Curriculum Vitae

RESEARCH INTERESTS

My research focuses on coastal dynamics and the quantification of its ecological impacts, particularly those in large lakes and the coastal ocean, where stratification and the Earth's rotation play a dominant role. I study the inner shelf response to wind and surface waves, upwelling dynamics, coastal-trapped waves, formation and transport of harmful algal blooms.

I am particularly interested in surface waves, internal waves, lake and ocean currents, transport of water and sediments and contaminants, and changes in the geomorphology. I use field observations and numerical models to study coastal systems, and develop further understanding of the processes that affect coastal embayments, coastal oceans, estuaries and rivers.

My current research sites are the Laurentian Great Lakes, with focus on Lake Ontario and particularly Toronto Waterfront and the complex system of embayments of Toronto Harbour, for which I am developing a high resolution hydrodynamic and water quality model based on unstructured mesh.

I am also interested in renewable energy, and impacts on the environment, specifically, those related to marine tidal current turbines and offshore wind turbines.

EDUCATION

2011-2015 Doctor in Philosophy (Ph.D) – Environmental Science
University of Toronto, Canada
Thesis: *Influence of Hydrodynamic Events on Water Quality and Fish Habitat in the Nearshore Zone and Coastal Embayments of the Great Lakes*

2007-2009 Master of Environmental Science (Menv.Sc.)
University of Toronto, Canada
Thesis: *Seiche driven water exchange in a shallow coastal lagoon of the Great Lakes*

2006-2007 Bachelor of Education (B.Ed), University of Toronto, Canada
Major: *Physics, Computer Science*

1981-1986 Master in Power Engineering (Combined Bachelor and Master degree)
Polytechnic Institute of Bucharest, Romania – School of Energy Engineering,
Thesis: *Non-equilibrium sediment transport model, applied to the Danube River*

EMPLOYMENT

2017- Senior Scientist, Ontario Ministry of Environment Conservation & Parks
2015-2017 Researcher, Post-Doctoral Fellow at University of Toronto, Canada
2011-2015 Researcher, Doctoral Fellow at University of Toronto, Canada
1994-2011 Computer Science and Research and Development positions, Toronto, Canada
1990-1994 Researcher/Lecturer, University Politechnica Bucharest, Romania, School of Energy Engineering
1989-1990 Assistant Lecturer, Nicolae Balcescu Agronomic Institute of Bucharest
1986-1990 Researcher, Environmental Research and Engineering Institute, Bucharest, Romania

PROFESSIONAL EXPERIENCE

2017-present

Ministry of Environment Conservation and Parks, 125 Resources Rd., Toronto, ON, M3P 3V6
Senior Project Scientist Water Modelling

I develop three-dimensional integrated water circulation and water quality numerical models for the Laurentian Great Lakes. I created integrated models for: Lake Ontario, Lake Huron, Lake St Clair, Lake Erie, Lake Superior and Trout Lake.

I provide on request emergency Spill response to municipalities for the Great Lakes and connecting channels.

In addition, I provide support for Regional Request related to modelling reports as well modelling for smaller lakes, as well as guidance for any physical limnology related work by the ministry and its contractors.

Also, I provide modelling support for all the ministry's Environmental Assessment projects, such as mining projects.

2015-2017

University of Toronto Scarborough, 1265 Military Trail, Toronto, ON M1C 1A4
Post-doctoral Researcher, Mitacs Elevate Fellow

I developed a high definition integrated water circulation and water quality 3D numerical model for the Toronto Waterfront in collaboration with Toronto and Region Conservation Authority and Environment Canada under the umbrella of the Remedial Action Plan, which also has as stakeholders the Ministry of Environment and Climate Change Ontario, and City of Toronto. The project is partially funded by Mitacs Elevate, which is a very competitive two-year research program for postdoctoral fellows, in which participants lead and undertake an industrially relevant research project.

- The project uses the Delft3D-FM (flexible mesh) integrated 3D modelling suite with the wave, sediment transport and morphology, and water quality modules.
- The model simulations run in parallel hyper-computing clusters using MPI and OpenMP techniques on partitioned meshes.
- The model based on existing bathymetry is operational and calibrated.
- Created in Python post processing and visualization tools for Delft3D-FM model results.
- I am currently evaluating several scenarios that aim to minimize the impact of urbanization developments on the water circulation, water quality in the embayments of Toronto Waterfront. Several climate change scenarios are also evaluated.
- Used the model to determine the thermal regimes in Toronto Harbour system of embayments to help optimize current restoration work and the creation of new fish habitat.
- Large datasets of recorded data were mined to provide inputs in the hydrodynamic model and coupling with atmospheric model was done statically through the model output files.
- Used Geographical Information Systems software to integrate geospatial data into the model.
- Created semi-annual financial reports and managed budgets.

2011-2014

University of Toronto Scarborough, 1265 Military Trail, Toronto, ON M1C 1A4

Research Associate, Ph.D. Candidate

I assessed the mechanisms that contribute to the flushing and thermal regimes in several coastal embayments of the Great Lakes, specifically in Lake Ontario and Lake Huron. Analysis of water currents, water levels and temperatures demonstrated that strong water level fluctuations may dominate the exchange flows in the shallow coastal embayments, which contrasts with the conventional wisdom that water circulation in coastal embayments of the Great Lakes is always dominated by baroclinic processes driven by differential heating and upwelling events.

- Designed and implemented freshwater monitoring projects and used data analysis techniques.
- Deployed monitoring instruments, such as arrays of benthic, surface and water column thermistor chain loggers, acoustic Doppler current profilers, water level loggers and DO and TP sensors.
- Developed analytical and numerical models (Delft3D and in-house) to create the mathematical frameworks for data interpretation. Used statistical analysis for cases where the complexity of the problems did not allow a direct mechanistic approach.
- Performed data analysis on water levels, wind waves, velocity and temperature time series, fish migration data and interpreted the results within the mathematical and model frameworks.
- Written grant proposals, and managed budgets for research grants. Supervised and mentored graduate and undergraduate students.
- Created complex data analysis and visualization tools in Python.
- Created reading and processing tool in Python for RDI Teledyne acoustic Doppler current profiler data files.

2006-2011

Mapfusion Inc. 66 The Esplanade St., Toronto, ON

Manager Research & Development

I assumed a technical lead role of Mapfusion's complete suite of map-centric business applications. Our base products were the Geospatial Information Management System and the Internet GIS Mapping Engine. Our branded API provided an easy way to integrate our services through specific communication channels within any enterprise project requiring spatial data.

- Engineered the full development cycle from customer requirements to deliverables.
- Designed, implemented and deployed mapping management software using data mining techniques in C++, Java, Python and JavaScript programming languages
- Provided analysis, architecture, design and implementation of the spatial data system services
- Sustained accessibility and ensured high performance of our Geospatial Information Management System using leading edge database management, Internet and geospatial technologies.
- Ensured services and products are delivered in a timely and efficient manner.
- Participated in contract negotiations and manage the overall solution delivery.
- Prepared contractual documents such as Request For Information/Proposal/Quotation (RFI/P/Q), Statement of Work (SOW), and Service Level Agreements (SLA).
- Prepared full financial reports for Scientific Research Grants Ontario.

- Conducted information sessions with existing and potential clients on our geospatial architectures, tools, services, and methodologies that contribute to operational efficiently.
- Provided work direction and guidance to team staff on a project basis and provided input on staff performance.

2002-2005

Adexa Inc. 250 Yonge St., Toronto ON.

Senior Software Developer

Adexa's large scale web enabled application server designed to support multiple supply chain tiers family of products. The application server was developed in house in C++ to offer speed advantage over other commercially available products.

- Provided technical recommendations for the design and implementation of supply chain processing software, including optimization of operations.
- Designed, implemented and deployed supply management software using data mining techniques and C++, Java, Python and JavaScript programming languages
- Modelled and optimized decision processes using Machine Learning Framework and spectral analysis, such as Fourier and Wavelet Transforms
- Led the development team of the on-line analytical processing modules
- Supervised and mentored other developers, reviewed code to ensure quality.
- Conducted reviews and managed the application server activities to ensure consistency and high quality.

1998-2002

i2 Technologies 5575 North Service Rd., Burlington ON.

Senior Software Developer, Team Lead

i2Techologies provided high quality and high availability supply chain management solutions for vertical and horizontal markets.

- Responsible for obtaining requirements from customers and created business plans.
- Provided the architecture and design for the business application.
- Devised functional specifications and implemented the client/server communication solution for four different transport layers and database back-ends.
- Provided guidance to the team of developers and ensured the development cycle with unit and comprehensive tests.

1994-1998

Iris Power Engineering Inc. 1 Westside Dr, Unit2, and Etobicoke, ON

Software Developer

Iris Power Engineering provided high quality and high availability monitoring systems for large scale deployments of electrical motors and for thermo- and hydro-electrical generators.

- Designed, developed and implemented monitoring software application for detection of partial electric discharge in rotors and stators of electrical power generators and large electrical motors.
- Designed and implemented the database back-end schemes and the application server that provided storage and data mining logic for the monitoring system.

1990-1994

Polytechnic Institute of Bucharest 313 Splaiul Independentei, Bucharest, Romania

Researcher/Assistant Lecturer

I worked as teaching assistant and lecturer at the Department of Hydraulics and Hydraulic Machinery at the Faculty of Power Engineering while completing my first PhD fellowship.

- Designed and implemented in-house models for sediment transport in rivers and open channels.
- Designed wind turbine propeller with in-house developed models
- Modelled water propagation in rivers, open channels, pipes and hydraulic machinery using in-house developed code
- Tutored undergraduate classes and laboratory demonstrations of hydraulic experiments.
- Marked undergraduate assignments and exams
- Taught courses: Fluid Mechanics, Hydrology, Numerical Methods

1986-1990

Environmental Research and Engineering Institute, 294 Splaiul Independentei, Bucharest, Romania

Research Engineer

The Environmental Research and Engineering Institute of Bucharest is the Romanian national research institute responsible for scientific and technological development in environmental protection and water management. Its mission is to develop and promote sustainable development practices in the conditions of dynamic climate change.

- Designed and tested physical hydraulic models using reduced scale laboratory structures for channels and dams.
- Developed in-house numerical hydrodynamic models for water propagation and sediment transport in the Danube River and open channels
- Developed flood monitoring systems.
- Developed in-house numerical atmospheric models for propagation of radionuclides from nuclear power plants.

DISTINCTIONS AND AWARDS

2015-2017 Post-Doctoral Fellowship Mitacs Elevate Award
2014-2015 Ontario Graduate Scholarship Award
2014 CGS Conference Grant
2013 CGS Travel Award, West Lafayette, USA
2012 Centre for Global Change Science Award,, Delft, Netherlands
2011-2012 Mary H. Beatty Fellowship
2011-2013 Ontario Graduate Scholarship Award
2011-2014 Natural Sciences and Engineering Research Council of Canada CGS D3

FIELD EXPERIENCE

Field work planning, configuration, calibration, deployment and installation of:

- Acoustic Doppler current profilers: Teledyne RDI Workhorse Sentinel 0 MHz and 600 MHz, SonTek PcADP 1500 MHz SonTek ARGONAUT-ADV
- Conductivity Temperature Depth (CTD) RBR XR-620
- Onset HOBO U22 Water Temperature Pro V2 (accuracy ±0.2ºC)
- RBR TR-1060 water temperature loggers (accuracy ±0.002ºC)
- Onset U20-001-04 and U20-001-02-Ti water level loggers
- Assisted with cruise planning and trained students.
- Mooring recovery and dissolved oxygen calibration.
- Tracked, deployed and recovered surface drifters.

PROFESSIONAL SOCIETY MEMBERSHIPS

- American Geophysical Union
- International Association of Great Lakes Research

COURSES AND WORKSHOPS

2012 Environmental modelling in Delft 3D
2012 Hydrodynamic modelling in Delft3D
2015 Leadership in Innovation Mitacs course
2015 Hydrodynamic modelling in Delft3D Flexible Mesh
2016 Foundations of Project Management

TEACHING EXPERIENCE

1993-1994 Fluid Mechanics, Numerical Methods
1991-1993 Hydraulics and Hydraulic Machinery
1990 Hydrology, Hydraulics

SKILLS

Applications

- Geographical Information Systems: ArcGIS, GRASS, QGIS, GMT, Remote Sensing
- Data analysis: Numpy, SciPy, Matlab, R, SPSS, Fourier and Wavelet transforms, scikit-learn, SPSS
- Hydrodynamic modelling: DHI,s Mike 3 suite, Delft3D, Delft3D-FM, FVCOM, in-house models
- Office tools: Word processing, Excel spreadsheets, Powerpoint presentations
- Graphical: Inkscape/SVG, Gimp, Photoshop, Krita, Adobe Illustrator, Corel Draw

Data formats and archiving

- Hydrodynamic model NetCDF, HDF5, HDFS, ESRI GIS formats, LaTeX

Programming languages

- Python, C++, C, FORTRAN, Java, JavaScript, Unix shell, HTML, XML, SQL
- Parallel super-computing: Linux clusters, MPI, OpenMP, Open ACC, Anaconda, Hadoop

Languages

- Romanian, French, German

PUBLICATIONS IN REFERRED JOURNALS

B Hlevca, MG Wells, L Cruz Font, SE Doka, R Portiss, M St. John, Steven J Cooke (2018) Water circulation in Toronto Harbour, *Aquatic Ecosystem Health & Management* 21 (3), 234-244

Midwood J.D., Gutowsky, L.F.G, **Hlevca, B.,** Portiss, R., Wells, M.G., Doka, S.E., and Cooke, S.J. (2018) Bowfin acoustic telemetry: insight into the ecology of a living fossil, *Ecology of Freshwater Fish*, 27 (1), 225-236

Peat, T., Gutowsky, L.F.G., Doka, S.E., Midwood, J.D., Lapointe, N.W.R., **Hlevca, B.,** Wells, M.G., Portiss, R., Cooke, S.J. (2016) Comparative Thermal Biology and Depth Distribution of Largemouth Bass and Northern Pike in an Urban Harbour of the Laurentian Great Lakes. *Canadian Journal of Zoology, doi:10.1139/cjz-2016-0053*

Hlevca, B., Cooke S. J., Midwood J. D., Doka S.E., Portiss R., Wells M.G., (2015) Characterization of water temperature variability within a harbour connected to a large lake, *Journal of Great Lakes Research,* doi:10.1016/j.jglr.2015.07.013, doi:10.1016/j.jglr.2015.07.013, 41, 1010-1023

Hlevca, B., Wells M., Parker S. (2015) Amplification of long-period waves in shallow coastal embayments of the Great Lakes. *Environmental Fluid Mechanics,* doi:10.1007/s10652-015-9406-3 15(6), 1181-121

Umbresi, A., **Hlevca, B.,** Panaitescu S. (1990) Statistical analysis model for some specific indicators of the water use at the hydrographical basin and economical branch levels. *Hidrotehnica*. 35(4), 33p (Romanian, national publication).

Roman, P., Carsteanu A., **Hlevca B.** (1987) Sediment transport, erosion and deposition in rivers due to overloading. *Revue Roumaine des Sciences Techniques – Mechanique Applique,* 32(5), p.

533-545.

PUBLICATIONS IN REFERRED JOURNALS

Under review

Cruz-Font, L., **Hlevca, B**., Wells, M.G., Doka, S.E., Midwood, J.D., Cooke, S.J., Portiss, R. (2023) Vertical movements of fish in a coastal embayment are related to upwelling events of a large lake. *Journal of Thermal Biology,* (under review).

Bogdan Hlevca, Todd Howell, Mohammad Madani and Nadine Benoit . (2023) Fine-Scale hydrodynamic modelling of Lake Ontario: Has climate change affected circulation patterns? *Environmental Modeling & Assessment ,* (under review).

Bogdan Hlevca, Todd Howell, Reza Valipour and Mohammad Madani (2023). Modeling nearshore-offshore water exchange in Lake Ontario. *PLoS One,* (under review).

OTHER PUBLICATIONS

Isbasoiu, E.C., Tolea, M., **Hlevca, B**., Georgescu, S.C., (1993), Theoretical and experimental research about the influence the unsteady flows have over the optimizations of hydro-mechanical equipment. *Contract No. 8-93-31 UPB Ministerul Invatamantului si Stiintei*, 24p. (Romanian).

Isbasoiu, E.C, **Hlevca, B**., Georgescu, S.C., (1993), Rules and regulations for operating the hydro-power plants on Bistrita river. *Contract No*. 8-93-15 UPB: *Intreprinderea Electrocentrale Bistrita,* 22p (Romanian)

CHAPTERS IN BOOKS

de Kerckhove, D.T, **Hlevca, B.,** Neff, M., Polakowska, A. (2012) Limnological and hydrological responses to climate change in Canadian freshwaters: Great Lakes and prairie watersheds. *Canadian Technical Report on Fisheries and Aquatic Sciences,* 104 p.

Roman, P., Carsteanu, A., **Hlevca, B.** (1989) The non-equilibrium state of sediment transport, erosion and deposition in rivers. *US- Romanian Workshop on Water Resources Engineering Proceedings,* 12p, Bucharest

Roman, P., Carsteanu, A., **Hlevca, B**. (1987) Mathematical modeling of erosion, pavement and sediment transport in reservoir tail waters. *Two Phase Flow Symposium,* p. 2096-2105 (Romanian, national).

CONFERENCE AND SYMPOSIUM PRESENTATIONS

Bogdan Hlevca, Todd Howell (2023) Estimating nearshore-offshore water exchange in Lake Ontario. 66th Annual Conference on Great Lakes Research, Toronto, Ontario Canada (international, oral presentation).

HLEVCA, B., WELLS, M. (2021) Small oscillations in Toronto Harbour and their effect on flushing shallow embayments. 2021 State of Lake Ontario Conference (international, oral presentation).

Bogdan Hlevca (2018) Field Observations and Hydrodynamic and Water Quality Modelling of Trout Lake, Ontario 61st Annual Conference on GREAT LAKES RESEARCH (international, oral presentation)

Bogdan Hlevca, Mathew G Wells, Liset Cruz Font, Steven J. Cooke, Susan E. Doka, Rick Portiss and Meg St. John (2016), Physical processes affecting the fish habitat and water quality in Toronto Harbour, Aquatic Ecosystem Health and Management Society: Author's Workshop, November 30, 2016 (oral presentation)

Hlevca B. and Wells M. G. (2016) Integrated hydrodynamic and water quality three-dimensional model for Toronto Waterfront, Canada, International HPC Summer School 2016, on HPC Challenges in Computational Sciences, June 26 – July 1, Ljubljana, Slovenia (international poster presentation)

Hlevca, B., Wells, M.G., St. John, M., Doka, S.E. and Cooke, S.J., (2016) Physical Processes in Toronto Harbour system of coastal embayments: Hydrodynamic modelling for habitat restoration. Coastal Zone Canada Conference, Toronto, Ontario, Canada, (international, oral presentation).

Hlevca, B., Wells, M.G., St. John, M., Doka, S.E. and Cooke, S.J., (2016) Exchange Between Coastal Embayments and a Large Lake Primarily Driven by Water Level Oscillations. 59th International Conference for Great Leaks Research, Guelph, Ontario, Canada, (international, oral presentation).

Cruz-Font L, **Hlevca, B.**, Wells, M.G., Midwood, J.D., Cooke, S.J., Rous, A.M., Doka, S.E. and Gutowsky, L.F.G. (2016) Thermal Biology Explains Fish Behaviour During Upwelling Events in a Large Coastal Embayment, (international, coauthor).

Hlevca, B., Wells, M.G., (2016) Frequent Water Levels Fluctuations Drive Exchange Between a System of Coastal Embayments and a Large Lake., Ocean Sciences Meeting 21-26 February, 2016 New Orleans, Louisiana, USA, (international, poster).

Liset Cruz-Font, **Bogdan Hlevca**, Mathew Wells, Jon Midwood, Steven Cooke, Susan Doka, Andrew Rous, Lee Gutowsky (2016). Thermal biology explains fish behaviour in response to upwelling events in a coastal embayment of Lake Ontario, GLATOS Annual Meeting, Ann Arbour, Michigan USA, (international, coauthor).

Hlevca, B., Wells, M.G., Cooke, S.J., Midwood, J.D., and Doka, S.E., (2015) Water-level fluctuations drive exchange in shallow embayments of the Toronto Waterfront. 58th International Conference for Great Leaks Research, Burlington, Vermont, USA , (international, oral presentation).

Cruz-Font, L., Veilleux, M.A.N., **Hlevca, B.**, Midwood, J.D., Wells, M.G., Cooke, S.J., Doka, S.E., Lapointe, N.W.R. and Rous, A.M., (2015) Upwelling Events in Toronto Harbour: Do Fish Really Care? 58th International Conference for Great Leaks Research, Burlington, Vermont, USA , (international, coauthor).

Liset Cruz-Font, Maxime Veilleux, **Bogdan Hlevca**, Jon Midwood, Mathew Wells, Steven J. Cooke, Susan Doka (2014). Fish Movements in Toronto Harbour Associated with Upwelling Events. American Fisheries

Society Annual Meeting, August 17-21 2014 (international, coauthor).

Hlevca, B., Wells, M.G., Cooke, S.J., Veilleux, M.A.N., and Midwood,J.D. (2014) Water temperature variability in Toronto Waterfront embayments. 57th International Conference for Great Leaks Research,, Mc Master University, Ontario, Canada (international, oral presentation).

Cruz-Font, L., Veilleux M.A.N., **Hlevca, B**., Midwood J.D., Wells, M. G., Cooke, S.J., and Doka, S.E. (2014), Fish movements in Toronto Harbour associated with upwelling events. 57th International Conference for Great Leaks Research,, McMaster University, Ontario, Canada (international, coauthor).

Hlevca, B., Wells, M., Parker, S., (2014) Amplification of long-period waves in two shallow coastal embayments of Fathom Five National Marine Park, Bruce Talks: Meeting of the Scientific Minds, Wiarton, Ontario, Canada (local, oral presentation)

Hlevca, B., Wells, M., (2013) The effect of upwelling events in Lake Ontario upon thermal variability in Toronto Waterfront embayments 56th International Conference for Great Leaks Research,, West Lafayette, Indiana, USA (international, oral presentation).

Hlevca, B., Wells, M., (2012) Man-made Influences upon the Water Exchange Driven by Lake Seiches in a Coastal Wetland of the Great Lakes, 55th International Conference for Great Leaks Research, Cornwall, Ontario, Canada (international, oral presentation).

Hlevca, B., Wells, M., (2009) Man-made Influences upon the Water Exchange Driven by Lake Seiches in a Coastal Wetland of the Great Lakes, *AGU 90(22) Joint Assembly*, Toronto, Ontario, Canada (international, oral presentation).

Roman, P., Carsteanu, A., **Hlevca, B.,** (1989), The non-equilibrium state of sediment transport, erosion and deposition in rivers, *US-Romanian Workshop on Water Resources Engineering (Romanian, oral presentation)*.

Roman, P., Carsteanu, A.., **Hlevca, B.,** (1987), Mathematical model of the erosion, deposition and armor downstream of dams, *Biphasic Fluids Symposium*, Bucharest, Romania (Romanian, oral presentation).