

# Joni Bugden-Storie

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## EDUCATION:

- Ph.D. (2002):** UNIVERSITY OF WATERLOO, Waterloo, Ontario. Faculty of Environmental Studies, Department of Geography. Specialization in Geomatics.  
Thesis Title: A Knowledge-Based Model for SAR-Crop Interactions: A Case Study in Norwich Township, Ontario. Advisor: Dr. Philip Howarth
- Masters (1996):** UNIVERSITY OF WATERLOO, Waterloo, Ontario. Faculty of Environmental Studies, Department of Geography. Specialization in Spatial Data Analysis and Resource Management.  
Thesis Title: Identification of Agro-Ecosystem Indicators using Integrated Remote Sensing Data  
Advisor: Dr. Philip Howarth
- BA cum laude (1994):** CARLETON UNIVERSITY, Ottawa, Ontario. Department of Geography. Concentration in Geographic Information Processing (G.I.P.).  
Thesis Title: Using GIS to Plan Canoe Routes in Algonquin Provincial Park  
Advisor: Danny Patterson
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## TEACHING EXPERIENCE:

- Assistant Professor*  
(2005 – Present) Western Carolina University (North Carolina)  
Environmental Geography (Geog150), Introduction to Remote Sensing (Geog324), Advanced Remote Sensing (Geog424), Natural Resources Conservation and Management (NRM140), Weather and Climate (Geog300), Regional Geography of South America; Australia; World Regions (Geog440), Land Suitability Classification (NRM470).
- Adjunct Assistant Professor*  
(2004/05) UNIVERSITY OF WATERLOO (Ontario)  
[Winter 2005] Geography and Our Planetary Environment (GEOG 102), Energy Balance Climatology (GEOG 409), Remote Sensing Project (GEOG 471)  
[Fall 2004] Geography and Our Planetary Environment (GEOG 102), Advanced Environmental Research Methods (ENVS 278), Physical Climatology (GEOG 309)
- Lecturer*  
(2002) WILFRID LAURIER UNIVERISTY (Ontario)  
Cartography II (GG351)
- Teaching Assistant*  
(2001) UNIVERSITY OF WATERLOO (Ontario)  
Environmental Remote Sensing (GEOG-376)
- Lecturer*  
(April 2000) UNIVERSITY OF BUENOS AIRES (Buenos Aires, Argentina)  
Introduction to Synthetic Aperture Radar (SAR): 3-Day Seminar
- Lecturer*  
(August 1999) NATIONAL UNIVERSITY OF SAN JUAN (San Juan, Argentina)  
Introduction to Synthetic Aperture Radar (SAR): 2-Day Workshop
- Lecturer*  
(Feb. 1997) YORK COLLEGE OF INFORMATION TECHNOLOGY (Ontario)  
Research Statistics (STATS210)
- Lecturer*  
(Dec. 1996) YORK COLLEGE OF INFORMATION TECHNOLOGY (Ontario)  
Statistics Level I (STATS100)
- Teaching Assistant*  
(May '97 to Aug. '98) UNIVERSITY OF WATERLOO (Ontario)  
Advanced Remote Sensing (GEOG-471 and GEOG-603)
- Teaching Assistant*  
(Jan. '95 to Dec. '97) UNIVERSITY OF WATERLOO (Ontario)  
Introduction to Environmental Research Methods (ES-178);  
(Sept. to Dec. '94) Advanced Environmental Research Methods (ES-278)

## PROJECT/WORK EXPERIENCE:

- Principal Investigator* (2008 to present) *Curriculum development through international student field work experiences*  
USDA International Science & Education CSRESS Grant ISE Proposal 2008-01615  
***Using International Remote Sensing Fieldwork to Improve Regional Natural Resource Management.***
- Principal Investigator* (2008 to present) *CAD to GIS Conversion and Hemlock Woolly Adelgid Mapping*  
Southern Highlands Reserve (non-profit, private botanical gardens).  
***The Southern Highlands Reserve Prototype Core Garden GIS Database.***
- Principal Investigator* (2006-2007) *Mapping existing and potential river cane habitat.*  
Eastern Band of Cherokee Indians – RTCAR grant  
***Prototype River Cane Geographic Information System.***
- Visiting Fellowship* (Oct. '02-Aug.'04) Agriculture & Agri-Food Canada (Eastern Cereal and Oilseed Research Centre)  
***Retrieval of biophysical crop and field descriptors and the delineation of homogenous field sub-units for crop management using polarimetric SAR data.***
- Research Assistant* (1994 to 2002) University of Waterloo – ***Oxford County Radar Experiment***  
Funded by the Application Development and Research Opportunity (ADRO) program, CSA, NASA, RADARSAT International Inc., and the Centre for Research in Earth & Space Technology (CRESTech).
- Coordinator/ Author* (March-Oct. 2000) Agri Food Laboratories – ***Using IKONOS Data to Generate Products for Agricultural Retailers in Middlesex County***  
[\$20,000]
- Coordinator/ Author* (March-Oct. 2000) Agri Food Laboratories – ***RADARSAT-1 Data for Commercial Agricultural Applications***  
[\$20,000]
- Cordinator* (April-Oct.2000) Canada Space Agency – Application Development and Research Opportunity (ADRO-2) -  
***RADARSAT Data for Commercial Agricultural Applications***  
[\$16,000]
- Principal Investigator* (1998 to 2001) Universities of San Juan-Waterloo GlobeSAR-2 Project -  
***Land-use/Land-cover Mapping of the Tulum Valley using RADARSAT-1 Data.***  
[\$34,000]
- Internship* (Dec. '98 to Feb. '99) Insitut InterAmerican de Cooperation Pour L'Agriculture -  
***Research, Education and Technology Transfer for Agriculture in Argentina.***  
[\$4,500 US]
- Co-Investigator and Proposal Author* (Nov. '98 to March '99) Universities Mayor San Simon-Waterloo GlobeSAR Project -  
***Agricultural Crop Identification and Monitoring in Bolivia using RADARSAT-1 Data.***  
[\$17,000]
- Coordinator* (May to Aug. '98) Agreco – ***Crop Monitoring using CASI Data***
- Coordinator* (Feb. '98 to Mar. '99) Agrisat – ***Detection of Soil Moisture using RADARSAT-1 Data***  
Funded by the RADARSAT User Development Program (RUDP); Canadian Space Agency.
- Coordinator* (Feb. to Oct. '97) Agreco - ***Crop Monitoring using CASI & RADARSAT Data***  
Funded through the RADARSAT User Development Program (RUDP).
- Participant* (Jan. to Aug. '96) University of Waterloo – ***Lake St. Clair Wetlands Project***  
Funded through Application Development and Research Opportunity (ADRO) program.

*Environmental Coordinator* (May to Aug. '94) Aqua-Terre Environnemental Consulting – **Lake Lisgar Rehabilitation Project**  
Liaison person between Joint Services Coalition and the Town of Tillsonburg, Parks and Recreation, Long Point Conservation Authority and local media.

## RESEARCH PUBLICATIONS:

### THESES:

- Bugden, J.L., 2002, A Knowledge-Based Model for SAR-Crop Interactions: A Case Study in Norwich Township, Ontario. Unpublished, Doctor of Philosophy in Environmental Studies Thesis, University of Waterloo, 256 p.p.
- Bugden, J.L., 1996, Identification of Agro-ecosystem Indicators using Integrated Remote Sensing Data. Unpublished, Master of Environmental Studies Thesis, University of Waterloo, 123 p.p.
- Bugden, J.L., 1994, Using GIS to Plan Canoe Routes in Algonquin Provincial Park. Unpublished, Honours Bachelor of Arts Thesis, Carleton University, 63 p.p.

### JOURNAL PUBLICATIONS:

- Bugden, J.L., Pattey, E. and McNairn, H., 2009, Object-based classification of multi-polarization SAR using crop and soil homogeneous zones, Canada Journal for Remote Sensing, Vol 35, No 2, p130-140.
- Smith, A.M., Eddy, P.R., Bugden-Storie, J., Pattey, E., McNairn, H., Nolin, M., Perron, I., Hinthner, M., Miller, J. and Haboudane D., 2006, Multi-polarized radar for delineating within-field variability in corn and wheat, Canadian Journal of Remote Sensing, Vol. 32, No. 4, p. 300-313.
- Bugden, J.L., J.Andrey and P.J. Howarth, 2004. A SAR process model for land-cover mapping, Canadian Journal of Remote Sensing, Vol. 30, No. 2, pp.195-204.

### CONFERENCE PAPERS:

- Jesus Soria-Ruiz, Yolanda Fernandez-Ordonez, Heather McNairn , Joni Bugden-Storie, 2007, Corn Monitoring and Crop Yield Using Optical and Radarsat-2 Images, *IEEE International Geoscience and Remote Sensing Symposium*, July 23-27, 2007 Barcelona, Spain
- Lapen, D.R., G.C Topp, J.L. Bugden and E. Pattey, 2004. A New TDR Probe for Evaluating Airborne SAR data for Soil Water Content Estimates, *Canada-China Agriculture Symposium*, October 2004.
- Bugden, J.L., K. Hochheim, E. Pattey, and H. McNairn, 2003. Canopy Volumetric Moisture Content and Polarimetric SAR, *Canadian Remote Sensing Symposium Proceedings*, Montreal, PQ, October, 2003.
- Perron, I., M.C. Nolin, E. Pattey, J.L. Bugden et A. Smith, 2003. Comparaison de L'utilisation de la Conductivité Électrique apparente ( $CE_a$ ) des Sols et des données Polarimétriques RSO pour Délimiter des Unités D'aménagement Agricoles, *Canadien Remote Sensing Symposium Proceedings*, Montreal, PQ, Octobre, 2003.
- Smith, A.M., P. Eddy, J.L. Bugden, E. Pattey, H. McNairn, M. Nolin, J. Miller and D. Haboudane, 2003. Delineating within-field management zones using multi-temporal, multi-polarized airborne SAR imagery. *Canadian Remote Sensing Symposium Proceedings*, Montreal, PQ, October, 2003.
- Bugden, J.L., H. McNairn and E. Pattey, 2003. End-User Diagnostic of Polarimetric SAR Data Quality, *ASAR Workshop Proceedings*, Montreal, PQ, June 2003.
- Bugden, J.L. and P.J. Howarth, 2001. A primer for the use of radar data in land-cover applications, *Third International Conference on Geospatial Information in Agriculture and Forestry*, 5-7 November, Denver, Co.
- Bugden, J.L., G. Salinas de Salmuni and P.J. Howarth, 1999. RADARSAT vineyard identification in Tulum Valley, San Juan, Argentina, *Canadian Remote Sensing Symposium*, Volume 2, June 21-24, 1999. Ottawa, pp. 375-382.
- Salinas de Salmuni, G., G. Ibañez, J.L. Bugden, M.I. Lund, J. Mareca, and J. Maraz, 1999. Land use and land cover of the irrigated zones in the Provinces of San Juan and Mendoza in Argentina, *GlobeSAR-2 University Symposium*, May 1999, Buenos Aires, Argentina, CD-ROM.
- Bugden, J.L. and P.J. Howarth, 1998. RADARSAT parameters for crop classification in Norwich Township, southwestern Ontario, *Symposium Radarsat ADRO*, Montreal, Quebec. October 12-15, CD-ROM, 10 p.p.
- Bugden, J.L. and P.J. Howarth, 1997. Identification of agro-ecosystem indicators using optical and SAR remote sensing data, *Geomatics in the Era of RADARSAT*, May 25-30, Ottawa, CD-ROM, 7 p.p.
- Bugden, J.L. and P.J. Howarth, 1996. The detection of agro-ecosystem indicators using SAR and optical remote sensing data in Oxford County, *Canadian Association of Geographers - Ontario Chapter*, October 25-26, Trent University, Peterborough, p.p. 61-70.
- Bugden, J.L. and P.J. Howarth, 1996. The detection of agro-ecosystem indicators of agricultural sustainability using remote sensing data in Oxford County, southern Ontario, *18th Canadian Symposium of Remote Sensing*, March 25-29, Vancouver, p.p. 176-179.

## CONFERENCE PRESENTATIONS/ABSTRACT AND REPORTS:

- Burda, C. and J.L. Bugden-Storie, 2009, Hemlock Woolly Adelgid Mapping Project, a Report and database DVD for Southern Highlands Reserve, Lake Toxaway, NC, 8 pages, August 2009.
- Mellon, S., T. Liner and J.L. Bugden-Storie, 2009, Field Data Collection for RADARSAT-2 Data in the Tulum Valley, Argentina (March 2009), a Report and database DVD for a USDA International Science & Education CSRESS Grant ISE Proposal 2008-01615, 53 pages, July 2009.
- Bugden-Storie, J.L., 2009, Introduction of polarimetric radar and end-user diagnostic of polarimetric SAR data quality, Workshop: International Workshop on GIS and Microwave R.S. Polarimetry, Tools and Applications, National Institute for Space Research (INPE), Sao Jose dos Campos, SP, Brazil, March 12-13, 2009.
- Bugden-Storie, J.L., 2009, Understanding Canopy Characteristics for Mapping Deciduous Forest Land in Jackson County, NC, Workshop: International Workshop on GIS and Microwave R.S. Polarimetry, Tools and Applications, National Institute for Space Research (INPE), Sao Jose dos Campos, SP, Brazil, March 12-13, 2009.
- Bugden-Storie, J.L., 2009, Using PolSARPro 4.0 to analyze polarimetric SAR images, Workshop: International Workshop on GIS and Microwave R.S. Polarimetry, Tools and Applications, National Institute for Space Research (INPE), Sao Jose dos Campos, SP, Brazil, March 12-13, 2009.
- Bugden-Storie, J.L., 2009, A Introducción al radar polarimétrico y diagnóstico de calidad de dato SAR polarimétrico por parte del usuario fina, Workshop: Imágenes SAR Polarimétricas y sus Aplicaciones, Entrenamiento en el manejo del software POLSAR-Pro, CONAE, Ciudad Autónoma de Buenos Aires, 3 y 4 de marzo de 2009.
- Bugden-Storie, J.L., 2009, Aplicaciones de las imágenes radar polarimétricas, Workshop: Imágenes SAR Polarimétricas y sus Aplicaciones, Entrenamiento en el manejo del software POLSAR-Pro, CONAE, Ciudad Autónoma de Buenos Aires, 3 y 4 de marzo de 2009.
- Bugden-Storie, J.L., 2009, Introducción al programa PolSAR Pro 4.0. Estudiantes y docentes de la Universidad de Carolina del Oeste (WCU), Workshop: Imágenes SAR Polarimétricas y sus Aplicaciones, Entrenamiento en el manejo del software POLSAR-Pro, CONAE, Ciudad Autónoma de Buenos Aires, 3 y 4 de marzo de 2009.
- Mellon, S., M. Kerfonta, A. Lawson, C. Burda, B. Donaldson, C. Hamrick, S. Miller, D. Van Denabeele, and J.L. Bugden-Storie, 2009, Comprendiendo las características de la cubierta para el mapeo bosques caducifolios en el condado de Jackson, Carolina del Norte, Workshop: Imágenes SAR Polarimétricas y sus Aplicaciones, Entrenamiento en el manejo del software POLSAR-Pro, CONAE, Ciudad Autónoma de Buenos Aires, 3 y 4 de marzo de 2009.
- Bugden-Storie, J., 2008, Using International Remote Sensing Fieldwork to Improve Regional Natural Resource Management, GIS Day @ AB-Tech, Remote Sensing I Session, 14-November2008.
- Bugden-Storie, J.L. and F. Obusek, 2008, Mapping of non-tidal wetlands using ALOS PolSAR polarimetric radar data in Carteret County, North Carolina, Association of American Geographers, April 15-19, 2008, Boston, MA
- Burda, C., J.L. Bugden, T. Nergart and C.D. Storie, 2008, Mapping existing river cane sites within Jackson County, North Carolina using visible aerial photography, Poster, Association of American Geographers, April 15-19, 2008, Boston, MA
- Bugden-Storie, J.L., 2007, Welcome GIS Community, GIS Day @ WCU, November 14<sup>th</sup>, 2007, Cullowhee, NC.
- Nergart, T., J.L. Bugden and C.D. Storie, 2007, Extracting Existing and Potential River Cane Sites using Remote Sensing Data, Poster, *Association of American Geography*, April 17-22, 2007, San Francisco, CA.
- Bugden, J.L., Storie, C. and Griffith, A., 2007, Prototype River Cane Geographic Information System (Version 2), a Report and database DVD for the Revitalization of Traditional Cherokee Artisan Resources.
- Bugden, J.L., G. Salmuni and L. Dutra, 2007, Polarimetric SAR Feature Extraction for Agricultural Land-Cover Mapping in Latin America: Developing Spatial Products for Environmental Decision Systems. *Association of American Geography*, April 17-22, 2007, San Francisco, CA.
- Storie, C.D., J.L. Bugden and A. Griffin, 2007, Prototype River Cane Geographic Information System. *Association of American Geography*, April 17-22, 2007, San Francisco, CA.
- Bugden, J.L., Storie, C. and Griffith, A., 2006, Prototype River Cane Geographic Information System, a Report and database DVD for the Revitalization of Traditional Cherokee Artisan Resources, September 2006.
- Bugden-Storie, J.L., Pattey, E. and McNairn, H., 2006, *Crop and Soil Mapping using object-based classification of multi-polarization SAR*, *Association of American Geographers Annual Meeting*, Chicago, IL., March 7-10, 2006.
- Bugden, J.L., E. Pattey and H. McNairn, 2003. eCognition Segmentation of Crop Management Sub-units using Polarimetric SAR Data, *2003 Annual Meetings of American Society of Agronomy, Crop Science Society of America and Soil Science Society of America*, 2-6 November 2003, Denver, CO.
- Perron, I., M.C. Nolin, E. Pattey, J. Bugden and A. Smith, 2003. Using Soil Electric Conductivity and Polarimetric SAR Data for Delineating Within-Field Soil Management Units, *2003 Annual Meetings of American Society of Agronomy, Crop Science Society of America and Soil Science Society of America*, 2-6 November 2003, Denver, CO.
- Smith, A., P. Eddy, E. Pattey, J. Bugden, H. McNairn, M. Nolin, J. Miller and D. Haboudane, 2003. Mapping Within-Field Spatial Variability and Delineating Management Zones using SAR, *2003 Annual Meetings of American Society of Agronomy, Crop Science Society of America and Soil Science Society of America*, 2-6 November 2003, Denver, CO.

- Bugden, J.L., J. Andrey and P.J. Howarth, 2001. Understanding RADARSAT-Crop interactions with Statistics and Multitemporal Profiles, *23rd Canadian Symposium on Remote Sensing*, August 21-24, Sainte Foy, Quebec.
- Bugden, J.L., J. Andrey and P.J. Howarth, 2000. Agricultural Feature Extraction and Statistical Analysis using RADARSAT Data, *22nd Canadian Symposium on Remote Sensing*, Victoria, British Columbia, August, 2000.
- Bugden, J.L., and P.J. Howarth, 2000. RADARSAT-Crop Backscatter Interactions in Norwich Township, Southwestern Ontario, *International Conference on Geospatial Information in Agriculture and Forestry*, Orlando, Florida, January 2000.
- Bugden, J., M. Bunch, and P. Howarth, 1999. Chimo Soil Moisture Project. Report prepared for Agrisat upon completion of contract.
- Bugden, J.L. and P.J. Howarth, 1998. RADARSAT Parameters for Crop Classification: Preliminary Results, *Canadian Association of Geographers Annual Meeting*, University of Ottawa, Ontario. June, p. 94.
- Bugden, J.L. and P.J. Howarth, 1998. The detection of agriculture biomass using optical and SAR remote sensing data, *Canadian Remote Sensing Symposium*, Calgary, Alberta, May 11-13, 1998.
- Howarth, P.J., J.L. Bugden, V. Kalnins, and J. Piwowar, 1997. Analysis of RADARSAT images with different incidence angles and modes recorded over an agricultural test site, southern Ontario, Canada, *Geomatics in the Era of RADARSAT*, May 25-30, Ottawa. CD-ROM.
- Howarth, P.J., J. Bugden, C. Derksen, M. Jollineau, V. Kalnins, J. Shang and M. Wulder, 1997. Soil Moisture Field Data, Report prepared Agreco Crop Monitoring using casi & RADARSAT Data contract, April 1997, 77 p.p.
- Bugden, J., C. Derksen, M. Jollineau, J. Piwowar and J. Shang, 1997. Early Emergence Field Data, Report prepared Agreco Crop Monitoring using casi & RADARSAT Data contract, May 1997, 77 p.p.
- Bugden, J., P. Howarth, M. Jollineau and J. Shang, 1997. Vegetation One Field Data, Report prepared Agreco Crop Monitoring using casi & RADARSAT Data contract, July 1997, 61 p.p.

## WORKSHOPS:

- Certified Online Instructor training course, Western Carolina University, 2009
- Participant, Geography Faculty Development Alliance workshop, funded by the National Science Foundation, University of Colorado at Boulder, July 2006.

## Grants & Contracts - PRINCIPAL INVESTIGATOR:

2008	CAD-GIS Conversion and Mapping Hemlocks at Southern Highlands Reserve Botanical Gardens (SHR)	\$8,505
2008-2010	Using International Remote Sensing Fieldwork to Improve Regional Natural Resource Management (USDA – CSREES)	\$99,612
2006-2009	Polarimetric SAR Feature Extraction for Land-Cover Mapping in Latin America: Developing Spatial Products for Environmental Decision Systems (CSA - SOAR)	\$50,000
2005-2006	Prototype River Cane Geographic Information System for the Revitalization of Traditional Cherokee Artisan Resources	\$35,808
1998-2001	Land-use/Land-cover Mapping of the Tulum Valley (Argentina) using RADARSAT-1 Data	\$34,000
1998-1999	Co-PI: Agricultural Crop Identification and Monitoring in Bolivia using RADARSAT-1 Data	\$17,000

## COMMUNITY SERVICE:

2009	Cullowhee Valley School Earth Day Event (Science Day – Our Changing World projects & games)
2006	Great Smoky Mountain National Park – Student involvement in bird-banding demonstration
2006	Cullowhee Valley School Earth Day Event (Clean Air/Clean Water science projects & games)
2001	Graduate Student Representative Faculty of Environmental Studies Dean Nomination Committee
2000	Initiate and Organize “Laurier-Waterloo Graduate Student Brown Bag Sessions”
2000	Director Board of Directors: Graduate Student Association
1999-2000	Graduate Student Representative Senate Research Council
1999-2000	Department of Geography Representative Graduate Student Association
1996	Participant in Manulife Ride for Life: Heart Foundation Charity
1996	Chair D2 Session at CAG-ONT Trent University, Peterborough Ontario October 1996
1995 & 1996	Graduate Student Orientation Volunteer Faculty of Environmental Studies
1994 1998-99	Council Member Minota Hagey Residence Council

**AWARDS:**

<i>2001</i>	Student Poster Award, 23 <sup>rd</sup> Canadian Symposium on Remote Sensing [\$100]
<i>2000</i>	Ontario Graduate Scholarship [\$12,000]
<i>1999</i>	Ontario Graduate Scholarship in Science and Technology [\$15,000]
<i>1998</i>	Inter-American Institute for Cooperation in Agriculture Internship [\$4,500 US]
<i>1996</i>	Institute for Space & Terrestrial Science Poster Competition [\$75]
<i>1996</i>	University of Waterloo Scholarship [\$2,000]
<i>1995</i>	University of Waterloo Incentive Scholarship [\$1,000]
<i>1994</i>	University of Waterloo Scholarship [\$1,250]
<i>1994</i>	Carleton University Dean's List: Undergraduate Academic Achievement Award

**PROFESSIONAL AFFILIATIONS:**

- American Association of Geographers
- Canadian Remote Sensing Society
- Canadian Aeronautics and Space Institute