ADVANCING HUMAN AND SOCIETAL HEALTH AND WELL-BEING

At McMaster, we are devoted to the cultivation of human potential.

We are committed to taking a collaborative approach to improving people’s lives, contributing to global knowledge and finding creative solutions to some of our most complex challenges.

One of the ways we fulfill this commitment is by pioneering groundbreaking research in fields ranging from health care to business, arts and culture to advanced manufacturing. We’re empowering the next generation to create a Brighter World.

LAND ACKNOWLEDGMENT

McMaster University recognizes and acknowledges that it is located on the traditional territories of the Mississaugas and Haudenosaunee nations, and within the lands protected by the Dish With One Spoon wampum agreement.

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Global Nexus for Pandemics and Biological Threats

McMaster launched the Global Nexus for Pandemics and Biological Threats to ensure Canada and the world are better able to manage the human and economic devastation of COVID-19 and avert future pandemics. Since the pandemic began, McMaster researchers across diverse fields of expertise have rapidly mobilized to deliver on more than 150 COVID-19 related research projects, leveraging vast international networks. Global Nexus, led by McMaster researchers from many disciplines, is an international network of scientists, clinical health and medical specialists, engineers, social scientists, history and policy researchers, and business and economics researchers devoted to one goal: preventing future pandemics and mitigating global health threats like antimicrobial resistance. The innovative network quickly garnered international attention, as well as government and philanthropic support, for its approach in its first few months.

Centre of Excellence in Protective Equipment and Materials (CEPEM)

A team of engineers, scientists and manufacturers from private industry and McMaster University successfully created the first N95 respirator made and approved for sale in Canada — one of the many success stories stemming from the university’s Centre of Excellence in Protective Equipment and Materials (CEPEM). Launched early in the pandemic to build expertise in supporting domestic supply chains for PPE, the team has worked with more than 50 companies from across Canada. The centre has established itself as an innovative partner to a growing number of companies being set up in Canada to design and develop PPE, providing assistance in testing and developing advanced technology.

Evidence-based, plain-language resource takes the guesswork out of using cloth masks

Through the pandemic, as questions about masks and masking protocols have continued to arise, McMaster researchers and experts have maintained an informative plain-language resource to inform the choice of materials and designs for cloth masks, communicating around materials and design, and curating high-quality information on mask use and mask cleaning. Whether it’s queries about the best materials, the number of layers, the comparative efficacy of different fabrics or the value of masks as vaccination rates rise, this free online resource offers clear, evidence-based insights and pragmatic tips that make it easy and accessible for Canadians to adhere to safety protocols.

An affordable, safe, effective treatment for COVID-19 patients

Researchers at McMaster have discovered an inexpensive and accessible medication that can save the lives of COVID-19 patients and cut hospital admissions by up to 30 per cent. The trial of fluvoxamine, a repurposed drug, is part of the larger TOGETHER Trial for test potential COVID-19 treatments in a community setting. Its findings are also combating misinformation about other medications sometimes touted as effective treatments. They have submitted their findings to Canadian authorities, as well as the U.S.-based National Institutes of Health and the World Health Organization.

McMaster Health Forum

The McMaster Health Forum, a leading international collaborating centre focused on health and social systems evidence, has developed COVID-19 Evidence Network to support Decision-making (COVID-EN), a resource to help leaders and policymakers as they respond to unprecedented challenges related to the COVID-19 pandemic. This network brings together more than 50 of the world’s leading evidence-synthesis, technology-assessment, and guideline-development groups. It also covers the full spectrum of contexts where the pandemic response is playing out, including low-, middle- and high-income countries.

Pan-Canadian collaborative project examines how COVID shots affect inflammatory illness

McMaster researchers are partners in a major nationwide study on the effectiveness of COVID-19 vaccines in people with immune-mediated inflammatory diseases such as rheumatoid arthritis, inflammatory bowel disease and psoriasis. The study will not only help obtain immunological answers to crucial clinical questions that affect many in Canada and around the world, but will address the problem of vaccine hesitancy and misinformation, arising from the lack of knowledge on the subject, and will ultimately lead to better vaccination outcomes.

Researchers lead several studies to protect vulnerable seniors

Canada’s long-term care sector has been especially hard hit by the pandemic, with devastating effects in many communities, where vulnerable seniors and front-line health care workers bore the brunt of the crisis. Researchers at McMaster are conducting several studies related to long-term care in Ontario, including a study on immunity responses in Ontario long-term care facility residents, whose findings supported the use of a third or booster shot for older adults and other at-risk populations.

Preventing the next pandemic:
The link between our COVID research and the SDGs
The burden of precarious employment

Poverty is more than the lack of income and resources to live one day to the next. It means hunger and malnutrition, sub-standard housing, limited access to education and social discrimination. The Poverty and Employment Precarity in Southern Ontario research project is a joint university-community initiative led by McMaster University and United Way Toronto & York Region in partnership with more than 30 university, community sector, labour, government and media partners. Its goal has been to gather data on trends in precarious employment and to encourage policy debate and further research. PEPSO has influenced key policy decisions, expanded existing knowledge and served as a foundation for further research.

Working together

McMaster is a partner in the International Association of Universities (IAU) Cluster on Higher Education and Research for Sustainable Development, which promotes the role institutions around the world must play in achieving the SDGs and Agenda 2030. The Cluster works on all dimensions of the SDGs, combining economic, social, cultural and environmental sustainability. Led by the University of Ghana, McMaster is focusing on SDG 1 (No Poverty).

Policy made for real people

The McMaster Community Poverty Initiative brings together faculty, students and staff not just with community groups, but also with people living in poverty. It ensures policy development is fully informed by people with firsthand knowledge about what it means to be poor and living in Hamilton. As a partner with Living Wage Hamilton, MCPI advocates for a minimum wage that allows workers to earn enough to pull themselves and their families out of poverty, which affects health, education levels and the community’s economic prosperity.

Money for those who need it most

The McMaster Students Union successfully advocated for the University to lower the barriers for low-income and struggling students by diverting $250,000 from merit-based scholarships to needs-based aid. All McMaster bursaries — non-repayable funds used for such things as tuition, books, living expenses and special equipment — are based solely on financial need. In 2018-2019, McMaster’s students received about $6.2 million in bursaries.

Help in extreme circumstances

When all other avenues have been exhausted, the university provides emergency financial support to students in need — including those facing a lack of funds for basic living expenses or required technology for courses, pending eviction and negative circumstances beyond their control.

End poverty in all its forms everywhere.

Professor Catherine Connelly, the Canada Research Chair in Organizational Behaviour, tackles SDG 1 by shedding light on the challenges faced by vulnerable workers — those with disabilities, temporary workers, and people in precarious or gig economy jobs who are often impacted during times of economic change.

Medical aid where it’s needed

Health conditions that come with age coupled with poverty often lead to more trips to the emergency room, and more calls to 911. A team of researchers at McMaster University’s Department of Family Medicine developed Community Paramedicine at Clinic — CP@Clinic — which sees paramedics hold drop-in sessions in social housing locations where seniors live, assessing risks and providing tailored education. The result? A decrease in 911 calls, strengthened connections with primary health-care providers and improved quality of life for patients. Health Canada has funded a national expansion of the service.

Food to warm the heart

No one should have to decide between paying the hydro bill, buying a warm coat and boots for winter, or eating three meals a day. Or two. Or one. The student-run Food Collective Centre is dedicated to ensuring that food is always accessible to support food-insecure individuals. Their goals include cultivating stronger food systems on campus and in the surrounding community, and advocating for policies to increase food security.

A roof over your head

Finding affordable housing on a limited income can be an almost insurmountable challenge. The Symbiosis initiative through the School of Graduate Studies connects students in need of low-cost or no-cost housing — in exchange for modest help around the house — with seniors who have a spare room and could benefit from extra support and companionship. Both parties are matched, sign agreements and Symbiosis follows up to ensure the cohabitation is harmonious.

THE NUMBER OF PEOPLE LIVING IN POVERTY IN HAMILTON IS AT ITS LOWEST POINT IN THE LAST 16 YEARS.
End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

Let it grow
The community engagement component of the School of Interdisciplinary Science brings together students, faculty and community partners. Past projects include the McMaster Teaching & Community Garden, designed to facilitate local food production alongside teaching and learning opportunities; nutrition workshops for Hamilton seniors; creation of a permaculture garden to explore sustainable agriculture; and a partnership with the United Way to create an urban farm for experiential learning.

Numbers to work with
A 2018 study conducted by McMaster sustainability students, Toronto charity Meal Exchange and the McMaster Students Union found that 28 per cent of students surveyed encountered moderate food insecurity, while 12 per cent experienced severe food insecurity — but only 24 per cent of those surveyed used available on-campus services, largely due to stigma. The study’s findings have been taken up by groups with an interest in resolving food insecurity.

Moving beyond charity
Hamilton Community Food Centre (HCFCL), a project of the Neighbour to Neighbour Centre (N2N), offers food-based programs that bring everyone together to grow, cook, share and advocate for good food. Researcher Tina Moffat received funding to evaluate the youth food programming at the HCFCL, part of a growing movement of food centres across Canada that move beyond charity models of food banks to give food-insecure populations access to nutritious food in a dignified manner.

Understanding the problem
The McMaster University Centre for Climate Change studies, among other things, the impact human activities have on the environment. Crop failures and diminishing yields due to weather events can put food security at risk. Water scarcity caused by climate change could lead to wide-scale famine. At the other end of the spectrum, flooding may contaminate food and water sources. Research into the societal impact of climate change provides the necessary information to understand the challenge and develop solutions.

Power foods
With more than 3.6 million meals served on campus every year, the university has the purchasing power to leverage support for a sustainable food system. McMaster is committed to buying local. To that end, 39 per cent of the produce purchased by the university in 2019 was local, a five-per-cent increase over the year before.
Ensure healthy lives and promote well-being for all at all ages.

**Information is power**

The McMaster Health Forum is a leading international collaborating centre that works to ensure health systems around the world are strengthened by evidence-informed policymaking. Active for a decade, the forum recently broadened its focus to include social systems and the Sustainable Development Goals. Its 75-plus partners include the World Health Organization, the Pan-American Health Organization and departments at all levels of government. Its free, searchable databases — Health Systems Evidence and Social Systems Evidence — are the most comprehensive access points for policymakers, researchers and stakeholders seeking evidence on a wide range of issues, accessed by 13,500 registered users globally.

**McMaster and the world**

The UN Sustainable Development Goals are fundamental to the work of McMaster’s Global Health Office, which connects researchers, educators, students and clinicians with global development organizations and funding agencies. For the last decade, the Global Health Office has formed partnerships with institutions and governments in developing countries — advancing the education of women health professionals in Pakistan, improving the health of vulnerable people in Indonesia, and increasing access to health education in underserved communities in the High North regions of Canada and Norway. Educational partnerships for the Doctoral and Master of Science in Global Health span five continents; examples of research areas include data science, health equity, pandemic planning and infectious disease, and refugee health and humanitarian crises.

**Health through knowledge**

The Population Health Research Institute, founded by McMaster and Hamilton Health Sciences, is a global health institute and world leader in large clinical trials and population studies. An international network of almost 400 scientists, investigators and research fellows work together to address global health challenges such as cardiovascular disease, poverty-related infectious disease and under-nutrition. Type-2 diabetes, stroke and cognitive decline. To date, more than 1.5 million people have participated in studies in 102 countries.

**Network to support COVID decision-making**

Co-founded by the McMaster Health Forum and the Ottawa Hospital Research Institute, COVID-19 is a network that brings together more than 50 of the world’s leading evidence-synthesis, technology-assessment and guideline-development groups around the world. It covers the full spectrum of the pandemic response, from public-health measures and clinical management to health-system arrangements and economic and social responses.

**Nuclear medicine research for cancer treatment**

McMaster University and the Nuclear Research and Consultancy Group in the Netherlands are collaborating on research in the field of nuclear medicine. Working together, these two globally renowned research reactors will provide the world with the highest quality radioisotope (I-125) for the treatment of prostate and other types of cancers.

Built in 1959, McMaster Nuclear Reactor was the first university-based research reactor in the British Commonwealth. Now the largest research reactor at a Canadian university, it is one of a suite of research facilities at McMaster that generate discoveries in medicine, clean energy, nuclear safety, materials and environmental science. It is one of the world’s largest suppliers of the medical radioisotope iodine-125, used in the treatment of prostate cancer.

**Indigenous connections**

The Indigenous Health Initiative in the Faculty of Health Sciences advocates for meaningful change in the health system to ensure that Indigenous community members receive health care that is culturally safe. It strives to educate doctors, nurses and other health-care professionals to respect Indigenous ways of knowing about health and well-being. The university also offers Indigenous-specific support, advocacy and aid accessing programs on campus and in the broader community through Indigenous Student Services. There is a ceremonial space, a counsellor and Elders, recreation, workshops, and self-care and mental wellness services geared to Indigenous students.

**The science of aging**

The McMaster Institute for Research on Aging seeks to address the complex issues facing an aging population worldwide, while working to engage the older adult community, their families, health-care providers and other key stakeholders to optimize the health and longevity of the aging population. These efforts include making the university more accessible to seniors and practical solutions to reduce the social isolation experienced by older members of the community. McMaster Optimal Aging Portal provides an internationally available information-sharing resource for citizens, clinicians, health-care professionals and policymakers on aging, offering the latest scientific evidence on aging and health-care topics for seniors.
Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

**Full STEAM ahead**

The McMaster Children & Youth University delivers free programming for children and youth aged seven to 14 in all areas of science, technology, engineering, arts and math (STEAM). The programs — which includes a family lecture series, workshops and online activities — are intended to share McMaster research in a way that is fun and accessible to all children and youth. The goal is to empower and academically prepare young people, especially those at a socioeconomic disadvantage, to aspire to a university education. MCYU also works to deepen the university’s relationships with schools and organizations in neighbourhoods where high school completion rates are disproportionately low.

**Sustainable goals**

The Academic Sustainability Programs Office oversees the SUSTAIN courses, a suite of five undergraduate courses open to students in all faculties, and offers an Interdisciplinary Minor in Sustainability, with more than 70 courses to choose from. It also operates the Sustainability Internship Program, which allows students to focus on a real-world sustainability project for a course credit.

**2.3 million**

Library pattens annually

**1.9 million**

Print and electronic books in combined collections

**Learning and listening later in life**

Older adults can take advantage of many learning opportunities at McMaster. Those 60 years and older — providing they meet admission and prerequisite requirements — may enrol in tuition-free for-credit courses, only paying an application fee. Enrolling as a listener is an option for those who wish to take a course for the joy of learning, but not for credit. McMaster Learning for 55+ offers an affordable lineup of classes geared to this age group, with topics such as arts and literature, science and technology, health, wellness, and business and innovation. The university is also a member of the Age Friendly University network, a global body comprised of higher-education institutions committed to becoming universally accessible.

**Tools for success**

The made-at-McMaster Archway program partners all first-year students with a coach and mentor to provide proactive guidance based on their goals, interests and needs, providing a supportive virtual community during semesters online. The Student Success Centre is the go-to resource for programs, services and events to help all students achieve their academic, personal and professional goals. It’s where students connect with support for online learning, writing, tutoring and skills development. As part of its International Student Services section, the centre hosts orientation and social events intended to help newcomers adjust to life in Canada.

**Coding is cool**

Software Tool For Change is dedicated to teaching elementary and middle school students math skills through coding in a fun and safe environment. Lessons incorporate mathematical concepts such as the cartesian coordinate system and trigonometry. The project offers free lessons, activities, tools, teaching videos, class visits and some fee-based tutoring and camps. Volunteers include McMaster undergraduates as well as Jr. Mentors in Grades 5 to 8.

**Students tackling problems through an SDG lens**

MacChangers is a co-curricular experiential learning program at McMaster. Students from all Faculties are given the opportunity to propose innovative solutions to the most pressing problems confronting society as identified in the UN SDGs and Our Future Hamilton long-term community vision. Recent projects include reducing paper receipts in local business, designing a new bike lane in the city’s core and an online resource to address housing needs.

**Accessing university-level studies**

McMaster enjoys a strong, longstanding partnership with Six Nations Polytechnic, including the SNP-University Consortium Agreement. Under the agreement, McMaster and five other universities offer credit courses for the first year of a general BA in the Six Nations community, which are then transferrable to any of the participating universities. The program is intended to improve education completion and employment opportunities, as well as support community control of postsecondary education. Since its inception, more than 250 students in the program have successfully completed their credit courses for the first year of a general BA in Indigenous Studies in addition to their college diploma.
Achieve gender equality and empower all women and girls.

Female undergrads outnumber male undergrads

At McMaster, admissions are based on academic performance, not gender. In recent years, the number of female undergraduates has outnumbered male undergraduates, according to the McMaster University Fact Book. For example, 55 per cent of undergraduate students in 2021-21 identified as female, compared to 45 per cent as male. The university has a number of programs that actively recruit female students, particularly in science, technology, engineering and math (STEM) and areas that have traditionally seen lower female enrolment.

Inclusion and collegiality

Through its Equity and Inclusion Office, the university seeks to foster an environment of inclusion and collegiality that goes beyond non-discrimination and harassment policies. In partnership with Pride at Work Canada, the university celebrates all employees, regardless of gender expression, gender identity and sexual orientation. McMaster’s gender-neutral washrooms are open to all on campus and Rainbow and Transgender Pride crosswalks at the main entrance reinforce the importance of making visible and validating the lives of LGBTQ2SI+ community members.

Engineering change

One of the Faculty of Engineering’s strategic goals is to inspire young women to pursue careers in the field. It’s working. In 2020-21, 34 per cent of first-year Engineering students identified as women, a 15.5 per cent increase over the last five years. A number of initiatives have sent a ripple of change through the faculty, including shifting hiring practices to increase diversity and sharing the success stories of female students, staff and faculty. The relatively new Integrated Biomedical Engineering & Health Sciences Degree has been of specific interest to female students.

Dollars and sense

Female students can tap into a variety of financial aid, free programs, scholarships and bursaries designed to help women succeed. In the 2017-18 fiscal year, more than 55 per cent of scholarships and grants were given to female students, and more than 52 per cent of the university’s bursaries went to female students. Scholarships aid Indigenous women, females studying engineering and business, and those who show community leadership.

The McMaster family

Several made-at-McMaster programs allow faculty to take leave without significant financial or career repercussions, such as the Life Events Support Program, which helps mitigate the impact of various leaves (parental, family medical) on research productivity. The university offers numerous child care options: the on-campus McMaster Children’s Centre, and free child care to participants in the McMaster Discovery Program, open to members of the public whose circumstances have not allowed them to benefit from a university education.

STEM champions

McMaster hosts many programs, initiatives and activities to encourage young women to consider careers in the STEM fields — Science, Technology, Engineering and Math — such as the Girls in Science Day. The Faculty of Engineering offers summer camps, STEM Girls Clubs for elementary students, conferences such as Go ENG Girl and Go CS2E Girl for female high school students, and other outreach efforts.

Targeted programming

The DeGroote School of Business’s focus on offering programs that appeal to women has produced an uptick in the number of female students considering business studies and careers. In 2019-20, 60 per cent of the students in the Integrated Business & Humanities program were women; 77 per cent of students in the Master of Finance program were women.

It’s who you know

Mentoring and supports bolster the success of women on campus — staff, academics and students at all levels. Some are formalized programs, while others are less structured, as best suits the needs of the individual. These include job shadowing with industry leaders, women in leadership conferences, female-centric associations, the DeGroote Women’s Professional Network and the McMaster Women in Science and Engineering (WISE) Initiative.

55% of undergraduates are women

70% of The Management Group at McMaster are women

55% of undergraduates are women

70% of The Management Group at McMaster are women

Achieve gender equality and empower all women and girls.
Ensure availability and sustainable management of water and sanitation for all.

Water conservation on campus

The university’s water consumption has seen a steady decline of more than 61 per cent per student per year from 2002 to 2018. Over the next five years, we are committed to reducing our water consumption by five per cent each year, as outlined in McMaster’s 2020 Energy Management Plan. Part of the plan includes employing a rigorous monitoring and metering program and reducing potable water consumption in McMaster’s fish research labs by 80 to 95 per cent, saving the equivalent of 16 Olympic sized swimming pools of potable water a year.

Water Without Borders

Why do almost a billion people go without daily access to safe water? How does climate change affect water-borne illness? And why does half the world’s population go without adequate sanitation? The Water Without Borders program at McMaster seeks to answer these questions and more.

Look to the skies

Rainwater collection systems on campus reduce the university’s reliance on municipal water systems, storing the collected water in cisterns. The water is filtered and disinfected for use for both drinking and non-drinking purposes. The Engineering Technology Building was designed to reflect the faculty’s strategic plan, Engineering a Sustainable Future, and features rainwater harvesting for wastewater flushing and landscape irrigation.

In the community

McMaster spreads the word about good water management in a number of ways. McMaster Water Week celebrates water and related research in a community fair atmosphere that hosts area organizations in a variety of fields. The Rock Garden in the Royal Botanical Gardens incorporates best practices in sustainable garden design and management, including pollinator-friendly species and drought-tolerant perennials that require less water.

Savings in the rain

According to the Facility Services Energy Management Plan (May 2020), 28 irrigation systems operate on campus based on a schedule — not the most efficient way to operate. If the system waters the grounds while it’s raining. A pilot project involving a 10-acre field used an advanced control system that tracks weather data to make adjustments to the schedule as needed. Thus far, the results have been promising.

A closer look

The McMaster University Centre for Climate Change studies water resources and hydroclimate — vital research, considering the availability of fresh, clean water is expected to decline due to climate change. The Spencer Creek Watershed adjacent to campus offers a living laboratory for McMaster researchers to collect data and better understand how land use affects drinking water quality, lake health and biological ecosystems, from the creek to Hamilton Harbour and out into the Great Lakes.

Water of life

Water is necessary to all forms of life, and has been recognized by the United Nations as a fundamental human right that affects everything from physical and mental health to peace and security. As the home of the United Nations University — Institute for Water, Environment and Health, McMaster plays a crucial role in resolving water problems and ensuring all have access to this vital resource.

Have a drink

More than 200 water stations on campus provide free, clean drinking water to students, staff, faculty and visitors. Water bottle refilling stations on campus have eliminated the use of over 20 million water bottles since 2010.

6,000
HOMES AND COMMUNITY BUILDINGS
AFFECTED BY LONG-TERM DRINKING WATER ADVISORIES
IN INDIGENOUS COMMUNITIES

The availability of fresh, clean drinking water is expected to decline with future climate change, and we can expect this to be the number one climate issue in the 21st century.

Biology professor Pat Chow-Fraser (front), a member of McMaster’s Centre for Climate Change, conducts water quality research with a student at Long Point, Ontario.
McMaster is one of three Ontario universities leading the Advanced Manufacturing Consortium, which provides businesses with access to our technical expertise and world-class assets.

Ensure access to affordable, reliable, sustainable and modern energy.

A multidisciplinary approach

The mission of the McMaster Institute for Energy Studies emphasizes the economic and environmental impacts of all stages in the energy process. MIES researchers come from the sciences, engineering, social sciences and business administration. Its areas of study include the development of semiconductor nanowires for solar energy, combining nanotechnology, photonics and energy technology, affordably reducing the noise and vibration performance of vertical axis wind turbines for deployment in urban areas; increasing the power output of nuclear reactors, which will be used for electricity generation in Canada for decades to come; and fuel cells, the bridge to storing all the power produced by the sun and wind.

Driven by the sun

The McMaster Solar Car Project builds and races electric vehicles powered by the sun. Started by students, built by students and led by students, the project’s driving force is to create one of the most eco-friendly vehicles possible and turn climate change around. Team members have built seven cars since the project’s inception in 1997, competing against other top universities around the world. The eighth vehicle is the Arc-Avenger.

Increasing the yield

Global energy demands are expected to double in the next 20 years, while the world struggles to reduce greenhouse gas emissions. The need to get every joule possible from renewable energy sources is clear. One tool may be advances in high-power conversion systems, as researched in the Department of Electrical & Computer Engineering. Even small improvements in efficiency can reap significant rewards when dealing with large-scale wind or solar farms — and potentially lower costs.

Powering up credentials

The undergraduate Power and Energy Engineering Technology program is all about power — power quality, protection and control; energy management; and renewable energy technologies such as biomass, fuel cells, geothermal, solar and wind. This unique diploma-to-degree program is made for college graduates who wish to power up their education to the next level, as all qualified applicants receive two years’ worth of advanced credit from their previously completed college diploma or university degree.

Testing the grid

Producing sustainable, clean energy from solar panels and wind turbines is part of the solution. The Smart Grid Engineering Lab lets future engineers study how that energy — often produced at different ranges from current methods — can be fed into existing power grids safely and efficiently without overwhelming the system. At the other end of the grid, the state-of-the-art facility can help determine how to best address the energy demands of electric cars and other emerging technology.

Leading the charge

The university has a fleet of 13 electric vehicles as well as free charging stations, but those may need to change, if research in the Department of Electrical & Computer Engineering eliminates some of the challenges related to recharging batteries in electric and autonomous vehicles. How about high-power wireless and ultrafast chargers in a drive-thru charging station? First a prototype, then some industrial partners. Then, who knows?

Hot topic

We lose as much as 70 per cent of the energy we produce in energy transmission through the electricity, natural gas and pipe oil pathways that supply our communities. Research by Jim Cotton in the Department of Mechanical Engineering is finding ways to take back that energy through harvesting heat, with sides of improved energy efficiency and reducing greenhouse gas emissions. Initiatives in integrated energy systems research include experimental and computational investigations of heat transfer, thermodynamics and fluid dynamics.

Big wheels keep on charging

Diesel doesn’t just keep the wheels turning on transport trucks: it’s used to power a generator for electrical components such as a truck’s lift gate and refrigeration unit — and powering one refrigeration unit with diesel produces as much carbon dioxide as seven passenger cars. A team of Master’s students from the W. Booth School of Engineering Practice and Technology worked with Westhill Innovation to design a light, modular, easy-to-install system of solar panels to take advantage of the 440 square feet of unused space on one trailer and use that energy to power the components. As transport trucks turn from diesel to electric power, it’s hoped the solar trailer technology can also extend the range of the vehicles.

McMaster’s Net Zero Carbon Roadmap

As part of McMaster’s commitment to a safe and sustainable campus, the university performed a study in 2020 to provide an analysis of the main campus carbon emissions and develop a plan for reaching the goal of net zero carbon emissions. The Net Zero Carbon Roadmap explores reducing greenhouse gas emissions and proposes altering methods of power generation, energy conservation measures for our buildings, electrification and heat recovery projects, and fleet transition to electric vehicles. Design element strategies for new construction projects include high performance building envelopes, efficient ventilation, and LED lighting with occupancy sensors. Renewable energy production using photovoltaic installations and carbon capture strategies are also potential future elements of the plan.

7 Affordable and clean energy

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BRIGHTER WORLD

McMaster University Sustainable Development Goals Report | 2021 | 19

BRIGHTER WORLD
Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all.

A good place to work
McMaster has been consistently recognized as one of Canada’s Best Diversity Employers. The national list, focuses on five employee groups: women; visible minorities; persons with disabilities; aboriginal peoples; and lesbian, gay, bisexual and transgender/transsexual peoples. The publication cited the university’s efforts to help employees manage their work-life balance through flexible work options, ongoing employee development opportunities and subsidized memberships for the on-campus health club.

Open to criticism
McMaster employees are actively encouraged to raise concerns about their working environment, both formally and informally, though the university works with employee groups to identify and resolve issues before they become a problem. Employees may turn to the Ombuds Office for confidential help. The Equity and Inclusion Office has a broad mandate, but in more narrow terms, it’s there to find and address inequity and exclusion.

On-the-job learning
Approximately 2,700 students hold positions at the university as teaching assistants. TAs lead class discussions, mark assignments, meet and correspond with students, and facilitate help sessions. Being a TA is a great way to gain valuable experience at the head of the class while supplementing the bank account. Graduate student TAs earn $44.51 per hour, while undergrad TAs earn $25.81. McMaster also works to ensure that part- and full-time internships, when available, are paid.

Stopping exploitation and abuse
McMaster is committed to the International Labour Organization (ILO), which promotes an end to oppression, exploitation and abuse of workers worldwide. Suppliers, subcontractors and licensees of the university are expected to comply with these standards, including an obligation to respect, promote and realize the principles of fundamental labour rights, freedom of association and the right to collective bargaining, the elimination of all forms of forced or compulsory labour, the effective abolition of child labour, and the elimination of discrimination against women.

Balancing the scales
Pay equity and the concept of equal pay for equal work matter to McMaster. Collective bargaining ensures frequent pay equity checks for unionized staff, while faculty pay is analyzed annually to pinpoint— and eliminate— any systemic gender imbalance. For example, in 2015, female faculty across the board were given a $3,515 raise to match their salaries with those of their male colleagues.

Spotlight on Labour Studies
The School of Labour Studies offers certificates, undergraduate and graduate programs for students seeking careers in law, community development, policy analysis, teaching, research and more. Members of the faculty seek answers to such questions as: How do national dreams propel migrant workers into global circuits of labour? What are the causes and ramifications of work injuries and illnesses among racialized precarious workers? And how do gender identity and sexual orientation affect worker experiences in non-metropolitan cities?

Work in a Global Society
How is the world of work changing in a globalized world? What counts as work and who is a worker? What impact does extreme employment precarity have on the health and well-being of workers? Affiliated with the university’s School of Labour Studies, the Institute for Work in a Global Society (WIGS) research group brings a social science perspective to issues of concern to paid and unpaid workers.

Students gaining real-world experience
The Engineering Co-op Program provides undergraduate and graduate students with opportunities to gain valuable work experiences around the globe before they graduate. In 2020-2021, 1,773 undergraduate and 70 graduate students participated in a co-op experience, earning total wages of $25,536,453 (average of $50,006/annually).

Students gaining real-world experience
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Build resilient infrastructure, promote sustainable industrialisation and foster innovation.

Form and function

The McMaster Nuclear Reactor is the world’s only self-funded research reactor, providing neutrons for research and producing vital medical isotopes. Access to neutrons is essential to support Canadian industry and foster innovation. The university has teamed up with Bruce Power, the world’s largest operational nuclear facility — which provides electricity to Ontarians and medical isotopes globally — to develop and promote nuclear technologies in the province.

Safe nuclear power in the face of disaster

Global disasters have demonstrated the need to create innovative, holistic and interdisciplinary solutions to mitigate seismic risk to the global nuclear infrastructure so many countries depend on. Enter the Natural Sciences and Engineering Research Council CaNRisk Collaborative Research and Training Experience program, or CaNRisk-CREATE. The team’s mission is to train the next generation of experts to ensure nuclear infrastructure systems are resilient under cascading hazards.

Warm thoughts in action

The ICE-Harvest project — Integrated Community Energy and Harvesting Systems — pulls excess heat created by electricity generation and heat production at the community level, then redistributes it where and when it’s needed through a combination of heat pumps and absorption chillers. The research born of the project installed at the Gerald Hatch Centre will help communities to site, design, optimize and control ICE-Harvest systems to economically achieve greenhouse gas reduction targets and better manage the energy grid.

LEEDing by example

The Gerald Hatch Centre — a living laboratory for researching and applying sustainable building technologies as well as being a student centre for experiential learning — was built to meet a zero-net energy threshold and demonstrate its potential as a standalone resilient facility. The Ron Joyce Centre, the Burlington site of the DeGroote School of Business, is a LEED Gold certified building, demonstrating sustainable site development, water efficiency, energy efficiency, materials’ selection and indoor environmental air quality.

Bringing ideas to market

Located just east of the main campus, the McMaster Innovation Park supports startups and scale-ups with a focus on life sciences and biotechnology; engineering and advanced manufacturing; and information and communication technology. A bridge between academia and industry, MIP is home to 70 companies, with more than 800 people working on-site. MIP helps students and industry transform ideas from vision to commercial reality, bolstered by the technical prowess of McMaster and other academic institutions.

Dipping into a big pool of talent

The McMaster Computing Infrastructure Research Centre (CIRC) offers Innovation-as-a-Service (IaaS), a fee-for-service R&D centre that helps companies turn ideas into real products using a cost-effective and fast-paced approach. The service is provided by a team of engineering researchers and students, working across a variety of technologies and application areas. Projects have included an algorithm-based system for improving roadway safety, and a new thermal management system for cooling micro-data centres.

Sustainable energy conversion process

The McMaster Advanced Control Consortium brings together academics and industry to develop chemical processes that are environmentally friendly, socially acceptable and economical. Under the theme of Sustainable Design, MACC researchers are developing more sustainable processes to convert biomass, coal, natural gas, shale oil and nuclear energy into electricity, gasoline, diesel, methanol, dimethyl ether and hydrogen. While not yet in a position to satisfy power demands on a municipal scale, process innovations can reduce carbon dioxide emissions, improve thermal and carbon efficiencies, reduce fossil fuel consumption and increase profitability.

Follow the shipping CLUEs

The free shipping offered by many online retailers comes with a hidden price: few shoppers are aware of when they click the Buy Now button — emissions from more delivery trucks, wear-and-tear on roads, traffic congestion and heavy vehicles through residential areas. Elkafi Hassini, a supply chain management expert with the DeGroote School of Business and head of the Smart Freight Centre at McMaster, is working to find ways to make commerce more efficient while taking less of a toll on communities. The Smart Freight Centre’s $11.5-million, four-year initiative CLUE: City Logistics for the Urban Economy will see researchers at McMaster and its partners execute 24 projects to bridge the knowledge gaps in Canada’s urban freight system.
Reduce inequality within and among countries.

Opportunity and education

The Michael G. DeGroote School of Medicine has enhanced the equity streams for its admissions process to include applicants from socio-economically vulnerable backgrounds, Black applicants and Hispanic/Latino applicants, in addition to the equity stream for Indigenous applicants, and is developing and expanding mentorship opportunities. Four minors in the Faculty of Social Sciences target areas of potential inequality: Diversity and Equity; Gender, Sexualities and Families; Immigration, Race Relations and Indigenous-Settler Relations; and Asian Studies. As well, the Faculty of Humanities offers an interdisciplinary minor in African and African Diaspora Studies.

The right to good health

The McMaster Institute for Health Equity promotes healthier, fairer lives for all by understanding and highlighting the underlying causes of such inequality. At the global level, stark inequities are found in health outcomes between countries, but dramatic differences in health status and outcomes are also found within nations — even affluent countries like Canada. The institute draws on McMaster’s strengths in interdisciplinary research, knowledge mobilization and community engagement and as one of the top universities in the world for health and medicine.

A strategic plan to meet complex challenges

Innovation, globalization, economic restructuring, social inequality, regional conflicts and international migrations pose enormous challenges. Understanding the forces at work and crafting effective responses to them require our best theoretical, empirical, historical and creative perspectives, as addressed in the university’s Strategic Plan for Research. McMaster is well positioned to play a considerable role in addressing the profound challenges that face us in the 21st century.

Recognizing social inequalities

The School of Nursing has created an Equity Community of Practice (ECP) to build a community of staff and faculty at the School of Nursing(SON) dedicated to deepening and affirming their understanding of equity, the recognition of systemic social inequalities that create unfair structural barriers to equal opportunity and meaningful engagement.

Cultural knowledge

The Indigenous Health Initiative of the Faculty of Health Sciences collaborates with partners on and off campus to better integrate Indigenous cultural knowledge into educational and research programs within the faculty, while prioritizing the recruitment of Indigenous faculty members and development of a robust cross-faculty Indigenous health curriculum. A number of its members helped form an Indigenous Health Practitioners task force in the fall of 2020, Indigenous faculty members and development of a robust cross-faculty Indigenous cultural knowledge into educational and research programs within the faculty, while prioritizing the recruitment of Indigenous faculty members and development of a robust cross-faculty Indigenous health curriculum. A number of its members helped form an Indigenous Health Practitioners task force in the fall of 2020, bolstering rural medicine in Nepal and developing a centre that assists students with disabilities at the State Islamic University in Yogyakarta, Indonesia.

Developing networks

McMaster is the host institution for Academics without Borders (AWB), a virtual, volunteer-driven NGO that connects academics in the developed world with colleagues and universities in developing countries. With the ongoing engagement of its faculty and staff with AWB, McMaster seeks to support higher education to foster greater prosperity, equity and well-being for all. Recent projects include

Strategy sessions

McMaster’s Access Strategy helps undergraduate students from underrepresented groups succeed, from the application process through to graduation. Those groups range from first-generation university students and older learners to racialized minorities or those from low-income families and neighbourhoods. The university’s Equity, Diversity and Inclusion Strategy sets a course to champion the benefits of diversity and address persistent biases and inequities; and identify and implement best practices to achieve EDI goals by driving cultural, systemic and personal change. The confidential Employment Equity Census Report, which invites staff to help the university collect information to assist in decision-making, is in line with this strategy.
Good neighbourhoods = good health

Jim Dunn spent more than a decade studying Regent Park, the largest urban redevelopment project in Canadian history. He found clear evidence that people who are more satisfied with their housing and neighbourhood, and who feel safer and more secure, also enjoy improvements to their overall health. Dunn is the Director of the McMaster Institute for Health Equity, and the Senator William McMaster Chair of Urban Health Equity. His latest work is as the director of the Canadian Housing Evidence Collaborative, an ambitious new pan-Canadian research network that brings together researchers, policymakers and individuals with lived experience from across Canada to tackle the complex issues involved in making safe, healthy housing affordable for all Canadians. The network was created to support the National Housing Strategy, a 10-year federal initiative that aims to cut homelessness in half and create housing for those with the greatest need — women and children fleeing abuse, Indigenous youth, people working through mental health conditions or addictions, and others who are marginalized or vulnerable.

Beautiful, inside and out

McMaster University is woven deeply into the fabric of the community. The campus spans 350 acres in Hamilton, Ont. — the City of Waterfalls — in a nature-rich setting of waterfalls, valleys, meadows, wetlands and forests. The 30-acre central core of campus is largely reserved for pedestrians and cyclists. The campus is part of a natural trail system managed by the Royal Botanical Gardens and the Conservation Authority. Public art, performances and cultural events are available to the public throughout the year, along with free access to historic buildings, archives, botanical and scientific collections.

Revitalizing underused land

McMaster is a key player in revitalizing city brownfield sites and underused land — putting them to good use and providing a boost to the local economy. For example, in the 10 years since the master plan for the McMaster Innovation Park was unveiled, the project has been transforming a 37-acre brownfield site, once home to Westinghouse Camco warehouse and plant facilities, into a place where scientists, researchers, engineers, and entrepreneurs turn ideas into commercial opportunities. Closer to campus, ambitious plans are underway to transform underused parking lots back into marshland, providing valuable habitats in a sensitive ecological area as well as opportunities for research.

Art and books and so much more

Coins, antiquities, paintings, sculpture, maps — the McMaster Museum of Art houses more than 6,000 objects that illustrate the history of art from the late 15th Century to the 21st Century, including a carefully curated collection of Canadian art. The museum is a partner with the Department of Family Medicine in The Art of Seeing visual literacy program and offers lectures, workshops and guided tours for the public for all ages. McMaster’s four on-campus libraries — Mills Library, Kemmy Libraries, H.G. Thode Library and the Health Sciences Library — and their study zones and learning spaces, physical and digital, are also fully open to the public without charge. Aside from traditional services, historical archives from cultural figures and collections of rare books, the libraries offer space for podcasting, digital production and a makerspace with 3D printers, laser cutters and other tools for creating.

Stars above

Graduate students, postdoctoral fellows and faculty from the Department of Physics and Astronomy guide shows at the W.J. McCallion Planetarium geared to children, families and all those who love to look up and wonder. The interactive presentations are tailored to the age and nature of the audience, touring the Milky Way, the constellations and interesting objects in and beyond our own galaxy. When possible, the show includes current celestial events in the skies over Hamilton.

Getting from here to there — sustainably

With a campus that places a priority on pedestrians, it’s only natural that McMaster should encourage sustainable commuting for the entire campus community. Students receive subsidized bus passes for the school year, and transit links on campus connect McMaster to Hamilton, Toronto, Niagara and points beyond. The campus serves as a hub for a city-wide bike share program, which offers students a discounted membership. To reduce the number of cars coming to campus, the university has a carpool program that provides designated parking spots, as well as the opportunity to split the cost of a parking permit between multiple users.
Ensure sustainable consumption and production patterns.

Reusing technology, sharing with community
McMaster’s ACCESS Tech IT Collection, Reuse, and Donation program accepts computers, smartphones, tablets and other technology from staff, faculty members and students. These items, that otherwise would end up in landfill, are wiped and refurbished for donation for those in need in partnership with a local non-profit. For the technology not suitable for donation, McMaster partners with a local business to safely recycle and dispose of the item. The program holds an annual technology collection event and a free pick-up of technology, organized by program collaborators including Academic Sustainability Program students and McMaster staff in facility services and University Technology Services. The university’s libraries also offer recycling bins for batteries, electronics and writing tools such as pens and highlighters. In 2018, McMaster diverted more than 8,500 pounds of electronic waste away from landfills through recycling, a three-fold increase year over year.

Ethically sourced products for the university
McMaster was an early adopter of a policy to ensure that suppliers of goods to the university conduct their businesses ethically. The Code of Labour Practices demands they pay dignified living wages, treat women equally, and safeguard health and safety. As well, as one of the first Canadian universities to be a signatory to The Okanagan Charter, McMaster has used this collective, international benchmark to promote the health of people, places and our planet.

Sustaining interest
Sustainability efforts on campus are bolstered by the growing number of students enrolled in some of the innovative academic sustainability programs offered at the undergraduate and graduate level. McMaster’s Interdisciplinary Minor in Sustainability offers more than 70 courses from faculties across campus. The Sustainable Future Program provides students with opportunities for interdisciplinary, student-led, community-based, and experiential education focused on sustainability. The student-led projects — which tackle everything from waste management practices to promoting a bike buddy program — are tagged in the program’s annual report with the SDGs they connect with the most.

Don’t waste energy, harvest it
Jim Cotton is a mechanical engineer who’s using his research to develop thermal and electrical systems that allow harvesting and sharing of energy that would otherwise be wasted. Cotton’s Integrated Community Energy and Harvesting (ICE-Harvest) systems embed integrated thermal and electrical generation, as well as storage, within communities, so they can be powered, heated and cooled in a way that’s cost-effective and carbon-reduced. ICE-Harvest captures waste heat from various parts of the community, like sports arenas, grocery stores, and big box centres, and transfers this energy to other buildings.

Eating green
The Choose To Reuse program encourages students, faculty and staff to use reusable mugs and green food containers — and get a discount on their beverage and food purchases — while dining on campus. The fee to join the program was $5, until Hospitality Services pushed to provide campus residents with a free Choose to Reuse membership card, resulting in a 294-per-cent jump in the use of the green eco-containers from 2018 to 2019.

Local, local, local
Hospitality Services defines “local” as grown or produced in Ontario. As a large institution with over 3.6 million meals served annually, the Wellness and Sustainability team recognizes the purchasing power that Hospitality Services has to further support a sustainable food system. In 2019, Hospitality Services added 194,000 compostable coffee cups and eliminated 1.3 million pieces of plastic cutlery. Also, disposable napkins used at campus facilities are made from 100-per-cent post-consumer recycled paper and are fully compostable.

Goodbye plastic, hello compostable cups
Dining facilities at the university use compostable cutlery, coffee cups, paper straws and take-out containers. Products are clearly labelled as compostable to encourage users to dispose of them in organic waste bins across campus. In 2019, Hospitality Services added 194,000 compostable coffee cups and eliminated 1.3 million pieces of plastic cutlery. Also, disposable napkins used at campus facilities are made from 100-per-cent post-consumer recycled paper and are fully compostable.

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“Climate change doesn’t have to be an insurmountable problem. The COVID-19 pandemic has proven we can quickly shift to a different way of living and working that significantly lowers greenhouse gas emissions. The question now is: Are we willing to make lasting sustainable changes?”

Professor Altaf Arain, Director, McMaster Centre for Climate Change

**Take urgent action to combat climate change and its impacts.**

**Exploring how carbon is stored**

Findings from McMaster’s Remote Sensing Laboratory show 405 billion tonnes of carbon is stored in ecosystems across Canada, according to a study led by World Wildlife Canada (WWF-Canada). And, as global temperatures rise and that land decomposes, or is disturbed by human intervention, that carbon could then be released into the atmosphere, accelerating climate change.

**Public perceptions and policy**

The McMaster University Centre for Climate Change connects science, technology and policy to deliver a broad range of local and global climate change solutions. Aside from understanding the impact of climate change, the centre’s goals include exploring perceptions of and responses to climate change, encouraging the application of science in meeting it head-on, and developing public policies to meet societal challenges caused by future climate change.

**A weather eye on sea ice**

In Canada’s arctic, the safety of Inuit and northerners depends on sea ice, and the movements of fish and caribou are part of daily life. In this environment, the effects of climate change are glaringly evident. But policymakers don’t always have the information, the resources or the will to consider the community’s experiences of climate change. Geographer Gita Ljubicic and her cross-disciplinary team at StraightUpNorth are closely involved with local communities, co-creating solutions that pair social and environmental research, and Inuit and scientific knowledge in decision making.

**Greener roads**

Climate change and environmental emissions are intertwined with economic prosperity and must be considered for the sustainability of the transportation industry and the planet. The McMaster Institute for Transportation and Logistics is a non-profit organization of private and public-sector investors that works with business and government partners to address challenges and brings together the resources, expertise and experience the industry desperately needs. The MITL’s key focus areas are research, education and outreach.

**University-wide Sustainability**

The focus on environmental sustainability runs through every part of the university, from innovative teaching and research, to the campus environment and operations. A snapshot of these collective measures to advance environmental sustainability within our institution, the communities that surround us and around the world was published in 2020 as McMaster’s inaugural university-wide Sustainability Report. McMaster’s Office of Sustainability is also presently facilitating the development of McMaster’s first institution-wide Sustainability Plan.

**Part of the change**

Hamilton has seen its shorelines battered by high winds, rising lake levels and extreme weather events. In 2019, the city joined dozens of municipalities across the country in declaring a state of climate emergency and set an ambitious goal to be 100 per cent carbon neutral by 2050. The city partnered with the W Booth School of Engineering Practice and Technology to convene a workshop to develop a concrete climate action strategy. The long-term collaboration will see McMaster students and researchers deliver a host of climate-related projects with the city.

**Money talks**

McMaster has pledged with several other leading Canadian universities to work together on climate change initiatives across invested assets, as part of Investing to Address Climate Change: A Charter for Canadian Universities. It agrees to incorporate environmental, social and governance factors into investment practices, and to regularly assess the carbon intensity of portfolios and set targets to reduce them. The university has also signed the United Nations Principles for Responsible Investment, committing to transparent measurement, carbon-reduction goals and reporting. As part of responsible investing practices, McMaster has pledged a 45-per-cent carbon reduction of the public equities within the investment pool by 2030.
Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

What fish can tell us
The Aquatic Behavioural Ecology Lab investigates the evolution of complex breeding systems, social behaviour, reproductive tactics and decision-making in animal societies, primarily using fish as subjects. Like humans, fish are vertebrates, and make good comparative model species to try to uncover the evolution of behaviour. As well, there is a great deal of economic interest in fish as a food resource, as a recreational sport and in the aquarium hobby. ABEL’s three main field locations are Lake Tanganyika — the second deepest lake in the world — in the East African Rift valley; Hamilton Harbour and Lake Ontario; and beaches in the Pacific Northwest.

Listening to Arctic voices
McMaster and Ottawa’s Carleton University are home to the OceanCanada Arctic Ocean Working Group, which covers Canada, Denmark, Norway, Sweden and the United States. The group’s key goal is the empowerment of community voices in the Arctic region, developing policy-relevant recommendations for protection, conservation and management of coastal and ocean resources. The United Nations University Institute for Water, Environment and Health — based out of McMaster — is also a member of OceanCanada.

Sustainably sourced fish on the menu
In 2019, Hospitality Services decided to no longer support the purchase of fish that was not sustainably sourced. An ordering guide was created for acceptable fish products, which include ASC, MAC and Ocean Wise certified products. According to the 2019 Wellness and Sustainability Overview, the university purchased 11,000 pieces of sustainably sourced salmon.

Impact of wastewater on aquatic life
Researchers in the Faculty of Science use the Cootes Paradise Marsh — a 1,482-acre marshland at the western edge of Hamilton Harbour — as a living laboratory to explore the impact of effluents and treated wastewater on aquatic life in the marsh. The team hosts information sessions in partnership with the Royal Botanical Gardens to increase public knowledge of water quality and raise awareness of research findings.

25 years of water development research body
The United Nations University Institute for Water, Environment and Health (UNU-INWEH), hosted at McMaster, is one of 13 UN universities, think tanks aimed at resolving pressing global concerns — in this case, water security. UNU-INWEH, which marks its 25th anniversary this year, is helping to bridge the gap between research and policy in the quest to make a difference in the lives of billions. It promises to continue to offer new insights, tools and solutions as the United Nations projects global water demand to increase by more than 50 per cent by 2040.

Back to the future of fisheries
The Fisheries Archaeology Research Centre investigates long-term trends in fisheries production resulting from environmental change and human exploitation. The work helps address current concerns with global climate and environmental change and the effects of overfishing in different parts of the world. One major ongoing research program monitors 10,000 years of fish and shellfish use on the coast of British Columbia. A second major area of ongoing research concerns the effect of human colonization in Polynesia on the production and productivity of reef fisheries.

Saving wetlands through citizen science
iWetland, out of the McMaster Ecohydrology Lab, draws information from automated and crowdsourced monitoring stations in the Georgian Bay Biosphere Reserve, the world’s largest freshwater archipelago. Working with provincial parks and First Nations communities, the team hosts events to raise awareness of wetland ecosystems, species at risk and the iWetland citizen science initiative. It also installed a weather station in the Magnetawan First Nation, training MFN staff to operate the equipment.

Something to talk about
Ohneganos: Let’s Talk Water is a student-led YouTube show hosted by McMaster Indigenous Studies student Makasa Looking Horse that shares stories, art and film. Episodes feature interviews with knowledge keepers, scholars, artists, musicians and activists interested in issues related to climate change, water and Indigenous well-being. A Facebook Live component encourages viewer participation. The show also seeks to engage advocates under 25 with smaller social media initiatives. Ohneganos is a McMaster University and Six Nations project supported by Global Water Futures.

Fighting big problems by going small
A team of researchers in the department of chemical engineering is looking for solutions to large environmental problems using very, very small materials: nanoparticles. One project is a Global Water Futures initiative to resolve the issue of water quality on Six Nations of the Grand River. Along with analyzing the contaminants in the water, they’re developing nanocomposite membranes that not only filter water, but also resist getting clogged with biofilms, bacteria and other foulants.

"This land and the water is everything to our people. We feel strongly about protecting our ways of knowing and our land and our water for future generations.”
Professor Dawn Martin-Hill, 2022 University of Oklahoma International Water Prize recipient
Nature in our backyard

McMaster’s historic campus sits on 350 acres in Hamiltion and offers nearby waterfalls, valleys, meadows, wetlands and forests to explore in Cootes Paradise, McMaster Forest, Webster’s Falls and the Niagara Escarpment, a UNESCO biosphere reserve since 1990. Nature at McMaster assists with the land management of natural areas related to trails and invasive and native species management on the university’s property, runs hiking events, stewardship projects and offers classroom and outdoor learning programming.

McMarsh and Watershed Trust

The McMarsh project was initiated several years ago as a university-wide collaboration aimed at restoring an ecologically sensitive wetland located on Parking Lot M in the west campus. McMarsh is a further expansion of a 30-metre buffer that was established around Parking Lot M in 2017 when 140 native trees and shrubs were planted where paving was removed to reduce the amount of runoff into nearby Coldwater Creek. McMarsh is now part of a larger project which is reimaging a broader portion of the west campus. The Watershed Trust is currently being co-led by the Faculty of Humanities and the Faculty of Science and allows for opportunities for experiential learning and integrated campus community projects in this area of the campus. Plans for McMarsh are currently being reviewed and the Watershed Trust initiative will be explored in more detail through the Campus Master Planning process to begin in the coming year.

Conservation strategies

Geographers at the School of Earth, Environment and Society are investigating how forest ecosystems in southeastern Canada function and respond to climate change and extreme weather conditions. Extensive land use changes, agricultural activities and forest harvesting in the Great Lakes region are putting pressure on water resources, as are more frequent extreme weather events and climate change. Funded by a Global Water Futures grant that supports a multidisciplinary team of researchers from multiple universities and other collaborators, the project is intended to help guide municipalities and conservation authorities in developing watershed management strategies to account for shifts in land use and climate change.

McMaster University Sustainable Development Goals Report 2021

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss.

McMaster is a proud home of over 75 solitary bee homes and counting! In 2021, students from a third-year Academic Sustainability Program class project (SUSTAIN 3S03 – Implementing Sustainable Change) successfully supported McMaster’s application to become a certified Bee City Campus. McMaster SUSTAIN students and Facility Services are committed to continue protecting pollinators by adding new elements to bee related projects on campus yearly.

Bee City Campus

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Out of the classroom, into the community

Students in SUSTAIN 3S03 – part of McMaster’s interdisciplinary Sustainable Future Program – take part in community-based, experiential research that places local knowledge and action within a global context. Projects in 2019-2020 have included work with Hamilton’s Community Permaculture Lab, a survey of hand-made bee habitats on campus and planting more than 100 trees on campus, while also removing more than 100 invasive species. It’s anticipated that more than 1,000 students will complete a SUSTAIN course in the 2020-2021 academic year.

Dry peatlands add to fire risk

International research led by McMaster scientists Mike Waddington and Manuel Helbig has pinpointed dramatic differences in the ways boreal forests and peatlands regulate water loss. The problem is, most global climate models assume all biome is trees, not the spongy bogs and fens of peatlands, which are prone to drying out as the climate warms. Drier peatlands mean bigger, more intense fires that can release vast amounts of carbon into the atmosphere, accelerating global warming.

Forest for the trees, and everything else

The 115 acre McMaster Forest has been designated by the McMaster Senate and the Board of Governors as environmentally significant natural land to be used for ecologically sensitive teaching, research and recreation purposes. It is an incredibly biodiverse area of mixed forests, old-growth forests, wetlands, meadows, creeks and prairie. Many undergraduate courses use the property, and it’s the site of undergraduate and graduate research projects. The public is welcome to visit the forest.
Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

**Leading Globally Engaged Universities program**
As part of the university’s commitment to global engagement, McMaster is an active member of the International Association of Universities. In May 2018, McMaster hosted the fifth session of the IAU’s Leading Globally Engaged Universities program, a leadership training program. It was the first time this program was held in North America. Attendees came from Colombia, Haiti, Ghana, Romania, South Africa, Thailand, the U.K., the U.S., as well as from across Canada. The program recognizes the important role higher education institutions can play in the development of sustainable and democratic societies.

**Peace and reconciliation**
Olive Wihouh, Associate Professor in the School of Nursing at McMaster University, is co-lead for the Teaching and Learning working group of the Commonwealth Peace and Reconciliation Network. The network brings together an interdisciplinary collective of academics, researchers and professional staff from more than 40 universities across the Commonwealth who work in the fields of peace, truth, justice, and reconciliation. Knowledge, capacity and resources can be shared through the network to engage in activities that have a direct impact on university practice and the wider world.

**Eyes and ears for the UN**
In his role as chair of the UN Expert Mechanism on the Right to Development, Bonny Ibhawoh — who holds the university’s Chair in Global Human Rights — works to monitor, evaluate and report on conditions around the world related to the rights of individuals and countries to freely enjoy economic, social, cultural and political progress.

**Curriculum for Peace**
The interdisciplinary Peace Studies program is concerned with war and peace, violence and non-violence, conflict and conflict transformation. By focusing attention on problems of conflict, particularly of a violent nature, researchers attempt to improve our methods of analyzing and dealing with these problems. The university also hosts the Hope Chair in Peace and Health. As well as teaching and conducting research, the chair works collaboratively to establish on-campus and community events and programs.

**Playing a national advisory role in Canada’s response to COVID-19**
McMaster researchers are taking leadership roles in Canada’s response to the COVID-19 pandemic – from serving on national task forces to conducting research that will influence public policy. Charu Kaushic, professor and scientific director of the Canadian Institutes of Health Research’s Institute of Infection and Immunity, is on the national COVID-19 Immunity Task Force, which is charged with establishing priorities and overseeing testing to determine the national spread of the virus. Several researchers also serve on federal panels advising on other elements of the pandemic response.

**Innovation in government**
Participedia: A Global Partnership to Create and Mobilize Knowledge About Democratic Innovations examines public participation in governance and what forms work best for specific problems and issues, under specific circumstances. The research team, which includes McMaster Chair of Global Human Rights Bonny Ibhawoh as a co-investigator, aims to map this rapidly developing domain of political innovation to create the information base necessary for high-quality research and evidence-based public policy practice.

**Celebrating Gandhi**
The Gandhi Peace Festival is held annually on the weekend closest to the day of his birth, Oct. 2. The festival is intended to promote non-violence, peace and justice, to support local peace and human rights organizations, and to draw attention to and encourage dialogue about issues around the world. It is co-sponsored by the India-Canada Society of Hamilton and the Centre for Peace Studies, and is twinned with the annual Mahatma Gandhi Lectures on Non-violence. In 2020, the theme of the festival was Black Lives Matter, while the 20th annual lecture explored the topic From the Civil Rights Movement to Black Lives Matter.

**A better neighbourhood, a better city**
McMaster University has a main campus in west Hamilton bordered by three residential neighbourhoods and multiple sites in the heart of downtown Hamilton, in Burlington and other communities. Therefore, strong working relationships between McMaster and its surrounding communities are paramount to supporting the vitality and well-being of the university and greater Hamilton area. The President’s Advisory Committee on Community Relations provides an open forum for respectful dialogue and ongoing collaboration between the university and our neighbours. As part of the Hamilton Anchor Institution Leadership, McMaster collaborates with the city’s other large public- and private-sector members to address Hamilton’s complex challenges.
Manufacturing processes.

Engineering students work with industry partners and have the opportunity to work on hands-on projects to improve individual manufacturing processes.

The Learning Factory is a world-class facility that simulates the factory of the future with advanced manufacturing technologies. Engineering students work with industry partners and have the opportunity to work on hands-on projects to improve individual manufacturing processes.

Evidence, Insight, Action.

Now in its 13th year, the McMaster Health Forum is designated as the WHO Collaborating Centre for Evidence-Informed Policy. The Forum’s goal is to generate action on the pressing health-system issues of our time. It strengthens health systems — locally, nationally and internationally — and gets the right programs, services and drugs to the people who need them.

Partners in global health

The university has more than 1,900 partnerships with faculty, institutions and communities in 247 countries and regions. The Global Health Office works with many of these partners to find new and innovative solutions to critical global health problems. As a result of its efforts, McMaster has advanced the education of women health professionals in Pakistan, improved the health of vulnerable people in Indonesia, and, most recently, worked to improve access to higher education in underserved communities in the Far North of Canada and Norway. The university’s School of Nursing is designated a PAHO/WHO Collaborating Centre, which focuses on global priorities in primary health care.

McMaster has student exchange agreements with more than 100 postsecondary institutions worldwide.

Strengthen the means of implementation and revitalise the global partnership for sustainable development.

Global Nexus for Pandemics and Biological Threats

McMaster launched the Global Nexus for Pandemics and Biological Threats to ensure Canada and the world are better able to manage the human and economic devastation of COVID-19 and avert future pandemics. Led by McMaster researchers from many disciplines, the Global Nexus is developing an international network of scientists, clinical health and medical specialists, engineers, social scientists, history and policy researchers, economics and business experts devoted to one goal: preventing future pandemics and mitigating global health threats like antimicrobial resistance. The innovative network has already garnered international attention, and government and philanthropic support for its approach in its first few months.

McMaster, the United Nations and Global Water Futures

McMaster is the only university in Canada to serve as host and partner to a United Nations University through the Institute for Water, Environment and Health (UNU-INWEH) which acts as the UN think tank on water. Researchers at McMaster play a key role in Global Water Futures, a collaboration driven by four major institutions to transform the way communities, governments and industries in Canada and other cold regions of the world prepare for and manage increasing water-related threats. GWF is the largest university-led freshwater research program ever funded worldwide, in part with a $77.8-million grant from the Canada First Research Excellence Fund. In 2020, GWF extended funding for two McMaster projects and awarded three new projects funding from a total $2.4 million. The UNU-INWEH recently received a $10-million funding extension from the Canadian government.

Harnessing expertise

As a member of Universities 21 (U21), McMaster University participates in a leading global network of research-intensive universities that has helped more than one million students and 200,000 staff. U21 facilitates the delivery of programs, activities and initiatives that could not be reached through a single university or via bilateral agreements. RISE (Real Impact on Society and Environment) is U21’s international showcase of student achievement in sustainability and social innovation. In 2019, a McMaster student took one of the four RISE prizes with Guided Hands, a product that helps those with limited fine motor skills complete everyday tasks, such as writing, painting and fully participating in school and society.

Making connections

The McMaster Global annual showcase turns the spotlight on the university’s mission to make global engagement in education and sparking ideas an integral part of its presence in Canada and the world. A host of free activities, lectures and workshops are open to all. McMaster Global is engaged in international partnerships that involve research collaboration, faculty exchanges, student exchanges and mobility agreements and joint supervision of doctoral students.
Established in 2015, the United Nations Sustainable Development Goals set out a vision for countries and institutions worldwide to come together in a concerted effort to end poverty, reduce inequalities, improve health and education, and advance sustainability and economic growth while addressing climate change.

In 2019, Times Higher Education introduced its Impact Rankings, which measure universities’ contributions in support of the UN SDGs. In 2021, McMaster University ranked 14th globally and 3rd among Canadian Universities, demonstrating McMaster’s commitment to advance human and societal well-being locally and globally.

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McMASTER IS A UNIVERSITY WITH IMPACT

We are ranked among the top 80 universities globally and, through our cutting-edge research and world-class teaching and learning, we are focused on advancing human and societal health and well-being – in our community and around the world.

As the pioneers of problem-based learning, we have a rich history of educational innovation. As Canada’s most research-intensive university, we work across disciplines to find creative solutions to complex problems, helping to improve people’s lives and build a brighter future for all.

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