IC-IMPACTS

Building Healthy Communities in Canada & India

2013-2014 ANNUAL REPORT

NCE RCE

Networks of Centres of Excellence of Canada | Réseaux de centres d'excellence du Canada

Our *Vision*

Working hand-in-hand with communities in Canada and India, IC-IMPACTS and its partners will develop and implement community-based solutions to the most urgent needs of each nation: poor water quality, unsafe and unsustainable infrastructure, and poor health from water-borne and infectious diseases. By helping communities overcome these urgent problems, IC-IMPACTS will create Healthy Communities in both nations through improved health and longevity, increased economic prosperity, and positive social change.

Our *Mission*

Driven by a commitment to research excellence and partnership, IC-IMPACTS will deliver a new model for international collaboration that ensures on-the-ground change in local communities.

IC-IMPACTS will be a portal for multisector engagement between Canada and India, providing new pathways for leadership in commercialization and innovation, and enhancing the competitiveness and prosperity of their industrial sectors.

IC-IMPACTS will reaffirm Canada's and India's international reputations for leadership in research and innovation through an impact-focused research program that demonstrates clear benefits to partner communities, industrial sectors, and capacity-building initiatives. This will provide a firm and collaborative foundation for partnership between the two countries enabling them to look to each other to advance their innovation economies in the future.

By providing real-world experiences in implementing solutions in community contexts, IC-IMPACTS will train and equip a generation of entrepreneurial researchers and innovators with essential skills in research, innovation, commercialization, and leadership. These "innovation leaders" will continue the work of IC-IMPACTS around the world, driving knowledge economies and enabling enduring social change.

Table *of Contents*

Highlights *of Success*

84 PARTNERS

158 RESEARCH INVESTIGATORS

6 COMMUNITIES ENGAGED

2 Communities in Canada

4 Communities in India

Highlights *of Success*

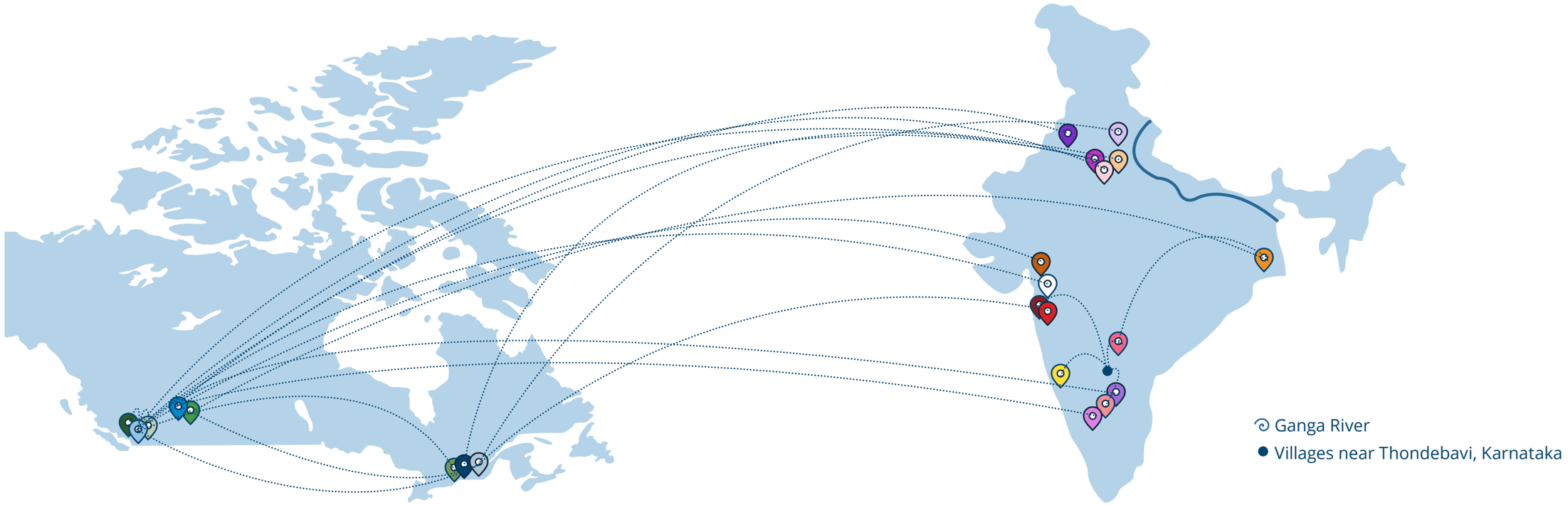
9 PROJECTS FUNDED

94 HIGHLY QUALIFIED PROFESSIONALS

8 WORKSHOPS DELIVERED

44 Students in Training

50 Professional Practitioners Trained



- McMaster University
- The University of Alberta
- The University of British Columbia
- The University of Toronto
- BI Pure Water Canada
- Stantec Inc.
- GE Water, North America
- Aboriginal Affairs and Northern Development Canada (BC)
- ACC Limited
- Brick & Byte Innovative Products
- FOSROC International
- GE Water, India
- Rashtriya Ispat Nigam Limited (RINL)
- SkillNet Solutions India
- Rural Agency for Social and Technological Advancement (RASTA)
- Baba Farid University of Health Sciences
- Indian Institute of Science, Bangalore
- IIT Roorkee
- IIT Bombay
- National Institute of Engineering
- Starmass Environmental Technologies
- National Environmental Engineering Research Institute
- IT Innovations for Masses

Executive *Summary*

Above: IC-IMPACTS researchers and industry members assessing a thermal power plant in Bathinda, India.

IC-IMPACTS, the India-Canada Centre for Innovative Multidisciplinary Partnerships to Accelerate Community Transformation and Sustainability, brings together expert researchers, industry innovators, community leaders, government agencies, and community organizations, to work hand-in-hand to find solutions to the key challenges that affect the quality of life of millions of people in Indian and Canadian communities.

The Centre's signature "partner community" strategy is designed to provide IC-IMPACTS with key insights into the needs of communities and the ways in which the water-infrastructure-health nexus can be tackled to make significant improvements in the livelihoods and wellbeing of community members. The 2013-2014 fiscal year is bringing shape to this strategy and allowing IC-IMPACTS to see the need for a broadening of this concept to allow for demonstration initiatives within larger urban contexts and even to watersheds such as the Ganges River basin. Thus, the increasing diversity of "partner community" contexts will enable IC-IMPACTS researchers to evaluate the scalability and transferability of their technology solutions in a much more extended fashion than originally imagined.

Excellence of the Research Program: IC-IMPACTS research agenda is focused in three strategic areas: Safe and Sustainable Infrastructure, Integrated Water Management, and Public Health. Significant progress has been made in the Safe and Sustainable Infrastructure and Integrated Water Management themes. In total, nine projects have been launched by IC-IMPACTS and the first technologies are nearing readiness for deployment into IC-IMPACTS partner community contexts within the next year. The Public Health theme underwent a redevelopment in the past year to better meet the needs and challenges of communities in Canada and India, to better intersect with the water and infrastructure themes, and to provide the opportunity for deployable health improvements within community contexts within the next three years. It has been a year of tremendous positioning for the health theme as a joint research workshop with Baba Farid University of Health Sciences has led to a "Water for Health" initiative that will bring about IC-IMPACTS first significant joint partnership with the Department of Biotechnology in India to support Indian researchers. Moreover, the refocusing has made the health theme better positioned to serve First Nations communities in Canada, and the first stage of a research initiative in the area of remote community health challenges has been developed and will take place in summer 2014 in the Dene Tha' First Nation in Alberta.

In 2013/2014, IC-IMPACTS launched its first Call for Proposals open to sociological, interdisciplinary and cross-thematic research that will support (i) Research into approaches or frameworks for successful application and community adoption of new technologies in remote and rural contexts; (ii) Sensor and monitoring technologies that bridge any two or more of IC-IMPACTS core infrastructure, water and public health themes; and (iii) Research into successful building of community based health awareness that will support technologies developed in the foci of IC-IMPACTS Public Health and Water Management themes. These projects strategically reinforce the impacts of research and innovation activities from IC-IMPACTS three core themes.

Executive *Summary*

Knowledge Mobilization and Exchange: The ability to deploy new technologies directly into partner communities in Canada and India is a cornerstone of the IC-IMPACTS strategy to create healthy communities with social and economic benefits. Importantly, IC-IMPACTS also aims to serve as a facilitator of existing technologies and expert know-how that can be brought to bear on the challenges faced in Indian and Canadian communities, industrial sectors, and national contexts. In the 2013-2014 fiscal year, IC-IMPACTS held eight (8) workshops, collaboration meetings, and site visits in India. Through these events, IC-IMPACTS researchers and industrial leaders from Canada and India shared their expertise and ideas. Industry leaders from Canada visited the Vizag Steel Plant to have a first-hand understanding of water contamination and infrastructure corrosion challenges. Indian road experts – ACC Limited, FOSROC International, RASTA, and NIE – worked with Stantec Inc., Starmass Environmental Technologies and Canadian researchers to develop a new initiative in alternative pavements for rural road surfaces. Canadian water treatment experts including Trojan Technologies, FP Innovations, Clearford and WaterTap shared their solutions and expertise with the National Mission for Clean Ganga, the outcome from which will be the establishment of a "test-bed" environment for existing and newly developed water technologies to aid in the restoration of the health of the Ganga River and provide economically effective solutions to Indian industry waste water output.

Networking and Partnership: IC-IMPACTS began as a partnership of three of Canada's leading research universities (The University of British Columbia, University of Alberta, and University of Toronto), and internationally reputed academic institutions in India. The 2013-2014 fiscal year saw the expansion of IC-IMPACTS into a fully pan-Canadian Centre of Excellence that will now brings together the strengths of research experts from across the country. Similar extension to Indian academic institutions has also occurred so that IC-IMPACTS is now truly a Centre involving two nations.

The 2013-2014 fiscal year for IC-IMPACTS also witnessed significant headway in developing meaningful partnership with the Government of India. Of great success was the co-hosting of a workshop in February 2013 with the National Mission for Clean Ganga of the Ministry of Environment and Forests. Equally significant was the development of an initiative with the Department of Biotechnology to design a jointly funded research program in the area of Water for Health biotechnologies, to be unveiled in the 2014-2015 fiscal year.

Development of HQP: With the launch of research projects, IC-IMPACTS graduate training program also unfolded. Forty-four (44) graduate students at the Masters, Doctoral and Post-doctoral levels are now active researchers within the IC-IMPACTS network. IC-IMPACTS also launched in partnership with Engage North of the University of Alberta the Community Engagement Fellowship Program. This new program in Canada provides undergraduate and graduate students the opportunity to work on community-identified projects in remote northern Canadian and First Nations communities. Additionally, the 2013-2014 fiscal year also saw IC-IMPACTS commence its professional practitioner training activities with the delivery of lectures and case studies in Fibre Reinforced Polymers (FRPs) to 50 members of the concrete engineering community in Bangalore.

Through these various initiatives, IC-IMPACTS trained 94 individuals and is well on its way to reaching its goal of training 700 students, researchers and professional practitioners within a five year period. The trained "innovation leaders" will form the backbone of Canada and India's economic growth strategies in key areas including: clean drinking water, low-carbon and safe infrastructure, and public health and infectious disease prevention and treatment.

Strengthening Canada-India Collaborations: The vision of IC-IMPACTS is to become a new model for international collaboration that ensures on-the-ground change in local communities. This vision is driven by a commitment to research excellence and partnership between academic institutions in India and Canada in areas of critical importance to both countries. Together, the world-leading research institutions and their partners will enhance Canada's profile as a global leader in international development and research innovation, and India's well deserved reputation for research excellence and global talent development. As IC-IMPACTS generates research innovations, new industrial ventures will emerge around them that will significantly strengthen industrial sectors in both nations. Ultimately, IC-IMPACTS will deliver tangible results to support Canada and India's joint commitment to healthy communities, by bringing positive social change, health and longevity, and economic prosperity to millions of people in both nations.

A Message from the Honourable Roy Maclaren
Chairman of the Board of Directors

I am pleased to report that IC-IMPACTS' first full year of operation has proven to be a productive one. With its mandate in mind, IC-IMPACTS has worked with communities, researchers, industry innovators and government agencies in India and Canada to implement solutions to challenges affecting the quality of life for both Canadians and Indians. It is the strategy of IC-IMPACTS to demonstrate technologies in selected partner communities in both Canada and India, and I am gratified to report that significant progress has been made to this end.

IC-IMPACTS is currently funding nine Canada-India projects, catalyzing research and supporting forty-four masters and doctoral level students, and collaborating with more than eighty industrial, NGO and academic partners in both nations. Additionally, approximately 160 experts in the areas of infrastructure, water and health have been mobilized to advance these efforts.

Here in Canada, in partnership with Engage North at the University of Alberta, IC-IMPACTS has launched the Community Engagement Fellowship Program. This program provides undergraduate and graduate students the opportunity to work on community-identified projects in remote northern Canadian and First Nations communities. In the year ahead, we look forward to a more comprehensive, strategic and engaged approach to enhance opportunities for Canadian industrial participation and the identification of community showcases. This will be done as we unfold a targeted Canadian engagement strategic plan in 2014/2015.

In India, significant advancements have been made in engaging Indian organizations in all sectors – industry, academic, government and communities. Recently, India's Department of Biotechnology confirmed its participation in a jointly-funded research partnership with IC-IMPACTS, partnering in a joint call for proposals totaling $3 million. This is a substantial development, representing the first official joint-funded research partnership with IC-IMPACTS by an Indian government agency.

Key partnerships have also been established between IC-IMPACTS and the National Mission for Clean Ganga, Rashtriva Ispat Nigam Limited, and Baba Farid University of Health Sciences in Faridkot. Notably, new partnerships between Canadian and Indian industry have also unfolded, with significant collaborations now developing with Stantec Inc., Starmass Environmental Technologies, FOSROC International, ACC Limited, and RASTA, which will be working on a joint project for alternative pavements in the Thondebavi region.

These significant accomplishments could not have been done without the hard work and commitment of a dedicated team, led by CEO Dr. Nemy Banthia and COO Ms. Sue Roppel. I also want to acknowledge the noteworthy contributions of the Scientific leads from the three lead institutions: Dr. Stewart Aitcheson (University of Toronto); Dr. Sushanta Mitra (University of Alberta) and Dr. Nemy Banthia (University of British Columbia). My thanks to them and the committed scientists from across Canada and India, all of whom have contributed to a most successful first full year for IC-IMPACTS.

Sincerely,

The Honourable Roy Maclaren, PC
Chairmain of the Board of Directors
IC-IMPACTS Centres of Excellence

A Message from Dr. Nemy Banthia
CEO & Scientific Director

During the 2013-2014 fiscal year, IC-IMPACTS has made great headway in achieving its overall vision to create healthy communities in Canada and India through world-leading research, innovative training, signature partner communities and multi-sector partnerships.

Over the past year, IC-IMPACTS formally launched its research program and has since funded nine research projects that will significantly advance knowledge in Safe and Sustainable Infrastructure and Integrated Water Management, creating new rapid detection and low-resource water quality monitors, water treatment technologies and innovative low-carbon materials as well as new structural health monitoring techniques, condition assessment tools and strengthening systems that together will lead to safer, more sustainable civil infrastructure and preservation of heritage buildings.

IC-IMPACTS innovative multi-sector partnership strategy came to life in 2013-2014 with new collaborations involving departments of the Government of India, industrial companies, community organizations, and universities. Highlights in partnership development include the creation of a new Community Engagement Fellowship Program with Engage North at the University of Alberta which sees undergraduate and graduate students tackling community-driven projects in the Dene Tha' First Nation, Alberta, and Hamlet of Pangnirtung, Nunavut.

In India, IC-IMPACTS partnered with the National Mission for Clean Ganga (NMCG) to co-host a stimulating workshop discussing industrial wastewater treatment, water quality monitoring and watershed remote sensing and GIS applications for the Ganges River basin, the outcome from which was the creation of a four-point action plan that will help identify solutions to the Ganga River's contamination from industrial sectors. Further, a workshop with Baba Farid University of Health Sciences seeded a new initiative with the Department of Biotechnology to create a joint call for water and health biotechnologies.

The 2013-2014 period was also defined for IC-IMPACTS by engagement with the industrial sectors of Canada and India. Canadian and Indian companies participated in site tours to Thermal power and Steel Plants in India, shared their expertise in workshops and professional training of practicing engineers, and came together to define a novel alternative pavements project which will unfold in a village near Thondevabi, Karnataka. Canadian and Indian industrial partners have also come aboard many of IC-IMPACTS research projects and they will help shape the innovations of the next three years and serve as important catalysts and leaders for research deployment activities in IC-IMPACTS partner communities.

Looking ahead to the 2014-2015 fiscal year, IC-IMPACTS will continue to fund new, innovative projects and will connect with communities to find collaborative solutions to infrastructure, water, and health-related issues.

It is rewarding and humbling to see how much the investigators and partners of the IC-IMPACTS Centres of Excellence have accomplished in a single year. It is my honor to serve as the Chief Executive Officer and Scientific Director of this Centre. I would like to thank the members of our Board, Research Management Committee, scientific leaders, staff, researchers, and students for all of their hard work and accomplishments.

Sincerely,

Dr. Nemkumar (Nemy) Banthia
Chief Executive Officer
& Scientific Director

Research Focus
Safe & Sustainable Infrastructure

Civil infrastructure is the foundation of a community and is critical for the health, safety and prosperity of citizens. To tackle infrastructure challenges in its partner communities, IC-IMPACTS has developed a holistic research program that interconnects to the overall water and health themes of the Centre.

New technologies selected for development will improve the quality of drinking water, prevent intermixing of drinking and waste water systems, and strengthen water infrastructure against damage from seismic activity and corrosion due to more frequent severe weather events induced by climate change.

Projects under this theme will also substantially improve the health of populations by reducing air pollution from cement manufacturing and addressing water contamination.

IC-IMPACTS is working to produce greener concrete by incorporating industrial and agricultural waste into the production of concrete. Fly-ash and pond-ash waste from thermal plants, and recyclable fibers from agricultural waste are used to produce a concrete that uses less cement and is reinforced by natural materials. IC-IMPACTS is also developing innovative, non-destructive techniques to test the degradation of concrete structures, and developing nanotechnology to prolong the life of rapidly decaying wastewater infrastructure.

IC-IMPACTS researchers are investigating the use of Fiber-Reinforced Polymers (FRPs) to strengthen and repair deteriorating structures, protect structures from future seismic activity, and to conserve heritage sites.

Above: Theme Lead Dr. Nemy Banthia and Danush Doongaji from Stewols Limited visit and assess concrete columns in Nagpur, India.

Canada's infrastructure deficit is estimated at $123 billion and is growing annually by $2 billion. India's investment in infrastructure has doubled in the past five years (4% to 8% of GDP) and is expected to require a further $1 trillion over the next 5 years.

Federation of Canadian Municipalities (2007); The Economic Times (2011)

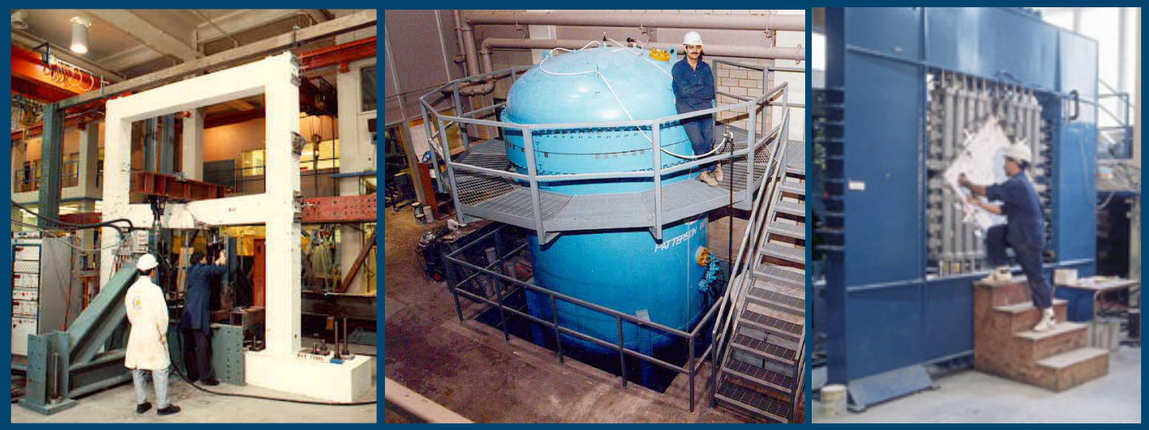
Funded Projects

1. **Conservation of Heritage Masonry Structures Within Cauvery Basin Waterworks**
   Led by Dr. Vivek S. Bindiganavile, University of Alberta
   Collaborating with Dr. Narayana Suresh, National Institute of Engineering

2. **Sustainable Infrastructure Using Smart FRPs**
   Led by: Dr. Shamin A. Sheikh, University of Toronto
   Collaborating with Dr. Frank Vecchio, University of Toronto; Dr. Umesh Sharma, IIT Roorkee; Dr. Pradeep Bhargava, IIT Roorkee

3. **Modeling and Assessment of Deficient and Repaired Structures**
   Led by Dr. Frank Vecchio, University of Toronto
   Collaborating with Dr. Shamim A. Sheikh, University of Toronto; Dr. Pradeep Bhargava, IIT Roorkee

Project Spotlight



Above: Researchers test and measure the strength of structural columns using physical tests in Toronto, Canada.

Reinforced concrete structures, if properly designed and maintained, will typically meet strength and serviceability criteria in a safe and efficient manner over the intended life of the structure. Situations often arise, however, where design codes or construction standards were not properly followed or where insufficient attention was given to maintaining the structure. In such cases, the safety and serviceability of the structures are at risk. This is particularly true if the structure is subjected to uncommon or extreme loads, if the codes used for the design have been improperly applied or circumvented, or if the structure is deteriorating, for example due to corrosion of steel, and in need of rehabilitation. With aging infrastructure, the need exists for analytical tools providing advanced assessment capabilities so that safe and economical remedial actions can be taken if necessary. Common commercial software packages are typically of little use in this regard.

Dr. Frank Vecchio of the University of Toronto and Dr. Pradeep Bhargava of IIT Roorkee are developing state-of-the-art analysis tools for concrete structures. They are working on improving modelling software that will accurately assess the performance of deficient concrete structures, particularly those that are showing distress due to corrosion of the reinforcement or deterioration of the concrete. Developing practical tools applicable to the challenges faced by engineers in Canada and India today is a crucial step in ensuring safe and sustainable infrastructure is being developed.

Research Focus
Integrated Water Management

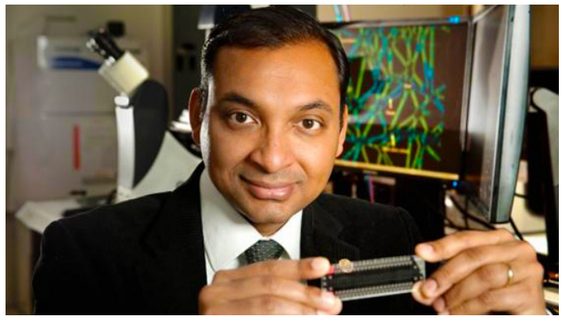
Access to safe drinking water is fundamental to human survival and yet it is one of the world's greatest challenges. Finding new water solutions for Indian and Canadian communities is an urgent priority. IC-IMPACTS is developing, testing, and implementing new water quality sensor technologies to monitor and evaluate the health of water and developing new technologies for treating both potable and waste waters.

It is critically important to not only develop low-resource technologies but to also consider the contexts in which they will be deployed. Rural Canadian communities have varied water treatment facilities and many rely solely on ground wells, making water supplies susceptible to contamination from farm runoff or ground contaminants such as arsenic.

A significant factor to consider in developing water-sensing and treatment technologies is the instability and unreliability of the electricity supply. Accordingly, the IC-IMPACTS Integrated Water Management theme will also focus upon novel approaches to providing consistent, stable, and affordable power to ensure the effective operation of water sensing and treatment solutions.

Above: Waste littered in an open water source in Mumbai, India.

In India, the complexity of contamination, which often includes pathogenic, inorganic, metal, and industrial byproducts, represents unique challenges in developing water systems. To improve upon existing water monitoring technologies and processes, IC-IMPACTS is developing innovative sensors to monitor diseases, and organic and inorganic contaminants. These sensors will be connected to data management units that will wirelessly communicate sensor data to relevant authorities, creating early warning systems for contaminated water sources. These water monitoring units are being designed for ultra low power use for greater reliability in the field.



Above: Dr. Sushanta Mitra is leading the water theme forward

IC-IMPACTS is also creating innovative water treatment solutions by using bioreactors with engineered nanoparticles and electrocoagulation to remove contaminants and heavy metals. These water treatment units are also being designed for low power use and may use organic photovoltaics as a power source.

IC-IMPACTS is working to develop solutions for improving water quality and human health that will recognize both the resource constraints of partner communities and the long-term potential of communities around the world to use the technologies.

> 768 million people in the world, approximately one tenth of the world's population, do not have access to safe water.
>
> *World Health Organization (2013)*

Funded Projects

1. **Development of an ICT Platform for Water Quality Monitoring**
   Led by Dr. Clarence W. de Silva, The University of British Columbia
   Collaborating with Dr. Shamim A. Sheikh, University of Toronto; Dr. Arun K. Pande, IT Innovation for Masses; Dr. Sagarika Damle, SkillNet Solutions India

2. **High Quality Potable Water for Small/Remote Communities in Canada and India**
   Led by Dr. Pierre Bérubé, The University of British Columbia
   Collaborating with Dr. Madjid Mohseni, The University of British Columbia; Dr. Paul Schüler, GE Water, North America; Dr. George Thorpe, BI Pure Water Canada; Mr. Danny Higashitani, Aboriginal Affairs and Northern Development Canada, British Columbia; Dr. Hoshang Subawalia, GE Water, India; Dr. Pawan Labhasetwar, NEERI, India; Dr. Manish Rahate, NEERI, India; Dr. Param Pal Sahota, Baba Farid University of Health Sciences

3. **Quantum Dot Solar Panels for Water Treatment in Remote Settings**
   Led by Dr. Edward Sargent, University of Toronto
   Collaborating with Dr. Xihua Wang, University of Alberta; Dr. Arun Pande, Brick & Byte Innovative Products; Dr. Prashant Kamat, Brick & Byte Innovative Products

4. **Microfabricated, Low-Cost, High-Sensitivity Chlorine and pH Sensor Systems for Water Quality Monitoring**
   Led by Dr. M. Jamal Deen, McMaster University
   Collaborating with Dr. P. Ravi Selvaganapathy, McMaster University; Dr. Raja Ghosh, McMaster University; Dr. Ali Q. Contractor, IIT Bombay; Dr. Soumyo Mukherji, IIT Bombay

5. **Handheld P-LAPS Pathogen Detector**
   Led by Dr. Thomas Thundat, University of Alberta
   Collaborating with Dr. Zubin Jacob, University of Alberta; Dr. Pradeep Nair, IIT Bombay; Dr. R. Pratap, IIS Bangalore

6. **A Nanotechnology Enabled Device for the Detection of Harmful Bacteria in Drinking Water**
   Led by Dr. Michael J. Serpe, University of Alberta
   Collaborating with Dr. Soumyo Mukherji, IIT Bombay

Project Spotlight

Above: Devices identifying contaminated water using a colour change being developed in Alberta, Canada.

Poor sewage infrastructure often leads to the contamination of suface waters - the most common being E. Coli. Consuming water infected with E. coli can lead to many complications, most commonly diarrhea, which can ultimately lead to death.

To combat this problem, communities offer a communal water supply - a water container from which the community inhabitants draw from. Although water in these containers are treated by boiling before use, the water can easily become re-contaminated and may infect several community members at once. A method to determine whether a source of water has been contaminated with harmful bacteria would be a major breakthrough for improving community health and saving lives.

Dr. Michael J. Serpe of the University of Alberta and Dr. Soumyo Mukherji of IIT Bombay are currently developing an inexpensive and easy to use device for the detection of harmful bacteria in water. Different visual colors are being used to communicate the safety of community water sources, allowing for quick responses to the exposure of unsafe water.

The United Nations reports that more than one in six people worldwide – 894 million people – do not have access to improved water sources that are imperative to meet basic needs such as drinking, cooking, and cleaning. The creation of this device has the potential to save millions of lives around the world.

Research Spotlight
Public Health

The IC-IMPACTS Public Health research theme has been revised and refocused to better meet the needs of communities in Canada and India and to better integrate with the IC-IMPACTS infrastructure and water themes. This new direction will take advantage of the unique features and strengths of IC-IMPACTS' multifaceted research agenda, partner community strategy, and training emphasis to deliver major innovations and impacts through the application of advanced sensor systems and decision aids to improve the detection, prevention and management of infectious and water-borne illnesses.

> Over 3.4 million people die each year from water, sanitation, and hygiene-related causes.
>
> *World Health Organization (2008)*

Three core areas now drive the Public Health research theme:

1. The development and evaluation of new technologies that enable improved detection, screening, in-depth characterization, ongoing monitoring and management of infectious diseases, and water-borne and water related infections in India and Canada;

2. The development and evaluation of mobile, networked health technologies that aim to prevent infectious diseases and improve health outcomes; and,

3. The application of strategies to prevent infectious diseases and improve health outcomes in the primary health care setting, including in the delivery of maternal and child health services.

By focusing on these core areas, IC-IMPACTS will be able to better support health related research that will have deployable outcomes, approaches, technologies and interventions that can be implemented within community contexts rapidly. IC-IMPACTS will also be able to increase the opportunity for commercialization of new technologies and better integrate with the infrastructure and water themes, allowing for more opportunities for holistic solutions for communities and more cross-thematic research and training.

Above: A doctor inspects the health of a patient in India.

Above: "Water for Health" workshop with the Department of Biotechnology, BIRAC, Canadian High Commission, and DFATD in Delhi, India.

Developing Focus

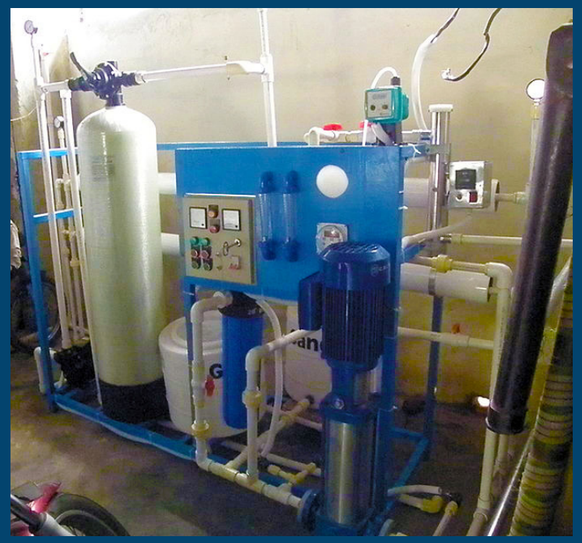
1 Identifying Needs of Communities

IC-IMPACTS consulted with experts across Canada and India to better understand the public health needs of Canadian and Indian communities. The knowledge and advice from these meetings helped revise the overall strategy for the IC-IMPACTS Public Health theme and helped focus the theme on finding solutions to community-wide issues. These consultations included a three day "Water for Health" workshop hosted by Baba Farid University of Health Sciences and IC-IMPACTS, resulting in a new university partnership with Baba Farid University of Health Sciences and the identification of Faridkot, Punjab as a new partner region for IC-IMPACTS.

2 Securing Resources for Indian Collaborators

Meetings between IC-IMPACTS and the Department of Biotechnology (DBT) have led to the development of a joint collaboration between both parties to fund research proposals, create graduate-level mobility programs, and host an annual workshop in the areas of water and health.

Spotlight: Water for Health Workshop



Above: A reverse osmosis water purification unit (left) Dr. Stewart Aitchson working on a mobile health device in Toronto, Canada

In November 2013, IC-IMPACTS and the Baba Farid University of Health Sciences (BFUHS) in Faridkot, Punjab, co-hosted a three day "Water for Healh" workshop in Faridkot to examine the health and water quality challenges of the Faridkot-Bathinda region of the Punjab. Through the participation of nearly 100 researchers, community members, and government representatives, IC-IMPACTS learned a great deal about the quality of water, its sources of contamination, diminished water infrastructure distribution network and the impacts of poor water quality on the health of citizens, particularly in the areas of child and maternal health. To better understand the challenges confronted, a combined research team from BFUHS and IC-IMPACTS visited a reverse osmosis water treatment site outside Faridkot and a thermal power plant in neighboring Bathinda.

As a result of the many interesting scientific papers, community challenges presentations, and site visits, IC-IMPACTS and BFUHS devised four topic areas for the basis of joint research collaborations. These include: (i) characterization of thermal power plant by-products of fly-ash and bottom ash and examination of environmental and health impacts from the storage of these waste products; (ii) quality assessment of the water distribution system including an infrastructure analysis and audit and the potential for the use of novel biocoatings to clean water during its distribution; (iii) water quality assessment and treatment and the examination of potential alternatives to reverse osmosis systems; and (iv) mobile health technologies for the delivery of health awareness for disease prevention and provision of health treatments, particularly with the goal of improving maternal and child health in the region.

Above: Contaminants from India's tannery industry (left) and sugar refinement industry (right) are contributing to the pollution of the Ganga River. *Photo credit: Danwatch (left) The Hindu (right).*

Ganga River Workshop

IC-IMPACTS and the National Mission for Clean Ganga (NMCG) co-hosted the "Integrated Water Management for Ganga Collaboration Workshop" in Delhi, India on February 10 & 11, 2014. The workshop, which was attended by over 120 members of the scientific, industrial, government and financial communities, led to the creation of a detailed action plan outlining collaborative and innovative solutions to better manage the Ganga river, seek new methods for detecting the health of the river, and treating sources of contamination.

The workshop was significant as it established Canadian scientists and industries as partners to help address industrial pollution issues affecting the Ganga River. Presentations from Trojan Technologies, FP Innovations, Clearford, and WaterTap showcased Canadian industrial innovations and the potential transportability of these technologies to the Ganga River.

An action plan created by the NMCG and IC-IMPACTS as an outcome of the workshop will focus collaborative activities in four areas: the launch of new joint research projects, knowledge mobilization, training, and regulatory and management framework development. It also results in the formation of a Indo-Canadian scientific advisory committee to provide ongoing advising and knowledge sharing between Canada and India.

The collaboration between IC-IMPACTS and NMCG will help alleviate industrial pollution at point of source thus preventing harmful contaminants from making their way into the Ganga River. The collaboration will also create cost-effective interventions to recapture core ingredients and save the loss of valuable investments during industrial manufacturing processes. It will expand efforts in the overall Reduce-Re-use-Recycle water management strategy by introducing new cross sector water use approaches such as water-cascading and other water recapture technologies, and will provide critical baseline data from remote sensing, local monitoring and GIS informatics to better understand the current condition of the Ganga River and to monitor the effectiveness of new strategies to improve its overall quality.

Mobilizing *Industry*

Above: Vizag Steel Plant in India. *Photo credit: Vizag Steel.*

Above: RINL Chairman and Managing Director Dr. Choudhary, signs agreement with IC-IMPACTS in the presence of BC Premier Christy Clark and Minister Wat in Vancouver Canada.

RINL Steel Plant Visits

On July 19, 2013, IC-IMPACTS and Rashtriya Ispat Nigam Limited (RINL) signed a Statement of Cooperation focused on research collaboration related to infrastructure and water, technology development and transfer, and institution of joint meetings, workshops and seminars. Experts from Stantec Inc., Starmass Environmental Technologies, and various Canadian universities visited the Vizag Steel Plant in November 2013 and February 2014 to better understand the water and infrastructure challenges of the largest steel plant in India. Organized by IC-IMPACTS, these site visits strengthened Canadian-Indian industrial partnerships and presented new business opportunities to various infrastructure companies in both Canada and India.

Above: Deteriorated road in a village near Thondebavi, Karnataka, India

Above: IC-IMPACTS and industry partners meeting with Anil Sole, Mayor of Nagpur in Nagpur, India

Alternative Pavements Workshop

IC-IMPACTS brought together ACC Limited, RASTA, FOSROC International, Stantec Inc., Starmass Environmental Technologies, and various other industrial and academic institutions to develop new techniques in producing highly durable thin-film pavements technologies. This multi-sector partnership between Canadian and Indian industry and academia will demonstrate innovative pavement solutions along a 1 km stretch of road in a village near Thondebavi, Karnataka. The results of this IC-IMPACTS project will be significant, as the unique pavement technologies developed could be widely adopted into thousands of other pavement projects in both India and Canada. Additionally, intoducing water capture and treatment technologies from the road surface will also aid in addressing water shortages in arid climates.

Engaging Communities *in Canada*

IC-IMPACTS partnered with Engage North at the University of Alberta to launch an innovative Community Engagement Fellowship Program that places undergraduate and graduate students on community-driven projects into northern Canadian and First Nation communities.

Dene Tha' First Nation, Alberta

Dene Tha' is an Alberta Treaty 8 First Nation with populations centered in three communities: Bushe River, Meandre River, and Chateh. Dene Tha' is a member of the North Peace Tribal Council and is located in the Alberta North Peace Region. IC-IMPACTS and Engage North created a graduate fellowship with the Dene Tha' that focuses on understanding the challenges of public health in remote communities and examines opportunities for improvement in public health delivery. The fellowship is a critical first stage in understanding the health circumstances and service systems of the Dene Tha' and providing meaningful assessment of the opportunity for mobile health technologies to be introduced as a component of the health delivery system.

Hamlet of Pangnirtung, Nunavut

Pangnirtung is a traditional Inuit community located 40 kilometers south of the Arctic Circle on Baffin Island (100 kilometers from Iqaluit), and is home to approximately 1500 people. IC-IMPACTS and Engage North created fellowships in Pangnirtung to focus on improving the community's overall health and wellbeing. The Youth Coding Club fellowship program brings together local youth and community and business partners to promote an interest in computer science and engineering education. Meanwhile, the Print Shop Archive fellowship project focuses on the study and showcasing of world-class and local Inuit art. These fellowships will help promote an interest in fine arts, science, and technology to a young and innovative generation.

Engaging Communities *in India*

Faridkot Region, Punjab

IC-IMPACTS partnered with the Baba Farid University of Health Sciences in Faridkot, Punjab to create a "Water for Health" initiative, focusing on water quality assessment, sustainability of water distribution systems and health treatments using mobile health technologies. The neighbouring region of Bathinda and the Bathinda Thermal Power Plant provides additional research in the use of fly-ash and infrastructure building materials.

Nagpur, Maharashtra

IC-IMPACTS researchers are investigating the use of cement reinforced fly ash waste from thermal power plants, and natural fibers from textile and agricultural waste. This reinforced building material will be used to help strengthen buildings, bridges, dams, and power plants. Researchers are also establishing a long term water sampling campaign to understand linkages between industrial activities and their impact on the quality of source water.

Villages near Thondebavi, Karnataka

In partnership with ACC Limited, RASTA, FOSROC, and NIE, IC-IMPACTS has developed a project to examine new techniques for producing highly durable pavement solutions that use minimal resources. This project will be demonstrated along a 1 km stretch of road in a village near Thondebavi, Karnataka, where five different and innovative pavement technologies will be showcased in 200m segments.

Ganga River Basin

IC-IMPACTS and the National Mission for Clean Ganga (NMCG) co-hosted the "Integrated Water Management for Ganga Collaboration Workshop" in Delhi, India. This workshop led to the creation of a detailed action plan outlining collaborative and innovative solutions to better manage the Ganga River. With over 37% of India's population living along the Ganga River, this partnership has the potential to affect the health and livelihood of millions of people.

Professional Training

In partnership with FOSROC, IC-IMPACTS hosted a professional practitioner training session for over 50 practicing engineers and consultants regarding the use of Fibre Reinforced Polymers (FRPs) as a strengthening solution to deteriorating infrastructure. A delegation of IC-IMPACTS scientists and industrial partners provided information and case study sessions on the effectiveness, application requirements, and implementation considerations for use of FRPs in the field. The session was very well received and IC-IMPACTS will now work with FOSROC and others to develop a training program around the application of advanced infrastructure technologies for the Indian engineering sector.

Above: FOSROC Training Session in Banglore, India.

Community Engagement Fellowships

Above: Dene Tha', Canada *Photo credit: Dene Tha'*

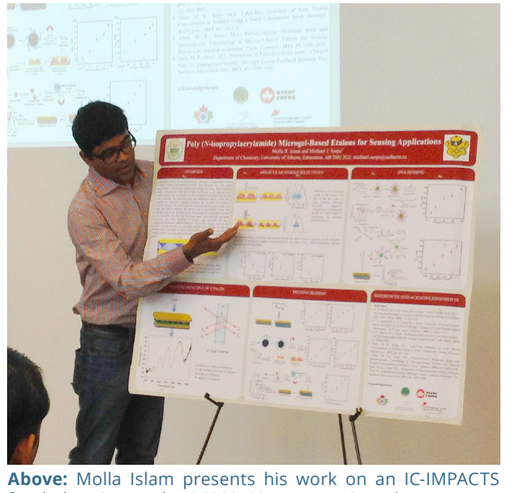
Above: Hamlet of Pangnirtung, Canada *Photo credit: Engage North*

IC-IMPACTS partnered with Engage North at the University of Alberta to launch an innovative new Community Engagement Fellowship Program. This program places undergraduate and graduate students on community-driven projects in the communities of the Dene Tha' First Nation, Alberta and the Hamlet of Pangnirtung, Nunavut.

These four-month long projects are aimed at tackling key challenges facing a community's overall health, sustainability and prosperity. In addition, Fellows will actively participate in aspects of community life so that they develop a holistic understanding of how their specific project has an impact on the opportunities and challenges of the community as a whole and so that they can most effectively develop a workable solution to the project that will be adopted usefully by the community within its cultural context.

The Community Engagement Fellowship Program will help provide a highly qualified assessment on existing technologies that may solve community specific challenges in the IC-IMPACTS core areas of infrastructure, water management, and public health.

Training & *Capacity Building*



Above: Molla Islam presents his work on an IC-IMPACTS funded project at the AGM in Vancouver, Canada

Student Presentation of Results

On March 12, 2014, IC-IMPACTS hosted its 1st Annual General Meeting (AGM) at The University of British Columbia. The event was attended by IC-IMPACTS staff, members of the Board and Research Management Committee and Network Researchers.

Students from each IC-IMPACTS funded projects were also invited to attend the event and showcase their research. Open networking sessions before and after the AGM allowed students to meet other researchers working on similar projects and to understand how their project fits with the overall research agenda of IC-IMPACTS.

The AGM was followed by a focus group involving the students where they brainstormed methods of greater student engagement and collaboration. The event was a success with many attendees expressing interest for more frequent meetings of this nature to be held.

Graduate & Post Doc Training - Student Spotlight

Patricia Oka is helping develop a novel water treatment system to provide water at a community scale (up to 20 households). This water treatment system hopes to address common issues with shallow hollow fibre ultrafiltration (SHFUF). SHFUF treatment systems are very costly due to their complex design, demand for skilled operators, and power consumption, making them inaccessible for small communities to use. Because water-borne diseases are still a challenges to overcome, it is significant to create an SHFUF treatment system more readily available for remote use. This novel SHFUF system currently being developed needs to be able to operate passively, contain limited mechanical complexity and use minimal energy for it to be scalable.

Cement pipes represent a significant percentage of municipal sewage, water and storm collection systems in Canada and India. A significant percentage of the pipelines exceed their 50-year design life and need to be replaced or repaired with more durable material. Negar Roghanian is working on using advanced and sustainable materials to extend the service life of structures and to strengthen them against damage and corrosion. Using nanotechnology, she will help develop corrosion resistance, environmentally friendly and sustainable material with antibacterial properties that could improve concrete pipes durability, extend the infrastructure's service life, and decrease the risks associated with infrastructure failure and contamination of the surrounding environment.

The Year *Ahead*

In 2014-2015 IC-IMPACTS will be focusing its activities in five strategic directions:

1. Accelerating the Public Health Agenda

With the approval of a revised and refocused Strategic Health Plan in March 2014, IC-IMPACTS will undertake a series of proactive measures to accelerate its Public Health theme agenda. Several concrete actions that will unfold within the next six months, include: (i) the launch of a joint call for research proposals with the Department of Biotechnology, India to support Water for Health biotechnology development; (ii) the facilitation of the development of joint research projects between Canadian health researchers and Baba Farid University of Health Sciences with whom IC-IMPACTS held a joint workshop in November 2013; and, (iii) the deployment of a Community Engagement Fellowship graduate student with the Dene Tha' in summer 2014 to examine remote community health delivery services and the potential for mobile technologies to improve health treatment.

2. Mobilizing Results into Community Contexts

With the unfolding of IC-IMPACTS research agenda in 2013/2014 and the creation of the mechanisms for continuing to support new research projects, IC-IMPACTS will now turn its attention to maturing its "partner community" strategy, making specific sites ready for the deployment of research outcomes and providing opportunities for technology transfer of Canadian and Indian industrial innovators. This will involve the establishment of demonstration sites for testing technologies, securing test-bed environments for existing and new technologies to be proven and evaluated within Indian and Canadian environments, and activating partners within host communities to ensure the successful adoption of new technologies. It will also see significant industry-to-industry partnership developing as the expertise of our complementary sectors come together to improve the infrastructure, water quality, and health of communities in Canada and India.

3. Engaging Canadian Partners & Communities

Positive initial steps were achieved to introduce IC-IMPACTS activities into the communities of the Dene Tha' in northern Alberta and Pangnirtung, Nunavut through the Community Engagement Fellowship program with Engage North. Individual investigators also worked with communities in BC and Ontario as part of their research project. However, a more comprehensive, strategic and engaged strategy needs to be developed that enhances opportunities for Canadian industrial participation and signature community showcases. IC-IMPACTS will prepare and unfold a targeted and meaningful Canadian Engagement Strategic plan in 2014/2015.

4. Resourcing Research within India

2014/2015 will be a year of turning hard-earned partnership development ground-work into full collaborating partnerships to fund Indian researcher participation in the IC-IMPACTS Centre. Noteworthy initial successes are expected with the Department of Biotechnology and National Mission for Clean Ganga. Other collaborations, notably with the Department of Science & Technology and Council for Scientific and Industrial Research Council, will continue to be sought.

5. Professional Training Programs

IC-IMPACTS will continue to organize professional training programs in India and Canada along with our industrial partners. The February 2014 event in Bangalore in conjunction with FOSROC was a success and resulted in significant further interaction between Canadian and Indian companies. This also provided us an opportunity to showcase Canadian technology in India. IC-IMPACTS will be working to develop future professional training activities in the areas of bridge monitoring, low carbon building materials, advanced water treatment, rehabilitation of waste-water infrastructure, and others where knowledge-sharing between Canada and India can significantly improve the quality and safety of structures and water resources.

Over 80% of wastewater worldwide is not collected or treated, and urban settlements are the main source of pollution.

World Water Development Report (2012)

Above: A drainage ditch in Kanpur, India pours raw sewage into the Ganga River. *Photo credit: Daniel Bachhuber (2008).*

Board *of Directors*

As at March 31, 2014

Name	Title	Organization
Honourable Roy MacLaren	Board Chair	IC-IMPACTS
Professor Stephen J. Toope	President & Vice-Chancellor	The University of British Columbia
Dr. Roger Cheng	Chair	Department of Civil & Environmental Engineering, University of Alberta
Mr. Barj Dhahan	National Chair	Canada-India Foundation
Mr. Peter Sutherland	Senior Business Advisor, Asia	Aird & Berlis LLP
Dr. Pradeep Khare	Retired, Former CEO	National Energy Board
Mr. Hari Varshney	President	Varshney Capital Corp.
Dr. Sujatha Ramdorai	Professor of Mathematics	TIFR Mumbai and The University of British Columbia
Ms. Malini Sen	Senior Editor	The Times of India
Dr. Nemy Banthia	CEO & Scientific Director	IC-IMPACTS
Professor Gautam Sen	Chairman	Healthspring Community Medical Centres
Mr. Fouad Elgindy	Observer to the Board Senior Program Manager	NCE Secretariat

Research *Management Committee*

Name	Title	Organization
Dr. Nemy Banthia	Professor	The University of British Columbia
Dr. Stewart Aitchison	Professor	University of Toronto
Dr. Sushanta Mitra	Professor & Asst. VP Research	University of Alberta
Dr. Pradipta Banerji	Director	IIT Roorkee
Dr. Reed Ellis	Vice President, Practice Lead - Bridges	Stantec Inc.
Dr. Kevin Kane	Professor	University of Alberta
Dr. Madjid Mohseni	Professor, Associate Head Graduate, Scientific Director RES'EAU WaterNet	The University of British Columbia
Dr. Daman Panesar	Assistant Professor	University of Toronto
Mr. Fouad Elgindy	Observer to the RMC Senior Program Manager	NCE Secretariat

Scientific *Leadership*

Dr. Nemy Banthia
Scientific Director, Theme Lead for Safe & Sustainable Infrastructure

Nemkumar (Nemy) Banthia is a Professor of Civil Engineering, Distinguished University Scholar and a Senior Canada Research Chair in Infrastructure Rehabilitation at the University of British Columbia, Vancouver, Canada. Dr. Banthia has edited/co-edited eighteen volumes, published over 350 technical papers, and holds five international patents. A professional engineer in the province of BC, he continues to serves on the technical committees of various professional societies including the American Concrete Institute where he chaired the committee on fiber reinforced concrete for six years, RILEM where he chaired the Technical Committee on FRP-Concrete Bond, and the Canadian Standards Association where he chairs the Durability Committee of the Highway Bridge Design Code. Dr. Banthia serves on the editorial boards of eight international journals and is the Editor-In-Chief of Journal of Cement and Concrete Composites—a journal with the highest impact factor in the field. His awards include: WG Hislop Award of the American Concrete Institute (ACI) BC Chapter, four Best Paper Awards, the Wason Medal of the ACI International, Wolfson Merit Award of the Royal Society of the United Kingdom, Distinguished Researcher Award of the Korea Concrete Institute, Killam Research Prize from the Killam Foundation, Horst Leipholz Medal of the Canadian Society of Civil Engineering and the Mufti Medal of the Int. Society for Health Monitoring of Infrastructure (ISHMII). He is a fellow of the ACI International, Canadian Society for Civil Engineering, Indian Concrete Institute, Canadian Academy of Engineering and the Royal Society of Canada.

Dr. Sushanta Mitra
Associate Scientific Director, Theme Lead for Integrated Water Management

Dr. Sushanta Mitra is currently a Professor in Mechanical Engineering and Assistant Vice-President (Research) at the University of Alberta. He is the Associate Scientific Director and the Director of Mobility for IC-IMPACTS. He is the Theme Lead for the Integrated Water Management in IC-IMPACTS. He is also the Director of Micro and Nano-scale Transport Laband the Team Leader for Global Integrated Water Management Network and Nano-Bio-Energy Network. He serves as a Guest Editor for four international journals and also the co-Editor of Microfluidics and Nanofluidics Handbook. He is actively involved in number of professional organizations, including as the Vice-Chair for Micro & Nano Fluid Dynamics Technical Committee of ASME, Board Member for CSME and Engage North, and Member of the Committee on International Scientific Affairs, American Physical Society (APS). For his contribution in the field of mechanical engineering, he has been elected the fellow of the American Society of Mechanical Engineers (ASME), the Canadian Society of Mechanical Engineers (CSME) and the Engineering Institute of Canada (EIC). He is a registered professional engineer of the provinces of Alberta and Ontario.

Dr. Stewart Aitchison
Associate Scientific Director, Theme Lead for Public Health

Professor J. Stewart Aitchison received his Ph.D. from the Department of Physics, Heriot-Watt University, Edinburgh, U.K., in 1987. He joined the Department of Electronics and Electrical Engineering, University of Glasgow in 1990 and was promoted to a personal chair as Professor of Photonics in 1999. Since 2001, Professor Aitchison has held the Nortel chair in Engineering at the University of Toronto. His research focuses on the development of micro and nano-scale devices for optical signal processing and sensing applications. From 2004 – 2007, he was the Director (and from 2010 – 2011 the interim director) of the Emerging Communications Technology Institute at the University of Toronto, where he established an open access micro and nano-fabrication facility. In 2009, he co-founded ChipCare Corporation with James Dou and Rakesh Nayyar. ChipCare is currently developing a portable HIV monitoring system, which will enhance healthcare delivery in remote communities. This project won the University of Toronto inventor of the year award in 2012 and the Canada business magazine Innovation Award in 2010. Professor Aitchison is a Fellow of the Royal Society of Canada and a Fellow of the American Association for the Advancement of Science.

Partnerships

Industry Partners

ACC Limited	Rashtriya Ispat Nigam Ltd. (RINL) [Vizag Steel]
Bekaert Industries Pvt. Ltd.	Reliance Industries Ltd.
BI Pure Water Canada	Robonik India Pvt. Ltd.
Brick & Byte Innovative Products Pvt Ltd	Schock Canada
Cauvery Neeravari Nigama Ltd. (Cauvery River Waterworks)	Sensor Technology Ltd.
Delcan	Skillnet Solutions India Pvt Ltd
Dufferin Concrete	Stantec Inc.
FOSROC International	Starmass Environmental Technologies Pvt. Ltd.
GE Water	Stewols India Pvt. Ltd.
Golder Associates Consulting (India) Pvt. Ltd.	Stream Technologies Inc.
IT Innovation for Masses (India)	Tandon Consultancy Services
Kryton International Inc.	Tata Consultancy Services
Lars Enviro Pvt. Ltd.	Ushta Infinity Construction Company Pvt. Ltd.
Lifecare Innovations Pvt. Ltd.	Vector Corrosion Technologies
Pultrall Inc.	

Community Partners

Alberta Urban Municipalities Association	Indian Association of Structural Engineers
Bureau of Indian Standards	Indian Concrete Institute
Butibori Manufacturers' Association	MaRS Innovation
Canada India Business Council	Public Health Foundation of India
Canada India Education Society	Rotary Club Nagpur
Canada India Foundation	Sengupta Consultancy
Canadian Construction Association	Vidarbha Industries Association

Partnerships

Government Partners

Aboriginal Affairs and Northern Development Canada	Nagpur Municipal Corporation
Canadian Institutes of Health Research	National Mission for Clean Ganga (NMCG)
Department of Biotechnology, Government of India	Natural Sciences and Engineering Research Council
Energy and Petrochemical Department, Government of Gujarat	Ontario Ministry of Environment
Industry Canada, Federal Government of Canada (through Networks of Centres of Excellence)	Public Health Ontario
Ministry of Environment and Forests (India)	Regional Medical Research Centre for Tribals (India Council of Medical Research)
Ministry of Transportation of Ontario	Social Sciences and Humanities Research Council

Academic Partners

The University of British Columbia	Indian Institute of Technology – Roorkee
University of Alberta	Institute of Chemical Technology
University of Toronto	International Centre for Genetic Engineering and Biotechnology
University Health Network	Khulna University
McMaster University	Mitacs
Apollo Hospitals	National Environmental Engineering Research Institute (NEERI)
Baba Farid University of Health Sciences	National Institute of Engineering (India)
Bhavan's Research Center, Mumbai University	Pandit Deendayal Petroleum University
Birla Institute of Technology & Science Pilani	Res'Eau – WaterNET
Building Fire Research Centre, National Institute of Engineering	Rural Agency for Social & Technology Advancement (RASTA)
Indian Institute of Science, Bangalore	United Nations University – Institute for Water, Environment and Health
Indian Institute of Technology – Bombay	University of Hyderabad
Indian Institute of Technology – Delhi	Vallabhbhai Patel Chest Institute, University of Delhi
Indian Institute of Technology – Kharagpur	

2013 - 2014

Statement of Financial Position

As of March 31, 2014 and 2013

	2014	2013
Assets		
Current		
Restricted cash		
Uncommitted	$4,064,441	$2,476,150
Committed to research funding	$71,500	-
Cash held at other institutions	$189,448	$23,000
Accounts receivable	$1,182	-
Prepaid expenses	$10,123	-
Unspent research advances	$527,313	-
	$4,864,007	$2,499,150
Liabilities		
Current		
Accounts payable and accrued liabilities	$43,527	$114,448
Deferred contributions	$4,820,480	$2,384,702
	$4,864,007	$2,499,150
Net Assets	$ -	$ -

*Approved by the IC-IMPACTS Board of Directors on May 14, 2014

Financial *Statements*

2013 - 2014

Statement of Operations

Year ended March 31,2014 and Period from Incorporation January 18,2013 to March 31, 2013

	2014	2013
Receipts		
Contribution from Networks of Centres of Excellence	$569,302	$108,998
Contributions from Canadian universities	$316,970	$5,450
Contributions from Indian partners	$26,241	-
	$912,513	$114,448
Disbursements		
Communications and promotion	$9,383	$8,165
Highly qualified personnel support	$173,720	-
Operating costs	$121,242	$11,894
Professional and consulting fees	$39,867	$20,260
Research networking	$99,590	$64,439
Research grants	$139,857	-
Staff salaries	$276,804	-
Technology transfer	$52,050	$9,690
	$912,513	$114,448
Net Assets, beginning and end of periods	$ -	$ -

*Approved by the IC-IMPACTS Board of Directors on May 14, 2014

*Only cash contributions are reported. In-kind contributions are not captured in these statements

2013 - 2014

Statement of Cash Flows

Year ended March 31,2014 and Period from Incorporation January 18,2013 to March 31, 2013

	2014	2013
Cash provided by (used in)		
Operating activites		
Contribution from Networks of Centres of Excellence	$2,830,050	$2,476,150
Cash received from host university	$92,000	$23,000
Cash received from other Canadian universities	$400,000	-
Cash disbursed for research grants	($667,170)	-
Cash disbursed for operations and networking	($828,641)	-
Increase in cash	$1,826,239	$2,499,150
Cash, beginning of period	$2,499,150	-
Cash, end of period	$4,325,389	$2,499,150
Cash composed of		
Uncommitted restricted cash	$4,064,441	$2,476,150
Restricted cash committed to research funding	$71,500	-
Cash held at other institutions	$189,448	$23,000
	$4,325,389	$2,499,150

*Approved by the IC-IMPACTS Board of Directors on May 14, 2014

HAY & WATSON | Chartered Accountants

900-1450 Creekside Drive, Vancouver BC V6J 5B3
P 604 734 1690 **F** 604 336 8959 **E** creekinfo@hay-watson.bc.ca

INDEPENDENT AUDITOR'S REPORT

To the Directors of IC-IMPACTS Centres of Excellence

We have audited the financial statements of IC-IMPACTS Centres of Excellence (the "Network"), which comprise the statement of financial position as at March 31, 2014 and the statements of operations and cash flows for the year ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe the audit evidence we have obtained is sufficient and appropriate to provide a basis for our qualified audit opinion.

Opinion

In our opinion, the financial statements present fairly, in all material respects, the financial position of the Network as at March 31, 2014, and the results of its operations and its cash flows for the year then ended, in accordance with Canadian accounting Standards for not-for-profit-organizations.

Hay + Watson

Chartered Accountants
Vancouver, British Columbia
May 15, 2014

Get in Touch

Canadian Office

Room 179, C.K. Choi Building
1855 West Mall
The University of British Columbia
Vancouver, BC, Canada
V6T 1Z2

Phone
+1 604 822 3013

Fax
+1 604 822 0212

Email
macahilas@ic-impacts.com

Web
www.ic-impacts.com

Indian Office

UBC India Office
Unit 121, Square One, Plot C2
District Centre, Saket
New Delhi, India
110017

Phone
+91 991 004 8507

Email
beg@ic-impacts.com