library.

Acted as Consultant in the fields of Hydraulics and Hydrology to private groups and Government.

1966-1970      Enrolled as a Graduate Student in the Ph.D. Program at Waterloo while on a National Research Council of Canada Scholarship. At the University of Waterloo the emphasis is placed on independent research to qualify for a Ph.D. degree. His research topic, "Flow Retardance in Vegetated Channels", was of his own choosing, with Professor T.E. Unny of the University of Waterloo as his advisor and Professor V.T. Chow of the University of Illinois as his external examiner.

Department of Civil Engineering, Colorado State University

1978-1979      Employed as a Visiting Professor to conduct research on the flow resistance and sediment trapping characteristics of vegetated channels and vegetative buffer strips. The overall objective of the research was to determine the width of a vegetative buffer strip between a water course and activity which encourages soil erosion such as road building, logging, mining and farming. The approach taken was to mathematically model in detail the physical processes

affecting sediment transport and deposition. Before the processes of sediment transport and deposition could be mathematically modelled, the hydraulic characteristics of the vegetation needed to be understood. While involved in this activity, all the available flow data collected in grassed channels was analyzed in terms of a stiffness criteria developed as a Ph.D. student. The work has resulted in a rational basis for designing vegetated channels both with respect to channel size and channel stability.

#### Non-Professional Employment

1961-1966 Summer employment with C.C. Parker and Associates, Hamilton, as survey party chief on pre-engineering and construction layout.

Employed on various construction projects as a surveyor and quantity estimator during work terms while enrolled in the Cooperative Engineering Program at the University of Waterloo.

#### Ontario Department of Highways

1957-1960 Employed first as a chainman and later as a party chief on a survey crew. Responsible for layout work on various road and bridge construction projects.

The experienced gained from 1957 to 1966 was applied directly to teaching at the Civil Engineering Department's Survey Camp.