

2009-2019 - A Decade of Profound Impact  
**CSPC 2019** **11<sup>th</sup>** **Canadian Science Policy Conference**  
November 13-15, 2019 | Westin Hotel, Ottawa, ON  
[www.sciencepolicy.ca](http://www.sciencepolicy.ca)

# 5<sup>th</sup> Annual Science Policy Awards of Excellence - Youth Category

 **CSPC**  
CANADIAN SCIENCE POLICY CENTRE

# 5<sup>th</sup> Annual Science Policy Awards of Excellence - Youth Category

CSPC is proud to present its 5<sup>th</sup> Annual Science Policy Awards of Excellence - Youth Category which follows in the spirit of our 2013 Young Generation Award.

This award recognizes a young individual (student, postdoctoral fellow, researcher, entrepreneur, etc.) under the age of 35 who developed an innovative and compelling evidence-based policy that will make a positive difference to Canadians. Proposals were to be connected to one or more of the themes for the 2019 CSPC Conference. This award is designed not only to highlight innovative, evidence-driven policy ideas, but also to encourage innovative young people who may not currently be studying, or working on, public policy to develop and share their policy ideas. The Selection Committee was impressed by the quality of the submissions and the dedication of the applicants so they wanted to share the best of these innovative evidence-based policy proposals with the CSPC community. Please join us in congratulating our 2019 winner **Emily De Sousa** for her proposal **“Eliminating Seafood Fraud: A Fishy Approach to Food Policy”** and our runners-up, **Mahzad Sharifahmadian** and **Sabrina Bedjera**.



**2019 Winner:**  
**Emily De Sousa,**  
 MA Student  
 Department of Geography,  
 Environment & Geomatics  
 University of Guelph



We are honoured to have **Donna Strickland**, Nobel Laureate in Physics 2018, with us to present the 2019 Award during the CSPC Gala on November 14, 2019



**2019 Runner-up:**  
**Mahzad Sharifahmadian**  
 Life Sciences Manager  
 District 3 Innovation Centre  
 Concordia University  
*“Scientist entrepreneur – the engines of economic growth”*



**2019 Runner-up:**  
**Sabrina Bedjera**  
 MASc in Civil and Environmental Engineering,  
 University of Waterloo  
*“A holistic approach to measuring drinking water success in Indigenous communities”*



This year, the CSPC Awards Committee was happy to see that many high quality proposals.

CSPC would like to extend very warm thanks to the distinguished members of our 2019 Awards Selection Committee for their valuable time, commitment and enthusiasm for encouraging young people to consider how they might contribute to evidence-based policy.

A special thank you to Naveed Aziz and Sandra Noël, Hamed Babazadeh, Shelly Deeke, Majid Naji, and Jenny Smith for all of their work on making this award possible.

Proposals are reviewed blind and the Committee enjoyed learning about the incredible diversity and passion of the young people who applied to the Award once the winners had been selected and the applicants were revealed.

## 2019 CSPC Awards Selection Committee



**Jessica Kolopenuk**  
Assistant Professor,  
Faculty of Native  
Studies,  
University of Alberta  
Winner 2018  
CSPC Youth Award



**Isabelle Lacroix**  
École de politique  
appliquée,  
Université de  
Shebrooke



**Maureen Kearney**  
Director,  
Office of Science,  
Policy & Society,  
AAAS



**Alice B. Aiken**  
Professor  
Vice President  
Research  
& Innovation,  
Dalhousie University



**Raghwa Gopal**  
President & CEO,  
Innovate BC



**Paul Dufour**  
Senior Fellow  
Institute for Science,  
Society and Policy,  
University of Ottawa



**Mehrdad Hariri**  
CEO & President,  
Canadian Science  
Policy Centre



**Naveed Aziz**  
Co-Chair,  
CSPC Awards Committee  
Chief Scientific Officer,  
CGEn, Canada



**Sandra Noël**  
Co-Chair,  
CSPC Awards Committee  
Manager,  
Innovation Canada, ISED

In this, the Award’s fifth year, the CSPC followed up with previous winners and runners-up to ask them about the impact that the CSPC Science Policy Awards of Excellence have had on their lives. It is inspiring to see these bright young people continue to pursue their passion for evidence-based policy.

**1<sup>st</sup> CSPC Award Winner (2013)—Ari Cuperfain**



Ari Cuperfain was the inaugural recipient of the Canadian Science Policy Awards of Excellence, Young Generation Award in 2013. He has since completed a MSc in Chemistry and a MD, and is currently in his residency in Psychiatry at the University of Toronto. His research interests are in neurogenetics with a focus on both aging and personalized medicine. With respect to science policy, Ari was one of two Canadian delegates selected to attend the Global Biotech Revolution 2016 Leaders of TomorrowGapSummit, where young professionals from over 30 countries met to address the most pressing global challenges in biotechnology expected over the next several decades. Ari is passionate about geriatric medicine, geriatric psychiatry and models of healthcare delivery for older adults.

**2<sup>nd</sup> CSPC Award Winner (2016)—Amani Saini**  
***“Using Genetic Tests to Prevent Adverse Drug Reactions”***



Amani Saini received the 2016 Canadian Science Policy Award of Excellence for her policy to prevent adverse drug reactions (ADRs). Afterwards, she started an organization, Adverse Drug Reaction Canada (ADR Canada) ([www.adrcanada.org](http://www.adrcanada.org)), which raises awareness about preventing ADRs through data collection, pharmacogenomics, genetic testing, and electronic medical records. This year, ADR Canada worked with a political party in the Yukon to write a motion calling on the Canadian government to improve reporting of ADRs. This motion was tabled, then debated in the Yukon Legislative Assembly in April. It passed unanimously and a letter was sent to the federal Minister of Health with the signatures of all three party leaders in the Assembly. In the coming years, ADR Canada will continue to expand its activities to better communicate policies and disseminate knowledge of how ADRs can be prevented. It will connect with Canadians and organizations to build a national network of those wanting to see an end to ADRs, which are Canada’s 4th leading cause of death. Amani currently works as the Policy Advisor at Vancouver Coastal Health and can be found on Twitter at @amani\_saini

**3<sup>rd</sup> CSPC Award Winner (2017)—Sierra Clark**

***“Residential Woodburning in Canada: Health and Climate Effects and Intervention Strategies”***



Sierra Clark is currently a doctoral student in Epidemiology at Imperial College London and works with the Pathways to Equitable Healthy Cities project which aims to improve population health, enhance health equity, and ensure environmental sustainability in cities around the world. “The Award led me to apply for a PhD project which would have a direct impact on health-oriented policies in cities around the world, as well as the Policy Analyst Recruitment and Development Program (PARDP) policy analyst role within the department of Natural Resources Canada. The policy that I proposed for the CSPC Youth Award would have been within the jurisdiction of that department and I could have acted on it within that role. It was a very tough decision for me, though in the end, I chose to accept the PhD. While my actions on this policy proposal are on hold for now, it is likely I will revisit it, or something similar, in the future.

**4<sup>th</sup> CSPC Award Winner (2018)—Jessica Kolopenuk**

***“An Indigenous Approach to Canada’s National Missing Persons DNA Program”***



Jessica Kolopenuk is an Assistant Professor in the Faculty of Native Studies at the University of Alberta (UofA). She is a co-founder and co-lead of the Indigenous Science, Technology, and Society Research and Training Program (Indigenous STS) at the UofA; and the Summer internship for Indigenous peoples in Genomics Canada (SING Canada). Her academic work and policy advising is aimed at understanding what scientific knowledge means for Indigenous peoples and, additionally, what Indigenous knowledge can mean for scientific fields. Kolopenuk’s program-building goals encompass support for Indigenous students and communities who wish to engage with science, technology, and policy fields; and building the capacities those fields so that they are capable of producing and backing highly interdisciplinary, relational, and Indigenous research and training approaches.

**2016 Runner-up—Robert Gooding-Townsend**

***“Using a Modified Lottery to Select Among Meritorious Grant Applications”***

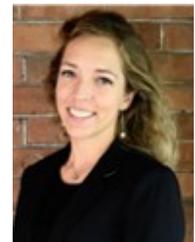


My career trajectory has taken me away from the world of science policy, especially after I realized that it was not a good decision for me to pursue a PhD. I’m now working at Copperleaf, a Vancouver software company that provides decision analytics for utilities. My science policy background has been crucial to some of the large initiatives I’ve been involved with: internally building support to become carbon neutral, and investigating how our solution can help utilities mitigate and adapt to climate change. When I’m not at work, I like to hang out on Science Twitter (@rjgoodin) and write overly contrived fantasy stories.

**2016 Runner-up—Jessica Ross**

***“Rethinking Phosphorus: Contaminant or Commodity?  
 Securing Food for Our Future”***

2018 has seen Canada’s phosphorus policy community grow and progress, and Jessica has been thrilled to be part the effort! The year kicked off with the National Nutrient Recycle and Reuse (NNRR) Forum in March, a concerted effort across several government, academic, and industry stakeholders to develop a Canadian phosphorus roadmap and policy. This forum led to the preparation of the “NNRR Forum Report - A Roadmap for Building a Canadian Nutrient Recovery and Reuse Framework,” which includes information and recommendations from Jessica’s paper published in FACETS, “Canada: Playing Catch-Up on Phosphorus Policy.”



Jessica is also the co-founder of [www.PhosphorusHub.com](http://www.PhosphorusHub.com), an outreach effort alongside the NNRR Forum. The goal of the Phosphorus Hub is to connect Canadian and North American groups who are interested in the intersection of food, soil, fertilizer, security, water, and the circular economy - in other words, phosphorus. The highlight of the year came in September, when Jessica and her thesis supervisor, Dr. Sidney Omelon (McGill), were selected as Top 10 finalists out of 150 applicants in the MaRS Discovery District’s Women in CleanTech challenge. Their technical proposal and vision for the role of phosphorus within a sustainable, clean technology future meant they got to speak about their vision with one of their heroes, writer and innovator Margaret Atwood.

Jessica was recognized as the Valedictorian at the University of Ottawa’s Fall 2017 Convocation (Science, Engineering, and Medicine). She continues to work full-time as a Project Manager in the Department of National Defence.

**2017 Runner-up—Dr. Deena M. Hamza**

***“A Proactive and Cost-Effective Approach to Reducing Mental Illnesses”***



Since the success of her proposal, Deena has undertaken research into the training family medicine residents receive in mental illness. As a key collaborator with the College of Family Physicians of Canada, Deena has provided evidence of the urgent need to enhance training experiences for residents in the treatment of mental illness, as well as providing care to Indigenous peoples and marginalized, disadvantaged and vulnerable populations. In addition, Deena has been invited to speak as an “expert” on mental health in for media and other audiences and received the Audience Award at UAlberta’s Falling Walls competition (part TedTalk, part Dragon’s Den) for her pitch “Breaking the Wall of Mental Illness”. Deena is Evaluation Lead with Postgraduate Medical Education in the Faculty of Medicine & Dentistry at UAlberta where she is evaluating the curriculum change from a time-based system to one where residents are required to demonstrate competencies specific to their area of practice to improve patient care outcomes by ensuring future physicians have skills in patient-centered care, communication, professionalism, critical thinking, and teamwork alongside the attainment of medical knowledge.

**2017 Runner-up—Meagan Grabowski**

***“Modernizing the Yukon Scientists and Explorers Act”***

Being part of the Canadian Science Policy Conference Award recipients provided a strong foundation and motivation for me to move my policy recommendations forward. After receiving a congratulatory letter from the Yukon Government Minister of Tourism and Culture, I had a meeting with the Deputy Minister about my recommendations and received news that improvements would be made. In my community, I continue to discuss and push for better relationships between researchers and northerners, particularly First Nations’ Governments. I have also been growing my consulting business, and continue to work on relationship building with between levels of government, industry and researchers on behalf of the First Nations. I see a strong future for the Yukon in moving from a field site for international and national researchers, to a driver and leader in all stages of research.



# Impact of the Award

## 2018 Runner-up—Anna Levinsson

### *“Sex, drugs & cardiovascular disease: cardiovascular drug development needs women”*



Originally from Sweden, I arrived in Montreal in summer 2015. I had recently finished my PhD in medical science and came to Montreal for a summer program in cultural psychiatry at McGill University. My background is quite interdisciplinary; I have a master’s degree in mathematical statistics with minors in art history and German language. The topic of my doctoral dissertation was interaction effects between genetic susceptibility and air pollution exposure on cardiovascular disease, but during my time as a PhD candidate, I also collaborated with a German research team on a study of sex differences in schizophrenia. Since I arrived in Montreal I have worked as a postdoctoral fellow at McGill University Department of Psychiatry and currently as a postdoctoral fellow at Montreal Heart Institute and Université de Montréal Département de Médecine. I currently hold a Mitacs Accelerate Postdoctoral Fellowship with AstraZeneca as industrial partner.

## 2018 Runner-up—Claire Velikonja & Samuel Looper

### *“Wildfire Disaster Monitoring and Management Through the Canadian Space Agency”*

Claire Velikonja is an undergraduate in Chemical Engineering at the University of Toronto and member of UTAT Space Policy. Samuel Looper is an undergraduate in Engineering Science at the University of Toronto, and executive director of the University of Toronto Aerospace Team (UTAT) Space Policy Division. UTAT is a student design team, with over 100 members designing and building rockets, microsattellites, and UAV. UTAT has a strong commitment to STEM outreach, and education. The Space Policy Division was founded to promote innovation, and sustainability in applications of space technologies. The division is motivated by our experience building and developing rockets and satellites to find novel applications and study the potential of space based technologies to improve the lives of people on Earth. The division has begun a partnership with the United Nations Space Generation Advisory Council to study Space Technology for Disaster Management and continue our advocacy on the international stage.



We look forward to seeing the impact of the Award on this year’s winner and runners-up to following up with the 2019 winners to see where their interest and drive takes them.

**We hope that you enjoy the Awards Committee’s 2019 selection of top Awards proposals on the following pages.**

# 2019 WINNER - Emily De Sousa

## Eliminating Seafood Fraud: A Fishy Approach to Food Policy



### BIOGRAPHY

Emily De Sousa is a graduate student at the University of Guelph, Department of Geography, Environment, and Geomatics. Her research interests include seafood sustainability, ocean governance, and the geography of islands. She is the founder and creative director of Airplanes & Avocados, a sustainable travel brand teaching readers how to see the world and save it at the same time, as well as the founder and executive director of Youth Action on Climate Change, a community incubator dedicated to cultivating the next generation of environmental leaders. Emily is a trained PADI Divemaster and hopes to pair her love of scuba diving with her academic pursuits to continue researching the underwater world and how we interact with our oceans.

### INSPIRATION

*“Growing up in a Portuguese household, I’ve been surrounded by seafood my entire life, peeling shrimp since before I could even walk. Growing up, this made me the weird kid with smelly lunches. As an adult, it makes me an expensive dinner date. One of the main reasons that seafood can be so expensive and inaccessible to many is due to seafood fraud: the intentional act of mislabeling for economic gain. When I learned that Canada was one of the leaders of seafood fraud, I was devastated. I immediately made the focus of my work repairing the seafood industry’s reputation and finding ways to ensure everyone has access to the most nutritious protein source on the planet.”*

### OPPORTUNITY FOR ACTION

Seafood is a significant source of protein for nearly 3 billion people around the world and contributes \$6 billion to the Canadian economy. But a lack of coordinated policy threatens local seafood supply, specifically when it comes to seafood fraud [1,2].

Approximately 30% of seafood products around the world are mislabelled [3]. A 2018 study by OCEANA, revealed that Canada is one of the leading culprits of seafood mislabelling: 44% of seafood sold in Canada is mislabelled [3, 4].

# Emily De Sousa

## Eliminating Seafood Fraud: A Fishy Approach to Food Policy

Seafood mislabelling has dire consequences, including compromising sustainable fisheries and undermining conservation efforts by misrepresenting stock numbers [5]. Mislabelling also creates health risks for consumers, resulting in a loss of consumer trust in food supply. Potential health issues that can arise from seafood mislabelling include tetrodotoxin poisoning from puffer fish and oily diarrhea from escolar, a product which humans cannot actually digest [6, 7].

A 2016 study revealed that 55% of consumers doubt that the seafood they consume is what it says on the package [3]. This lack of consumer trust can negatively affect Canada's seafood economy and drive consumers to avoid one of the most nutritious food sources on the planet [6].

Numerous studies have linked a variety of human health attributes directly to the consumption of seafood. Omega-3 fatty acids derived from seafood are important for reducing inflammation and preventing the onset of diabetes. Vitamin D present in salmon is essential for healthy bone functioning. In a study conducted in the UK, children deficient in vitamin B12 experienced greater levels of anxiety and performed more poorly on tests than children with diets of mussels, which provide them with excess B12 [8, 9]. Additionally, mussels are one of the best natural sources of iodine, required for normal thyroid gland function in humans [9].

A recent study estimated that 5,800 diet-related deaths could be avoided every year if Canadians increased their consumption of fish to 150g per week, the levels recommended in Canada's Food Guide [10]. The value of these health benefits to Canadian society is considerable; 5,800 lives saved represents a potential benefit to Canadian society of between \$42 and \$50 billion per year [10]. These economic impacts of seafood fraud extend to the entire industry as a whole; not only are consumers not getting what they pay for, but responsible seafood businesses are facing an unfair market competition from those not playing by the rules. This has devastating long-term consequences to responsible fishers [4].

Seafood can also be the key to addressing food security in Canada. Over 4 million Canadians are currently struggling with food insecurity [11], while a study conducted in Alaska revealed that communities with access to locally caught seafood, enjoy improved food security, especially those households at the lowest income levels [12].

Seafood is invaluable to ensuring the future of food security in Canada and providing Canadians with access to healthy and affordable food. Earlier this year, the federal government announced the first ever Food Policy for Canada with an initial investment of \$134 million to help Canada build a healthier and more sustainable food system. [13].

However, until Canada addresses the fraud problem within its seafood industry, the food policy will fall short in terms of making meaningful change for all Canadians. In order to build an effective food policy, we need a reliable and sustainable seafood industry.

# Emily De Sousa

## Eliminating Seafood Fraud: A Fishy Approach to Food Policy

With the longest coastline in the world, Canada should be a leader on matters pertaining to ocean sustainability, including seafood. The recommendations below seek to strengthen the mandate of the Food Policy, with the primary goal of ending seafood fraud and making seafood accessible and affordable for all Canadians.

### PROPOSED ACTION

The proposed actions are a culmination of evidence-based approaches that focus on building a more transparent seafood supply chain and supporting the vision of the Food Policy for Canada.

#### 1. Strengthen the Safe Food for Canadians Regulations to include strict traceability regulations

Scientific literature widely advocates for transparent traceability of the entire seafood supply chain [14]. It is the most important step to ending seafood fraud. Mandatory full-chain boat-to-plate traceability would require that handlers throughout the supply chain, from fish packers to purchasers in supermarkets and restaurants, provide details about the seafood at each stage of the supply chain. [15].

Canada's Safe Food for Canadians Regulations currently fall short of international traceability standards [16]. In order to implement full-chain boat-to-plate traceability in Canada, the Canadian Food Inspection Agency (CFIA), in consultation with fishers, seafood retailers, consumers, and ocean conservation groups, must make full-chain traceability a requirement in the Safe Food for Canadians Regulations. All seafood being sold in Canada must include key information that follows fish throughout the supply chain; including who, what, where, when, and how the fish was caught, processed, and distributed.

Taking this proactive approach is the first step to building a more transparent seafood supply chain.

#### 2. Utilize DNA barcoding as a regulatory tool

DNA barcoding is a powerful molecular tool fit for the purpose of identifying mislabeling of seafood products in Canada. The technology compares a DNA sample from a seafood product against a global database "the Barcode of Life Data System" which contains sequences from hundreds of thousands of species [6]. This has already proven to be a successful forensic tool in identifying mislabelled seafood in Canada [6]. The Food Policy for Canada has committed \$24.4 million dollars to ending food fraud in Canada [13]. In order to effectively address food fraud, part of this funding should be directed towards supporting regular and randomized DNA barcoding of seafood products sold in grocery stores, retailers, and restaurants across Canada. This would allow authentication of species and ensure the integrity of the imposed traceability regulations recommended above. It is recommended that this process be overseen by members of the Canadian Food Inspection Agency, the soon-to-be-developed Food Policy Council, and independent researchers who specialize in DNA barcoding.

# Emily De Sousa

## Eliminating Seafood Fraud: A Fishy Approach to Food Policy

### 3. Improve seafood labelling standards

In Canada, the only information required on seafood labels is a generic marketplace name and the country where the product was last processed [17]. This labelling method allows many species to be listed under the same common name, leading to confusion and undesired consequences. For example, in Canada more than 200 species can be listed as “snapper”. These inadequate labelling rules cheat consumers, risk their health, hurt law-abiding fishers, and can make consumers unknowing accomplices to unsustainable fishing [6, 17].

In order to finally end mislabelling, Canada’s labelling standards need to be brought up to par with other seafood labelling standards around the world [18]. All seafood products sold in Canada must be labelled with their scientific species name, information about whether the product was farmed or fished, its country of geographic origin, and the type of fishing gear that was used to harvest it. This method of comprehensive labelling will help more clearly identify mislabelling and has previously been suggested as a tool to help combat seafood fraud [6].

# Emily De Sousa

## Eliminating Seafood Fraud: A Fishy Approach to Food Policy

### REFERENCES

1. Duke University. (2010). Sustainable fisheries needed for global food security. *Ecology, Business, Conservation* Feb, Atlanta, 1–3.
2. Government of Canada. Fisheries and Oceans Canada, International Fisheries Overview. 2016. <https://www.dfo-mpo.gc.ca/international/issue-enjeu-eng.htm>
3. Pardo, M. Á., Jiménez, E., & Pérez-villarreal, B. (2016). Misdescription incidents in seafood sector, 62(1184), 277–283. <https://doi.org/10.1016/j.foodcont.2015.10.048>
4. Seafood Fraud and Mislabelling. OCEANA. <https://oceana.ca/en/publications/reports/seafood-fraud-and-mislabelling-across-canada>
5. Chin, T., Adibah, A. B., Hariz, Z. A. D., & Azizah, M. N. S. (2016). Detection of mislabelled seafood products in Malaysia by DNA bar coding : Improving transparency in food market, 64. <https://doi.org/10.1016/j.foodcont.2015.11.042>
6. Shehata, H. R., Naaum, A. M., & Gardu, R. A. (2018). DNA barcoding as a regulatory tool for seafood authentication in, 92. <https://doi.org/10.1016/j.foodcont.2018.04.045>
7. Hanner, R., Becker, S., Ivanova, N. V., Steinke, D., Hanner, R., Becker, S., ... Steinke, D. (2011). FISH-BOL and seafood identification : Geographically dispersed case studies reveal systemic market substitution across Canada, 1736. <https://doi.org/10.3109/19401736.2011.588217>
8. Rimm, E. B. (2019). Fish Intake, Contaminants, and Human Health, 296(15), 1885–1900.
9. Rideout, K., & Kosatsky, T. (2017). Fish for Dinner ? Balancing Risks , Benefits , and Values in Formulating Food Consumption Advice, *Risk Analysis*, 37(11). <https://doi.org/10.1111/risa.12769>
10. Regulatory Impacts, Alternatives, and Strategies. (2013). *Farmed Seafood and Canadian Health : How Higher Seafood Consumption Can Save Lives.*
11. Tarasuk, V., Dachner, N., Tarasuk, V., & Dachner, N. (2012). Household Food Insecurity in Canada.
12. Loring, P. A., Gerlach, S. C., & Harrison, H. L. (2013). Seafood as local food : Food security and locally caught seafood on Alaska ' s Kenai Peninsula, 3(3), 13–30.
13. Government of Canada. (2019). New Food Policy for Canada. <https://www.canada.ca/content/dam/aafc-aac/documents/20190614-en.pdf>
14. Spink, J., & Moyer, D. (2011). Defining the public health threat of food fraud. *Journal of Food Science*, 76(9), 157–163.
15. Fox, M., Mitchell, M., Dean, M., Elliott, C., & Campbell, K. (2018). The seafood supply chain from a fraudulent perspective, 939–963.
16. Canada Food Inspection Agency. Understanding the Safe Food for Canadians Regulations. [https://www.inspection.gc.ca/DAM/DAM-aboutcfia-sujetacia/STAGING/text-texte/\\_\\_\\_\\_\\_regs\\_safe\\_food\\_regulations\\_handbook\\_business\\_1531429195095\\_eng.pdf](https://www.inspection.gc.ca/DAM/DAM-aboutcfia-sujetacia/STAGING/text-texte/_____regs_safe_food_regulations_handbook_business_1531429195095_eng.pdf)
17. Government of Canada. CFIA Fish List. <http://www.inspection.gc.ca/active/scripts/fssa/fispoi/fplist/fpresults.asp?lang=e&q=&cmbIn=e&cbShowAll=on>
18. Warner, K. A., Lowell, B., Timme, W., Shaftel, E., & Hanner, R. H. (2019). Seafood sleuthing : How citizen science contributed to the largest market study of seafood mislabeling in the U . S . and informed policy, 99. (November 2018), 304–311. <https://doi.org/10.1016/j.marpol.2018.10.035>

# RUNNER-UP - Mahzad Sharifahmadian

## Scientist entrepreneurs – the engines of economic growth



### **BIOGRAPHY**

Mahzad is manager of life sciences at District 3 Innovation Centre – Concordia University’s centre of innovation and entrepreneurship. She holds a PhD in Biochemistry & Molecular Medicine from Université-de-Montréal, with expertise & publications on design and development of novel drugs for antibiotic resistant infections. While finishing her PhD, she co-founded Rubisco, a biotech company offering point-of care diagnosis of pathogens (dissolved in 2018). Since joining District 3 in 2017, she has advised over 30 startups and 4 university spinoffs.

### **INSPIRATION**

*“As a scientist with strong publications who could land a job in academia, I was passionate to see my research leading to products with tangible impacts. When I learned about entrepreneurship, I found it a right medium for turning my expertise into applications. Therefore, I created my startup upon finishing my PhD. Beside all learnings and opportunities during my startup journey, entrepreneurship broadened my horizons and made me a better person. I became agile, analytical, sharp, result-oriented and much more sociable! Since my graduation, I have been advocating for entrepreneurship within academic settings – a mission that I continue to accomplish. I believe if a researcher has worked on a technology for 5-6 years, they should have the opportunity to commercialize it.*”

### **OPPORTUNITY FOR ACTION**

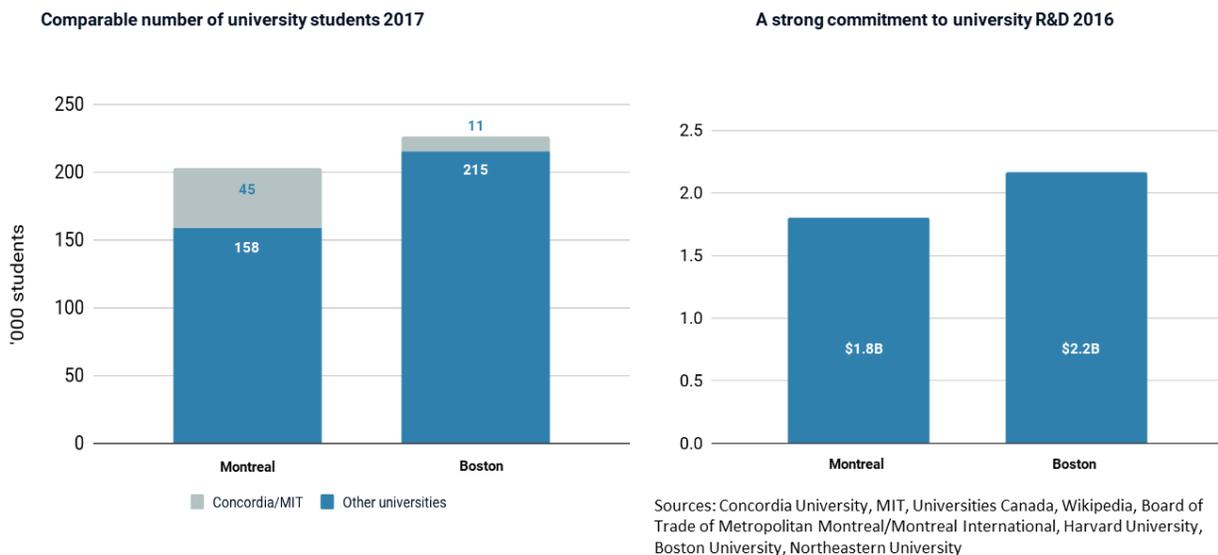
There are over 200,000 PhD students in Canada who are at the highest level of knowledge in their field of expertise and contribute to the advancement of Canada’s scientific discoveries. PhDs can create cutting edge technologies and translate them into applications for the benefit of the general public. It is estimated that over 6,000 PhDs graduate each year. In theory, this high concentration of graduate students enables industries to draw on a significant pool of brain power and workforce.

# Mahzad Sharifahmadian

## Scientist entrepreneurs – the engines of economic growth

Despite the prestige that often comes with having your PhD, and the esteem associated with the title, it is often difficult for graduates to integrate into the job market. There are a limited number of opportunities in academia, and limited available positions in industry for PhD level expertise, often making them overqualified for available industry positions. Despite major investments by government on education and research at academic institutions, these investments do not translate to forces that would drive the economy. Inevitably, limited career opportunities have led to brain drain of PhD graduates and inefficient economical use of this intellectual force. Considering a large number of PhD students have international status in Canada, it is common to see these students move to other countries after graduation, notably to US for better jobs & salaries. Brain drain is a well-known and unmet problem in Canada [1&2].

Moreover, Canadian industries are facing a problem with a similar root, low pace of adopting innovation. Failure in creating opportunities to attract recent graduates who can contribute to offering disruptive technologies, the shortage in number of scientific talents who match their needs, in particular coping with fast-paced nature of industrial competition, knowledge on innovation methodologies, teamwork and business acumen lead Canadian companies to lose dominance in the market to US rival companies. Canada is a highly innovative nation, but the listed challenges prevent the translation of innovation into wealth creation. As an example Montreal with the highest number of university students per capita among metropolitan areas in North America [3] compares well to Boston, the intellectual capital of the U.S., on core innovation vectors such as number of students and available budget at universities for research and development (Figure 1)[4].



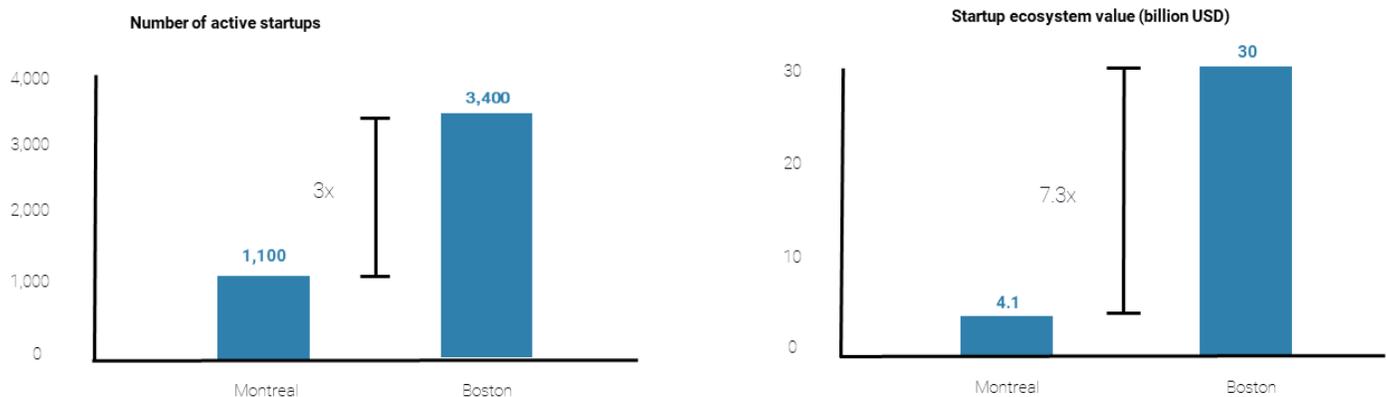
**Figure 1.** Montréal compares well with Boston for key innovation indicators

However, Boston has invested heavily in translating university research into commercialization and training talents on entrepreneurship.

# Mahzad Sharifahmadian

## Scientist entrepreneurs – the engines of economic growth

A comparison on the number of startups and generated value into economy shows that Montreal is far behind Boston: it faces a considerable low number of startups led by university graduates despite the high number of students and R&D projects (Figure 2).



**Figure 2.** Montreal vs Boston: The output gap in terms of startups is massive.

It is clear that Canada's economic growth and stand point in global innovation economy would highly depend on closing the gap between academic research & economy through translation of technological innovation[5].

### PROPOSED ACTION

Here I propose a series of actions addressing the unmet needs for experiential learning, understanding the market fit of academic research and the opportunity to pursue an entrepreneurial path. This proposition with a focus on PhD researchers creates a major opportunity for Canada to support the transformation of researchers into entrepreneurs. This opportunity can stimulate our economy by creating deep tech ventures and jobs for highly skilled and specialized PhD and postdoc graduates. This program expands the skill set of scientists beyond the scope of research and accelerate the translation of research discoveries into commercially viable applications. The following proposed program aims to train the next generation of scientists who can provide value to industries with innovative approaches and ranks them as problem solvers. This proposal entails a national approach applicable to all postgraduate degree programs.

- Training on innovation practices & entrepreneurial skills: a curriculum that will be offered by local university innovation centers or business schools as accredited courses for students in post graduate programs including MSc, PhDs. This curriculum should focus on practices in the specialized industry, commercialization paths for research based technologies, road map to entrepreneurship and fundamental skills for creation of startups. The offering of this curriculum should not be affected by changes in the administration of the universities. A similar training program proposed has been launched in 2019 in Quebec supported by Les Fonds de recherche du Québec (FRQ). Results represented in the first cycle report prove the need of such training among PhD graduates [6].

# Mahzad Sharifahmadian

## Scientist entrepreneurs – the engines of economic growth

- Federally governed network of support: this initiative would align local, provincial and national resources toward accelerating university spin-offs including; fundings, subsidized access to research platforms & access to a network of experts from industrial consortiums of Canada. This network of support de-risks financing & early stage uncertainties and encourages researchers to create start-ups.
- Supporting the culture shift: smart policies that will increase the value of entrepreneurship among academics in a practical way. Defining funds that considers licensing & startup involvement as factors for evaluation of grants. Increase number of grants dedicated to advancing the commercialization of research such as GAPP by Genome Canada. Encouraging & acknowledging collaboration of faculties with entrepreneurship centers as part of their annual performance evaluation.
- Collision of innovative minds; translating technologies into applications that can land in the market requires a teamwork to address needs from different perspectives such as business, design, science, engineering, social sciences. To create a collaborative and multidisciplinary culture that stimulates innovation & teamwork across different faculties (i.e. Industrial mandates for collision of creative minds from design, sciences, engineering & business departments). Indeed teamwork is an instrumental step towards the entrepreneurial journey. Success of centers such as MIT Media Lab is proof that multidisciplinary trainings & joint projects will skill graduate researchers with tools to assess industrial challenges and embark on developing disruptive products [7]. Furthermore, it would accelerate adoption of emerging technologies, for example with Artificial Intelligence and the advancement of scientific discoveries into medical applications.
- A new track in academic system, postdoc entrepreneur. Defining funds accessible to PIs for hiring postdoc entrepreneurs to turn their developed technologies into commercially viable products for their startup.

Success of this program relies on the collaboration of all stakeholders of innovation ecosystem including industries, academia, government and entrepreneurs. Through experiential training, collision of brain powers and alignment of entrepreneurial resources, we will create a nation-wide dynamic living lab that translates into the application of cutting-edge, supporting Canadian industries, and creating career opportunities for university graduates.

This proposition will be a paradigm shift and would change the impact of universities on the economy through five pillars; (i) Facilitating go-to-market strategies for newly developed technologies, (ii) Growing partnership opportunities between research labs and industries, (iii) Creating jobs relevant to the skills and knowledge of PhD graduates, (iv) Driving investments into Canadian companies, (v) Activating an entrepreneurial culture among researchers and graduate students.

# Mahzad Sharifahmadian

## Scientist entrepreneurs – the engines of economic growth

### REFERENCES

1. [RETOURNER LE DRAIN DU CERVEAU: Où vont les talents canadiens en STEM? Rapport de l'Université de Toronto et de l'Université Brock, mai 2018](#)
2. [La migration interprovinciale et le Québec • Clemens, Labrie et Emes, Institut Fraser, 2016](#)
3. [Le blogue du Palais des congrès de Montréal, 2011](#)
4. [Rapport sur les écosystèmes émergents au monde 2017](#)
5. [Council of Canadian Academies, 2018. Competing in a Global Innovation Economy: The Current State of R&D in Canada. Ottawa \(ON\): Expert Panel on the State of Science and Technology and Industrial Research and Development in Canada, Council of Canadian Academies.](#)
6. [Nouvelles et communiqués, les Fonds de recherche du Québec, 2019](#)
7. [MIT Media Lab at a glance, 2018](#)

# RUNNERS-UP—Sabrina Bedjera

## A holistic approach to measuring drinking water success in Indigenous communities



### **BIOGRAPHY**

Sabrina Bedjera holds a Masters of Applied Science in Environmental Engineering from the University of Waterloo, and a Bachelors' of Science and Education from the University of Ontario Institute of Technology. Sabrina's masters' project looking at optimizing drinking water treatment in Ontario. Sabrina's interest in policy occurred after participating in Science Outside the Lab a week-long program focusing on the interaction between science, policy and society. Sabrina was part of the collaborative water program at the University of Waterloo and volunteered as Academic Vice Chair for Students of the Water Institute – Graduate Section. She was a Student Experience Working Group member as part of the Indigenization Strategy at the University of Waterloo. Sabrina has a passion for water, policy, and social justice.

### **INSPIRATION**

*"Through the collaborative water program at the University of Waterloo I learned about drinking water treatment issues in Indigenous communities. I had the opportunity to learn from Indigenous communities themselves and even had the honor of attending a water ceremony. This experience opened my eyes to the importance of water in these communities. Since then I have volunteered with Indigenous groups on my campus and have started researching how to improve water treatment in these areas."*

# Sabrina Bedjera

## A holistic approach to measuring drinking water success in Indigenous communities

### OPPORTUNITY FOR ACTION

Canadian Indigenous communities are disproportionately affected by poor water quality (Arsenault et al., 2018). There are many factors that are linked to this water inequality, including colonization, governance issues, water infrastructure, and operator training (Galway et al., 2016; Patrick et al., 2019; Thompson et al., 2017). Indigenous communities are 90 times more likely to be without running water (Bermedo-Carrasco et al., 2018; Morrison et al., 2015), and are at a higher risk for water-borne diseases (Bradford et al., 2016; Galway et al., 2016). Poor water quality in these communities has been linked to skin problems and gastrointestinal issues (Bermedo-Carrasco et al., 2018).

Many Indigenous communities have a spiritual connection with water (Arsenault et al., 2018; Galway et al., 2016; White et al., 2012). Water is respected, kept clean, and is used for cultural purposes (Bradford et al., 2016). Lack of clean water can hinder Indigenous peoples' ability to maintain relationships with the nature around them, which is an important part of their identity (Arsenault et al., 2018).

As a result of this water inequality, in 2015 the government pledged to end boil water advisories in Indigenous communities (Black & McBean, 2018), and allocated billions of dollars to this cause. As of August 2019, 87 long term drinking water advisories have been lifted, and there are 56 long-term advisories remaining (Government of Canada, 2019).

However, focusing only on boil water advisories as a measure of drinking water success can leave some Indigenous communities behind. Many Indigenous people lack access to running water, and obtain their water from cisterns, which are regularly supplied by water trucks. This water is frequently contaminated with bacteria during this process, which can cause health issues (Bradford et al., 2018B). In the community of Garden Hill First Nation in Manitoba, 30% of the community uses cisterns for their drinking water. The community has encountered various issues such as contamination and slow water delivery. However, because the treatment plants are producing safe drinking water, and the water is getting delivered to the community, there are no boil water advisories issued (Elash, 2019). Therefore, this community is not eligible for extra funding which could be used to better maintain their cistern system (Bradford et al., 2018B)

Communities with running water that have long-term boil water advisories can still suffer even after the advisories are lifted. Community members are often unsatisfied and untrusting of their water, even though it is deemed safe from a water treatment perspective (Bermedo-Carrasco et al., 2018; Kot et al., 2015). Boil water advisories on their own do not provide enough information on the state of drinking water in Indigenous communities. Indigenous communities are diverse and have many factors that affect their capacity to produce clean water, such as access to running water, infrastructure, trained staff, and education. Therefore, in addition to boil water advisories, it is crucial to develop measures of drinking water success that adequately evaluate the state of drinking water in Indigenous communities.

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## A holistic approach to measuring drinking water success in Indigenous communities

However, it is important that these measures of success are co-created with Indigenous people. Indigenous communities are often not involved in making the policy decisions that impact their communities. As a result, their treaty and Indigenous rights can be ignored due to them not being consulted (Latchmore et al., 2018).

Therefore, there is currently a need for new measures of drinking water success that are created in collaboration with Indigenous people and adequately represent the state of drinking water in Indigenous communities.

### **PROPOSED ACTION**

Indigenous communities are diverse and have varying needs. Therefore, boil water advisories on their own are not an adequate measure of drinking water success. Indigenous people should be collaborating on all drinking water projects that affect them, as their input, knowledge, and values are necessary in order for these projects to be effective. This proposal offers a potential policy solution that could help to achieve safe drinking water in these communities.

#### **1. Create a committee to develop effective measures of drinking water success founded in Indigenous knowledge and values**

Boil water advisories are not a sufficient measure of drinking water success. In order to develop better measures of success, a committee should be created with meaningful Indigenous representation, drinking water experts, federal and provincial government officials, and researchers. The non-Indigenous members of the committee should be versed in Indigenous knowledge and values before serving on the committee. The goals of this committee would be to conduct a survey of existing measures of drinking water success, determine whether new research is needed in this area, facilitate any resulting research projects, and combine the results into a set of overall drinking water goals for Indigenous communities.

#### **2. Complete background research into potential measures of drinking water success**

There are many common measures of water quality, such as dissolved organic matter, metal concentration, and chlorine residuals. These should still be used to measure water quality in treatment plants, cisterns, and all areas where Indigenous people receive water. However, these common measures do not necessarily capture the full picture of drinking water success, and additional factors should be considered.

Previous literature has already given some insight into new potential measures of success. Studies have investigated how satisfied Indigenous people were with their tap water, and how often they drank tap water in comparison to bottled water (Bermedo-Carrasco et al., 2018; Dupont et al., 2014).

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Measuring Indigenous peoples' satisfaction would provide information as to how these communities are feeling about their water. Health issues should also be considered, such as the number of gastrointestinal issues, waterborne diseases, and skin problems (Bradford et al., 2016).

### **3. Determine if new research is needed and facilitate that research**

In addition to the existing literature, new research may need to be conducted in collaboration with Indigenous communities to assess their needs. This research should include communities that do not have access to running water and obtain their water through other means such as cisterns.

Past water research has often been culturally inappropriate as Indigenous values have been misunderstood (Bradford et al., 2016). This can result in barriers in communication, which can prevent these communities from receiving safe drinking water (Bradford et al., 2016, 2018). A community-based participatory method is recommended which involves collaboration with Indigenous communities in all aspects of the research process (Bradford et al., 2016).

### **4. Create overall drinking water goals for Indigenous communities**

Once an effective set of metrics for drinking water success has been determined, the next step will be to create drinking water goals according to these metrics.

These goals could differ depending on the province or the community as water quality varies throughout Canada. The committee will need determine whether overall drinking water goals can be set federally for Indigenous communities or whether they should be specific to the province or community.

After these goals have been established, it will be the role of the appropriate federal, provincial, Indigenous, and community agencies to allocate the appropriate resources to ensure that these goals are met.

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## A holistic approach to measuring drinking water success in Indigenous communities

### REFERENCES

1. Arsenault, R., Diver, S., McGregor, D., Witham, A., & Bourassa, C. (2018). Shifting the framework of Canadian water governance through Indigenous research methods: Acknowledging the past with an eye on the future. *Water*, 10(1), 1-18 <https://doi.org/10.3390/w10010049>
2. Bermedo-Carrasco, S., Bharadwaj, L., & Waldner, C. L. (2018). Factors associated with drinking and being satisfied with tap water in Indigenous communities in Saskatchewan, Canada. *International Journal of Circumpolar Health*, 77(1), 1-10. <https://doi.org/10.1080/22423982.2018.1466605>
3. Black, K., & McBean, E. (2018). Drinking water supply systems: Decreasing advisories and improving treatment through real-time water quality monitoring. *Journal of Water Supply: Research and Technology - AQUA*, 67(4), 317-331. <https://doi.org/10.2166/aqua.2018.091>
4. Bradford, L. E. A., Bharadwaj, L. A., Okpalauwaekwe, U., & Waldner, C. L. (2016). Drinking water quality in indigenous communities in Canada and health outcomes: A scoping review. *International Journal of Circumpolar Health*, 75(1), 1-17. <https://doi.org/10.3402/ijch.v75.32336>
5. Bradford, L. E. A., Vogel, T., Lindenschmidt, K.-E., McPhedran, K., Strickert, G. E. H., Fonstad, T. A., & Bharadwaj, L. A. (2018). Co-design of water services and infrastructure for Indigenous Canada: A scoping review. *Facets*, 3(1), 487-511. <https://doi.org/10.1139/facets-2017-0124>
6. Bradford, L., Waldner, C., Mclaughlin, K., Zagozewski, R., Bradford, L., Waldner, C., Zagozewski, R. (2018B). A mixed-method examination of risk factors in the truck-to-cistern drinking water system on the Beardy and Okemasis First Nation Reserve, Saskatchewan. *Canadian Water Resources Journal / Revue Canadienne Des Ressources Hydriques*, 43(4), 383-400 <https://doi.org/10.1080/07011784.2018.1474139>
7. Dupont, D., Waldner, C., Bharadwaj, L., Plummer, R., Carter, B., Cave, K., & Zagozewski, R. (2014). Drinking water management: Health risk perceptions and choices in first nations and non-First Nations communities in Canada. *International Journal of Environmental Research and Public Health*, 11(6), 5889-5903. <https://doi.org/10.3390/ijerph110605889>
8. Elash, A. (2019, January 9). This First Nation produces clean water. So why are so many residents afraid to drink it? CBC News. Retrieved from <https://www.cbc.ca/news/indigenous/garden-hill-first-nations-drinking-water-1.4907864>
9. Government of Canada. (2019, January 8). Ending long-term drinking water advisories. Retrieved from <https://www.sac-isc.gc.ca/eng/1506514143353/1533317130660>
10. Galway, L., Galway, & P., L. (2016). Boiling over: A Descriptive Analysis of Drinking Water Advisories in First Nations Communities in Ontario, Canada. *International Journal of Environmental Research and Public Health*, 13(5), 505. <https://doi.org/10.3390/ijerph13050505>
11. Kot, M., Gagnon, G. A., & Castleden, H. (2015). Water compliance challenges: How do Canadian small water systems respond? *Water Policy*, 17(2), 349-369. <https://doi.org/10.2166/wp.2014.172>
12. Latchmore, T., Schuster-Wallace, C. J., Longboat, D. R., Dickson-Anderson, S. E., & Majury, A. (2018). Critical elements for local Indigenous water security in Canada: A narrative review. *Journal of Water and Health*, 16(6), 893-903. <https://doi.org/10.2166/wh.2018.107>
13. Morrison, A., Bradford, L., & Bharadwaj, L. (2015). Quantifiable progress of the First Nations Water Management Strategy , 2001 - 2013: Ready for regulation? *Canadian Water Resources Journal / Revue Canadienne Des Ressources Hydriques*, 40(4), 352-372. <https://doi.org/10.1080/07011784.2015.1080124>
14. Patrick, R. J., Grant, K., & Bharadwaj, L. (2019). Reclaiming Indigenous Planning as a Pathway to Local Water Security. *Water*, 11(5), 936.
15. Thompson, E. E., Post, Y. L., & Mcbean, E. A. (2017). A decade of drinking water advisories: Historical evidence of frequency, duration and causes. *Canadian Water Resources Journal / Revue Canadienne Des Ressources Hydriques*, 42(4), 378-390 <https://doi.org/10.1080/07011784.2017.1387609>
16. White, J. P., Murphy, L., & Spence, N. (2012). Water and indigenous peoples: Canada's paradox. *International Indigenous Policy Journal*, 3(3), 3. <https://doi.org/10.18584/iipi.2012.3.3.3>

# HONOURED PARTICIPANT -

## Blake Freier

### Values and Science: Strengthening the Model Policy on Scientific Integrity



#### BIOGRAPHY

I am a fifth-year PhD student at the University of Waterloo. My research focuses on the responsible use of science by governments, the nature of expertise, and public trust in science. My research draws on philosophy, science, policy studies, and science and technology studies to understand the relationship between objectivity, trust, values, and expertise so that we may better understand the ways in which scientific evidence is successfully or unsuccessfully used in public policy. Specifically, I examine the relationship between values and trust, and how these affect assessments of credibility when persons or institutions provide science advice. I have attended the Science Outside the Lab North program and was a panelist at CSPC in 2018.

#### INSPIRATION

*“Over the past four years, I’ve been amazed by the fact that lay-publics often did not seem to value science to the same degree that I do. Whether it be anti-vaccine sentiment being expressed at parties, or climate denial being expressed by politicians, the problem seemed clear: people care more about some ideology than they do about evidence. As I began to study this problem, it became clear that the problem wasn’t that simple. People do value science, but they value it in different ways and for different reasons. Furthermore, I learned that values play a role in scientific inquiry! Equipped with my new knowledge, I began to look for ways to ensure that governments enacted policies that were informed by the “best available science” in ways that were consistent with the responsible use of values in science, and to make my work useful to both policymakers and scientists.”*

# Blake Freier

## Values and Science: Strengthening the Model Policy on Scientific Integrity

### OPPORTUNITY FOR ACTION

The opportunity for action that I have identified is a way to amend the Model Policy on Scientific Integrity [Nemer 2018] so that it may better inspire public trust in Canadian science. There is a disconnect between what the Model Policy identifies as “scientific integrity” and the body of evidence from science and technology studies on scientific integrity and practice, based on the myth that science is and ought to be, value-free.

Contextual values (e.g., social, ethical, or political values) are commonly thought to undermine the constitutive values of science [Longino 1990; Harding 1991]. The worry is that if social values can affect science, then we will end up with ideologically driven science, which would undermine the integrity of science and make science a tool for political agendas. But values do play a role in science [Kuhn 1977; Longino 1990, 2002; Douglas 2009; Kourany 2010; Fehr 2011]. Science has certain accepted constitutive values that allow us to determine what counts as good scientific practices, methods, and theories, such as “accuracy” or “internal consistency” [Longino 1990].

However, contextual values may also play a legitimately direct role in science at two stages of scientific inquiry: the decision of what research question to ask, and the decision of what methodology to use [Douglas 2009, Brown 2013, Lacey 2013]. These decisions require judgment, and judgment reflects values. For example, one may decide to study cancer both because one has the social value of reducing cancer rates, and the ethical value of caring for loved ones who have suffered from it and may thus want to develop less physically taxing treatments so as to reduce suffering. Depending on the value system, Contextual values can also play an indirect role in science. In instances of high stakes regarding the outcome of a decision, and high uncertainty surrounding the causal mechanisms at play, we need social or ethical values to fill the gap between evidence and action. For example, in studying the relationship between cancer rates and dioxin exposure, we need to decide whether we want to risk more false positives or more false negatives [Douglas 2000]. If, in the interests of public health, we err on the side of false positives, then rates may appear higher than they are. On the other hand, if, out of economic considerations, we err on the side of false negatives, then rates may appear lower than they are. These social values have an important influence on the facts that get produced and they do not undermine the epistemic authority of science by replacing facts with ideology. Furthermore, since such facts are likely to be used to inform policy, the value considerations that go into the production of these facts have a significant impact on the lives of Canadians.

Science and technology studies has shown that considerations like those I discussed above are a regular part of scientific practice. Values in science are thus not the exception, but the rule. Value-free science is a myth. But government scientists, like all scientists, make these kinds of value-judgements regularly, while Canadians have minimal, and indirect say in which kinds of values are reflected in federal science. The fact and presence of values in science is not acknowledged by the scientific integrity policy.

# Blake Freier

## Values and Science: Strengthening the Model Policy on Scientific Integrity

In a time where democratic institutions around the world are under siege, truth is under attack, and something as ostensibly uncontroversial as “healthy eating” has become political [Zimonjic 2019], Canada needs a policy for scientific integrity that ensures that our institutions are operating in a way that empowers Canadians by informing them of the values guiding government science.

### PROPOSED ACTION

Due to the nature of the proposed policy changes, this policy solution will need support and input from departments, agencies, and public servants. As such, my proposed action, while offering some concrete suggestions, provides general criteria for what an amended policy on scientific integrity should look like.

My solution is as follows:

1. Provide training to government scientists on the ways that values play a role in scientific inquiry. Such training is unlikely to be a sufficient intervention on its own, but it can provide scientists with a better understanding of the role that values play in scientific inquiry at different stages, when, and how, these roles are appropriate, and lay the groundwork for recommendations two and three.
2. Amend the model policy on scientific integrity so that the role of values in science is recognized, and so that it provides guidance on what values should guide and inform government science. That the policy is a model is useful in this regard, as different values may appropriately influence the science of different departments and agencies. Establishing these guiding values will require input from departments, agencies, and public servants. Furthermore, by creating guiding values or more explicitly linking these organizations’ values to their research, public trust in government science, departments, and agencies will be strengthened. Canadians can be assured that government science will be less open to political interference. While institutionalizing these values does not eliminate the need for subjective interpretation and discretion, it does provide more transparency and accountability to government science.
3. Finally, while the protections for government scientists to speak to the media are a step forward, they are incomplete. Parliament should enact stronger whistleblower protections for all government workers, so that employees who speak out against violations of these guidelines to the media do not face reprisal. Currently, the Public Servants Disclosure Protection Act (PSDPA) offers limited, and often ineffective, support for government workers who speak out about government wrongdoing [Johnson 2018; Lukiwski 2017]. The act only protects employees who report wrongdoing to law enforcement, rather than the media. However, it isn’t clear that all government wrongdoing is illegal wrongdoing, and so, the act should be expanded to include protections for employees who go to the media. At minimum, parliament should enact the changes to the PSDPA proposed in 2017 by the Standing Committee on Government Operations and Estimates. If governments do exert undue influence on government science, or direct departments and agencies in ways that contravene the established guiding values, whistleblowers need to be protected.

# Blake Freier

## Values and Science: Strengthening the Model Policy on Scientific Integrity

### REFERENCES

1. Brown, M. J. (2013). Values in Science beyond Underdetermination and Inductive Risk. *Philosophy of Science*, 829-839.
2. Douglas, H. (2000). Inductive Risk and Values in Science. *Philosophy of Science*, 559-579.
3. Douglas, H. (2009). *Science, Policy, and the Value-Free Ideal*. Pittsburgh: University of Pittsburgh Press.
4. Fehr, C. (2011). Feminist Engagement with Evolutionary Psychology. *Hypatia*, 50-72.
5. Harding, S. (1991). *Whose Science? Whose Knowledge? Thinking from Women's Lives*. Ithica: Cornell University Press.
6. Johnson, E. (2018, September 2). 'Process is torturous': Federal whistleblower says Canada doesn't protect people who speak out. Retrieved from CBC News: <https://www.cbc.ca/news/canada/british-columbia/delays-in-whistleblower-protection-system-1.4803588>
7. Kourany, J. (2010). *Philosophy of Science After Feminism*. New York: Oxford University Press.
8. Kuhn, T. (1977). Objectivity, Value Judgment, and Theory Choice. In T. Kuhn, *The Essential Tension: Selected Studies in the Scientific Tradition and Change* (pp. 320-339). Chicago: University of Chicago Press.
9. Lacey, H. (2013). Rehabilitating Neutrality. *Philosophical Studies*, 77-83.
10. Longino, H. (1990). *Science as Social Knowledge*. Princeton: Princeton University Press.
11. Longino, H. (2002). *The Fate of Knowledge*. Princeton: Princeton University Press.
12. Lukiwski, T. (2017). Strengthening the Protection of the Public Interest within the Public Servants Disclosure Protection Act. Standing Committee on Government Operations and Estimates. Ottawa: House of Commons.
13. Nemer, M. (2018, July 30). Model Policy on Scientific Integrity. Retrieved from Government of Canada - Office of the Chief Science Advisor: [https://www.ic.gc.ca/eic/site/063.nsf/eng/h\\_97643.html](https://www.ic.gc.ca/eic/site/063.nsf/eng/h_97643.html)
14. Zimonjic, P. (2019, July 18). Conservatives 'declaring war on Canada Food Guide' like they did on long-form census, Trudeau says. Retrieved from CBC News: <https://www.cbc.ca/news/politics/scheer-trudeau-canada-food-guide-1.5216957>

# HONoured PARTICIPANTS - Alana Westwood, Kathlyn Woolfson, and Elnaz Shadabi An Action Plan for Lasting Science Integrity Policies



## BIOGRAPHIES

Alana Westwood, Kathlyn Woolfson, and Elnaz Shadabi are all members of the 2018-2019 cohort of the Mitacs Canadian Science Policy Fellowship. Dr. Westwood took up her fellowship at Natural Resources Canada, and Drs. Woolfson and Shadabi completed their fellowship years at Canadian Food Inspection Agency. This policy proposal arose from a Science Policy Hackathon workshop co-hosted by Mitacs and Evidence for Democracy with support from FACETS, all of who the applicants wish to thank. The applicants also wish to thank the other members of their working group including Dr. Stefanie Haustein, Dr. Claire Austin, Dr. Katie Gibbs, and Peter Severinson.

## INSPIRATION

*"In these contentious times, Canadian federal science and evidence has a role in public discourse. Policies that ensure the integrity of science (inclusive of social and economic sciences) conducted by federal scientists are one tool to establish and protect the role of evidence in public life. We are members of the Mitacs Science Policy Fellowship, whose objectives include bringing with scientific expertise to support government policy development and allowing Fellows the opportunity to learn about the governance and implementation of science in public policy. As both Fellows and federal public servants, we share an interest in the use of evidence to support public policy. We also wish for federal scientific activities to be seen as credible and trustworthy in the eyes of stakeholders and the public. The federal Scientific Integrity Policies offer a promising tool to achieve these goals, but their potential has not yet been fully realized."*

# Alana Westwood, Kathlyn Woolfson, and Elnaz Shadabi

## An Action Plan for Lasting Science Integrity Policies

### OPPORTUNITY FOR ACTION

Integrity is one of the cornerstones of ethics in scientific practice [NOAA, 2011]. In recent years, the Government of Canada has been criticized for not upholding principles of scientific integrity, including the right for scientists to freely share information [Magnuson-Ford and Gibbs, 2014; PIPSC, 2015]. Thousands of scientists in Canada and worldwide have signed on to letters challenging the rigour and transparency of the science used in federal decision-making related to environmental assessment and fisheries [Chan and 299 co-signatories, 2014; Jacob and >1800 co-signatories, 2016; Lassonde and >200 co-signatories, 2016; Moore and 130 co-signatories, 2016; Schindler and 371 co-signatories, 2016; Schindler and 624 co-signatories, 2012]. Indeed, scientific integrity in the public service and the federal government was a key issue in the 2015 federal election [Halpern, 2015].

Upon taking office in 2015, Prime Minister Justin Trudeau issued a Mandate Letter to the Minister of Science which stated that the Minister would create a Chief Science Officer mandated to ensure that government science is fully available to the public, that scientists are able to speak freely about their work, and that scientific analyses are considered when the government makes decisions. [Trudeau, 2015]. The newly-created Office of the Chief Science Advisor (OCSA) then worked with the Treasury Board Secretariat and the Professional Institute of the Public Service in Canada (PIPSC) to develop a Model Policy on Scientific Integrity [ISED, 2018]. All Canadian government science-based departments and agencies (SBDAs) were then instructed to adopt their own version of a Scientific Integrity Policy (SIP) in 2018, which would apply to employees who “design, conduct, communicate, manage, review or make use of department or agency research , science or related activities”.

As we approach the one-year anniversary of the adoption of SIPs by SBDAs, which is also an election year, the future of these policies remains in question. It was necessary that the SIP policies be adapted by individual SBDAs to meet the specific needs of their employees and the type of work. However, the patchwork of SIPs across SBDAs offers challenges regarding implementation and longevity. For example, it is unclear if the appropriate mechanisms are in place to ensure SIPs continue to be upheld and implemented in the event of a change of either Parliamentary or SBDA leadership. It is unclear if implementation of the SIPs is being conducted in a coordinated fashion between SBDAs. There is also a lack of central accountability to ensure that each SBDA is implementing and upholding the SIP in the spirit of the original intent of the policy.

The intense public scrutiny on the issue of scientific integrity in the public service in Canada is not historical. The federal SIP was widely covered in major media outlets [e.g. Semeniuk, 2018], and scientists and the public continue to challenge the scientific integrity of Canada’s environmental assessment system [Beazley, 2018; Jacob et al., 2018a; Jacob et al., 2018b; Westwood et al., 2019]. Not only is it important that implementation be carried out in a way that ensures the longevity and coordination of, and accountability for, the SIPs, but that implementation should also be transparent and clearly understandable by the public.

# Alana Westwood, Kathlyn Woolfson, and Elnaz Shadabi

## An Action Plan for Lasting Science Integrity Policies

### PROPOSED ACTION

Our proposal is for Canada’s Office of the Chief Science Advisor (OCSA) to lead a coordinated effort to ensure the long-term sustainability of the SIP by publishing a public report card on SIP annually. Although the OCSA is currently collecting information about SIP implementation as part of its review processes, to our knowledge, there is no plan for a publicly available report. We propose for the OCSA to publish an annual report card providing a rating for each SBDA under three categories 1) Education and engagement, 2) Transparency and accountability, and 3) Leadership.



|   | SBDA's   |
|---|--|
| <b>Education and Engagement</b><br>        | Mandatory training for scientists and managers<br>Open forum on SIP<br>Survey of scientists and managers on SIP uptake   |
| <b>Transparency and Accountability</b><br> | SIP available publicly on website<br>SBDA reporting on implementation publicly available on website and linking to SIP<br>Review of each SBDA's progress is available publicly |
| <b>Leadership</b><br>                      | Designated scientific integrity office(r) to address conflicts and complaints<br>Designated SBDA SIP champion (ADM level)  |

Each SBDA should continue to determine appropriate activities to ensure the implementation and longevity of their SIP as tailored to their size, capacity, and the needs of their scientific personnel. Thus, the OCSA would not prescribe activities to support implementation of the SIPs, but rather, collect information provided by each SBDA on their implementation activities and classify them under these three categories.

# Alana Westwood, Kathlyn Woolfson, and Elnaz Shadabi

## An Action Plan for Lasting Science Integrity Policies

Examples of activities that may qualify for each category include:

- 1. Education and engagement.**
  - Mandatory training on the SIP for scientists and managers;
  - Holding an SBDA-wide town hall or forum on the SIP;
  - Surveying employees about their awareness and use of the SIP.
- 2. Transparency and accountability.**
  - Posting the SIP publically on SBDA website;
  - Publically posting their implementation activities related to the SIP;
  - Public participation in implementation activities
  - (e.g. expert panels or sessions that are open to the public).
- 3. Leadership.**
  - Designated scientific integrity officer(s) to address conflicts and complaints;
  - Designated “SIP Champions” within the department at management and working levels.

After collecting all information volunteered by the SBDAs, the OCSA would publish a brief annual report card. The report card would allow for a quick visual comparison on the progress of each SBDA towards implementing the SIP and be available to the general public (for an approximation of such a report card, see the picture).

This report card would ensure not only implementation of SIPs across the Canadian federal government, but also facilitate better coordination by allowing SBDAs to directly compare their implementation and engagement activities. Although the report card itself is a mechanism for accountability to the public, it will also encourage internal structures of accountability within SBDAs as related to the SIP to facilitate reporting of annual activities.

|   | SBDA 1 | SBDA 2 | SBDA 3 |
|---|--------|--------|--------|
| <b>Education and Engagement</b><br>        | ✓      | ✗      | ✓      |
| <b>Transparency and Accountability</b><br> | ✗      | ✓      | ✓      |
| <b>Leadership</b><br>                      | ✓      | ✗      | ✓      |

Finally, the report card can be used as a tool to promote longevity of the SIP by communicating their implementation as a priority to both SBDAs and the public. Such a public reporting mechanism would ensure accountability for the SIP, and promote communication within government departments/agencies, while simultaneously informing members of the public and other stakeholders and improving their trust in SBDA – scientific activities.

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### REFERENCES

1. Beazley, D., 2018. Canada's proposed new Impact assessment: Putting science first? National Magazine. <https://www.nationalmagazine.ca/en-ca/articles/law/hot-topics-in-law/2018/canada-s-proposed-new-impact-assessment-putting-sc>
2. Chan, K., Salomon, A., Taylor, E., + 297 co-signatories, 2014. Open letter on the Joint Review Panel report regarding the Northern Gateway Project.
3. Halpern, M., 2015. How science helped to swing the Canadian Election. The Guardian. <https://www.theguardian.com/science/political-science/2015/oct/21/how-science-helped-to-swing-the-canadian-election>
4. (ISED) Innovation Science and Economic Development Canada, 2018. Model policy on scientific integrity [WWW Document]. URL <https://www.ic.gc.ca/eic/site/052.nsf/eng/00010.html> (accessed 8.12.18).
5. Jacob, A.L., Fox, C.C., Gerwig, T., Muñoz, N., Pitman, K., Price, M., + >1800 co-signatories, 2016. Young researchers' open letter to Prime Minister Trudeau.
6. Jacob, A., Westwood, A., Komers, P., Gibbs, K., Otto, S., 2018a. Environmental assessment policy must be based on science. Policy Options. <https://policyoptions.irpp.org/magazines/february-2018/environmental-assessment-policy-must-be-based-on-science/>
7. Jacob, A.L., Moore, J.W., Fox, C.H., Sunter, E.J., Gauthier, D., Westwood, A.R., Ford, A.T., 2018b. Cross-sectoral input for the potential role of science in Canada's environmental assessment. FACETS 3, 512-529. doi:10.1139/facets-2017-0104
8. Lassonde, M., + >200 co-signatories, 2016. Letter from the Royal Society of Canada regarding Site C dam project.
9. Magnuson-Ford, K., Gibbs, K., 2014. Can scientists speak? Evidence for Democracy; Simon Fraser University.
10. Moore, J., + 130 co-signatories, 2016. Scientific flaws in assessment of environmental risks from the proposed Pacific NorthWest Liquefied Natural Gas facility at Lelu Island, Skeena River estuary.
11. NOAA, 2011. NOAA Administrative Order 202-735D. Subject: Scientific Integrity. National Oceanic and Atmospheric Administration.
12. (PIPSC) Professional Institute of the Public Service of Canada, 2015. The Big Chill: Silencing Public Interest Science, A Survey.
13. Schindler, D., + 371 co-signatories, 2016. Statement of Concerned Scholars on the Site C dam project, Peace River, British Columbia.
14. Schindler, D., + 624 co-signatories, 2012. Open letter re. Potential amendments to section 35 of the Fisheries Act.
15. Semeniuk, I., 2018. Ottawa unveils integrity rules to shield scientists from interference. The Globe and Mail. <https://www.theglobeandmail.com/canada/article-ottawa-unveils-integrity-rules-to-shield-scientists-from-interference/>
16. Trudeau, J., 2015. Minister of science mandate letter. Office of the Prime Minister. <https://pm.gc.ca/en/mandate-letters/minister-science-mandate-letter>
17. Westwood, A.R., Olszynski, M., Fox, C.H., Ford, A.T., Jacob, A.L., Moore, J.W., Palen, W.J., 2019. The role of science in contemporary Canadian environmental decision-making: The example of environmental assessment. UBC Law Rev. 52, 243-284.