

Final Assessment Report

Collaborative Water Program (MAsc, MArch, MA, MES, MMath, MSc, PhD)

August 2023

Executive Summary

External reviewers found that the Collaborative Water Program (MAsc, MArch, MA, MES, MMath, MSc, PhD) delivered by the Faculties of Engineering, Environment and Science was in good standing.

“The program provides an excellent additional graduate student experience for cohorts of students interested in ‘water’ from a range of faculties and departments, offered in a manner that emphasizes and reinforces a broadly interdisciplinary approach, and graduates earn an extra designation on their diploma. The program has had very high enrollment for such a collaborative program with broad indications of student and faculty satisfaction and belief in the program’s value.”

A total of 4 recommendations were provided by the reviewers, regarding increasing the program’s funding, creating formal tracking of its graduate students, adding a statement of interest to admission requirements, and enhancing the program’s advertising efforts. In response, the program created a plan outlining the specific actions proposed to address each recommendation as well as a timeline for implementation. The next cyclical review for this program is scheduled for 2027-2028.

Enrollment over the past three years

	Masters	PhD
2022-2023 (CURRENT YR)	46	55
2021-2022 (LAST YR)	71	62
2020-2021 (THREE YRS)	89	59

This data is based on Active Student Extracts in Quest on September 8, 2023.

Background

In accordance with the University of Waterloo’s Institutional Quality Assurance Process (IQAP), this final assessment report provides a synthesis of the external evaluation and the internal response of the Collaborative Water Program (MAsc, MArch, MA, MES, MMath, MSc, PhD) delivered by the Faculties of Engineering, Environment and Science. A self-study (Volume I, II, III)

was submitted to the Associate Vice-President, Graduate Studies and Postdoctoral Affairs on May 28, 2021. The self-study (Volume I) presented the program descriptions and learning outcomes, an analytical assessment of the programs, including the data collected from student and faculty surveys, along with the standard data package prepared by the Office of Institutional Analysis & Planning (IAP). The CVs for each faculty member with a key role in the delivery of the program(s) were included in Volume II of the self-study.

From Volume III, two arm’s-length external reviewers were selected by the Associate Vice-President, Graduate Studies and Postdoctoral Affairs: Dr. Julia Baum, Professor of Biology, University of Victoria, and Dr. William Gough, Professor of Physical and Environmental Sciences and Vice-Principal Academic and Dean of the University of Toronto Scarborough.

Reviewers appraised the self-study documentation and conducted a remote visit to the University on October 3-6, 2022. An internal reviewer from the University of Waterloo, Dr. Lois Anderson, Professor of Fine Arts, was selected to accompany the external reviewers. The visit included interviews with the Associate Vice-President, Graduate Studies and Postdoctoral Affairs; Deans of the Faculties of Engineering, Environment and Science; Faculties Associate Deans of Graduate Studies – Engineering, Environment, and Science; Director of The Water Institute, Director (and former Directors) of the Program, as well as faculty members, staff and graduate students. The Review Team also had an opportunity to meet with representatives from the library.

Following the site visit, the external reviewers submitted a report on their findings, with recommendations. Subsequently, the program responded to each recommendation and outlined a plan for implementation of the recommendations. Finally, the Deans of each Faculty responded to the external reviewers’ recommendations, and endorsed the plans outlined by the program.

This final assessment report is based on information extracted, in many cases verbatim, from the self-study, the external reviewers’ report, the program response and the Deans’ responses.

Program Characteristics

A total of 13 Master’s degrees and 9 PhD degrees are currently offered through the CWP:

Master’s Degrees	Doctoral Degrees
MASc in Chemical Engineering - Water	PhD in Applied Math - Water
MASc in Civil Engineering - Water	PhD in Biology – Water
MArch - Water	PhD in Chemical Engineering - Water
MA in Economics - Water	PhD in Civil Engineering - Water
MA in Geography – Water	PhD in Earth Sciences – Water
MES in Geography - Water	PhD in Applied Economics - Water
MSc in Geography – Water	PhD in Geography – Water

Master's Degrees	Doctoral Degrees
MES in Social and Ecological Sustainability - Water	PhD in Public Health and Health Systems - Water
MES in Sustainability Management - Water	PhD in Social and Ecological Sustainability - Water
MMath in Applied Math - Water	
MSc in Public Health and Health Systems - Water	
MSc in Biology - Water	
MSc in Earth Sciences - Water	

Collaborative Water Program students apply to, and are admitted through, participating academic units. Students must be enrolled in thesis or major-paper based programs and intend to study water. Collaborative program requirements are in addition to home unit requirements, and include the following core courses and milestone:

- WATER 601 establishes an interdisciplinary¹ foundation for understanding contemporary water challenges and opportunities. In addition to exposing students to the perspectives of a diverse range of disciplines on water, the course trains students to recognize the importance of an interdisciplinary perspective. Peer-to-peer learning is a key pedagogical tool in the course. Through engaging with their peers from other disciplines, students build connections and learn the value of different ways of understanding problems and solutions.
- WATER 602 is designed to extend the interdisciplinary learning in WATER 601 from the classroom to the world of practice. Through exposure to practitioners who are addressing actual water problems, and through collaboration on water projects, students gain a grounded understanding of the importance of interdisciplinarity for understanding and then solving water problems. This course has a strong field-based learning component.
- The Research Seminar milestone provides an opportunity for students to discuss how learnings from CWP courses were applied in, or influenced, research proposals or research work in the student's home department or school. This milestone is normally met in March, following completion of WATER 602, during the Water Institute's World Water Day program.

Summary of Strengths, Challenges and Weaknesses based on Self-Study

Strengths

- Program Concept and Design: There is an increasing need for specialists with broad interdisciplinary knowledge and the ability to constructively collaborate. With increasingly complex issues in the water sector, contributions from multiple disciplines are often required.

¹ The term "interdisciplinary" is used generally to refer to the integration of knowledge and methods from different disciplines, using a synthesis of approaches, The term "multidisciplinary" is used to refer to people from different disciplines working together, each drawing on their disciplinary knowledge.

Explicitly recognizing this need, the CWP was conceived as a collaborative program jointly designed, delivered and governed by academic units from across every faculty at the University of Waterloo. The CWP's unique and innovative design allows students to be trained as a disciplinary expert in their home department, while in parallel exposing them to potential contributions from other water-related disciplines through the power of collaboration. In completing the CWP, students also begin to recognize, importantly, the limits of their disciplinary knowledge.

- Course Pedagogy: Core CWP courses were designed and are delivered as a complementary offering. WATER 601 uses a lecture format to expose students to interdisciplinary theory and practice and its application in the water domain. Students are exposed to a variety of disciplinary experts and are challenged to consider various perspectives in addressing water challenges. WATER 602 immerses students in field-based experiential learning, meeting a broad array of stakeholders in various locations in the Grand River watershed, from its headwaters, to Kitchener-Waterloo, to the Six Nations of the Grand River, to its mouth at Lake Erie. Student surveys have indicated that the program is overwhelmingly meeting learning objectives.
- Academic Unit Participation: The CWP is the University of Waterloo's most interdisciplinary graduate program with 11 departments and schools participating from each of Waterloo's six academic faculties. Academic units have actively participated in program governance by supplying CWP Program Directors, Program Committee representatives and course instructors. In addition, units have provided academic and non-academic support to CWP students.
- Student Participation: The CWP has been successful in attracting a large number of students from a variety of backgrounds. Student surveys have indicated that the CWP has strongly influenced students' decision to enroll at Waterloo and would help them excel in their careers. CWP student cohorts have been diverse, with an average of about 60 percent female and 30 percent international students. Total enrollment over the seven-year review period was an impressive 293 students.
- Water Institute Support: The CWP is fortunate to be centrally supported by the Water Institute. The Institute provides a central "point of focus" for faculty and students, central record keeping and logistical support, and complementary programming that expands learning and professional opportunities for students.

Challenges

- Resources: As a collaborative program, the CWP is jointly delivered and resourced by 11 participating academic units. These units not only provide administrative and governance support to the program, but also provide teaching and financial resources. Although not currently a challenge, if participating units withdraw support, including teaching, due to competing resource demands, this could present a challenge to the program.

- Course Delivery: The CWP has been fortunate to have core courses delivered by a relatively small, experienced team of instructors. Increasing the pool of instructors has many benefits, including increasing building program resiliency, and exposing students to greater diversity of experience and thought in teaching. Challenges to realizing a greater pool of teaching have included the lack of a systematic teaching schedule, and differences in how participating units recognize teaching credit.

Weaknesses

- Skewed Student Participation: CWP enrollment has been primarily comprised of students from the faculties of Engineering, Science and Environment. While the total number of water students in Arts, Mathematics and Applied Health Sciences is significantly smaller than the aforementioned faculties, more emphasis on the benefits of CWP participation needs to be communicated to prospective students from underrepresented faculties from supervisors, academic units, and the Water Institute.
- Instructor Diversity: The gender of WATER 601 and 602 instructors has not been adequately balanced over the review period. The CWP Program Committee recognizes this weakness and is actively encouraging participating units to consider gender when assigning teaching resources to the program.

Summary of Key Findings from the External Reviewers

The program, which consists of two graduate level courses (601 and 602), has been successful in providing an excellent additional student experience (and credential) for a large body of students (20 to 66 students per year for over a decade) that has added value to their degree by exposing students to the value of understanding and problem-solving water issues through an interdisciplinary lens. The dual aspect of 601 delivering the theoretical frameworks and 602 providing a local experiential learning opportunity appear well calibrated and valued by instructors and students. SWIGS (the Student Water Institute Group) has provided a mechanism for students within and among cohorts to connect and develop a greater sense of being part of a “water” cohort, although it is limited in what it can do compared to dedicated cohort building program components (e.g. retreat, orientation, field trips).

1. The program needs to be placed on a **firmer fiscal foundation**. While admirable efforts have been made with existing funds from three participating faculties, the current funding is exceptionally parsimonious, and is currently limiting what the program can offer in terms of experiential learning components, visiting fellows, and student scholarships, relative to what it was able to offer during the period when it was funded by the RBC Foundation. With relatively modest increases in funding a number of additional high impact elements could be reinstated, as identified consistently by instructors, administrators and students. These include more **field components, outside speakers, and cohort building events** that would bring considerable value to the program. We do not recommend restoration of the full scholarship program that was

funded by RBC, but the university could consider developing ‘**EDI-enhancing scholarships**’ as a mechanism to diversify the student cohort such as the intentional inclusion of indigenous, Black, and students living with disabilities, and other identified areas of underrepresentation.

2. We believe the program would also benefit from **better advertising and packaging**, as it is excellent and could be used as a stronger **recruiting tool** for U. Waterloo graduate students. At present, as reported to us, students often learn about the program only in an ad-hoc manner after applying to U. Waterloo. Further, while it appears that some professional skills development elements are available to students, including the Milestone event and via the Water Institute, these are not core or structured components of the Collaborative Water Program, but could be showcased as such to help recruit students.

3. We also recommend that the program participating faculties and departments contemplate an **admissions process** that allows prospective students to articulate their interest in water issues and treating such from an interdisciplinary approach. This process can also be designed to encourage the inclusion of underrepresented groups.

4. Finally, we recommend that the program undertake **better tracking of the success of its graduates**, including their employment in water-related fields, and an **alumni database**, as these are currently lacking. Collection and analysis of these data could help to pinpoint further areas of improvement, including specific skills that employers are seeking.

Program Response to External Reviewers’ Recommendations

1. Our **highest priority recommendation is a modest increase in CWP’s annual base funding to reinstate high impact educational elements**. These include the field components (at the scale they were done previously), the orientation / retreat for students, and the interdisciplinary international visiting fellows program.

Response

Program Response

The CWP program, while gratefully acknowledging the significant financial support currently offered by the Faculties of Engineering, Environment and Science, agrees that a modest increase in annual base funding would enhance the student experience. Of particular importance is support for experiential learning components embedded in the WATER 602 course, including an annual overnight “cohort building” retreat in the Grand River watershed and a visiting fellows program. While current funding supports several WATER 602 day trips, overnight retreats have not taken place the last several years due to financial and COVID-19 related constraints. In response to student, CWP committee

and external review recommendations, the Water Institute has agreed to financially support an overnight retreat during 2023 and 2024 WATER 602 offerings. An increase to the CWP's annual base funding would, however, sustain this valuable experience for students past the short-term.

Dean's Response – Engineering

Current CWP annual funding was agreed to for the period 2020 to 2025. In 2024, the CWP Director and the Water Institute can initiate discussions related to the funding for this program including the cost and benefit of adding educational activities such as the overnight retreat.

Dean's Response – Environment

Environment takes over the management of the program from mid-2023. Therefore, it is expected that a range of programmatic considerations will emerge of the next two years and that these will include financial matters. This recommendation will be considered in the context of ENV's future management of the program, including the funding agreement.

Dean's Response – Science

Science is supportive of increasing the number and diversity of field, laboratory, and cohort-building activities. We will support an increase in funding recommended by ENV in their 2024 negotiations with CWP.

Current CWP annual funding was agreed to by the Deans of Engineering, Environment and Science for the period 2020 to 2025. In 2024, the CWP Director and the Water Institute will initiate discussions with Deans on a funding renewal agreement. During those discussions, benefits of the overnight, cohort-building retreat will be articulated by the program and considered by the Deans.

In addition to annual base funding kindly provided by the Deans of Engineering, Environment and Science, the Water Institute and the CWP Director will work with central and faculty Advancement officers to identify potential donors who might support CWP experiential learning activities, a visiting fellows program or student scholarships.

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2. Our second highest recommendation is that the program would benefit from a formal process and database for tracking its graduates. This would include the elements noted above (e.g. their employment in water related fields), and could be used both to help quantitatively assess the success of the program, as well as a resource (e.g. for guest lectures, professional network) and for other alumni engagement.

Response

Program Response

While not related to academic content, the CWP agrees that the development of an alumni network would be useful. While usually the purview of Alumni Relations at central or departmental levels, developing a network for an interdisciplinary collaborative program is not straightforward institutionally or technically.

Notwithstanding the above, the Water Institute is currently establishing a network of CWP alumni using a LinkedIn platform. The purpose of the platform will be to facilitate interactions among CWP alumni, to create a database of potential contributors to the CWP and to allow the program to track the career trajectories of graduates. In addition, the emerging CWP network will be used to promote a CWP 10-year anniversary event planned for the Fall 2023 term.

Dean's Response – Engineering

I am supportive of this approach.

Dean's Response – Environment

I am supportive.

Dean's Response – Science

Science is supportive of the approach taken by CWP to build an alumni network.

3. We further recommend that the admissions process for CWP include a statement of interest by prospective students, and that the program explicitly encourage students from underrepresented groups.

Response

Program Response

While the CWP acknowledges that the intent of the recommendation is to create a more engaged cohort of students, the program does not support the addition of a statement of interest by prospective students during the admissions process as it is unclear how this would increase the fit or quality of incoming students. Incoming students must meet the entrance requirements of their home department or school and then choose to “opt in” and meet the additional program requirements of the CWP. By opting in students are implicitly expressing an interest in interdisciplinary learning and perspectives. If the purpose of the admissions statement is to “screen out” students who are not a good fit, then it would be addressing a problem that does not exist as the

vast majority of CWP students have embraced the program and the extra work that it entails. The addition of a statement of interest, therefore, would be an administrative requirement with no real benefit or purpose and it is hard to see how a prospective student admitted to a home department or school would be turned down by the CWP based on such a statement. Furthermore, such statements also create inherent equity concerns given students from diverse backgrounds often do not have adequate training and mentorship available to learn how to write such statements.

In principle, the CWP agrees that the program should encourage students from underrepresented groups to enroll and thinks that a targeted scholarship program would be the best means to achieve this. The CWP draws from the larger student population that is primarily recruited by participating faculties, departments, schools and supervisors. Broader equity, diversity and inclusion enrollment initiatives have and will continue to be implemented at various levels by these units. The CWP does not think generic statements encouraging students from underrepresented groups to join the program in marketing materials for example would be useful or appropriate. Overtime, the overall university student population needs to change which will then influence the makeup of the CWP population.

In the short term, however, the Water Institute and the CWP Director will work with central and faculty Advancement officers to identify potential donors who may support targeted student scholarships to incent participation from students from underrepresented groups.

Dean's Response – Engineering

I am supportive of this approach.

Dean's Response – Environment

I am supportive.

Dean's Response – Science

Science is supportive of this approach.

4. Finally, we recommend that the program could be better advertised and packaged in order to be an effective recruiting tool for graduate students to the University of Waterloo.

Response

Program Response

While not related to academic content, the CWP agrees that the university, participating departments and schools and the program could benefit from improved marketing and promotions. In response, the Water Institute is currently developing a renewed CWP marketing plan in consultation with central units (eg, Graduate Studies and Post-Doctoral Affairs, University Relations) and participating faculty, departments and schools. The plan will include the development/renewal of program collateral appropriate to various target groups and the deployment of program content across various (sub)university channels. In addition, faculty members from participating academic units will be systematically supplied with program information and appropriate marketing collateral.

Dean's Response – Engineering

I am supportive of this approach.

Dean's Response – Environment

I am supportive and note that recruitment will be a major consideration under ENV's management.

Dean's Response – Science

Science is supportive of this approach.

Recommendations Not Selected for Implementation

The CWP does not intend to implement recommendation 3 that suggests the admissions process for the CWP include a statement of interest by prospective students. The rationale for this decision is described above.

Dean's Response - Engineering

I support not asking for a statement of interest by prospective students.

Dean's Response - Environment

I support not asking for a statement of interest by prospective students.

Dean's Response - Science

Science supports not asking for a statement of interest by prospective students.

Implementation Plan

	Recommendations	Proposed Actions	Responsibility for Leading and Resourcing (if applicable) the Actions	Timeline for addressing Recommendations
1.	Modest increase in CWP's annual base funding.	<p>The Water Institute to support WATER 602 cohort building overnight retreat for 2023 and 2024.</p> <p>The CWP Director and Water Institute to discuss potential increase in core annual funding with Deans of Engineering, Environments and Science during program funding renewal discussions in 2024.</p>	<p>Water Institute</p> <p>CWP Director, Water Institute</p>	<p>2023-24</p> <p>2024</p>
2.	Formal process and database for tracking its graduates.	The Water Institute to establish and maintain alumni database.	Water Institute	2023, ongoing
3.	Admissions process for CWP include a statement of interest by prospective students, and that the program explicitly encourage students from underrepresented groups.	<p>Statement of interest not implemented.</p> <p>Work with Advancement Officers to identify potential donors that would support targeted scholarships for underrepresented groups.</p>	<p>Na</p> <p>CWP Committee, Water Institute</p>	<p>Na</p> <p>2023-24, ongoing</p>
4.	Program could be better advertised and packaged in order to be an effective recruiting tool.	The Water Institute, in consultation with central units, participating faculty, departments and schools and other stakeholders, to develop and implemented renewed CWP marketing and promotions plan.	Water Institute, CWP Committee	2023-24

The Department Chair/Director, in consultation with the Dean of the Faculty shall be responsible for the Implementation Plan.



Date of next program review _____ **2027-2028** _____
Date

Signatures of Approval

Nandita Basu _____ 30/10/2023
Chair/Director _____ Date

Mary Wells Digitally signed by Mary Wells
Date: 2023.10.30 10:21:17 -04'00'

Faculty Dean - Engineering _____ Date

November 1, 2023

Faculty Dean - Environment _____ Date

Faculty Dean - Science _____ Date

Oct 30/23

Sep. 6, 2023

Associate Vice-President, Graduate Studies and Postdoctoral Affairs _____ Date
(For graduate and augmented programs)