

FACULTY OF MANAGEMENT 2020

Research Publications



This report showcases the publications of Dalhousie University's Faculty of Management (FoM) for the year 2020. It has been a wonderfully productive year, despite all obstacles, and we are proud to highlight the breadth of our contributions.

Our research spans disciplines and addresses a large number of complicated and complex problems in the world. True to our vision, we contribute to and inspire transformational solutions for society.

Publications are organized by School and alphabetically by School-affiliated author. Publications authored by several researchers from the Faculty of Management appear only once under the author who first appears in this report.

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The report is based on a search in Scopus for authors employed in the Faculty of Management. Only publications with a date of 2020 are included. Some relevant items may not appear in Scopus. Additions were made to this report if identified by individual researchers by January 21, 2020. Some publications are reported in Scopus as 2020 "article in press" and may end up being assigned to a 2021 issue. FoM researchers' names are in bold print.

ROWE SCHOOL OF BUSINESS

[Aghakhani H. Carvalho SW. Cunningham PH. 2020. When partners divorce: understanding consumers' reactions to partnership termination in cause-related marketing programs. *International Journal of Advertising*. 39\(4\):548-570](#)

Cause-related marketing (CRM) is a pervasive, global marketing tactic used to aid consumer persuasion. While considerable academic research has been directed to understanding this practice and its impact on consumers, virtually nothing is known about the effect on consumers' attitudes and purchase intentions when a sponsoring firm terminates a CRM partnership. To address this knowledge gap, two experiments with samples of adult North American consumers were conducted. Study 1's findings suggest that the termination of a CRM partnership has a negative, direct effect on both brand perceptions and purchase intentions. Results also suggest that the impact is lessened (but not overcome) if the sponsoring firm switches its support to a new cause, regardless of the levels of fit between the brand and cause. In Study 2, when an altruistic reason was used to motivate the termination, consumers responded more positively when the decision was made solely by the sponsoring firm than when it was made mutually by the sponsoring firm and the cause. However, when the decision to terminate the partnership was motivated by an operational reason, consumers responded better when the decision was made mutually.

[Main KJ. Aghakhani H. Labroo AA. Greidanus NS. 2020. Change it up: inactivity and repetitive activity reduce creative thinking. *Journal of Creative Behavior*. 54\(2\):395-406](#)

Across three experiments, we show that a change in the levels of physical activity increases creative thinking, whereas inactivity or repetitive activity lowers it. Participants walking forward were more creative the first few minutes of initiating physical activity than those sitting, or those merely watching changing scenery, and these effects dissipated when they continued the forward movement over time (within 8 minutes). Furthermore, merely anticipating a change in physical activity, for example, when participants were aware a task is coming to its conclusion, also increased creative thinking. We hypothesize that a change in physical activity cues the need to navigate new situations, and thus, can increase mental flexibility and creative thinking to deal with new circumstances. But once people habituate to their physical state, either of being at rest or being in motion, their level of creative thinking also returns to baseline levels. We confirm that mood, feelings of achievement, and energy are not responsible for the observed effects.

[Mehralian G. Peikanpour M. Rangchian M. Aghakhani H. 2020. Managerial skills and performance in small business: the mediating role of organizational culture. *Journal of Asia Business Studies*. 14\(3\):361-377](#)

Purpose: The purpose of this paper is to develop a conceptual model to determine whether organizational climate (OC) mediates the effect of managerial skills (MSs) on business performance in small businesses, such as pharmacies. **Design/methodology/approach:** The model proposed in this research was tested using separate questionnaires specifically designed for managers, employees and clients. The data set consists of responses from 301 managers, 470 clients and 328 employees from community pharmacies in Tehran, capital of Iran, which were analyzed using structural equation modeling. **Findings:** Although the results indicated no significant direct relationship between MSs and pharmacy performance (PP), they also confirmed that having a context-appropriate set of MSs can

positively affect PP via the mediating effect of OC. Originality/value: This is the first study investigating how MSs improve performance in retail pharmacies. Although this research focuses specifically on small businesses in the pharmaceutical industry, it nevertheless contributes to the literature by showing the importance of OC.

Dawkins CE. **Barker JR.** 2020. A complexity theory framework of issue movement. *Business and Society*. 59(6):1110-1150

This research draws on complexity theory to provide an alternative conceptualization of issue management. We use six dynamics of complexity drawn from complex adaptive systems—equipoise, turbulence, sensitive conditions, bifurcation, attractor emergence, and symmetry breaking—to develop a metaphorical framework that describes what occurs during various periods of issue activity and what propels issues from one period of activity to another. We illustrate the framework with a case study of the pharmaceutical industry response to the HIV/AIDS pandemic in Sub-Saharan Africa. The article concludes with a discussion of the additional affordances this framework provides to extend and complement issue life cycle models.

Mackinnon NJ. Boucher A. **Barker J.** Ho C. Drugs associated with quality-related events reported by community pharmacies in Nova Scotia, Canada. *BMJ Open Quality*. 9(2):e000853

No abstract available.

El Hazzouri M. **Carvalho SW.** Main K. 2020. Dissociative threat: underperforming to distance the self from undesirable groups. *European Journal of Marketing*. Article in press.

Purpose: This study aims to introduce the concept of dissociative threat, which is the fear of being associated with an undesirable (dissociative) group as a result of demonstrating ability in a domain that is stereotypically linked to that group. Consumers experiencing dissociative threats use inability signaling as a self-presentational strategy in which they present themselves as lacking ability in the dissociative domain. Design/methodology/approach: Five experimental studies were conducted to test whether consumers experience threat in dissociative domains and to examine factors that influence this threat. Findings: Results showed that dissociative threat adversely affects consumers' performance at tasks that require using products linked to dissociative groups. Threatened participants reported intentions to perform poorly and train for a longer time in preparation for such tasks, thus signaling low ability in dissociative domains. Additionally, when participants who were experiencing dissociative threats received confirmation that they lacked ability in that domain, their performance at these tasks improved. Research limitations/implications: This study expands the knowledge on strategies, including inability signaling, that consumers use to avoid being linked to dissociative groups. Practical implications: The findings suggest to marketers that stereotypes that link their products to certain consumer segments can threaten other consumers. Factors that shape and alleviate this threat are identified, which may help companies who are marketing such products. Originality/value: This study extends the current understanding of stereotype threat and proposes a new self-presentational strategy, that has not been documented yet in the literature (i.e. inability signaling), that consumers use to deal with the dissociative threat.

Huang H. He Y. **Chen J.** 2020. Cross-market selling channel strategies in an international luxury brand's supply chain with gray markets. *Transportation Research Part E: Logistics and Transportation Review*. 144:102157

When a luxury brand manufacturer sells its product in two separate markets with price discrimination, it may face gray marketers, who purchase the product in the lower-price market and resell it in the higher-price market. To mitigate the effects of the gray market, a luxury brand manufacturer may strategically select its sales channels to sell the product in both markets simultaneously, in both markets sequentially, or exclusively in the high price market. We derive the equilibria for each strategy, and demonstrate that selling strategy can mitigate the negative the impact of gray market. The results further show that gray market is active only if the customer's valuation discount for gray products is moderate and the gap between the customer's perceived status valuation of the two markets is relatively large. As compared to the case without the gray market, we find an interesting and counter-intuitive result, that gray market activity can mitigate the double marginalization effect and lead to a Pareto improvement for both the manufacturer and its retailer. Our research enriches the literature on gray markets by offering new insights and implications, and our results provide international luxury brand manufacturers with guidelines for efficiently managing cross-market sales channels.

Pun H. **Chen J.** Li W. 2020. Channel strategy for manufacturers in the presence of service freeriders. *European Journal of Operational Research*. 287(2):460-479

We examine the case of a manufacturer that must decide whether to sell its product directly to the customer through its own store, and/or indirectly through an independent retailer; both the manufacturer and the retailer must decide on the level of service effort they will provide to the customer. When customers are dissatisfied with a product, they will make an extra trip to return that product. Pre-sales service improves customers' satisfaction with the product and reduces customer returns, but providing that service may be costly for the seller, and not all service leads to immediate sales. In particular, when a channel provides a high level of service, some customers may first visit this channel's store to take advantage of the service, only to buy the product from a cheaper channel (freeriding). This paper examines the impact of customers' freeriding behavior on a manufacturer's channel strategy. We find that the cost bearer of freeriding (the firm on which the customers freeride) can be better off, and the beneficiary of freeriding (the firm from which the freeriding customers purchase the product) can be worse off, when customers can freeride. We also find that when customers can freeride, the manufacturer is less likely to use the dual-channel structure, and total demand may be smaller, even though customers have the flexibility of choosing where to buy after experiencing pre-sales service.

Wan X. Li D. **Chen J.** Lei Y. 2020. Managing customer returns strategy with the option of selling returned products. *International Journal of Production Economics*. 230:107794

Managing customer returns is a crucial issue for the retailing industry. In this paper, we develop a model to investigate a monopolistic retailer's customer returns management strategy. The retailer should determine its returns policy: a money-back guarantee (MBG) or no-refund. If an MBG returns policy is offered, the retailer must also decide whether or not to sell the returned products as open-box products. We derive the optimal pricing strategy for each of the returns strategies and identify the retailer's optimal customer returns management strategy. We show when the retailer should implement each of the returns policies, and when it should sell the returned products as open-box products. We also show that even when the retailer cannot handle customer returns efficiently, it could choose to offer an MBG returns policy and sell returned products as open-box products, if the cost of inspecting returned items is low. Finally, we show that the retailer can simplify the choice of returns management

strategy based on identifiable quantities and threshold values. The implications of this study are also discussed.

Li W. **Chen J.** Chen B. 2020. Sourcing strategy of original equipment manufacturer with quality competition. *Decision Sciences*. 51(5):1110-1130

We develop game-theoretic models to study the sourcing strategy of an original equipment manufacturer (OEM) in the presence of a competing contract manufacturer (CCM). The OEM sells the product in a high-quality brand and has three strategy options: producing the product in house or outsourcing production to either a CCM or a noncompeting contract manufacturer (NCM). At the same time, the CCM provides its own product in a low-quality brand. We show that when the product qualities are exogenous, the OEM's sourcing strategy decision depends on the OEM brand's efficiency in producing and selling the product (the difference between quality and production cost), relative to that of the CCM brand. Interestingly, the OEM may prefer outsourcing to a CCM to soften price competition, even though this will mean a higher wholesale price; the CCM also prefers to produce for the OEM, even though its total demand may decrease. When the product qualities are endogenous, however, with quality competition, the OEM prefers either insourcing or outsourcing to an NCM to increase quality differentiation, depending on its cost disadvantage in producing the high-quality product.

Liu Z. Diallo C. **Chen J.** Zhang M. 2020. Optimal pricing and production strategy for new and remanufactured products under a non-renewing free replacement warranty. *International Journal of Production Economics*. 226:107602

Due to its economic and environmental benefits, the remanufacturing industry has become vital and popular worldwide. The demand for remanufactured products highly depends on their price and warranty coverage offered, as these two features are the two most important to customers for signaling value and quality of the remanufactured products. This paper identifies the conditions of the optimal pricing and production strategies for a monopolistic manufacturer under a non-renewing free replacement warranty for a two-period planning horizon. It is shown that the manufacturer's engagement in the remanufacturing activities depends on the warranty length and the ratio of the production cost to the remanufacturing cost. Numerical experiments provide additional managerial insights and implications by investigating the sensitivity of the optimal solutions to changes in the length of the warranty period offered.

Wang C. **Chen J.** Wang L. Luo L. 2020. Supply chain coordination with put option contracts and customer returns. *Journal of the Operational Research Society*. 71(6):103-1019

This article develops a newsvendor model to examine the optimal pricing and ordering decisions of a supply chain in which the supplier offers both wholesale price and option contracts to a retailer who faces customer returns and uncertain demand. The supplier is the Stackelberg leader who decides the option and exercise prices with a pre-determined wholesale price, and the retailer decides the product order quantity and option order quantity through the supplier's two contracts. We discuss the impact of customer returns and the option contract on the optimal pricing and ordering decisions, and on the profits of the supplier and the retailer. We show that the retailer's product order quantity, option order quantity, and expected profit decrease with customer returns rate; the supplier's optimal option price and exercise price decrease as more customers return products. We also discuss the supply chain coordination mechanism and propose a contract that can achieve supply chain coordination and ensure that both the supplier and the retailer can be more profitable.

Sun X. Tang W. **Chen J.** Zhang J. 2020. Optimal investment strategy of a free-floating sharing platform. *Transportation Research Part E: Logistics and Transportation Review*. 138:101958

Recent free-floating platforms offer service to consumers via a sharing model that can substantially increase the service's circulation and utilization. This paper examines the optimal investment strategy in product quality, input quantity, and dynamic advertising for a free-floating sharing platform that owns a durable product and leases it to consumers. We model the problem as an optimal control problem and solve it via the maximum principle and an algorithm. We discuss four investment strategies, one single-stage strategy and three two-stage strategies (flexible quality, flexible quantity, and dual-flexible). Our findings provide new insights and implications into the sharing platform's investment strategy.

Li W. **Chen J.** 2020. Manufacturer's vertical integration strategies in a three-tier supply chain. *Transportation Research Part E: Logistics and Transportation Review*. 135:101884

We develop game-theoretic models to examine the manufacturer's vertical integration strategies in a three-tier supply chain with two suppliers, one manufacturer, and two retailers. The supply chain sells two quality-differentiated products. We find that when quality is exogenous, regardless of the existing supply chain structure, the manufacturer's choice of forward or backward integration strategy depends on the relative efficiencies of two products. When quality is endogenous, however, the existing supply chain structure does affect the manufacturer's integration strategy decision. Although backward integration hurts the unintegrated supplier, forward integration can lead to a win-win outcome for the manufacturer and unintegrated retailer.

Wan X. **Chen J.** Chen B. 2020. Exploring service positioning in platform-based markets. *International Journal of Production Economics*. 220:107455

Online to offline (O2O) platforms have been widely used in practice, enabling consumers to search for information and purchase products or services online and then consume offline. Service differentiation, however, becomes a critical issue for competing firms when they join an O2O platform. This paper examines the impact of an O2O platform in the cinema industry by developing a general duopoly competition model. We find that after joining an O2O platform, competing cinemas should differentiate themselves less as either of two factors increases: the total market size or the proportion of audience members preferring movie ticketing services through the O2O platform. Based on analytical results from the model, we further develop hypotheses in the context of China's cinema industry, where O2O platforms play a major role in cinemas' total revenue. In order to further define the practical implications of the theoretical analysis, we conduct an empirical study, using real data collected from the Chinese cinema industry to demonstrate the impact of two major factors on service differentiation between cinemas that have joined O2O platforms. To align our empirical research with the Hotelling setting in the analytical model, five pairs of cinemas are selected using the partition clustering approach. We employ panel-data empirical models to test our hypotheses and conduct robustness checks. The findings confirm hypotheses regarding service differentiation in platform-based markets. Implications and insights are also discussed in this paper.

Li D. **Chen J.** Liao Y. 2020. Optimal decisions on prices, order quantities, and returns policies in a supply chain with two-period selling. *European Journal of Operational Research*. Article in press.

Selling products in a regular period and a markdown period, in the presence of customer returns, is common practice in the retailing industry. It is critical for the retailer to manage returns by choosing appropriate returns policies for the two periods. This paper examines the retailer's customer returns policy strategy, and pricing and ordering decisions, in a supply chain selling seasonal products over two periods. The manufacturer is a Stackelberg pricing leader and sets wholesale prices at the beginning of each period. The retailer may carry over both returns and strategic inventory of new products from the regular period to the markdown period; we show that if the holding cost on new products is low it carries over strategic inventory; it also carries returns to the markdown period, if it offers a Money-Back Guarantee in the regular period. Interestingly, we find that customer returns can serve as a substitute for inventory, and the retailer is less likely to carry strategic inventory from the first period to the second when it offers an MBG returns policy, as compared to when it offers a no-refund policy. We also show that an MBG returns policy is not always a dominant returns strategy for the retailer, if it has the option to carry strategic inventory. We identify the conditions under which either a no-refund policy or an MBG over two periods can lead to a Pareto improvement for both the retailer and the manufacturer.

Wang L. **Chen J.** Song H. 2020. [Manufacturer's channel strategy with retailer's store brand. International Journal of Production Research. Article in press.](#)

This paper examines the manufacturer's channel strategy as it considers introducing an online channel to sell its own national brand (NB) product, when the brick-and-mortar retailer sells both the NB and its own lower-quality store brand (SB) product. The manufacturer is motivated to introduce an online channel when the customers' 'hassle cost' of shopping online is relatively low and their transportation cost is relatively high. However, our results also demonstrate that when the online shopping hassle cost is high and the transportation cost is low, and even when there are very few sales in the online channel, the online-sales strategy can still contribute positively to the manufacturer's profit. The introduction of the online channel by the manufacturer may result in a win-win situation for the manufacturer and the retailer. As a corollary effect, when the retailer is able to determine the SB quality, it should position the SB at a lower quality level to avoid competition with the manufacturer's online channel.

Zhang Q. **Chen J.** Zaccour G. 2020. [Market targeting and information sharing with social influences in a luxury supply chain. Transportation Research Part E: Logistics and Transportation Review. 133:101822](#)

We consider a luxury supply chain in which one Stackelberg manufacturer sells products to consumers through a retailer. Driven by exclusivity or conformity, consumers are classified as either snobs or conformists, with uncertain preferences about the product. The manufacturer can obtain a private signal on this preference, while the retailer cannot. Results show that the manufacturer makes different market-targeting schedules in response to different signals. Interestingly, the manufacturer may benefit from either a no-information, a private-information, or an information-sharing policy, depending on its market-targeting strategy. Not sharing the manufacturer's information, however, is preferred by the retailer.

Sun M. **Chen J.** Tian Y. Yan Y. 2020. [The impact of online reviews in the presence of customer returns. International Journal of Production Economics. Article in press.](#)

We develop a duopoly model to examine how online reviews influence the decisions of two competing online sellers who sell products of differentiated quality under different returns policies. We derive the competing sellers' optimal decisions on price and returns policy with and without online reviews, and we find that online reviews have greater impact on the high-quality seller than on the low-quality seller. If

the salvage value of the product is relatively low, the seller has less opportunity to benefit from online reviews when it offers an MBG, as compared to a no-refund policy. The impact of online reviews on the competition between the two sellers has a “symmetric effect area,” where reviews may either weaken or intensify the price competition between the two sellers when they both offer a no-refund policy, but always intensify the competition if they both offer an MBG. We have identified the conditions under which online reviews lead to a win-win, or benefit one seller, or present a prisoner's dilemma for the two online sellers. We also show that MBGs at both sellers help mitigate the prisoner's dilemma if the net salvage value at both sellers is sufficiently high.

Liu Z. **Chen J.** Diallo C. Venkaradri U. 2020. Pricing and production decisions in a dual-channel closed-loop supply chain with (re)manufacturing. *International Journal of Production Economics*. Article in press.

The development of information technologies and e-commerce has allowed many companies to set up online platforms to sell their products in dual-channel supply chain (SC) networks. The double competition between new and remanufactured products within channels and across competing channels affects manufacturer and retailer pricing decisions. However, the current state of the literature shows a gap in the modelling and analysis of a dual-channel SC with both cross-channel competition and channel costs. To fill this gap, this paper develops a model for a CLSC in which the manufacturer sells new products through a retail channel and also directly through its online channel. The manufacturer may also sell remanufactured products in its online direct channel if it decides to produce them. The results indicate that: (i) the manufacturer's production and optimal pricing strategies depend on both production and channel selling costs; (ii) remanufacturing is not considered by the manufacturer when the unit manufacturing cost is sufficiently low and the retailer's channel cost is sufficiently high; (iii) the introduction of remanufacturing hurts the retailer's profit only when the unit manufacturing cost is sufficiently high; and (iv) selling the new product online mitigates the effect of remanufacturing on the retailer, and thus a high customer's acceptance of the remanufactured product can benefit the retailer.

Chen Y. **Chowdhury SD.** Donanda C. 2020. Mirroring hypothesis and integrality: Evidence from Tesla Motors. *Journal of Engineering and Technology Management*. 54:41-55

Viewing the relationship between vertical integration and product architecture as the “mirroring hypothesis”, we examine the case of Tesla Motors. Our analysis demonstrates that, by and large, Tesla pursues a high degree of integrality in product architecture and employs significant vertical integration. Such congruence offers support for the mirroring hypothesis in the introductory stage of the electric vehicle industry. Besides dedicating an idiosyncratic architecture to battery issues and customers’ range anxiety, Tesla tailors its organization and strategy to mesh with the demands of its other key stakeholders in the larger electric vehicle ecosystem by gradually mastering an effective systems integration.

Chowdhury SD. Wang E. 2020. Board size, director compensation, and firm transition across stock exchanges: Evidence from Canada. *Journal of Management and Governance*. 24(3):685-712

In this study, we examine the relationship between the role and compensation structure of non-executive directors when firms on the TSX Venture Exchange (TSX-V) move to the Toronto Stock Exchange (TSX-C) in Canada. Using data from 156 listed firms, we find that graduating TSX-V firms employ relatively larger number of nonexecutive directors and pay them a higher proportion of contingent compensation than do the TSX-C firms. The graduated firms also provide non-executive

outside directors with more components of compensation package. However, we find no support for the hypothesis that a TSX-V firm would pay a higher average director compensation in order to graduate. We also find that increases in the total amount and the components of compensation package are consistent with the shift in emphasis from resource dependence to monitoring in the same firm following its graduation from TSX-V to TSXC. The study's implications are given.

Sheppard JP. **Chowdhury SD**. 2020. [Nothing endures but change: Studying changes in industry choice and determinism](#). In Anderson T. Torp S. (Eds), *New Research in Strategy and International Business*. Emerald Publishing.

Much of the extant management research implies that the existence of industries and organizations depends on variables and factors largely beyond their control, and survival is the result of a happy confluence of their origins, events, and growth rather than actions of conscious volition. The authors suggest that industry circumstances can be overcome. So, rather than studying rates of organization population change as effects of environmental change, the authors propose that some managerial actions can be taken that, in the aggregate, will affect the industry context. Changes in concentration should influence the environment in which industry members will compete later. Migration moves and rationalization of production facilities, along with organization population pressures, should exert strong influences on changes in the industry environments. Such findings suggest that some degree of strategic choice is at and that firms have some discretionary choice in their industries.

Drumwright ME. **Cunningham PH**. 2020. [Unethical newsroom behavior: paradoxes and a perfect storm](#). *Journalism Practice*. Article in press.

Unethical behavior in newsrooms has come to public attention, and despite the glare of publicity, it persists. This research examines the question of why newsrooms provide a context conducive to persistent unethical workplace behaviors. We conducted 25 in-depth interviews with reporters, editors, anchors, producers, and news executives. Sexual harassment has been in the public eye, but our informants also described other unethical workplace behaviors such as bullying, discrimination, and incivility. Behavioral ethics emerged as a theoretical lens to help interpret our data. Five explanatory themes arose: 1) conceiving of work solely as creating journalistic content; 2) toxic rituals, rites of passage, and norms; 3) high power differentials and acquiescent behavior; 4) ineffective organizational mechanisms; and 5) a disruptive industry context. Networks of complicity enabled the bad behavior, and together with the themes, created a perfect storm that permitted unethical behavior to persist. Two paradoxes resulted: 1) the ethics paradox in which journalists had high ethical sensitivity in reporting but were blind to unethical behavior within newsrooms and 2) the power paradox in which journalists experienced role conflict caused by the need for initiative, courage, independence, and resistance to intimidation in reporting versus the dependence, obedience, and acquiescence required within newsrooms.

Hancock J. Witter T. **Comber S**. et al. 2020. [Understanding burnout and moral distress to build resilience: a qualitative study of an interprofessional intensive care unit](#). *Canadian Journal of Anesthesia*. 67(11):1541-1548

Objective: The purpose of this study was to explore personal and organizational factors that contribute to burnout and moral distress in a Canadian academic intensive care unit (ICU) healthcare team. Both of these issues have a significant impact on healthcare providers, their families, and the quality of patient care. These themes will be used to design interventions to build team resilience. Methods: This is a

qualitative study using focus groups to elicit a better understanding of stakeholder perspectives on burnout and moral distress in the ICU team environment. Thematic analysis of transcripts from focus groups with registered intensive care nurses (RNs), respiratory therapists (RTs), and physicians (MDs) considered causes of burnout and moral distress, its impact, coping strategies, as well as suggestions to build resilience. Results: Six focus groups, each with four to eight participants, were conducted. A total of 35 participants (six MDs, 21 RNs, and eight RTs) represented 43% of the MDs, 18.8% of the RNs, and 20.0% of the RTs. Themes were concordant between the professions and included: 1) organizational issues, 2) exposure to high-intensity situations, and 3) poor team experiences. Participants reported negative impacts on emotional and physical well-being, family dynamics, and patient care. Suggestions to build resilience were categorized into the three main themes: organizational issues, exposure to high intensity situations, and poor team experiences. Conclusions: Intensive care unit team members described their experiences with moral distress and burnout, and suggested ways to build resilience in the workplace. Experiences and suggestions were similar between the interdisciplinary teams.

Hancock J. Witter T. **Comber S.** et al. 2020. The Impact of End of Life Care on Burnout and Moral Distress in an Academic ICU. *Canadian Journal of Anesthesia (CJA) - Critical Care Canada Forum 2020 Abstracts*. In press.

Burnout results from chronically high levels of stress in the workplace and is characterized by emotional exhaustion, depersonalization and reduced personal accomplishment. Moral distress occurs when individuals are placed in situations that are at odds with their core values and have little power to make change Both have a significant negative impact on healthcare providers, their families as well as patients. Causes are numerous, however provision of end of life care (EOLC) has been identified as a significant contributor. Objective: Within our ICU team, previous research quantified high rates of burnout and moral distress. The objective of this study was to describe the impact that EOLC has on burnout and moral distress for the team at an academic Intensive Care Unit in Halifax, Nova Scotia.

Ohreen D. **Sundararajan B. Trifts V. Comber S.** Vygotskian Business Ethics: The Influence of Peers on Moral Reasoning in Business Ethics Education. *Journal of Management Education*. Article in press.

The Russian developmental psychologist Lev Vygotsky provides important theoretical underpinnings for an alternative method to business ethics pedagogy. Although Vygotsky's constructivist approach has been applied to other disciplines such as cognitive development, moral development, and network analysis and learning, its application to business ethics education is virtually nonexistent. Vygotsky's focus on language and peer influence provides a novel approach to ethics education. Although many business ethics instructors already use group discussion in their classes, we provide evidence that will reinforce such techniques as a crucial pedagogical method. This study is an exploratory application of Vygotsky's developmental theory to business ethics education. Data was gathered in business ethics and management courses, with experimental and control groups and analyzed using the Defining Issues Test and thematic-coded journal entries. Results indicate discussions created a zone of proximal development improving the moral reasoning for most students, giving them multiple perspectives, and providing support for students to engage in deliberations and peer dialogue when discussing ethical frameworks, ethical scenarios, and ethical decision-making.

Petrie DA. **Comber S.** 2020. Emergency Department access and flow: complex systems need complex approaches. *Journal of Evaluation in Clinical Practice*. 26(5):1552-1558

Hospital access block, often referred to as Emergency Department (ED) overcrowding when it manifests there, is an important public health issue and seemingly intractable problem in our evolving healthcare systems. The multiple, dynamic, and inter-dependent factors influencing its cause (and potential solutions) may best fit a complex adaptive systems (CASs) analysis and approach. Complex adaptive systems differ from simple systems in the number of components, the degree of interconnectedness between and among those components, and the certainty of a working solutions. Complicated systems lie some place in the middle but would still operate with predictable and controllable characteristics. While this categorization itself may be an oversimplification, it is clear that simple/complicated systems have different properties (linear cause-and-effect, predictable outcomes), and behave differently than complex systems (non-linear and difficult to predict). These different properties have a significant impact on problem formulation and solving. In fact, not recognizing how complex systems behave has limited attempts at health system “transformation” and complex issues management. For example, our approach to the opioid crisis and the obesity crisis started with siloed and doomed-to-fail linear approaches but have now recognized the complexity of the problem. This suggests that we need to shift our mindsets, and improve our systems thinking, as we address the health system problems that have proven resistant to conventional approaches. These shifts in thinking may significantly impact a Health System's approach to ED access block. Understanding the number of components and degree of inter-dependencies in the system may bring to the fore previously under-emphasized, or even unrealized, strategies and solutions.

[Dabić M. Maley J. Dana L-P. et al. 2020. Pathways of SME internationalization: a bibliometric and systematic review. *Small Business Economics*. 55\(3\):705-725](#)

Business is dynamic and rapidly changing. Global markets were previously the playing field of multinational corporations (MNCs), while small and medium enterprises (SMEs) were local; however, the removal of imposed barriers and recent technological advances in manufacturing, transportation, and communications have indorsed SMEs and international entrepreneurs (IEs) global access. SMEs and IEs are increasingly fueling economic growth and innovation, and these trends are presenting both opportunities and challenges to both MNCs and SMEs in the global arena. This review systematically examines comparative SME and IE research, analyzing (after fine-tuning) 762 articles published in leading journals from 1992 to September 2018. Our bibliometric and systematic review classifies SME and IE research findings into three echelons: (i) subjects, (ii) theories, and (iii) methods.

[Dana LP. Gurau C. Light I. Muhammad N. 2020. Family, community, and ethnic capital as entrepreneurial resources: toward an integrated model. *Journal of Small Business Management*. 58\(5\):1003-1029](#)

Our study investigates social mechanisms that facilitate the reproduction of an entrepreneurially oriented community structure. We combine qualitative and quantitative data collection, analysis, and interpretation to compare the entrepreneurial attitudes and activity of two matched groups comprising Memons and Non-Memons in Karachi, Pakistan, and to identify the social mechanisms that support the dynamics of intergenerational entrepreneurship support. Findings unveil interdependence among family, community, and ethnic capital, as contextual expressions of social capital that are manifest at different levels of the ethnic social system. We propose a model of the recurrent reproduction of entrepreneurial values, resources, activities, and structures.

[Gurau C. Dana L-P. Light I. Overcoming the liability of foreignness: a typology and model of immigrant entrepreneurs. *European Management Review*. 17\(3\):701-717](#)

This study addresses the diversity of extant models and theoretical interpretations of the immigrant entrepreneurship phenomenon. Combining an extensive literature review with the use of Bourdieu's theory of social practice, we develop a general model of immigrant entrepreneurship that identifies four different entrepreneurial paths, each characterised by a specific combination of personal resources, network embeddedness, individual habitus, and targeted opportunities. Through the interpretative lens of this model, foreignness can represent either a liability or a competitive advantage for the immigrant, depending on the entrepreneurial context and strategy. The proposed model provides useful insights into the phenomenon of immigrant entrepreneurship for academics, entrepreneurs and policy makers, offering a comprehensive framework which does not invalidate the extant models, but rather integrates them into a larger perspective.

Gurau C. **Dana L-P.** Katz-Volovelsky E. 2020. Spanning transnational boundaries in industrial markets: A study of Israeli entrepreneurs in China. *Industrial Marketing Management*. 89:389-401

This study investigates Israeli transnational entrepreneurs who provide B2B intermediation services in China. To understand the dynamic evolution of their profile and activity, we apply an interpretative framework that combines practice theory and boundary spanning models to analyze six case studies of Israeli transnational entrepreneurs in China. The findings indicate a gradual evolution of their personal and professional profile, determined by a dynamic interdependence between various forms of capital, entrepreneurial habitus, and circumstantial factors. They mobilize a combination of social, cultural, economic and symbolic capital to span organizational, country, cultural and stage boundaries between Israeli and Chinese individuals and organizations. We integrate these findings into a comprehensive model, presenting the various components and stages that led to the development of transnational profiles and activities. Our findings provide an original contribution both to industrial marketing theory and practice, and to transnational entrepreneurship literature, advancing academic understanding and offering a clear roadmap for entrepreneurs, organizations and policy-makers.

Jafari-Sadeghi V. Nkongolo-Bakenda J-M. **Dana L-P.** Anderson RB. Bioancone PP. 2020. Home country institutional context and entrepreneurial internationalization: the significance of human capital attributes. *Journal of International Entrepreneurship*. 18(2):165-195

The global economy involves enormous internationalization activities that provide untapped opportunities for entrepreneurs and businesses. This study sets out to improve the understanding of the role of the home country human capital on entrepreneurial internationalization. To advance this understanding, we conducted an analysis of data from 28 European countries using structural equation modeling (SEM) with partial least squares (PLS). The result of an empirical analysis revealed that the entrepreneurial intentions of the country's non-entrepreneurs has a positive and significant impact on effective business creation and the latter consequently has a positive and significant impact on the level of internationalization. Also, our findings indicate that the level of education has a negative impact on entrepreneurial readiness/awareness.

Angulo-Ruis F. Pergelova A. **Dana L-P.** 2020. The internationalization of social hybrid firms. *Journal of Business Research*. 113:266-278

This paper is concerned with the internationalization of firms that combine social and profit objectives at their core, referred to as social hybrid firms. In contrast to most profit-focused firms, such firms tend to place considerable attention on the social impact within their local communities. For this reason, the internationalization behavior of these firms has received limited research attention. In our empirical

setting, however, some social hybrid firms go beyond their local communities and internationalize. Using the attention-based view as a theoretical framework, we hypothesize several boundary conditions that affect the internationalization of social hybrid firms and test them with a representative data set of small and medium-sized, privately owned, indigenous businesses in Canada. Our findings reveal that social hybrid firms are more likely to internationalize when the levels of institutional isomorphism are high and when the organization leverages economic network ties. However, social network ties and government support reduce the likelihood of social hybrid firms to internationalize. The study provides theoretical and practical implications related to the phenomenon of social hybrid firms, their internationalization, and the attention-based view of the firm.

Dabić M. Vlacić B. Paul J. **Dana L-P.** et al. 2020. Immigrant entrepreneurship: a review and research agenda. *Journal of Business Research*. 113:25-38

Immigrant entrepreneurship has become a phenomenon of global interest. This paper reviews existing immigrant entrepreneurship literature in order to map out the major streams of research and identify widely used theories, methods, and contexts. To do this, the authors have reviewed 514 articles from academic journals. This paper highlights the need for interdisciplinary approaches that transcend boundaries. The development and adoption of different theoretical frameworks, the use of multi-level methods, and the consideration of unexplored country contexts are among the authors' recommendations for future research.

Gurau C. **Dana L-P.** 2020 Financing paths, firms' governance and corporate entrepreneurship: accessing and applying operant and operand resources in biotechnology firms. *Technological Forecasting and Social Change*. 153:119935

This study investigates the systemic relationship between financing paths used by early-stage biotechnology firms, the accessed resources, the subsequent reconfiguration of management and governance structures, and their effect on the level of corporate entrepreneurship. Adopting a qualitative methodology based on an inductive approach, in 2018 and 2019 we observed 12 UK biotechnology ventures that accessed private, corporate or crowdfunding equity investments. We collected primary data through open-ended and semi-structured interviews with CEOs and board members of these firms. Findings were interpreted applying a resource-based perspective, which unveiled the role and importance of operant and operand resources for organizational coordination and functioning. The way in which the controlled operant resources are used to improve the management and governance structures, and their functional interdependence, ultimately determines an optimal level of corporate entrepreneurship for effectively exploiting the accessed operand resources. The results provide useful insights regarding the systemic interdependence between financing paths, organizational resources, management team, governance bodies, and corporate entrepreneurship, that can enhance the understanding and performance of managers, shareholders and policy-makers involved in biotechnology business.

Leckel A. Veilleux S. **Dana L-P.** 2020. Local open innovation: a means for public policy to increase collaboration for innovation in SMEs. 2020. *Technological Forecasting and Social Change*. 153:119891

Our study focuses on how public policy can effectively increase collaboration for innovation among firms, entrepreneurs, research institutions and the public sector in a way that is easily accessible and beneficial for SMEs. In recommending Local Open Innovation (LOI), this paper helps to shape regional innovation policies by strengthening regional networks to efficiently facilitate collaborative innovation.

Considering cognitive barriers and constrained resources and capabilities for applying open innovation (OI) in SMEs with unrestricted scope, a local approach offers advantages to facilitating OI. In light of our findings, we present the impact of such a policy mechanism on the adoption of OI, the unique combination of features of the LOI process, and how they affect collaboration. We also present the respective stakeholder relations, barriers preventing SMEs from engaging in OI and potential remedies LOI offers to overcome these barriers. We conclude with varieties of LOI for strengthening regional development in different contexts.

Sahut J-M. **Dana L-P.** Laroche M. 2020. Digital innovations, impacts on marketing, value chain and business models: an introduction. *Canadian Journal of Administrative Sciences*. 37(1):61-67

Digital innovations are changing business models and industries and, in today's world, effective mastery of digital innovations can be greatly advantageous, yet digital innovation literature suffers from major lacunae. We contribute to this literature by providing definitions and analysing specificities of this emerging research stream. We then discuss the impact of digital innovation on marketing, value chain, and business models, focusing on tensions and marketing challenges, the value chain, and the evolutions of business models. We conclude with suggestions for further research.

Canziani BF. Welsh DHB. **Dana L-P.** Ramadani V. 2020. Claiming a family brand identity: the role of website storytelling. *Canadian Journal of Administrative Sciences*. 37(1):68-81

This study focuses on the creation of a family identity as a central communication objective in business storytelling. We contribute to the field of business website marketing by identifying, through textual analysis of US winery website narratives, how businesses communicate family brand identities. Results show that three claims that are critical for family brand identities—character, temporal continuity, and distinctiveness—do appear in the website texts. Our study provides beginning evidence that family identity does not require family ownership alone but can be built upon complementary narrative elements and tactics, including kinship references and heritage storytelling. Both content and linguistic style of narratives are useful in conveying a family brand identity to an external public for website design. Implications are discussed.

Salamzadeh A. **Dana L-P.** 2020. The coronavirus (COVID-19) pandemic: challenges among Iranian startups. *Journal of Small Business and Entrepreneurship*. Article in press.

The coronavirus outbreak has become a global issue with significant effects on capital markets, and the global economy; its impacts are estimated to be even more than the previous global recessions. In this interim, due to the impacts of this pandemic, startups are more prone to fail or succeed faster than ever before; however, the challenges they face are not yet clearly scrutinized, as the pandemic was faster than scholars. This study therefore investigates the main challenges of Iranian startups by interviewing the co-founders of fifteen well-known startups. The findings are analyzed through two-step coding, and findings were discussed in a focus group session to which startup co-founders, policymakers, and scholars were invited. It was revealed that there are six principal types of challenges to be addressed, including financial, human resources management, support measures and mechanisms, marketing, crisis management, as well as some others.

Knezović E. Palalić R. **Dana L-P.** 2020. Women's entrepreneurship in former Yugoslavia: an introduction. *Contribution to Management Science*. Springer. pp:1-9

A vast of literature on entrepreneurship has been published in the recent period. However, the topic is relatively not new. Therefore, this introductory chapter explores the role and importance of entrepreneurship from a historical and contemporary perspective. Furthermore, we discuss the role of gender when it comes to entrepreneurship. Besides, we provide a discourse when it comes to the role of women in the former Yugoslavian society which was a key determinant of later women entrepreneurship movement. Finally, we emphasize the importance of this topic for former Yugoslavian states.

Ramadani V. Memili E. **Dana L-P.** Ramadani V. 2020. Women's entrepreneurship in North Macedonia. *Contribution to Management Science*. Springer. pp:113-134

This chapter provides insights into women entrepreneurship in the Republic of North Macedonia. The chapter begins with an overview of North Macedonia and then presents an evidence-based current state of women entrepreneurship. The chapter continues with government and other policies, initiatives, and activities for facilitating women entrepreneurship. In the end, an outlook toward the development of women entrepreneurship in the future is presented.

Qureshi MI. Parveen S. Abdullah I. **Dana L-P.** 2020. Reconceptualizing the interventions of open innovation systems between the nexus of quadruple organization cultural dynamics and performance. *Quality and Quantity*. Article in press

Although open innovation systems have drastically improved manufacturing performance, still many organizations are not able to leverage on the open innovation systems due to cultural barriers. This research aimed to investigate the interventions of the open innovation systems between the relationships of organizational culture and organizational performance with the moderating effect of management support. A quantitative research design was employed to achieve research objectives. Data was collected through a structured questionnaire from 384 managers of the large manufacturing industry in Malaysia using a multistage random sampling technique. Structural equation modelling by using SMART PLS was used to test hypotheses. Results indicated that the relationship between organizational culture (e.g. clan, adhocracy, and market culture) and organizational performance was mediated by open innovation. Open innovation has no mediation effect between hierarchy culture and organizational performance relationship. While management support moderates the relationship between open innovation and organizational culture. The organizations exhibited more organic culture and focused on differentiation can harness open innovation and enhanced organizational performance.

Fatma EB. Mohamed EB. **Dana L-P.** Boudabbous S. 2020. Does entrepreneurs' psychology affect their business venture success? Empirical findings from North Africa. *International Entrepreneurship and Management Journal*. Article in press

This paper discusses the effect of psychological traits on success. We empirically explore the effect of entrepreneurs' psychological biases on their venture success. Using a sample of Tunisian entrepreneurs and the cognitive mapping technique, our results indicate that psychology does affect business venture success. Especially, the entrepreneurial overconfidence and optimism biases can largely affect the new venture success. However, other variables, such as capital and social networks, also have strong effects on new venture success in this country. We control for gender differences and their effects on our empirical findings. For this purpose, we divide our full sample to constitute two sub-samples using the entrepreneur's gender. We find that the behavioral factors, especially overconfidence, optimism and hope, have a great impact on new venture launched by female entrepreneurs compared to male

entrepreneurs. In fact, the success of new venture launched by male entrepreneurs is less affected by behavioral factors and only the overconfidence bias can have an influence and their new venture success remains dependent to their age, experience and education.

[Palicic R. Ramadani V. Mariam Gilani S. Gerguri-Rashiti S. Dana L-P. 2020. Social media and consumer buying behaviour decisions: what entrepreneurs should know? Management Decision. Article in press](#)

Purpose: This paper aims to investigate the impacts of social media on the Pakistani consumers' buying behavior, which could be reflected in either complex buying, variety seeking, dissonance reducing or habitual buying. **Entrepreneurs need to know how their loyal and prospective customers feel, think and how do they decide on purchasing certain products and services.** **Design/methodology/approach:** The self-administered online questionnaire is used to collect feedback from consumers in order to analyze the data and come up with the findings. A sample size of 396 respondents was used to analyze and find a relationship between social media and consumer buying behavior. **Findings:** Social media is found to have a partially significant impact on Pakistani consumers' buying behavior; word of mouth and content credibility are the two factors that influence Pakistani consumers' buying behavior. Pakistani consumers, below the age of 40, possess more complex buying behavior, which alerts entrepreneurs to consider it for their future marketing strategies. **Practical implications:** Entrepreneurs should make an effort to be differentiated from others while keeping customers aware of the products they provide. In addition, customers should not spend too much time when comparing brands; rather, businesses should make it more captive. **Originality/value:** This paper provides different results in comparison to the previous studies, in terms of the factors influencing consumers' buying behavior.

[Wang Y. Deng Q. Rod M. Ji S. 2020. A thematic exploration of social media analytics in marketing research and an agenda for future inquiry. Article in press](#)

This paper aims to present the current social media analytics in marketing research. A bottom-up thematic content analysis of 123 academic papers from 38 top Marketing and Information Systems journals was conducted. Types of social media platform, data, and analytics; marketing themes; and fields of study that are involved in social media analytics research are identified. The match between technological inputs and marketing outputs is presented. The findings reveal the current status of social media analytics in marketing research and identify various untapped areas for further research. This paper proposes that the impact of social media analytics is not restricted as a marketing research method; it fosters or amplifies changes in marketing approach, and structure and culture in organisations. To maximise its benefits, this paper suggests that firms could strategically build a technological knowledge base of social media analytics, and strategically manage and support its use by facilitating IT-marketing and IT-organisation alignments.

[Wang Y. Rod M. Deng Q. Ji S. 2020. Exploiting business networks in the age of social media: the use and integration of social media analytics in B2B marketing. Journal of Business and Industrial Marketing. Article in press](#)

Purpose: Based on an organizational capability perspective, this paper aims to propose a development model for social media analytics (SMA) capability that can be applied to business-to-business (B2B) marketing, with the aim of facilitating the use and integration of SMA in B2B marketing and maximizing the benefits of business networks in the age of social media. **Design/methodology/approach:** This is a critical interpretive synthesis of SMA publications collected from academic journals, business magazines and the SMA service industry. In addition, an inter-disciplinary approach was adopted by drawing upon

both marketing and information systems literature. In total, 123 academic papers, 106 industry case studies and 141 magazine papers were identified and analyzed. The findings were synthesized and compiled to address the predefined research question. Findings: An SMA capability development model is proposed. The proposed model consists of four inter-dependent levels (technological, operational, managed and strategic) that collectively transfer the technological capability of SMA to the dynamic organizational capability. Each level of SMA capability is detailed. SMA-in-B2B marketing is highlighted as a socio-technical phenomenon, in which a technological level SMA capability is emphasized as the foundation for developing organizational level SMA capabilities and organizational capabilities, in turn, supporting and managing SMA activities and practices (e.g. strategic planning, social and cultural changes, skills and resources, measurements and values). Practical implications: The proposed research framework may have implications for the operational level SMA development and the investigations on the direct and/or indirect measurements to help firms see the impact of SMA on their business. Originality/value: This study may have implications for the adoption, use, integration and management of SMA in B2B marketing. The proposed model is grounded on the integrated insights from academia and industry. It is particularly relevant to B2B firms that have engaged in or plan to engage in applying SMA to extract insights from their online networks and is relevant to B2B researchers who are interested in SMA, big data and information technology organization integration studies.

Engau A. Sigler D. 2020. Pareto solutions in multicriteria optimization under uncertainty. *European Journal of Operational Research*. 281(2):357-368

We present and analyze several definitions of Pareto optimality for multicriteria optimization or decision problems with uncertainty primarily in their objective function values. In comparison to related notions of Pareto robustness, we first provide a full characterization of an alternative efficient set hierarchy that is based on six different ordering relations both with respect to the multiple objectives and a possibly finite, countably infinite or uncountable number of scenarios. We then establish several scalarization results for the generation of the corresponding efficient points using generalized weighted-sum and epsilon-constraint techniques. Finally, we leverage these scalarization results to also derive more general conditions for the existence of efficient points in each of the corresponding optimality classes, under suitable assumptions.

Fatemi A. Fooladi I. 2020. A primer on sustainable value creation. *Review of Financial Economics*. 38(3):452-473

This paper argues that the current paradigm of value creation has led to a number of unacceptable outcomes. Exaggerated by executive compensation incentives focused on short-term results, the model of shareholder wealth maximization spurs short-term profits that fail to take into account those costs that are externalized to other stakeholders. We argue that the all-inclusive costs can far exceed those explicitly accounted for and that their magnitude is often such that it outweighs the short-term gains by a wide margin. The cascading nature of these costs, the growing voice of other stakeholders in support of their interests, the erosion of public trust, and the increasingly dire state of the global environment have accelerated the pace of calls for the adoption of a model of sustainable value creation—one in which shareholders' wealth is maximized without making any of the other stakeholders significantly worse off. Taking an exploratory step toward developing such an ideal process, we present a simple example of a valuation model that incorporates such a principle. We also argue that markets, education, and regulation represent the three indispensable cornerstones of a sustainable value creation framework.

Fooladi IJ. Jacoby G. Jin L. 2020. Real duration and inflation duration: a cross-country perspective on a multidimensional hedging strategy. *Journal of International Financial Markets, Institutions and Money*. 101265

In this study we consider two different duration measures: (i) real duration, which is a measure of a financial instrument (asset or liability) value sensitivity with respect to changes in the real interest rate, and (ii) expected-inflation duration, which is a measure of the instrument value elasticity with respect to changes in the expected rate of general price inflation. These two measures arise because the nominal interest rate is divisible into a real rate and the expected-inflation rate. Thus, when inflation is present, a duration measure depends on the source of the change in the interest rate. We empirically examine cross-country differences and show that in low (negative) nominal rate environments (France and Germany), nominal rates are less responsive to changes in inflation expectations than in a high nominal rate environment (Italy). We show that under-protection of cash flows against inflation may significantly lower the asset value with a sizeable expected-inflation duration. On the other hand, assets with an indexation scheme that over protects against inflation, will be significantly more expensive with nontrivial and negative elasticity with respect to the inflation rate. Finally, we demonstrate that the real and expected-inflation duration can be utilized to simultaneously hedge the net worth of a firm against adverse impacts of changes in the real interest rate and changes in the expected-inflation rate.

Marcos DVD. Romero JH. Aguirre JA. **Gonzalez PA.** 2020. Reduction of complications generated by type 2 diabetes mellitus using a remote health care solution in Peru. *Iberian Conference on Information Systems and Technologies*. CISTI. June 2020:9141064

In this article, we propose a technological architecture that supports the remote medical care service for elderly people suffering from Type 2 Diabetes Mellitus in Peru. The problem is based on the limitations that elderly people have with compliance with medical controls, which leads to increased complications of the disease and the patient's quality of life. The design of the technological architecture is based on 6 layers: 1) devices, 2) software, 3) channels, 4) data storage, 5) data processing and 6) information visualization. Through the solution, patients are able to autonomously manage their disease through periodic glucose control and the execution of an updated treatment in real time. In the same way, the specialist doctor periodically analyzes the glucose level and is notified in real time about the out-of-range indicators, which allows him to make treatment decisions as the anomaly occurs. The focus of the solution is to reduce the complications generated by the disease through efficient glucose control and periodic medical advice. The solution was validated in a nursing home with adults over 60 and an endocrinologist from a medical office in Lima, Peru. For the study, we measured the constancy of the glucose record, the average response time of the doctor in case of emergencies or indicators out of range, the percentage of reduction of complications and the level of satisfaction of the Telehomecare solution in older adults. The results show that patients interact more frequently as they adapt the solution as part of their daily routine. On the other hand, the response time was approximately 4.13 minutes from the anomaly record. The percentage of complication reduction was 14% and the level of satisfaction of the solution was reflected in the dimensions of the response time and understanding of the user's need.

Zambrano EO. Munoz KR. Armas-Aguirre J. **Gonzalez PA.** 2020. Technological architecture with low cost sensors to improve physical therapy monitoring. *Iberian Conference on Information Systems and Technologies*. CISTI. June 2020:9140873

In this article, we propose a wireless monitoring solution for gait parameters using low-cost sensors in the physical rehabilitation of patients with gait disorders. This solution consists of infrared speed sensors (IRSS), force-sensing Resistor (FSR) and microcontrollers placed in a walker. These sensors collect the pressure distribution on the walker's handle and the speed of the steps during therapy session. The proposal allows to improve the traditional physiotherapy session times through a mobile application to perform the monitoring controlled by a health specialist in real time. The proposed solution consists of 4 stages: 1. Obtaining gear parameters, 2. Data transmission, 3. Information Storage and 4. Data collection and processing. Solution was tested with 10 patients from a physical rehabilitation center in Lima, Peru. Preliminary results revealed a significant reduction in the rehabilitation session from 25 to 5.2 minutes.

Jennings JE. **James AE.** Tetzlaff EA. 2020. Treating nonfamily managers like family: New insights from a re-analysis of pre-existing qualitative interview data. In DeMassis A. Kammerlander N. (Eds). *Handbook of Qualitative Research Methods for Family Business*. Edward Elgar. pp:321-349

This research takes a second look at data collected by the second author during his dissertation research to address a recognized gap in family business research: the lack of empirically grounded research on the quality of relationships between owning family members and nonfamily managers, and the consequences of the relationship quality. In doing so, the authors address three questions that remain in extant literature: (1) What aspect of the relationship between non-family managers and family owners tends to be imbued with special significance?; (2) How do non-family managers tend to respond to the presence or absence of this aspect in their relationships with owning family members?; and (3) What interactions tend to be perceived as either contributing to or detracting from this salient and influential relational aspect? Their findings point to the significance of 'family-like relations' between non-family members and family owners. Their findings also offer insight into the types of interactions with family owners that tend to foster or thwart the development of family-like relations, distinguishing and elaborating instantiations of single critical incidents and recurring small gestures. In sum, their study advances understanding of how the quality of relationships between non-family managers and family owners can be strengthened or diminished, providing scholars with at least suggestive insight into a topic that is of documented concern to the leaders of family firms.

Kabat-Farr D. Settles IH. Cortina LM. 2020. Selective incivility: an insidious form of discriminate in organizations. *Equality, Diversity and Inclusion*. 39(3):253-260

Purpose: This article serves as an introduction to four articles featured in a special issue on selective incivility in the workplace. This collection of papers addresses pressing issues around unpacking and tackling selective incivility in organizations. Design/methodology/approach: This introductory article first highlights research in this area to date, provides a summary of the papers included in this special issue and ends with intriguing themes from the papers and ways in which they advance the field. Findings: These papers reveal contextual factors that help us better understand selective incivility: group processes, workplace gender composition, status and power and modality (in-person or online incivility). Originality/value: By bringing together four approaches to studying selective incivility, this special issue pushes the field forward, providing empirically based insights as well as compelling new research directions.

Walsh BM. Burrus A. **Kabat-Farr D.** et al. 2020. Living a calling and perceived work ability in domestic violence services. *Journal of Counseling Psychology*. 67(2):241-250

Calling involves experiencing a sense of purpose to engage in work that benefits others. We contribute to the literature by studying living a calling, which we conceptualize as a resource, to examine how and why it is related to perceived work ability (i.e., one's perception of their ability to continue working in their current job) among women working in domestic violence services. We propose that by living out one's calling, domestic violence services workers may perceive fewer of the salient interpersonal demands in their jobs (relationship conflict among colleagues, workplace incivility from clients served), which may partially explain a linkage to greater perceived work ability. We tested hypotheses using 2-wave survey data. The results suggest that there are direct and indirect positive relations between living a calling and perceived work ability. Workers living out their calling perceive less relationship conflict among colleagues, which partially explains the positive relation with perceived work ability. However, we did not find support for the similarly proposed mediating role of perceived client incivility. Theoretical implications for studying calling and practical implications for career counselors and organizations are discussed. For example, career counselors may consider the presence of a calling when exploring clients' career development in domestic violence work, whereas social service providers may benefit by selecting employees for whom the work aligns with their calling and creating opportunities for their calling to be lived out to facilitate perceived work ability.

Walsh BM. **Kabat-Farr D. Matthews RA. Schulte BD. 2020. Willingness to recommend: does workplace incivility actually play a role?** *Journal of Business and Psychology*. Article in press

To prevent workplace incivility, scholars encourage organizations to use reference checks to help eliminate uncivil applicants. However, under certain conditions, reference providers may be willing to recommend their rude colleagues for employment. We test this possibility by studying willingness to recommend, which captures a willingness to serve as a professional reference for a colleague. Based on signaling theory, we hypothesized that colleague incivility is negatively related to willingness to recommend, but this relationship is moderated by colleague in-role performance and job-level factors. In study 1, multilevel modeling of multisource data revealed that colleague incivility negatively related to willingness to recommend, but troublingly, this relationship was weaker among colleagues who were high rather than low performers, regardless of job-level moderators. In study 2, we tested whether organizations can intervene and encourage potential reference providers to pay greater attention to incivility. Regression results showed that providers placed greater weight on their colleague's incivility in relation to willingness to recommend when signals were sent that the hiring organization was unwilling to sacrifice civility for top performance. Our research helps illuminate when incivility instigators are likely to be recommended for employment and demonstrates a way to maximize the use of reference checks for incivility prevention.

Lee K. **Lee K-Y. Sheehan L. 2020. Hey Alexa! A magic spell of social glue?: sharing a smart voice assistant speaker and its impact on users' perception of group harmony.** *Information Systems Frontier*. 22(3):563-583

Unlike most other computing devices that are known to isolate their users, Smart Voice Assistant Speaker (SVAS) appears to improve the perception of social cohesion (i.e., Group Harmony) among its co-users. We hypothesize that the social cues emanated from the continued, and habituated, use of SVAS develop the "illusion of intimacy" which, in turn, ripples through the entire group, and help fulfill the need for social integration. The data collected from 218 families support this hypothesis. We argue that just as a puppy dog contributes to a happy family, so does the SVAS contributes to the social dynamics by making the users unconsciously fulfill their psychological needs and by increasing actual conversations among its users. Incidentally, the study compared the relative influence of three factors

(the beta weight of “Hedonic Motivation” being the highest, followed by “Compatibility,” and then “Perceived Security”) that, as a whole, explain over 60% of the variance in Satisfaction of post-adoption SVAS use.

Li L. **Lee KY**. Lee M. Yang S-B. 2020. Unveiling the cloak of deviance: linguistic cues for psychological processes in fake online reviews. *International Journal of Hospitality Management*. 87:102468

Although fake online reviews have been gaining more attention from both academics and practitioners, little effort has been made to explore the linguistic characteristics of the psychological processes related to fake reviews. This research proposes four linguistic cues (i.e., affective, cognitive, social, and perceptual) related to a reviewer's psychological processes and explores their relationships with fake reviews while examining the influence of time distance and reviewer location on these reviews. The results of logistic regression analysis of 43,496 reviews from Yelp.com suggest that affective, social, and perceptual cues are significantly related to fake reviews with the presence of the significant effects of time distance and reviewer location. Further, the results of post-hoc analysis confirm that the effect of photos on fake reviews is limited. This study contributes to the body of knowledge on online reviews and interpersonal deception theory, providing valuable implications for practitioners in the hospitality and tourism industry.

MacLean L. MacLean S. Richman A. 2020. Failure event severity and risk assessment. *Safety Science*. 123:104554

The failure events for a system constitute a marked point process, with severity marks defined by the consequences of failure. In this paper the process is summarized with the triplet: {failure rate, severity mean, severity exceedance}. Those component measures locate the process status in a 3-dimensional probability consequence diagram. If the dimensions are stratified into intervals, the diagram is displayed as a risk cube. Composite risk measures, which are consistent with orders of stochastic dominance, are defined by integration of the risk process. The composite measures will determine equivalence classes of risk processes, and benchmarks for the measures mark regions of high/low risk on the cube. The risk cube methodology is applied to incident data for an airport navigation system. The location of an individual airport triplet on a risk cube, with regions determined by a family of airports, illustrates the potential for identifying unusual performance in terms of failure events

Nazaire G. **Pacurar M**. **Sy O**. 2020. Betas versus characteristics: a practical perspective. *European Financial Management*. 26(5):1385-1413

We apply a new dummy-variable method to examine which factor exposures (betas) and characteristics provide independent information for US stock returns in the context of the multifactor models of Hou, Xue, and Zhang and of Fama and French. We find that betas related to market, size, value, momentum, investment, and profitability factors are not priced. In contrast, firm characteristics related to size, value, investment, and profitability have significant and independent explanatory power, suggesting that they are important in determining expected returns. Finally, the cross-sectional effect of momentum is subsumed when the return on equity is factored in.

Nazaire G. **Pacurar M**. **Sy O**. 2020. Factor investing and risk management: is smart-beta diversification smart? *Finance Research Letters*. Article in press

In this paper, we investigate the diversification benefits associated with factor investing in U.S. stock markets, using the dummy-variable framework for asset allocation. We find that beta-based investment strategies are primarily driven by beta-specific sources of return variation. At the same time, both betas and characteristics explain the variance of characteristic-based strategies, indicating that beta diversification is a more effective risk management tool than characteristic diversification. We also find that the correlations between the pure premiums of the 14 factor-based strategies considered are small, which suggests that diversification across smart-beta funds is beneficial. Monte Carlo simulations confirm these results.

[Presenza A. Abbate T. Meleddu M. Sheehan L. 2020. Start-up entrepreneurs' personality traits. An exploratory analysis of the Italian tourism industry. *Current Issues in Tourism*. 23\(17\):2146-2164](#)

This study examines the personality traits of start-up entrepreneurs within the Italian tourism industry. The purpose is to investigate how the specific personality traits of narcissism, locus of control, and the Big Five (i.e. extraversion, agreeableness, conscientiousness, neuroticism, openness to experience) influence the tourism start-up entrepreneur's behaviour. After a review and assessment of the literature regarding entrepreneurs' personality traits, the paper describes a quantitative analysis of eighty-nine Italian start-up entrepreneurs operating in the tourism sector. Two main results arose from the empirical analysis. Firstly, tourism entrepreneurs seem to be particularly narcissistic, extroverted and friendly (extraversion), disciplined (agreeableness), self-assured, efficient and organized (conscientiousness), unconventional (openness to experience), and proactive and vigorous (internal locus of control). Secondly, some personality traits are found to influence the efficiency and innovative capacity of entrepreneurs which ultimately lead to the success of start-ups. The paper further advances our understanding of tourism entrepreneurship by clarifying the relevance of specific personality traits that characterize start-up entrepreneurs in the tourism industry.

[Sy O. Zaman AA. 2020. Is the presidential premium spurious? *Journal of Empirical Finance*. 56:94-104](#)

A hotly debated question in finance is whether the higher stock returns under Democratic presidencies relative to Republican presidencies represent abnormal return, risk premium, or mere statistical fluke. This paper investigates whether this presidential premium is due to spurious-regression bias, data mining, or economic policy uncertainty. Decomposing the presidential premium into expected and unexpected components, we find that over two-thirds of the premium is unexpected, which is inconsistent with the spurious regression bias explanation. The presidential premium is not explained by data mining given that it persists in the post-publication period, and remains robust even if we purge returns of their covariation with economic policy uncertainty.

[Sundararajan B. 2020. Role Play Simulation: Using Cases to Teach Business Concepts - Simulations and Student Learning: A transdisciplinary perspective. Edited Volume – Schnurr and MacLeod \(Eds\). University of Toronto Press](#)

No abstract available.

[McManus JF. Trifts V. Carvalho SW. 2020. The relationship between fixed mindsets, brand self-engagement, and brand favourability. *Personality and Individual Differences*. 166:110198](#)

The current research explores whether a fixed mindset—the belief that human characteristics are fixed in nature—is associated with the tendency to engage important brands in one's self-concept (brand-self

engagement). Using a sample of American adults (N = 325), we conducted a cross-sectional survey wherein participants completed measures of mindsets, brand-self engagement, and brand favorability. The results of this research indicate that fixed mindsets are positively associated with engaging brands in one's self-concept, which in turn is associated with the degree to which people like their favorite brand. Based on prior work, we suggest that the relationship between fixed mindsets and brand-self engagement is due to chronic signaling motives, which results in a notable consequence: in general, brands become incorporated into one's self-concept as a detectable individual difference.

Ülkü MA, Akgün M, Venkatadri U, Diallo C, Chadha SS. 2020. Managing environmental and operational risks for sustainable cotton production logistics: system dynamics modelling for a textile company. Logistics. 4(4):1-20

Effective management of cotton production logistics (CPL) against volatile environmental conditions while maintaining product quality and yield at acceptable costs has become challenging due to increasing global population and consumption and climate change. In CPL, the harvesting, processing, and storage of cotton are all linked, prone to various environmental risks (e.g. flooding) and operational risks (e.g. excess spraying of pesticides). Thus, it is crucial for a resilient and sustainable supply chain management to prioritize risks and chart suitable risk response strategies. For a CPL, we employ a system dynamics (SD) approach to investigate the likelihoods of environmental and operational risks and their impacts in four dimensions: variable costs, fixed costs, quality performance, and yield. Using the case of a textile company in Turkey, we demonstrate an end-to-end framework for mitigating CPL risks. SD simulation results show that increases in seed prices and machine and equipment breakdowns are the risks that most affect the unit cost, whereas pests and plant diseases most hurt cotton harvest yield. Via scenario analyses, we demonstrate that a proper risk response strategy, compared to doing nothing, may reduce variance in cotton quality by about 35% at the expense of about an 11% increase in unit cost variability.

Al Halbusi H. Williams KA. Mansoor HO. Hassan MS. Hamid FAH. 2020. Examining the impact of ethical leadership and organizational justice on employees' ethical behaviour: does person-organization fit play a role? Ethics and Behaviour. 30(7):514-532

Leadership studies on corporate ethical behavior and practices have grown considerably, contributing significant knowledge on ethical leadership challenges that are organizational and industry focused. However, complex socio-ecological systems are placing pressure on organizational culture and old patterns of leadership behavior that play a role in organizational justice. In this study, we argue that scholars of business ethics must consider the role of organizational justice and use person-organization fit (P-O fit). To address this, our study investigates the mediating effect of organizational justice on the relationship between ethical leadership and employees' ethical behavior. We also examine the moderating role of P-O fit on the relationship between organizational justice and employee's ethical behavior. The study survey focused on 295 employees belonging to organizations in Iraq. We show that ethical leadership positively influences employees' ethical behavior, and this relationship is shaped by organizational justice. The findings reflect the positive impact of organizational justice on ethical behavior, and this relationship is more pronounced in employees with high rather than low P-O fit. This study clarifies the importance of employee's P-O fit and its impact on organizational processes for creating a positive impact on ethical behavior in the workplace. We also share practical implications of the study and recommend systemic research that explores this area.

Purpose: With the growing demand for ethical standards in the prevailing business environment, ethical leadership has been under increasingly more focus. Based on the social exchange theory and social learning theory, this study scrutinized the impact of ethical leadership on the presentation of ethical conduct by employees through the ethical climate. Notably, this study scrutinised the moderating function of the person-organisation fit (P-O fit) in relation of ethical climate and the ethical conduct of employees. **Design/methodology/approach:** To evaluate the research hypotheses, two-wave data were collected from 295 individuals who are currently employed in various Iraqi organizations (i.e. manufacturing, medical and insurance industries). **Findings:** In line with the hypotheses, the outcomes from a sample of 295 workers working in different Iraqi entities exhibited a positive relation between the ethical behaviour of leaders and the ethical conduct of employees in the ethical climate. Moreover, it was observed that the P-O fit of employees moderated the relationship between ethical climate and the ethical conduct of employees such that the relationship was more robust for those with a high P-O fit in comparison to those with a low P-O fit. **Research limitations/implications:** The primary limitation of this study is in the data, which was obtained from a single source. Although the study conducted two surveys and utilised a mediation and moderation variables model that was less likely to be influenced by common method bias (CMB) (Podsakoff et al., 2012), one cannot completely rule out CMB. Apart from the potential effects of the CMB, the consistency of the empirical findings could have also been compromised since self-reported data were utilised in measuring ethical behaviour, which can be a very complex and sensitive issue. For this reason, the social desirability response bias cannot be ruled out completely. When possible, future studies must gather data from multiple sources. Furthermore, supervisors must evaluate the ethical behaviour of employees. Another limitation was that the findings of this study were based on a sample in a Middle Eastern cultural context such as in Iraq. Perhaps, the particular cultural features of this context, which encompassed, among other things, a strong adherence to religious values (Moaddel, 2010), could have influenced the findings of this study. It is true that the effects of differences (P-O fit) are highly likely to replicate across cultural contexts (Triandis et al., 1988). However, it can be seen that further studies are needed to evaluate the context-sensitivity of these findings (Whetten, 2009) by analysing other cultures, where the importance of religiosity is on the decline (i.e. in Western countries, Ribberink et al., 2018) or where the cultural features are very much different from those that apply to Iraq. Lastly, other external factors were not taken into account by this study as it tried to explain ethical behaviour. Ethics is a highly complex subject and is influenced by numerous variables at the organisational, individual and external environment levels. Thus, caution must be observed when making inferences from the present study which, to a certain degree, offered a simplified version of ethical behaviour by concentrating on a few variables such as the Arab culture's traditional ideology, which dominates even science (Abu Khalil, 1992). In addition, there are the political conflicts in the Middle Eastern cultural context such as what is happening in Iraq (Harff, 2018). Thus, it is important to include such aspects in future researches. **Practical implications:** In terms of management, the findings send a clear signal to those in the upper echelon that, without ignoring the issue of ethics in organizations, employees are a critical aspect to be taken into account to encourage ethical behaviour at the workplace. This study has important practical implications. First, this study determined that ethical leadership (here, of the supervisors) positively influences the behaviour of subordinates (refers to the supervisors here); this in turn further improves the ethical behaviour of employees. It is vital that managers or supervisors are motivated to practice ethical leadership because they directly influence the employees. It has been suggested that top managers, especially chief executive officers, have the ability to shape the ethical climate, which also influences the ethical behaviour of employees further. This

study offered several feasible ways that managers can apply to achieve that. In particular, top managers may utilise the ethical climate as a way of communicating the ethical values that they have to their subordinates, thereby serving as a motivation for the subordinates to adopt an ethical behaviour. It was also suggested by this study that ethical climate and the P–O fit may, to some degree, substitute each other as they influence the ethical behaviour of employees. Therefore, firms that were identified to have a low level of ethical standards, practices, and policies, at least from the employees' perspective, are better poised to conduct ethical issues in order to construct the ethical behaviour of their subordinates. More importantly, it is highly essential that the value congruence between an organization and its followers be considered. Social implications: This study highlighted the notion of ethics and how it's essential for society. Ethics refer to the norms, standards, and values that direct the behavior of an individual. Ethical behaviour is vital in society because we need to be treated with respect as human beings. Originality/value: This study responds to recent calls for more research to identify factors which may strengthen or mitigate the influence ethical behavior in the workplace such as ethical leadership, ethical climate and Person–Organization.

Callen JL. Fang X. **Zhang W.** 2020. Protection of proprietary information and financial reporting opacity: evidence from a natural experiment. *Journal of Corporate Finance*. 64:101641

We utilize the staggered adoption of the Inevitable Disclosure Doctrine (IDD) by U.S. state courts as an exogenous shock to the proprietary costs of disclosure and study the impact of the IDD on corporate financial reporting policy. We find compelling evidence that firms headquartered in states that adopt the IDD exhibit a significant increase in financial reporting opacity relative to firms headquartered in states that fail to adopt the IDD. Our finding is robust to a battery of sensitivity tests. Cross-sectional evidence shows that the impact of the IDD on opacity is more pronounced for firms with weak external monitoring. Further, our path analysis shows that financial reporting opacity engendered by the adoption of the IDD had broad negative consequences for capital market investors.

Cao J. Luo X. **Zhang W.** 2020. Corporate employment, red flags, and audit report. *Journal of Accounting and Public Policy*. 39(1):106710

U.S. regulatory agencies and congressional oversight committees have expressed concerns that auditors often neglect red flags embedded in the operating characteristics of firms that misstate their financial reports. This study examines whether labor employment decisions, a major part of a firm's operations, help predict accounting improprieties and consequently play a role in audit planning and pricing. We find that negative abnormal employment changes are associated with a higher likelihood of subsequent financial restatements, accounting irregularities, and lawsuits related to accounting fraud, and generally require greater effort from auditors as manifested by higher audit fees and longer audit report lags. Positive abnormal employment changes are associated with subsequent restatements and longer audit report lags, but not associated with fraud or audit fees. Taken together, the results are consistent with auditors recognizing the individual misstatement risks pertaining to companies' employment decisions. These results suggest that standard setters, regulators, and practitioners should devote more attention to operational statistics to identify potential red flags.

SCHOOL OF INFORMATION MANAGEMENT

Conrad C. Aziz J. Smith N. Newmann A. 2020. What do users feel? Toward affective EEG correlates of cybersecurity notifications. *Lecture Notes in Information Systems and Organization*. 43:153-162

Security notifications attempt to change risky computer usage behaviour but often fail to achieve their desired effect. Though there are likely many causes for this phenomenon, information systems researchers have posited that emotional reactions to security notifications may play a role in its explanation. This work-in-progress paper describes a study to create a baseline of electroencephalographic (EEG) and behavioral responses to security notification images by comparing them to known responses to the well-studied International Affective Picture System (IAPS). By creating such a baseline of affective responses to security notification images, future work can explore the effect of passive emotional reactions to security notification designs which would generate insight into effective design practices.

Conrad C. Bailey L. 2020. 32:129-135. What can neuroIS learn from the replication crisis in psychological science? *Lecture Notes in Information Systems and Organization*. 32:129-135

The Reproducibility Crisis is a phenomenon that has gained considerable attention in the psychological sciences. Scholars in these fields have found that many high profile findings are either difficult to reproduce or could not be replicated. These findings have ultimately encouraged researchers to adopt pre-registered results, replication in study design and open data. As an emerging field, NeuroIS has an opportunity to learn from this crisis and adopt new practices based on the lessons learned in the psychological sciences. We explored the current state of NeuroIS research from the perspective of reproducibility by conducting a survey of the extant NeuroIS literature. We conclude by suggesting two practices that the NeuroIS community can undertake to help address the replication problem.

Klesel M. Schlechtinger M. Oschinsky FM. Conrad C. Niehaves B. 2020. Detecting mind wandering episodes in virtual realities using eye tracking. *Lecture Notes in Information Systems and Organization*. 43:163-171

Virtual Reality (VR) allows users to experience their environment differently and more immersively than traditional information systems (IS). Therefore, it is important to also study cognitive processes in VR settings. In this proposal, we focus on the concept of mind wandering, which is an emerging concept in IS research that can be studied using neurological measures such as eye tracking. Current literature suggests that mind wandering is a complex concept with different dimensions, namely deliberate and spontaneous mind wandering. While previous literature has provided initial evidence on the feasibility of eye tracking to approximate mind wandering, this study seeks to investigate how well eye tracking performs when it comes to a more nuanced perspective on mind wandering applied in an VR setting.

Godfrey D. Findlay C. Mulchandani D. Subramanalyzer R. Conrad C. Newman A. 2020. A tri-hybrid brain-computer interface for neuro-information systems. *Lecture Notes in Information Systems and Organization*. 43:291-297

Brain-computer interfaces (BCIs) are computerized systems that convert brain activity into control commands to operate software or external devices. Though promising, BCIs currently have limited practicality and usership due to poor signal classification and large training data requirements. The

present study aims to overcome both challenges by combining three brain signals. This paradigm could improve existing BCI technical efficacy, and extrapolate to applications where hands-free visual interfaces could equip users with communication and information resources that improve work processes.

[Conrad C. Agarwal O. Woc CC. et al. 2020. On using Python to run, analyze, and decode EEG experiments. Lecture Notes in Information Systems and Organization. 32:287-293](#)

As the NeuroIS field expands its scope to address more complex research questions with electroencephalography (EEG), there is greater need for EEG analysis capabilities that are relatively easy to implement and adapt to different protocols, while at the same time providing an open and standardized approach. We present a series of open source tools, based on the Python programming language, which are designed to facilitate the development of open and collaborative EEG research. As supplementary material, we demonstrate the implementation of these tools in a NeuroIS case study and provide files that can be adapted by others for NeuroIS EEG research.

[Brown A. Spencer R. Mclsaac J-L. Howard V. 2020. Drawing out their stories: a scoping review of participatory visual research methods with newcomer children. International Journal of Qualitative Methods. 19.](#)

Researchers are increasingly using participatory visual methods (PVM) to gain a deeper understanding of newcomer children's experiences, sense of identity, relationships, needs, strengths, and aspirations. By taking photos, producing digital stories, creating maps, drawing, sculpting, and other visual-based practices, children can help us understand how they navigate their complex worlds. We conducted a scoping review to explore what is known about participatory visual research with newcomer children. We searched nine databases, screened 692 articles, and included 21 articles for synthesis and analysis. Five common and connected areas were identified as important for consideration when envisioning, planning, and conducting this type of research with newcomer children: PVM provides an opportunity for children to communicate complex feelings and disrupt deficit discourse; participation in PVM research is highly dependent on varying cultural, economic, and relational factors; providing a range and choice of data collection activities permits deeper engagement and higher quality data; PVM can enhance meaningful engagement, reduce power asymmetry, and engender confidence and self-awareness; developing and sustaining trusted relationships are integral to the research process. The review reveals the need for more researcher reflexivity with an explicit attention to assumptions, values, and ethical considerations and suggests opportunities for researchers to better ensure newcomer children can share and shape their own stories.

[Martin C. MacDonald B. 2020. Using interpersonal communication strategies to encourage science conversations on social media. PLoS ONE. 15\(11Nov\):e0241972](#)

Today, many science communicators are using social media to share scientific information with citizens, but, as research has shown, fostering conversational exchanges remains a challenge. This largely qualitative study investigated the communication strategies applied by individual scientists and environmental non-governmental organizations on Twitter and Instagram to determine whether particular social media practices encourage two-way conversations between science communicators and citizens. Data from Twitter and Instagram posts, interviews with the communicators, and a survey of audience members were triangulated to identify emergent communication strategies and the resulting

engagement; provide insight into why particular practices are employed by communicators; and explain why audiences choose to participate in social media conversations with communicators. The results demonstrate that the application of interpersonal communication strategies encourage conversational engagement, in terms of the number of comments and unique individuals involved in conversations. In particular, using selfies (images and videos), non-scientific content, first person pronoun-rich captions, and responding to comments result in the formation of communicator-audience relationships, encouraging two-way conversations on social media. Furthermore, the results indicate that Instagram more readily supports the implementation of interpersonal communication strategies than Twitter, making Instagram the preferred platform for promoting conversational exchanges. These findings can be applicable to diverse communicators, subjects, audiences, and environments (online and offline) in initiatives to promote awareness and understanding of science.

[Liu Z. MacDonald B. 2020. New policies and evaluation system needed to address environmental concerns in China. *Sustainability*. 12\(12\):4924](#)

It is reported that the smog days in 2018 were much reduced compared to those in 2013 in China. The air environmental condition in China was much improved because of a number of comprehensive strategies adopted by the government such as phasing out backward production capacities and developing renewable energy industries. In addition, the Ministry of Ecology and Environment of the People's Republic of China adopted a series of measurements to respond to the environmental events, including questioning the local highest official in serious air pollution areas. However, there are still lots of questions to be answered for a long term consideration. For instance, given the current situation of a gross domestic production (GDP) driven assessment system for officials' credit, how long this high pressure pattern can respond to environmental events, such as air pollution, issue is a question. Therefore, unless this GDP driven assessment system is replaced by another assessment system it cannot last long. This paper also highlights the importance of developing low-carbon industries and circular economy as well as public involvement.

[MacDonald BH. Cadman R. Martin C. et al. 2020. Is the production and use of grey marine literature a model for open science? *Grey Journal*. 16\(2\):73-83](#)

Globally, grey literature is common. Large quantities of openly available grey literature have been generated since the latter half of the nineteenth century. It is a primary source of information used in many public policy and decision-making contexts, at all jurisdictional levels. In fact, public decision-making and policy development would seriously falter today in the absence of such literature. Moreover, in some jurisdictions, legislation mandates transparent governance processes in which current research must be fully open. This lengthy experience with open practices in the production and use of grey literature offers insights to the open science movement. In this paper, based on over fifteen years of interdisciplinary research, we demonstrate how open practices in the production and use of grey literature in marine environment science policy contexts could inform open science initiatives. The results from our numerous case studies about information use in decision-making processes, at local to global levels, address two conference themes, namely, the application of open science principles in promoting grey literature, and obstacles and challenges to such open access. Information pathways in coastal and ocean management are complex and involve many actors (including researchers; managers; policy analysts; members of industry, professional associations, community groups, and non-governmental organizations; politicians; and citizens generally). Open grey literature offers numerous

advantages in these settings, as an extensive variety of information needs, types, and formats are prevalent. Open grey literature can also be distributed without restriction by individuals and organizations. It can now be shared globally with ease, which is particularly beneficial to developing countries often unable to afford commercial information sources. However, while produced and used widely, grey literature also presents challenges that open science also encounters. Openness, i.e., open access, does not ensure awareness and it does not automatically equate to usability by a wide variety of audiences. Because grey literature is assumed to be largely accessible, often limited attention is focused on promoting awareness or communicating information in broadly understandable terms. Furthermore, the massive quantity of literature can contribute to its seeming invisibility. The multiplicity of formats and content can result in perceptions of limited value of grey literature. Even though the information may be rigorously peer-reviewed, in today's information-saturated environment, open-access may be equated with uncertain quality. Our research on the use and influence of grey literature in marine environmental decision-making highlights the benefits and challenges of open access information. Thus, our findings may be particularly informative to current efforts to advance open science principles globally.

Cadman R. **MacDonald BH**. Soomai SS. 2020. [Sharing victories: characteristics of collaborative strategies of environmental non-governmental organizations in Canadian marine conservation](#). *Marine Policy*. 115:103862

Over the last 50 years, non-state actors, particularly environmental non-governmental organizations (ENGOS), have taken on increasingly important roles in environmental governance. These roles have strengthened capacity in policy development and enhanced connections between decision makers and the public. How environmental NGOs navigate the tension between maintaining independence from government while also influencing decisions within political systems is not well understood. A change in the government of Canada following the 2015 national election provided an opportunity to explore the dynamic relationships between ENGOS and government. The government enlisted the assistance of ENGOS to achieve the 2020 national marine protection targets. In this study, the activities of two ENGOS—WWF-Canada (a national NGO) and the Ecology Action Centre (a local NGO)—regarding planning for three marine protected areas (MPAs) were studied. The objective of this research was to increase understanding of the role of ENGOS in decision making regarding MPAs, particularly focusing on how ENGOS use information in formal and informal processes to fulfil their mandates to promote marine conservation. Data were obtained from interviews; observations of formal and informal meetings and conversations; content analysis of email exchanges of the ENGOS with government staff, other ENGOS and numerous stakeholders; and review of key publications and public research reports. The results demonstrate the significant role of ENGOS in conservation governance and the major strategies that they use in deploying information at the science-policy interface. The ENGOS operate in an important boundary-spanning role using four types of action (hard advocacy, soft advocacy, gathering information and intelligence, and administration) and their interactions with diverse stakeholders. The ENGOS bridged interactions between government and stakeholders and transmitted scientific data and information, generated by researchers, to decision makers. The boundary-spanning activities of the ENGOS uniquely positions them in conservation decision processes. The ability to be flexible means that ENGOS can adapt their strategies to advance conservation policy and practice.

Larregue J. Lariviere V. **Mongeon P.** 2020. On the institutional and intellectual division of labor in epigenetics research: a scientometric analysis. *Social Science Information*. 59(1):117-143

While numerous qualitative social scientific analyses of (environmental) epigenetics have been published, we still lack a macro-level, quantitative assessment of the field of epigenetics as a whole. This article is aimed at filling this gap. Mobilizing an extended version of the Web of Science, we constituted a corpus of 199,484 documents (articles, reviews, editorial material, etc.) published between 1991 and 2017 and performed several scientometric analyses to map out the development and structure of the epigenetics field. Three main results were drawn from these investigations. First, contradicting the hope expressed by some social scientists that their disciplines will find solace in epigenetics' social biology, it is striking that the scientists, journals and institutions that drive most of the research in the field are overall little concerned with social and environmental dimensions of gene expression. Second, and confirming existing qualitative analyses, we find that epigenetics is constituted by diverse networks of scholars, institutions and research specialties that enjoy relative autonomy from each other and approach epigenetics through different thematic interests, from cognitive functions to cancer, to DNA methylation in plants and molecular biology. Third, findings obtained from the bibliographic coupling showed that these different networks became more and more autonomous over the last decade, which suggests that we are currently witnessing the constitution of a scientific archipelago akin to that of behavior genetics (Panofsky, 2014: 33) rather than to a discipline per se. At the same time, this differentiation was less pronounced conceptually speaking, as we also observed a clear standardization of the keywords used in epigenetics articles between 1991 and 2017, with DNA methylation and RNAs serving as rallying signs for different communities of researchers.

Colborne A. **Smit M.** Characterizing disinformation risk to open data in the post-truth era. *Journal of Data and Information Quality*. 12(3):13

Curated, labeled, high-quality data is a valuable commodity for tasks such as business analytics and machine learning. Open data is a common source of such data—for example, retail analytics draws on open demographic data, and weather forecast systems draw on open atmospheric and ocean data. Open data is released openly by governments to achieve various objectives, such as transparency, informing citizen engagement, or supporting private enterprise. Critical examination of ongoing social changes, including the post-truth phenomenon, suggests the quality, integrity, and authenticity of open data may be at risk. We introduce this risk through various lenses, describe some of the types of risk we expect using a threat model approach, identify approaches to mitigate each risk, and present real-world examples of cases where the risk has already caused harm. As an initial assessment of awareness of this disinformation risk, we compare our analysis to perspectives captured during open data stakeholder consultations in Canada.

Allam H. Bliemel M. Ali-Hassan H. Blustein J. **Spiteri L.** 2020. If you build it, they won't come: what motivates employees to create and share tagged content: a theoretical model and empirical validation. *International Journal of Information Management*. 54:102148

The purpose of this paper is to investigate factors influencing employees' knowledge-sharing behavior on social tagging supported systems. Using the strong theoretical background of the well-known technology acceptance model (TAM), this paper proposes and empirically validates a model that fits the social and technical nature of social tagging tools within the public sector. The analyses in this paper were based on data collected from a large survey of more than 480 respondents working for two public

organizations in the United States. The findings demonstrate a significant impact of the role of social presence in encouraging employees to create and share content. Further, there is a strong relationship between the benefits employees receive from using tagging tools and their creation and sharing of tagged content. Specifically, the following factors showed a significant impact on employees' creation and sharing behavior, specifically their attitudes towards and intentions to create and share tags: perceived ease of use, perceived usefulness, social presence, and pro-sharing norms. For researchers, the paper offers an opportunity to further study knowledge-sharing behavior regarding social media technologies. The findings should motivate practitioners to inject these tools with a social aspect so that employees are encouraged to share content.

SCHOOL OF PUBLIC ADMINISTRATION

Caron I. 2020. L'évolution de l'exercice du contrôle dans l'administration publique fédérale canadienne. *Canadian Public Administration*. 63(1):34-52

This article focuses on how control is exercised in the Canadian federal administrative system. More specifically, it aims to determine whether the management philosophy introduced by the Canadian federal government in 2000, which advocated for greater flexibility in the system, is reflected in government policies. The research examines the content of Canadian federal government financial management policies between 2000 and 2018.

Savard J-F. **Caron I.** Brock KL. Shephard RP. 2020. Teaching public administration in the COVID-19 era: preliminary lessons learned. *Canadian Public Administration*. 63(3):528-533

No abstract available.

Wang O. Somogyi S. **Charlebois S.** 2020. Food choice in the e-commerce era: A comparison between business-to-consumer (B2C), online-to-offline (O2O) and new retail. *British Food Journal*. 122(4):1215-1237

Purpose: This study associated consumers' food choice motives and socio-demographic characteristics with their attitudes and consumptions towards food shopping with four e-commerce modes: business-to-consumer (B2C), online-to-offline delivery (O2O Delivery), online-to-offline in-store (O2O In-store) and New Retail. It also explored consumer preferences for specific food categories within the four e-commerce modes. **Design/methodology/approach:** An online survey was administered to 954 participants from three Chinese cities: Beijing, Shanghai and Shenzhen. Descriptive analysis and linear regression were used in the data analysis. **Findings:** The following food choice motives (FCMs) and socio-demographic characteristics had a significant effect on food e-commerce attitudes and/or consumption, with some or all of the four e-commerce modes: Taste Appeal, Value for Money, Safety Concerns, Quality Concerns, Processed Convenience, Purchase Convenience, Others' Reviews, City, Gender, Household Size, Age, Income, Occupation and Marital Status. Consumers also have different consumption preferences for food categories in the four e-commerce modes. **Originality/value:** This is the first study to associate consumer FCMs and socio-demographics with their e-commerce attitudes and consumption regarding food in four e-commerce modes: B2C, O2O Delivery, O2O In-store and New Retail.

Charlebois S. Music J. Sterling B. Somogyi S. 2020. Edibles and Canadian consumers' willingness to consider recreational cannabis in food or beverage products: a second assessment. *Trends in Food Science and Technology*. 98:25-29

Background: Canada is one of the few countries in the world to have legalized Cannabis. Cannabis was legalized in October 2018, but not cannabis-infused food products, also known as edibles. These products will be legalized by October 2019. This study examines how consumers view the legalization of cannabis-infused food products, when cannabis became legal, but not yet edible. **Scope and approach:** The study measured the perceptions on legalization, stigma, health risks and food safety on edibles. Underscored by this study is the growing uncertainty among most demographics, which suggests perhaps that public regulators have not connected well with the public when it comes to the food safety

of edibles. Key Findings and Conclusions: Results show that while Canadians are ambivalent about social and public stigma, many remain concerned about inherent risks involved when consuming edibles. Concerns towards children and pets are also quite acute. Long term cannabis users are concerned about price and are still purchasing from old suppliers, which suggests that newly developed public distribution channels have been shunned to a certain degree. This study points to the need of more future evaluations of food safety measures and risk perception related to cannabis-infused food products.

Charlebois S. Somogyi S. Kirk SFL. 2020. Fragmented food habits and the disintegration of traditional meal patterns: a challenge to public health nutrition in Canada. *Journal of International Food and Agribusiness Marketing*. 32(1):69-78

This study examines the shifting patterns in meal consumption practices among Canadians and the sources of disruption of meal habits. It analyses the notion of breakfast, lunch, dinner, out-of-household consumption of food, cooking, and snacking which could be considered as disrupting eating habits. Meal skipping, primarily breakfast and lunch was common, particularly among women, as was consumption of food outside the home, particularly among lower income earners and respondents with lower education attainment. The findings of this survey suggest that contemporary Canadians are experiencing a disruption of meal times, a rise in the frequency of snacking and an erosion of the will or ability to prepare or cook meals at home. For many Canadians, the traditional notion of three-meals a day is becoming an ideal, rather than a daily reality. Fragmented food habits and the disintegration of traditional meal patterns represent a challenge to public health nutrition in Canada.

Theolier J. Barrere V. **Charlebois S.** Benrejeb Godefroy S. 2020. Risk analysis approach applied to consumers' behaviour toward fraud in food products. *Trends in Food Science and Technology*. Article in press

Background: Consumers' trust in food control system has been shaken down by multiple food fraud events in the last decade. Initiatives have been taken to restore this trust starting with the adoption of new laws and new management methods, based on risk analysis. Little is known about consumers' knowledge and application regarding this methodology. However, consumers' risk perception has been intensively studied during food fraud events, opening up the opportunity to see if consumers' behaviors correlate with risk analysis methodology. Scope and approach: This work assumes that consumers perform a quick, instinctive, and personal risk analysis when they buy a food product. The different components of the risk analysis have been analysed and discussed separately. Available scientific data has been reviewed as well as psychosocial effects impacting consumers' risk characterization and risk management. Consumers' strategies to mitigate food fraud have been discussed to determine how they could reduce risk exposure. Key findings and conclusions: Consumers' knowledge about the concept of food fraud is limited, and their understanding of the associated risks is built on incomplete information. Besides, consumers seem to apply an incorrect risk analysis methodology. However, consumers, either favoring or reducing the weight of data, are influenced by psychosocial effects and biased information. Communication and education regarding management of food fraud and detection of food fraud are needed from a consumer standpoint. Furthermore, actions have to be undertaken on a local level, as it appears that "consumers" is not a homogenous cluster.

Mechoulan S. 2020. Civil unrest, emergency powers, and spillover effects: a mixed methods analysis of the 2005 French riots. *Journal of Economic Behaviour and Organization*. 177:305-327

From early to mid-November 2005, many French urban suburbs experienced riots. In the affected areas the government declared a state of emergency which gave the police extrajudicial powers. It remained in place until January. I investigate whether the riots generated criminal spillovers, whether the emergency powers deterred criminal activity, and whether the police used those powers opportunistically to bust crime unrelated to the riots. I supplement linear regressions with a non-parametric bounded-variation assumptions framework combined with a synthetic control approach, and interviews I conducted with two of the events' key actors. Criminals did not take advantage of the riots to commit more crimes requiring planning. However, the riots triggered a surge of violent thefts. The state of emergency did not result in a decrease in delinquency. Several clues suggest a strategy of appeasement. Meanwhile, some serious crimes increased immediately after the riots ended, suggesting an emboldening effect. Evidence of police opportunism is scant.

Mechoulan S. 2020. *Analyse par approches multiples des conséquences des émeutes françaises de 2005: une présentation.* *Sécurité Globale* 23(4):149-152

No abstract available.

Pictou S. 2020. *Decolonizing decolonization: An indigenous feminist perspective on the recognition and rights framework.* *South Atlantic Quarterly.* 119(2):371-391

No abstract available.

Boin A. Brock K. Craft J. Halligan J. Hart P. Roy J. Tellier G. Turnbull L. 2020. *Beyond COVID-19: five commentaries on expert knowledge, executive action, and accountability in governance and public administration.* *Canadian Public Administration.* 63(3):339-368

Several Canadian and international scholars offer commentaries on the implications of the COVID-19 pandemic for governments and public service institutions, and fruitful directions for public administration research and practice. This first suite of commentaries focuses on the executive branch, variously considering: the challenge for governments to balance demands for accountability and learning while rethinking policy mixes as social solidarity and expert knowledge increasingly get challenged; how the policy-advisory systems of Australia, Canada, New Zealand, and United Kingdom were structured and performed in response to the COVID-19 crisis; whether there are better ways to suspend the accountability repertoires of Parliamentary systems than the multiparty agreement struck by the minority Liberal government with several opposition parties; comparing the Canadian government's response to the COVID-19 pandemic and the Global Financial Crisis and how each has brought the challenge of inequality to the fore; and whether the COVID-19 pandemic has accelerated or disrupted digital government initiatives, reinforced traditional public administration values or more open government. © The Institute of Public Administration of Canada/L'Institut d'administration publique du Canada 2020

Turnbull L. 2020. *The house of commons and responsible government.* *Canadian Politics. Seventh Edition.* pp:65-79

No abstract available.

Wranik WD. Jakubczyk M. Drachal K. 2020. Ranking the criteria used in the appraisal of drugs for reimbursement: a stated preferences elicitation with Health Technology Assessment stakeholders across jurisdictional contexts. *Value in Health*. 23(4):471-480

Objectives: Our goal was to estimate the relative importance assigned to health technology assessment (HTA) criteria by stakeholders involved in the HTA process. HTA is an increasingly common framework used in the appraisal of drugs for public reimbursement. It identifies clinical, economic, social, and organizational criteria to be considered. The criteria can vary across jurisdictions and are typically appraised by multidisciplinary expert committees. Guidance on the relative weighing of criteria is often absent. **Methods:** We elicited stakeholders' preferences using a single-scenario discrete choice experiment and a best-worst scaling model with conviction scores to assess the weights assigned to selected criteria by HTA stakeholders. We recruited 111 HTA stakeholders across multiple jurisdictions, including members of expert committees, clinical and economic experts, patients, and public payer representatives. Each judged twelve hypothetical cancer drug profiles for suitability for public funding and identified which characteristics were best and worst. In addition to standard discrete choice experiment and best-worst scaling models, we estimated a hybrid model to obtain a ranking of criteria by importance they played in the appraisal. **Results:** A strong clinical benefit proved the most important criterion, followed by cost considerations, presence of adverse events, and availability of other treatments. The importance of clinical benefit was moderated by unmet need, adverse events, and number of patients. **Conclusion:** Policymakers might want to consider providing an explicit weighing scheme, or moving to a 2-stage selection process with an assessment of the quality of clinical evidence as a gatekeeping step for a full HTA review.

SCHOOL FOR RESOURCE AND ENVIRONMENTAL STUDIES

[Baxter J. Walker C. Ellis G. Devine-Wright P. Adams M. Fullerton RS. 2020. Scale, history and justice in community wind energy: an empirical review. *Energy Research and Social Science*. 68:101532](#)

Although there is a clear positive link between community wind energy (CWE) projects and social acceptance, there is still empirical and conceptual ambiguity concerning the details of why. To fill this gap, we revisit foundational papers in this field and then, focusing on empirical case studies between 2010 and 2018 ($n = 15$), trace how recent research has engaged with existing conceptual frameworks. Most empirical researchers verify the importance of the two key dimensions defined by Walker & Devine-Wright [1]: process and outcome, and then relate this to procedural justice and distributive justice. Meanwhile, the core concept of “community” has been deployed, in both practice and research, in so many different and sometimes ambiguous ways that it remains difficult to assert if, and how, community-based renewable energy policy and siting practice produces high levels of local community acceptance. We suggest that parsing out the scale of investment in wind energy projects and the local historical context of energy transitions add clarity to the Walker & Devine-Wright framework as it relates to CWE; providing important conceptual nuance for guiding policy, developer practices and future empirical research.

[Carlson JT. Adams M. 2020. Assessing the consistency of in-stream tidal energy development policy in Nova Scotia. *Marine Policy*. 113:103743](#)

The provincial government of Nova Scotia, Canada, has provided numerous incentives for developing in-stream tidal energy projects since 2009. These incentives include co-operatively funding the development of the Fundy Ocean Research Centre for Energy with the Canadian federal government and industry partners, extensive funding of environmental impacts monitoring research for tidal energy projects, and offering direct financial incentives for tidal power produced and sold to the grid via feed-in tariffs. However, the provincial government has not treated all scales and types of tidal energy projects equally. Until recently, ambitious targets for hundreds of MW of tidal development by 2020–2025 led to tidal support policies focusing on large, utility-scale projects, with little evidence the tidal energy sector was prepared to pursue such projects in Nova Scotia or elsewhere. Some support was offered to smaller-scale, community-oriented tidal energy projects, but the rules and regulations for such projects were repeatedly changed (and sometimes revoked) between 2012 and 2018. Since the provincial legislature passed the revised Marine Renewable-electricity Act of 2018, a potentially more coherent and consistent tidal energy policy consensus appears to be forming in the province. This paper provides a review of the policies introduced, projects approved and canceled, and sectoral outlook for tidal energy development in Nova Scotia for the period 2009–2018.

[Ashrafi M. Magnan GM. Adams M. Walker TR. 2020. Understanding the conceptual evolutionary path and theoretical underpinnings of corporate social responsibility and corporate sustainability. *Sustainability*. 12\(3\):760](#)

To unlock the potential for corporations to play a more proactive role in sustainable development, it is critical to have a fundamental understanding of the pathways leading to a responsible and sustainable business. This study explores contributions of theories of the firm in explicating why and how integrating corporate social responsibility (CSR) and corporate sustainability (CS) into business strategic decisions and operation processes helps to improve the viability of corporations. The research objective is

addressed through a narrative review of relevant literature by following the developmental and evolutionary sequences in business responsibility and sustainability while contemplating the connections between CSR and CS through the lens of the dominant theoretical perspectives underpinning the concepts. The study posits an integrative theoretical framework that offers supports for embedding CSR and CS into a corporate business strategy. It discusses that corporate choice of CSR and CS actions and policies is supported by dual internal and external mechanisms based on resource-based theory and institutional theory. This is to meet the interests and expectations of internal and external stakeholders, the basis upon which stakeholder theory is constructed. Findings from this review corroborate the proposition that the three theories of resource-based, institutional, and stakeholder could be used as the primary approach to explain corporate recognition of the need for CSR and CS, and further build a coherent platform to support corporate choice and adoption of CSR and CS in business strategy.

Hossain T. Adams M. Walker TR. 2020. Role of sustainability in global seaports. *Ocean & Coastal Management*. Article in press.

Seaports are integral hubs of maritime supply chains and contribute to socio-economic development for communities. However, seaports can create negative impacts on host communities. Adopting sustainability initiatives within seaport operations is growing rapidly, and while many seaports claim to operate green or sustainably, sustainable port initiatives and approaches are poorly described in the academic literature. This research explores relationships between existing seaport sustainability and the current narrative that exists related to sustainability improvements. Thirty-six seaports were selected from North America (NA), Europe (EU) and Asia Pacific (AP) for analysis. Twenty-five (25) pre-defined indicators were used to identify operational trends linked to sustainability claimed by seaports. Each operation was assessed using publicly available data; using a mixed methods approach, descriptive statistical analysis for sustainability initiatives was performed to assess seaport sustainability efforts. Results show that EU seaports have made more progress in adopting various sustainability initiatives compared to NA and AP seaports, despite the public narrative of most seaport executives about their commitment to manage environmental impacts, and being good corporate citizens. Initiative most widely adopted include: greater emphasis on internal environmental policy and management – including third-party certification; investment in proactive environmental solutions; and enhanced stakeholder engagement.

Ashrafi M. Walker TR. Magnan GM. Adams M. Acciaro M. A review of corporate sustainability drivers in marine ports: a multi-stakeholder perspective. *Maritime Policy and Management*. 47(8):1027-1044

Maritime ports play a pivotal role in facilitating trade, serving as key nodes in global transport chains. Competitive pressure exists for port managers and operators to search for ways to deliver consistent improvements in productivity and profitability. Additionally, external effects associated with port activities have been given more attention in recent years, thus favouring a holistic integration of sustainability into port planning and operations. In this process, factors driving ports to become more sustainable need to be examined. This study, which is based on a systematic review of literature published since 1987, synthesizes various research perspectives for corporate sustainability drivers in maritime ports using the lens of stakeholder theory. Thirty drivers of corporate sustainability were identified, classified into 10 main drivers and further grouped into five clusters, serving as the basis for development of a multi-stakeholder perspective. This study also discusses examples of actions taken by ports in response to perspectives of various stakeholders using selected case examples from existing literature. This study provides an understanding of how decisions for adopting corporate sustainability

are motivated in ports according to a multi-stakeholder perspective, and highlights how ports have responded to shifts through developing and implementing sustainability strategies using global case examples.

[Needham JL. **Beazley KF.** Papuga VP. 2020. Accessing local tacit knowledge as a means of knowledge co-production for effective wildlife corridor planning in the Chignecto Isthmus, Canada. *Land*. 9\(9\):0332](#)

Inclusive knowledge systems that engage local perspectives and social and natural sciences are difficult to generate and infuse into decision-making processes but are critical for conservation planning. This paper explores local tacit knowledge application to identify wildlife locations, movement patterns and heightened opportunities and barriers for connectivity conservation planning in a critical linkage area known as the Chignecto Isthmus in the eastern Canadian provinces of Nova Scotia and New Brunswick. Thirty-four local hunters, loggers, farmers and others with strong tacit knowledge of wildlife and the land participated in individual interviews and group workshops, both of which engaged participatory mapping. Individuals' data were digitised, analysed and compiled into thematic series of maps, which were refined through participatory, consensus-based workshops. Locations of key populations and movement patterns for several species were delineated, predominantly for terrestrial mammals and migratory birds. When comparing local tacit-knowledge-based maps with those derived from formal-natural-science models, key differences and strong overlap were apparent. Local participants provided rich explanatory and complementary data. Their engagement in the process fostered knowledge transfer within the group and increased confidence in their experiential knowledge and its value for decision making. Benefits derived from our study for conservation planning in the region include enhanced spatial data on key locations of wildlife populations and movement pathways and local insights into wildlife changes over time. Identified contributing factors primarily relate to habitat degradation and fragmentation from human activities (i.e., land use and cover changes caused by roads and forestry practices), thereby supporting the need for conservation measures. The generated knowledge is important for consideration in local planning initiatives; it addresses gaps in existing formal-science data and validates or ground truths the outputs of existing computer-based models of wildlife habitat and movement pathways within the context of the complex social-ecological systems of the place and local people. Critically, awareness of the need for conservation and the value of the participants' shared knowledge has been enhanced, with potential influence in fostering local engagement in wildlife conservation and other planning initiatives. Consistent with other studies, engagement of local people and their tacit knowledge was found to (i) provide important insights, knowledge translation, and dissemination to complement formal, natural science, (ii) help build a more inclusive knowledge system grounded in the people and place, and (iii) lend support to conservation action for connectivity planning and human-wildlife co-existence. More broadly, our methods demonstrate an effective approach for representing differences and consensus among participants' spatial indications of wildlife and habitat as a means of co-producing knowledge in participatory mapping for conservation planning.

[Buckmann-Duck J. **Beazley KF.** 2020. An urgent call for circular economy advocates to acknowledge its limitations in conserving biodiversity. *Science of the Total Environment*. 727:138602](#)

This discussion paper explores the relationship between biodiversity and the circular economy and the potential implications of this relationship. The circular economy has emerged as an alternative model to a traditional linear economy. It aims to tackle the resource exploitation that accompanies a linear economy and decouple economic growth from reliance on primary resources. In the face of global environmental degradation and an urgent need for change, the concept has become popular around the

world and has led to the release of national policies and strategies on the circular economy. Problematically, while the basic concept is clear, it is ambiguous in how it will achieve some of its objectives, and it fails to address some key issues. In light of the accelerating rate of change, precipitous biodiversity decline is one such key issue. Through a content analysis of relevant circular economy publications, authors demonstrate that biodiversity protection is rarely mentioned in theory and policy. While the circular economy holds many benefits for society, its evasion of scrutiny has prevented it from manifesting in a comprehensive solution to environmental issues. The circular economy advocates for biomimicry, ecosystem service valuation, bioeconomy, and renewable energy. Each of these, however, has its own set of conflicts with biodiversity protection. Given the imminent need to protect biodiversity, the authors call for further research on the interaction between biodiversity and the circular economy, and for circular economy advocates to explicitly acknowledge the concept's limitations, thereby revealing the need for intersectional and complementary policies which aim to protect biodiversity.

[Srain HS. Beazley KF. Walker TR. 2020. Pharmaceuticals and personal care products \(PPCPs\) and their sublethal and lethal effects in aquatic organisms. *Environmental Reviews*. 0\(ja\)](#)

Pharmaceutical and personal care products (PPCPs) include over-the-counter and prescription drugs, veterinary drugs, fragrances, and cosmetics. PPCPs have been detected in aquatic environments at low concentrations and are emerging as contaminants of concern. PPCPs are primarily released into aquatic environments via untreated sewage, wastewater treatment plants, landfill leachate and can affect aquatic life through persistence, bioaccumulation, and toxicity. However, there are limited reviews of lethal and sublethal effects of PPCP exposures on aquatic organisms. To understand PPCP toxicity on aquatic organisms, a literature review was conducted which identified aquatic organisms known to be affected by PPCPs; concentrations of PPCPs reported as producing sublethal and lethal effects in aquatic organisms; and research gaps on PPCP aquatic toxicity. Twelve PPCPs were selected from three seminal studies for review, including bisphenol A, carbamazepine, erythromycin, fluoxetine, linear alkylbenzene sulfonate, metoprolol, naproxen, nonylphenol, ofloxacin, sertraline, sulfamethoxazole, and triclosan. Many aquatic species were affected by PPCPs at sublethal and lethal exposures, including sublethal effects at environmentally relevant concentrations. Because lethal effects were seldom observed at environmentally relevant concentrations, many studies considered PPCPs non-toxic. Few studies have compared effects of PPCPs on the same organisms for identical exposure parameters (time and concentration), resulting in wide variation in reported toxicity levels with limited consensus in the academic literature. Consensus in lethal concentrations was reported for *Daphnia magna* with 48 h exposure for bisphenol A and triclosan and *Vibrio fischeri* with 15 min exposure to carbamazepine. Environmentally relevant sublethal concentrations were higher than water quality guidelines developed for Canada and predicted no-effect concentrations derived globally. Species sensitivity distributions for some PPCPs show that aquatic species are affected lethally at environmentally relevant concentrations. More studies on indirect, and long-term ecological effects along with testing chronic toxicity of PPCPs at environmentally relevant concentrations, is recommended. These will help guide future research to determine extent and magnitude of PPCP concentrations in aquatic environments and help inform management decisions to reduce sources of PPCPs into the environment. Future management requires effective monitoring strategies regarding use, disposal, occurrence, and impacts at different life cycle stages of PPCPs in the environment.

[Allan JC. Beazley KF. Metaxas A. 2020. Ecological criteria for designing effective MPA networks for large migratory pelagics: Assessing the consistency between IUNC best practices and scholarly literature. *Marine Policy*. Article in press.](#)

No abstract available.

[Bale SL. Beazley KF. Westwood AL. Bush PL. 2020. The benefits of using topographic features to predict climate-resilient habitat for migratory forest landbirds: an example for the Rusty Blackbird, Olive-sided Flycatcher, and Canada Warbler. *The Condor: Ornithological Applications*. 122:1-9](#)

Maintaining a functionally connected network of high-quality habitat is one of the most effective responses to biodiversity loss. However, the spatial distribution of suitable habitat may shift over time in response to climate change. Taxa such as migratory forest landbirds are already undergoing climate-driven range shifts. Therefore, patches of climate-resilient habitat (also known as “climate refugia”) are especially valuable from a conservation perspective. Here, we performed maximum entropy (Maxent) species distribution modeling to predict suitable and potentially climate-resilient habitat in Nova Scotia, Canada, for 3 migratory forest landbirds: Rusty Blackbird (*Euphagus carolinus*), Olive-sided Flycatcher (*Contopus cooperi*), and Canada Warbler (*Cardellina canadensis*). We used a reverse stepwise elimination technique to identify covariates that influence habitat suitability for the target species at broad scales, including abiotic (topographic control of moisture and nutrient accumulation) and biotic (forest characteristics) covariates. As topography should be relatively unaffected by a changing climate and helps regulate the structure and composition of forest habitat, we posit that the inclusion of appropriate topographic features may support the identification of climate-resilient habitat. Of all covariates, depth to water table was the most important predictor of relative habitat suitability for the Rusty Blackbird and Canada Warbler, with both species showing a strong association with wet areas. Mean canopy height was the most important predictor for the Olive-sided Flycatcher, whereby the species was associated with taller trees. Our models, which comprise the finest-scale species distribution models available for these species in this region, further indicated that, for all species, habitat (1) remains relatively abundant and well distributed in Nova Scotia and (2) is often located in wet lowlands (a climate-resilient topographic landform). These findings suggest that opportunities remain to conserve breeding habitat for these species despite changing temperature and precipitation regimes.

[Van der Marel RC. Holroyd PC. Duinker PN. 2020. Managing human footprint to achieve large-scale conservation outcomes: Establishing density limits on motorized route-user networks in Alberta's eastern slopes. *Global Ecology and Conservation*. 22:e00901](#)

The relationships between human footprint and measurable impacts to biodiversity and ecosystems are complex. Also problematic is the hesitancy to derive threshold-based management tools from the scientific literature. Road ecology points to road densities as a useful surrogate for human footprint, and the research is replete with links between cumulative effects and various density thresholds. Yet there are few practical examples demonstrating how to go about managing the cumulative effects to biodiversity and how to reduce human footprint for large-landscape conservation. In Alberta's Eastern Slopes, a sub-regional planning process resulted in regulatory density limits being deployed on public lands in the Livingstone-Porcupine Hills. The density limits are applied to two classes of motorized route-use—open public use and restricted use by statutory consent holders—and are informed by biodiversity modeling analysis. Several elements supported the establishment of these density limits including a robust regional planning framework, legislative and regulatory tools, and thorough community engagement and participation in the planning process. Implementation success depends on resources for operational management, education, enforcement, monitoring, and restoration. We examine the Livingstone-Porcupine Hills Land Footprint Management Plan as an example of a real-world approach to

manage a common and growing problem. We demonstrate that there is sufficient scientific literature to support a conceptual framework for motorized route-user networks, and that real-world applications in threshold-based decision-making have practical merit. Density limits on motorized route-user networks constitute a viable cumulative effects management tool, especially for land managers seeking to maintain biodiversity and healthy ecosystems on large unprotected landscapes.

Quinton JM. Ostberg J. **Duinker PN**. 2020. The influence of cemetery governance on tree management in urban cemeteries: A case study of Halifax, Canada and Malmö, Sweden. *Landscape and Urban Planning*. 194:103699

Urban cemeteries represent an unusual type of greenspace that can provide a wide range of ecosystem benefits and services if they have mature tree populations. However, the extent to which tree management is prioritized in cemeteries alongside tasks associated with the burial and commemoration of the deceased is unknown. Given the large differences that exist amongst burial traditions and cemetery management around the world, it seems likely that cemetery tree management will not be uniform across countries. To investigate this, we compared cemetery governance and management in Halifax (Canada) and Malmö (Sweden) to determine which factors influence their cemetery tree populations, with a specific focus on tree planting. An inventory of places in which trees could be planted in cemeteries indicated that a large number of trees could theoretically be planted in both cities' cemeteries. However, manager interviews and a review of cemetery legislation indicated multiple dimensions of governance that result in the very real prospect that precious few of these plantable spots will actually become occupied by a tree. These dimensions differed between the two cities, with financial constraints and limited knowledge about trees playing a large role in Halifax, while in Malmö, legislation and public opinion influence the extent to which tree planting occurs. As such, the cities require different solutions to promote tree planting in their cemeteries to avoid future canopy loss and ensure the long-term continued provision of current ecosystem benefits and services.

Quinton JH. **Duinker PN**. Steenbert JWN. Charles JD. 2020. The living among the dead: Cemeteries as urban forests, now and in the future. *Urban Forestry and Urban Greening*. 48:126564

In the face of increasing population and urbanization, cities are trying to reconcile built infrastructure designed to accommodate human needs while also retaining and improving urban tree canopies. Given the diverse locations in which trees currently exist within cities, including public and private property, gardens, parks, and abandoned lots, we discuss the overlooked contribution of cemeteries to the urban forest. Specifically, we discuss the potential to expand the urban forest through planting trees in the cemeteries of Halifax, Nova Scotia (Canada). The objectives of our research were to 1) characterize the existing tree populations in Halifax cemeteries, and 2) estimate how many trees could be planted within these cemeteries. Our research indicates that Halifax cemeteries are dominated by non-native species such as *Acer platanoides*, *Tilia cordata*, and *Ulmus glabra*. Smaller trees are mostly limited to small copses comprised of dense regenerating stock, while the majority of area within cemeteries contains only larger and older trees. Limited natural regeneration and planting efforts, combined with the large size of Halifax's cemetery trees, indicates the likelihood of future canopy losses. However, this study also found over 2000 spots in which trees could be planted in the 27.5 ha of Halifax cemeteries, indicating that their tree populations could be almost doubled. Barriers such as financial limitations and hesitancy to plant trees amongst monuments need to be addressed and consideration needs to be given to the relationship between cemetery users and trees to determine how best to maintain (and potentially expand) the urban forest within cemeteries.

Doll S. **Duinker PN**. 2020. Characterization and justification of trees on an inner-city golf course in Halifax, Canada: An investigation into the ecological integrity of institutional greenspace. *Forests*. 11(1):96

Institutional greenspaces such as golf courses, cemeteries, military bases, hospitals, and university campuses are not generally revered for their ecological integrity. The existence of golf courses in particular has been heavily debated due to widespread perceptions of these spaces as environmentally degrading. Though much of the total area of golf courses is occupied by heavily manicured lawns, Canadian golf courses tend to be well treed and thus show significant potential to enhance forest coverage and contribute to the conservation of native tree species when established on previously unforested land. To explore this potential, a tree inventory was carried out on an inner-city golf course in Halifax, Nova Scotia, and findings compared to an earlier inventory of more naturalized (i.e., ingrowth) forest areas in the same city. Based in the Acadian Forest Region, this case study used the characteristics of a healthy and mature Acadian Forest as a model for ecological integrity. It was found that both the golf course and the ingrowth populations were largely representative of a mixedwood Acadian forest. Likewise, both populations were in a similar stage of regeneration and exhibited similar stresses. These results suggest that if improved forest management approaches are employed, golf courses will effectively strengthen the ecological integrity of urban forests. This is an especially important finding in the climate change era when tree populations are likely to be subjected to new environmental stressors which may be alleviated via the human intervention that is available on managed lands such as institutional greenspaces.

Thompson K. **Duinker PN**. **Sherren K**. 2020. Ecosystem services: A new framework for old ideas, or advancing environmental decision-making? Learning from Canadian forerunners to the ES concept. *Canadian Geographer*. Article in press.

Frameworks of ecosystem services (ES) are promoted as a new and important way to recognize, understand, and account for nature's benefits. We questioned assertions of the novelty of ES ideas and conducted a comparative analysis of approaches in planning, landscape architecture, and sustainable forest management against the Millennium Ecosystem Assessment ES framework. We conclude that the newer Millennium Ecosystem Assessment ES framing may assist planners in connecting local land-use change to human well-being, assessing trade-offs, and accounting for future uncertainty. Analogous approaches such as sustainable forest management offer practical insights, for example, about gauging, guiding, and reporting on sustainable use of ecosystems. We encourage environmental planners to engage with ES researchers to develop the approach and advance planning practice.

Quinton JM. Ostberg J. **Duinker PN**. 2020. The importance of multi-scale temporal and spatial management for cemetery trees in Malmo, Sweden. *Forests*. 11(1)

Research Highlights: A large body of research highlighted the important contributions that urban forests make to cities and their inhabitants. However, our urban forests face threats from issues such as rapid urbanization, climate change, and the spread of pests and diseases. As such, proactive and effective management is necessary to ensure their long-term sustainability. Given the multiple spatial and temporal scales on which threats can arise, effective management needs to account for these scales and adjust accordingly. The degree to which this currently happens is unclear. **Background and Objectives:** The aim of this study was to determine the role of multi-scale management in urban forestry, using cemeteries in Malmo, Sweden as a case study. Cemeteries can provide extensive tree canopy but are not readily considered in urban forest management. We sought to determine (1) the threats to the

current cemetery tree populations, (2) the extent of multi-scale cemetery tree management, (3) whether tree management plans promote multi-scale management, and (4) how cemetery tree management can be improved. Materials and Methods: Malmo cemetery tree inventories were analyzed with respect to size class and species diversity. Existing cemetery tree management plans were examined to determine the spatial and temporal scales of their recommendations. Interviews were conducted with cemetery managers to determine management priorities and actions. Results: We found that cemetery tree populations in Malmo suffer from a lack of age class and species diversity. Management tends to occur on short time scales and efforts focus mainly on addressing individual trees, although some consideration is given to large-scale species diversification. The management plans previously created for these cemetery trees make recommendations for age class and species diversification but are yet to be used extensively by cemetery managers. Conclusions: The long-term stability of Malmo's cemetery tree populations is threatened by a lack of species and age diversity. Current management efforts emphasize addressing small-scale issues. Although there is a desire to improve species diversity, this can cause conflict with existing cultural values.

Mayfield RJ. Langdon PG. Doncaster CP. Dearing JA. Wang R. Nazarova LB. **Medeiros AS.** Brooks SJ. Metrics of structural change as indicators of chironomid community stability in high latitude lakes. *Quaternary Science Reviews*. 249:106594

Understanding the effects of climate change on ecosystem structure and stability is challenging, especially in high latitude regions that are predicted to experience the largest increases in ambient temperature. Global warming is likely to be a key driver of ecosystem change in freshwater lakes. Increased temperature can positively or negatively affect lake community composition through the loss of cold-adapted taxa and the arrival of temperate or eurytopic taxa. Here, we analyse the likely effects of temperature-induced changes in taxonomic richness and compositional turnover of environmentally sensitive chironomids (Diptera: Chironomidae) across three regions—northern North America, Norway, and Russia—using existing datasets. Structural parameters (beta diversity, compositional disorder, and network skewness) were applied to model-simulated and empirical chironomid datasets across a large spatial temperature gradient. The analyses of empirical datasets showed changes in community structure across temperature gradients, suggesting varying states of ecosystem stability or instability. The comparison with null models enabled assessment as to whether these stresses agreed with expected patterns due to covarying summer temperature conditions or whether they deviated from expectations suggesting additional stress on the ecosystems. For all three regions, lakes in the mid-temperature range showed most evidence of relative ecosystem stability, with greater beta diversity, compositional disorder, and skewness, unanticipated by the modelled simulations. This is most likely due to more diverse habitats across the ecotone boundaries and additional factors that can influence ecosystem structures. Thus, we show that structural changes typical for ecosystem stability can be detected through changes in community structure across temperature gradients. This is important for understanding how lakes may change under current and future climate change.

Friesen TM. Finkelstein SA. **Medeiros AS.** 2020. Climate variability of the Common Era (AD 1-2000) in the eastern North American Arctic: Impact on human migrations. *Quaternary International*. 549:142-454

The eastern North American Arctic has a complex 5000-year prehistory, during which many human population movements occurred over great distances. Archaeologists have interpreted these movements as resulting from many factors; however, the effects of climate change are often hypothesized as primary drivers that can “push” human groups to leave some regions, or “pull” them to move to others. Here, we examine climate change at the regional scale over the Common Era using

Arctic paleoclimate data derived from a wide suite of biological proxies and geochemical tracers. We consider available statistical composites of high resolution (sub-decadal) paleo-temperature reconstructions for the Arctic region, as well as local-scale reconstructions at century or sub-century scale resolution in three focal regions of archaeological significance relevant to population movements: Victoria Island, Foxe Basin/Baffin Island, and the High Arctic (Ellesmere Island/Northwestern Greenland). We emphasize the two most widespread, though variable, climate change events characteristic of this period: the Medieval Climatic Anomaly and Little Ice Age in the second millennium AD; we also evaluate the evidence for the Roman Warm Period and Dark Ages Cold Period in the first millennium AD, as context for later events. We integrate information on the timing and magnitude of these events across the Canadian Arctic Archipelago, and assess the degree to which they coincide with current understanding of major population movements, with particular emphasis on three migration episodes. First, the expansion of Late Dorset Paleo-Inuit to the Central and High Arctic beginning in the late first millennium AD is plausibly linked to warming temperatures of the MCA. Second, the migration of Thule Inuit from Alaska to the Eastern Arctic beginning ca AD 1250 is not linked to warmer temperatures as previously hypothesized, and is therefore more likely related to social factors in Alaska. Third, the abandonment of northern regions and new settlement of southern regions by Inuit in the mid-second millennium AD is likely linked to a combination of cooling climate and increasing availability of European trade goods. Together, these three case studies indicate that linkages between climate change and migration are complex, variable, and mediated through social and economic factors.

Milosevic D. Milosavljevic A. Predic N. **Medeiros AS.** Savic-Zdravkovic D. Stojkovic Piperac M. Kostic T. Spasic F. Leese F. 2020. Application of deep learning in aquatic bioassessment: toward automated identification of non-biting midges. *Science of the Total Environment*. 711:135160

Morphological species identification is often a difficult, expensive, and time-consuming process which hinders the ability for reliable biomonitoring of aquatic ecosystems. An alternative approach is to automate the whole process, accelerating the identification process. Here, we demonstrate an automatic machine-based identification approach for non-biting midges (Diptera: Chironomidae) using Convolutional Neural Networks (CNNs) as a means of increasing taxonomic resolution of biomonitoring data at a minimal cost. Chironomidae were used to build the automatic identifier, as a family of insects that are abundant and ecologically important, yet difficult and time-consuming to accurately identify. The approach was tested with 10 morphologically very similar species from the same genus or subfamilies, comprising 1846 specimens from the South Morava river basin, Serbia. Three CNN models were built utilizing either species, genus, or subfamily data. After training the artificial neural network, images that the network had not seen during the training phase achieved an accuracy of 99.5% for species-level identification, while at the genus and subfamily level all images were correctly assigned (100% accuracy). Gradient-weighted Class Activation Mapping (Grad-CAM) visualized the mentum, ventromental plates, mandibles, submentum, and postoccipital margin to be morphologically important features for CNN classification. Thus, the CNN approach was a highly accurate solution for chironomid identification of aquatic macroinvertebrates opening a new avenue for implementation of artificial intelligence and deep learning methodology in the biomonitoring world. This approach also provides a means to overcome the gap in bioassessment for developing countries where widespread use techniques for routine monitoring are currently limited.

Engels S. **Medeiros AS.** Axford Y. et al. 2020. Temperature change as a driver of spatial patterns and long-term trends in chironomid (Insecta: Diptera) diversity. *Global Change Biology*. 26(3):1155-1169

Anthropogenic activities have led to a global decline in biodiversity, and monitoring studies indicate that both insect communities and wetland ecosystems are particularly affected. However, there is a need for long-term data (over centennial or millennial timescales) to better understand natural community dynamics and the processes that govern the observed trends. Chironomids (Insecta: Diptera: Chironomidae) are often the most abundant insects in lake ecosystems, sensitive to environmental change, and, because their larval exoskeleton head capsules preserve well in lake sediments, they provide a unique record of insect community dynamics through time. Here, we provide the results of a metadata analysis of chironomid diversity across a range of spatial and temporal scales. First, we analyse spatial trends in chironomid diversity using Northern Hemispheric data sets overall consisting of 837 lakes. Our results indicate that in most of our data sets, summer temperature (Tjul) is strongly associated with spatial trends in modern-day chironomid diversity. We observe a strong increase in chironomid alpha diversity with increasing Tjul in regions with present-day Tjul between 2.5 and 14°C. In some areas with Tjul > 14°C, chironomid diversity stabilizes or declines. Second, we demonstrate that the direction and amplitude of change in alpha diversity in a compilation of subfossil chironomid records spanning the last glacial–interglacial transition (~15,000–11,000 years ago) are similar to those observed in our modern data. A compilation of Holocene records shows that during phases when the amplitude of temperature change was small, site-specific factors had a greater influence on the chironomid fauna obscuring the chironomid diversity–temperature relationship. Our results imply expected overall chironomid diversity increases in colder regions such as the Arctic under sustained global warming, but with complex and not necessarily predictable responses for individual sites.

Medeiros AS. Milosevic D. Francis DR. et al. 2020. Arctic chironomids of the northwest North Atlantic reflect environmental and biogeographic gradients. *Journal of Biogeography*. Article in press.

Aim: While we understand broad climate drivers of insect distributions throughout the Arctic, less is known about the role of spatial processes in determining these relationships. As such, there is a need to understand how spatial controls may influence our interpretations of chironomid environment relationships. Here, we evaluated whether the distribution of chironomids followed spatial gradients, or were primarily controlled by environmental factors. **Location:** Eastern Canadian Arctic, Greenland, Iceland. **Taxon:** Non-biting midges (Chironomidae). **Methods:** We examined chironomid assemblages from 239 lakes in the western North Atlantic Arctic region (specifically from the Arctic Archipelago of Canada, two parts of west Greenland (the southwest and central west) and northwest Iceland). We used a combination of unconstrained ordination (Self Organizing Maps); a simple method with only one data matrix (community data), and constrained ordination (Redundancy Analysis); a canonical ordination with two datasets where we extracted structure of community related to environmental data. These methods allowed us to model chironomid assemblages across a large bioregional dimension and identify specific differences between regions that were defined by common taxa represented across all regions in high frequencies, as well as rare taxa distinctive to each region found in low frequencies. We then evaluated the relative importance of spatial processes versus local environmental factors. **Results:** We find that environmental controls explained the largest amount of variation in chironomid assemblages within each region, and that spatial controls are only significant when crossing between regions. Broad-scale biogeographic effects on chironomid distributions are reflected by the distinct differences among chironomid assemblages of Iceland, central-west Greenland, and eastern Canada, defined by the presence of certain common and low-frequency, rare taxa for each region. Environmental gradients, especially temperature, defined species distributions within each region, whereas spatial processes combine with environmental gradients in determining what mix of species characterizes each broad and geographically distinct island region in our study. **Main conclusions:** While biogeographic context is important for defining interpretations of environmental controls on species distributions, the primary

control on distributions within regions is environmental. These influences are fundamentally important for reconstructing past environmental change and better understanding historical distributions of these insect indicators.

Jaric I. Roll U. Arlinghaus R. Belmaker J. Chen Y. China V. Douda K. Essl F. Jahnig SC. Jeschke JM. Kalinkat G. Kalous L. Ladle R. Lennox RJ. Rosa R. Sbragaglia V. **Sherren K.** Smejkal M. Soriano-Redondo A. Souza AT. Wolter C. Correia RA. 2020. Expanding conservation culturomics and iEcology from terrestrial to aquatic realms. *PLoS Biology*. 18(10):e3000935

The ongoing digital revolution in the age of big data is opening new research opportunities. Culturomics and iEcology, two emerging research areas based on the analysis of online data resources, can provide novel scientific insights and inform conservation and management efforts. To date, culturomics and iEcology have been applied primarily in the terrestrial realm. Here, we advocate for expanding such applications to the aquatic realm by providing a brief overview of these new approaches and outlining key areas in which culturomics and iEcology are likely to have the highest impact, including the management of protected areas; fisheries; flagship species identification; detection and distribution of threatened, rare, and alien species; assessment of ecosystem status and anthropogenic impacts; and social impact assessment. When deployed in the right context with awareness of potential biases, culturomics and iEcology are ripe for rapid development as low-cost research approaches based on data available from digital sources, with increasingly diverse applications for aquatic ecosystems.

Chen Y. Caesemaeker C. Rahman HT. **Sherren K.** 2020. Comparing cultural ecosystem service delivery in dykelands and marshes using Instagram: a case of the Cornwallis (Jijuktu'kwejk) River, Nova Scotia, Canada. *Ocean and Coastal Management*. 193:105254

Climate change and sea level rise threaten coastal areas around the world. In the Bay of Fundy area of the Canadian Maritime Provinces, there are 364 km of dykes protecting 32,350 ha of drained agricultural land. The Nova Scotia Department of Agriculture is in charge of dyke maintenance on its coast, and making decisions about which dykes to reinforce for new climate conditions, which to realign (shorten), and which to simply abandon. Decision-makers need to better understand how people value and use dykeland compared with the marsh ecosystems they replaced, and to which areas will return if dykes are abandoned or realigned. Cultural ecosystem services (CESs) refer to nonmaterial contributions from nature to human beings' subjective and psychological aspects that affect their quality of life. We analyzed the CESs delivered by the dykelands and marshes of the Cornwallis (Jijuktu'kwejk) River by using 4 months of Instagram data. The results show two different portraits: 1) dykes and dykelands were more associated with aesthetics, recreational use, social relations, and female users; and 2) marshes (particularly a restored freshwater wetland in the study area) were more used by males and locals for artistic and educational value. Foreshore salt marshes were largely unmentioned in the dataset which may indicate that people did not consciously use or benefit from this ecosystem. Social media data are valuable in providing large-scale quantitative understanding of coastal land cover/land use alternatives to supplement other in-depth analysis, while having limitations regarding data noise and user bias, as well as concerns around ethical issues and ongoing data accessibility.

Chappell EN. Parkins JR. **Sherren K.** 2020. Climax thinking, place attachment, and utilitarian landscapes: implications for wind energy development. *Landscape and Urban Planning*. 199:103802

As a means of understanding responses to landscape change, the concept of climax thinking proposes that communities resist changes because individuals view their current landscape as in its optimal state.

We examined perceptions of past landscape change to help predict support for future change in the context of wind energy in the Chignecto area, Atlantic Canada. Change in this region includes a wind farm built in 2012 and the longer-term loss of four landscape features: dykes from the 1600s are being modified due to rising seas, foundries from the 1800s no longer exist, most giant hay barns from the 1800s have collapsed, and radio towers from WWII were dismantled. To assess local responses to these changes, we designed and randomly distributed a mail survey. The survey asked about exposure to turbines, support for wind energy, and demographics. Half the sample received images and descriptions of the four previous features, accompanied by questions about fit in the landscape and sadness at loss. These items were combined to create a climax thinking scale. Regression analysis reveals neither place attachment nor time in the region to be predictors of climax thinking, while male gender and conservative politics increase climax thinking. Conservatism decreases support for wind energy among people who can't see turbines from home and is not significant for people who can. Climax thinking increases wind support among people who can see them from home but is not significant for people who can't. Implications of results for renewable energy transitions are explored.

Thondhlana G. Redpath SM. Vedelt PO. Van Eden L. Pascual U. **Sherren K.** Murata C. 2020. Non-material costs of wildlife conservation to local people and their implications for conservation interventions. *Biological Conservation*. 246:108578

In assessment of costs (and benefits) of wildlife conservation, conventional economic valuation frameworks may inadequately address various non-tangible values and neglect social, cultural and political contexts of resources and their use. Correspondingly, there seems to be much more focus on quantifying the economic, material benefits and costs of wildlife conservation than the non-material aspects that also affect human well-being. In addition, current research on the costs of wildlife conservation tends to be discipline-focused which constrains comparability, often causing conceptual ambiguity. This paper is an attempt to address this ambiguity. While there is growing acknowledgement of the material costs of wildlife conservation, we contend that employing a broader, composite social well-being approach may provide better conceptual insights on—and practical options for—managing various non-material impacts of wildlife conservation for local people. Non-material impacts such as negative physical or psychological experiences, trauma, feelings of fear and anxiety cannot directly be measured by or converted to money, but such impacts still lead to human ill-being. Thus, taking these impacts into account is critical for the broader sustainability of wildlife conservation, making understanding and addressing them a key socio-ecological issue.

Tourangeau W. **Sherren K.** 2020. Leverage point for sustainable wool production in the Falkland Islands. *Journal of Rural Studies*. 74:22-33

The Falkland Islands ('Falklands') are home to half a million sheep that graze a marginal and drying landscape. This presents new challenges for the grazing management decisions that sustain farmers' livelihoods, lifestyles, and the surrounding natural environment. Our examination deploys Donella Meadows' (1999; 2008) concept of leverage points to explore the ways farmers intervene to make transformations toward social and ecological sustainability within these systems. The most effective and lasting transformations—called 'deep' leverage points—require changes in system design, structure, and way of thinking (e.g. paradigm shifts); these contrast with more common and less impactful 'shallow' leverage points, which focus on basic system parameters (e.g. rates and numbers). Thematic analysis of interview and field data reveals that while all methods of sheep grazing involve 'shallow' leverage points such as managing livestock numbers and wool quality, Holistic Management (HM)—a rotational grazing method based in systems thinking—facilitates 'deep' leverage points for sustainable transformations.

Careful planning, goal setting, and learning to think systemically enable HM farmers to make lasting transformations toward more sustainable wool production in the Falklands. Using leverage points as a framework, we explore the transformation potential of HM in this island community, and what this might mean for sustainable transformations in rangelands elsewhere.

Soubry B. **Sherren K.** Thornton TF. 2020. Are we taking farmers seriously? A review of the literature on farmer perceptions and climate change, 2007-2018. *Journal of Rural Studies*. 74:210-222

While there is broad agreement in theory that farmers' expertise should be integrated into discussions of land management and climate change adaptation in the food system, it is unknown how much research practice has integrated these recommendations. To gauge the state of the field, we reviewed and coded a sample set of papers (n = 105) concerning farmers' perceptions of climate change. Crosstabulation analysis reveals that: 1) researching farmer "perception" of climate change seems to be more frequent in the Global South, as opposed to the North, where other terms are used; 2) farmers are rarely described within their social-ecological contexts, and often simply have their observations segmented and assessed for verification against historical data or quantitative measurements; and 3) the broader dynamics of research practice may perpetuate extractive and colonial patterns of exchange between the Global North and South. We find that farmers from the Global South are rarely described, but often evaluated in their perceptions. We conclude that, with some exceptions, the field does not substantively embrace farmers' perceptions as a contribution to adaptation discourse. We posit that the lack of in-depth qualitative methods in our sample may be correlated with the perception of farmers as passive and vulnerable, rather than viably adapting.

Tournegeau W. Lamarque M. Greenland-Smith S. **Sherren K.** 2020. Beyond intrinsic: a call to combine scales on motivation and environmental values in wildlife and farmland conservation research. *Human Dimensions of Wildlife*. Article in press

It has become common to explore farmer motivations for adopting land management changes on a scale from intrinsic to extrinsic, including in studies on "motivation crowding" that examine how external incentives can undermine or reinforce a farmer's intrinsic reasons for protecting nature. We set out to do the same in a study on riparian management for the conservation of a species at risk in Nova Scotia, Canada. In our survey of 553 farmers in Nova Scotia, we received surprising results: similar agreement with statements on motivations to use riparian setbacks when wildlife is mentioned. All these statements corresponded to internal motivations found at the intrinsic end of the scale used. We postulate that environmental values associated with 'wildlife' triggered the positive responses. Environmental values influence farmer motivations toward conservation. We propose future studies on farmer motivations for adopting land management changes combine a scale on motivations with a scale on environmental values.

Dahl KM. Bork EW. Parkins JR. **Sherren K.** 2020. Assessing variation in range health razed northern temperate grasslands. *Rangeland Ecology and Management*. Article in press.

Contemporary methods of rangeland health (RH) assessment evaluate indicators designed to assess land use impacts on ecosystem function. These methods have not been tested relative to variation in specific grazing practices, including grazing period length and stocking rates during the growing season. We report on RH outcomes for three habitat types (native grassland, tame pasture, and forested pasture) across 97 pastures on 28 beef cattle ranches in Alberta, Canada. Pastures were distributed along a climatic gradient encompassing the grassland, parkland/foothill, and boreal regions. Surveys of ranchers

were used to quantify typical grazing period length (1 May–31 October) and, if applicable, rotation length, along with corresponding stocking rates for each pasture over the previous 5 yr. Pastures were assessed for RH using indicators of vegetation composition and structure, litter abundance, soil stability, weed presence, and within tame pastures, woody plant encroachment. An Akaike Information Criterion analysis compared the influence of aridity, grazing period length, and stocking rate on total range health scores (RHS) and ordination used to identify associations between indicator scores and grazing metrics. Total RHS varied among habitat types, being greater in forests than native and tame grasslands ($P < 0.05$), and declined with increasing forage utilization, particularly in forests. Within tame pastures, total RHS varied primarily in response to regional climate, with RHS decreasing as moisture deficits increased and declining with longer grazing periods during summer. Native grasslands also decreased in RHS in response to longer grazing periods, with stocking rates having little impact on RHS. Select RH indicators were associated with improved health in native grasslands grazed for shorter periods including low weed abundance and greater litter. Further studies are recommended to understand how, over and above climatic influences, variation in grazing practices alter the health of northern temperate grasslands.

Sherren K. Tournegeau W. Lamarque M. Greenland-Smith S. 2020. Exploring motivation crowding around farmer incentives for riparian management in Nova Scotia. *Canadian Geographer*. 64(2):250-265

Incentive programs to encourage landowners to protect habitat should be carefully designed to avoid motivation crowding: basically, replacing intrinsic reasons such as a land ethic with extrinsic ones like payments. Little research on motivation crowding tests real programs, and no such work has been done in Canada. We surveyed farmers in Nova Scotia in 2017 to explore whether participation in a new incentive program called Wood Turtle Strides, or knowledge about a similar incentive program potentially available in the future, would alter reported motivations to use riparian setbacks and buffers. Motivations to use setbacks or buffers were heavily intrinsic across all four survey cohorts: wildlife stewardship and sacrifice motivated actions more than social pressures. We were not able to statistically test for motivational crowding due to low program uptake and thus post-program survey responses, but there was no evidence of second-hand crowding: farmers being motivated by hearing about a program in an adjacent jurisdiction. Findings point to the significance of wildlife stewardship for many farmers, and persistent resistance to conservation among others, as well as a risk of low additionality. More post-program research is necessary to fully understand the program's net impact on motivations and conservation.

McPherson K. Wright T. Tyedmers P. 2020. Challenges and prospects to the integration of ocean education into high school science courses in Nova Scotia. *Applied Environmental Education and Communication*. 19(2):129-140

Ocean education can potentially improve understanding and engage individuals to act sustainably. Within Canada, a country bordered by three oceans with vast ocean resources, there is no formal mandate to teach ocean literacy within the school system. The ocean impacts the economy, culture, and ecology of Nova Scotia. This study examines, through semi-structured interviews, the challenges experienced by high school science teachers to the integration of ocean education into science courses. Results from this study indicate that despite placing value on the ocean the main challenges teachers incurred were limited background knowledge, lack of resources, curriculum outcomes, and time constraints.

Wilson TJB. Cooley SR. Tai TC. Cheung WWL. Tyedmers PH. 2020. Potential socioeconomic impacts from ocean acidification and climate change effects on Atlantic Canadian fisheries. *PLoS ONE*. 15 (1):e0226544.

Ocean acidification is an emerging consequence of anthropogenic carbon dioxide emissions. The full extent of the biological impacts is currently not entirely defined. However, it is expected that invertebrate species that rely on the mineral calcium carbonate will be directly affected. Despite the limited understanding of the full extent of potential impacts and responses there is a need to identify potential pathways for human societies to be affected by ocean acidification. Research on these social implications is a small but developing field. This research contributes to this field by using an impact assessment framework, informed by a biophysical model of future species distributions, to investigate potential impacts facing Atlantic Canadian society from potential changes in shellfish fisheries driven by ocean acidification and climate change. New Brunswick and Nova Scotia are expected to see declines in resource accessibility but are relatively socially insulated from these changes. Conversely, Prince Edward Island, along with Newfoundland and Labrador are more socially vulnerable to potential losses in fisheries, but are expected to experience relatively minor net changes in access.

Eichinger L. Walker TR. 2020. Review of remedial options for the Boat Harbour remediation project in Nova Scotia, Canada. *Remediation*. 31(1):91-104

Boat Harbour, located in Pictou County, Nova Scotia, Canada has been receiving industrial effluent wastewater from a nearby kraft pulp mill and chlor-alkali plant for over 50 years. Before receiving industrial effluent wastewater, the tidal estuary was culturally significant to the nearby Pictou Landing First Nation community. The tidal estuary was known for its medicinal, recreational, ceremonial, and subsistence functions. Formally a 140-ha natural tidal estuary, raw industrial wastewater was discharged into Boat Harbour beginning in 1967. Since inception, effluent treatment has undergone several upgrades in aeration capacity within the Boat Harbour Effluent Treatment Facility (BHETF) until the cessation of effluent discharge in 2020. Fifty years of industrial wastewater effluent discharge has resulted in widespread inorganic and organic contamination of unconsolidated sediments and surface water. Primary contaminants of concern include metals, dioxins and furans, and polycyclic aromatic hydrocarbons. The province of Nova Scotia has committed to the remediation of the BHETF, estimated to cost over \$292 million CAD. The goal of the remediation program is to return Boat Harbour to its natural state as a tidal estuary to restore the historical, traditional, and recreational uses of the land. Remediation components and alternatives were rated based on technical (26%), environmental (24%), economic (22%), social (14%), and regulatory (14%) weighted indicators. Criteria weighting for the five indicator categories was determined collaboratively with stakeholders. For each design component of remediation, a list of approaches was developed along with subsequent alternatives. Approaches and alternatives were screened to eliminate options that were not technically feasible or did not align with remediation goals. The remaining feasible concepts underwent detailed review and evaluation to select Qualified Remedial Options to be shared with stakeholders for input.

Patrício Silva AL. Prata JC. Walker TR. Campos D. Duarte AC. Soares AMVM. Barcelò D. Rocha-Santos T. 2020. Rethinking and optimising plastic waste management under COVID-19 pandemic: Policy solutions based on redesign and reduction of single-use plastics and personal protective equipment. *Science of the Total Environment*. 742: 140565.

Plastics have been on top of the political agenda in Europe and across the world to reduce plastic leakage and pollution. However, the COVID-19 pandemic has severely disrupted plastic reduction

policies at the regional and national levels and induced significant changes in plastic waste management with potential for negative impacts in the environment and human health. This paper provides an overview of plastic policies and discusses the readjustments of these policies during the COVID-19 pandemic along with their potential environmental implications. The sudden increase in plastic waste and composition due to the COVID-19 pandemic underlines the crucial need to reinforce plastic reduction policies (and to implement them into action without delays), to scale up in innovation for sustainable and green plastics solutions, and to develop dynamic and responsive waste management systems immediately. Policy recommendations and future research directions are discussed.

Nwafor N. **Walker TR.** 2020. Plastic Bags Prohibition Bill: A developing story of crass legalism aiming to reduce plastic marine pollution in Nigeria. *Marine Policy*. 120:104160

Mismanaged plastic land-based waste entering the marine environment is a growing problem globally. Plastic bag reduction policies have been widely adopted in Africa but are mainly punitive outright legislative bans. Limited evidence exists that document effectiveness of these legislative bans on curbing plastic marine pollution in Africa. In May 2019, the Nigerian government passed the Plastic Bags Prohibition Bill (Bill) which proposed to prohibit the use, manufacture and importation of all plastic bags used for commercial and household packaging. The Bill proposed by the Nigerian government mirrors punitive legislation prevalent elsewhere across Africa. Legislative tools used internationally were compared to the proposed Nigerian Bill and limitations identified. We highlight how the Bill can be redrafted to reflect national policy to improve ocean management. Redrafting the Bill should include proactive measures, such as market-based instruments, proper planning, coordination, implementation and enforcement before final enactment into law.

Nwafor NA. **Walker TR.** 2020. Rethinking marine insurance and plastic pollution: food for thought. *Resources, Conservation and Recycling*. 161:104950

No abstract available.

Chaudhary M. **Walker TR.** Willis R. Oakes K. 2020. Baseline characterization of sediments and marine biota near industrial effluent discharge in Northumberland Strait, Nova Scotia, Canada. *Marine Pollution Bulletin*. 157:111372

A bleached kraft pulp mill operating in Nova Scotia, Canada has discharged effluent into a former tidal estuary known as Boat Harbour since 1967. After treatment in Boat Harbour, effluent is discharged into Northumberland Strait. Contaminated sediments in Boat Harbour are slated for remediation following cessation of effluent discharge. A review of historical documents to identify contaminants in marine biota in Northumberland Strait found insufficient data to properly assess baseline conditions prior to remediation. This study measured metal, methylmercury, dioxin and furan concentrations in surficial sediments and American lobster (*Homarus americanus*), rock crabs (*Cancer irroratus*) and blue mussels (*Mytilus edulis*) in Northumberland Strait. When compared to Canadian Council of Ministers of the Environment sediment quality guidelines and Canadian Food Inspection Agency tissue guidelines results indicated limited contamination in sediments and biota, posing low risk to marine biota. Long-term monitoring is recommended to verify effectiveness of remediation.

Quanz M. Willis R. Burr D. Recoskie R. **Walker TR.** 2020. Aquatic ecological risk assessment frameworks in Canada: a case study using a single framework in South Baymouth, Ontario, Canada. *Environmental Monitoring and Assessment*. 192(8):530

Ecological risk assessment (ERA) is used to determine potential effect of human activities and industries on the natural environment. Numerous ERA management approaches exist and vary based on jurisdiction or ecological media. This ERA focused on contaminants within an aquatic ecosystem in sediments and surface water at South Baymouth port facility in Ontario, Canada. Contaminants were evaluated using the Canada-Ontario Decision-Making Framework for Assessment of Great Lakes Contaminated Sediments (COA). Following COA, this study (1) examined historical data from South Baymouth to determine contaminants of potential concern, (2) delineated potential contamination by comparing sediment and surface water concentration data to sediment quality guidelines and water quality guidelines from Canada and from different jurisdictions if Canadian guidelines were unavailable, (3) compared sediment concentrations to reference concentrations, and (4) developed an ERA decision matrix (used to inform management decisions at this aquatic site). Although sediments exhibited negligible potential for ecological risk and required no remedial management action, this case study highlights strengths of using COA for this ERA which included use of iterative and consistent approaches, but also highlights weaknesses which included unclear linkages between cause and effects of aquatic contaminants. Recommendations for future ERAs at contaminated aquatic sites include use of passive samplers and incorporating recent macroecology techniques.

[Prata JC. Silva ALP. Walker TR. Duarte AC. Rocha-Santos T. 2020. COVID-19 pandemic repercussions on the use and management of plastics. *Environmental Science and Technology*. 54\(13\):7760-7765](#)

Plastics are essential in society as a widely available and inexpensive material. Mismanagement of personal protective equipment (PPE) during the COVID-19 pandemic, with a monthly estimated use of 129 billion face masks and 65 billion gloves globally, is resulting in widespread environmental contamination. This poses a risk to public health as waste is a vector for SARS-CoV-2 virus, which survives up to 3 days on plastics, and there are also broad impacts to ecosystems and organisms. Concerns over the role of reusable plastics as vectors for SARS-CoV-2 virus contributed to the reversal of bans on single-use plastics, highly supported by the plastic industry. While not underestimating the importance of plastics in the prevention of COVID-19 transmission, it is imperative not to undermine recent progress made in the sustainable use of plastics. There is a need to assess alternatives that allow reductions of PPE and reinforce awareness on the proper public use and disposal. Finally, assessment of contamination and impacts of plastics driven by the pandemic will be required once the outbreak ends.

[Diggle A. Walker TR. 2020. Implementation of harmonized Extended Producer Responsibility strategies to incentivize recovery of single-use plastic packaging waste in Canada. *Waste Management*. 110:20-23](#)

Millions of tonnes of virgin (primary) plastic are produced annually, while recoverable (secondary) plastic rapidly accumulates as waste in landfills and the environment. Single-use plastics (SUPs) have short lifespans, and most of this waste is generated by packaging from global food industries. Food packaging waste comprises approximately one-third (8 million tonnes) of all Canadian municipal solid waste, and only 20% is recovered for reuse or recycling. Extended producer responsibility (EPR) strategies leverage corporate resources to reduce SUP waste generated by consumers. Implementation of EPR strategies allows local jurisdictions to gain greater control over their waste streams. Although Canada has had a national EPR strategy since 2009, it is currently only implemented for packaging in five provinces (e.g., British Columbia, Saskatchewan, Manitoba, Ontario and Québec), and is currently under development in New Brunswick. In this short communication, a case example of EPR implementation in Nova Scotia is provided which highlights the potential economic benefits for municipalities (\$14–17 M CAD in estimated savings), for improved solid waste management and for increasing recycling rates.

Further, a regional EPR strategy is recommended for all Atlantic Canadian provinces (e.g., Newfoundland and Labrador, New Brunswick, Prince Edward Island and Nova Scotia) now that the Canadian federal government has announced a move towards zero plastic waste under the Ocean Plastics Charter.

Adam I. **Walker TR.** Bezerra JC. Clayton A. 2020. Policies to reduce single-use plastic marine pollution in West Africa. *Marine Policy*. 116:103928

Countries in Africa are increasingly adopting policies to reduce single-use plastic (SUP) pollution, yet there has been limited analysis of policies adopted by African countries. This paper reviews SUP reduction policies, specifically in West Africa. The main policy instruments used by countries in West Africa is legislative SUP bans mostly on plastic grocery bags. Of the 16 countries, 11 have instituted bans, one has a market-based instrument and rest (4) with no strategy. Bans carry hefty punishments (i.e., fines and prison sentences). However, there is limited consultation when drafting bans, no national campaigns, and limited notification (less than one year) between ban announcement and subsequent implementation. There are no provisions for re-useable alternatives. We recommend current and future policies to reduce SUPs should engage stakeholders, allow sufficient time between announcement and implementation where the policy should be widely publicised. Governments are encouraged to offer inexpensive re-useable alternatives.

Johnston Edwards S. **Walker TR.** 2020. An overview of Canada's National Pollutant Release Inventory program as a pollution control policy tool. *Journal of Environmental Planning and Management*. 63(6):1097-1113

Formed under 'right-to-know' legislation and public disclosure principles, Pollutant Release and Transfer Registers (PRTs) are a key policy tool for pollution control. PRTs affect both social and environmental policy outcomes by making facility pollutant release quantities available to stakeholders. While PRTs operate under similar principles, they are designed to reflect national priorities. This study investigates and critically discusses the stated policy goals of Canada's National Pollutant Release Inventory (NPRI) to other PRTs. Notably, there are issues involving data completeness and accuracy, creating gaps in inventory emissions, thereby not reflecting actual emissions. While relative pollutant release levels have decreased, overall toxicity has increased. Coupled with the omission of toxicity factors and pollutant thresholds from the NPRI, this creates a false sense of progress for stakeholders. Making pollutant release data more comprehensive would improve stakeholder engagement and better inform the decision-making process which can be applied to policies across geopolitical scales.

Ashrafi M. Magnan GM. Adams M. **Walker TR.** 2020. Understanding the conceptual evolutionary path and theoretical underpinnings of corporate social responsibility and corporate sustainability. *Sustainability (Switzerland)*. 12(3), #760

To unlock the potential for corporations to play a more proactive role in sustainable development, it is critical to have a fundamental understanding of the pathways leading to a responsible and sustainable business. This study explores contributions of theories of the firm in explicating why and how integrating corporate social responsibility (CSR) and corporate sustainability (CS) into business strategic decisions and operation processes helps to improve the viability of corporations. The research objective is addressed through a narrative review of relevant literature by following the developmental and evolutionary sequences in business responsibility and sustainability while contemplating the connections between CSR and CS through the lens of the dominant theoretical perspectives underpinning the concepts. The study posits an integrative theoretical framework that offers supports

for embedding CSR and CS into a corporate business strategy. It discusses that corporate choice of CSR and CS actions and policies is supported by dual internal and external mechanisms based on resource-based theory and institutional theory. This is to meet the interests and expectations of internal and external stakeholders, the basis upon which stakeholder theory is constructed. Findings from this review corroborate the proposition that the three theories of resource-based, institutional, and stakeholder could be used as the primary approach to explain corporate recognition of the need for CSR and CS, and further build a coherent platform to support corporate choice and adoption of CSR and CS in business strategy.

[Wright RJ. Langille MGI. Walker TR. 2020. Food or just a free ride? A meta-analysis reveals the global diversity of the Plastisphere. ISME Journal. Article in press](#)

It is now indisputable that plastics are ubiquitous and problematic in ecosystems globally. Many suggestions have been made about the role that biofilms colonizing plastics in the environment—termed the “Plastisphere”—may play in the transportation and ecological impact of these plastics. By collecting and re-analyzing all raw 16S rRNA gene sequencing and metadata from 2,229 samples within 35 studies, we have performed the first meta-analysis of the Plastisphere in marine, freshwater, other aquatic (e.g., brackish or aquaculture) and terrestrial environments. We show that random forest models can be trained to differentiate between groupings of environmental factors as well as aspects of study design, but—crucially—also between plastics when compared with control biofilms and between different plastic types and community successional stages. Our meta-analysis confirms that potentially biodegrading Plastisphere members, the hydrocarbonoclastic Oceanospirillales and Alteromonadales are consistently more abundant in plastic than control biofilm samples across multiple studies and environments. This indicates the predilection of these organisms for plastics and confirms the urgent need for their ability to biodegrade plastics to be comprehensively tested. We also identified key knowledge gaps that should be addressed by future studies.

[Taylor S. Edwards SJ. Walker TR. 2020. A toxicity-based analysis of Canada’s National Pollutant Release Inventory \(NPRI\): a case study in Nova Scotia. Environmental Science and Pollution Research. 27\(2\):2238-2247](#)

After the success of the Toxics Release Inventory (TRI) in the United States (US), Canada created the National Pollutant Release Inventory (NPRI). Both NPRI and TRI focus on public opinion to coerce facilities to reduce quantities of emissions, through market pressure, although early reductions in Canada may be attributed to traditional command-and-control mechanisms. NPRI uses a quantity-based approach to report atmospheric and effluent releases of pollutants to air and water, but does not account for relative toxicity of releases, which could lead to harmful chemicals being overlooked. A toxicity-based approach using characterization factors from the USEtox® environmental impact assessment tool was used for this study. Releases of organic and inorganic pollutants to both air and water in Nova Scotia for 2015 were analyzed. Using an ecotoxicity analysis found that the highest priority chemicals identified using the NPRI’s quantity-based approach differed markedly from those identified using the toxicity-based approach. Many of the high-priority chemicals identified using toxicity-based analysis are detrimental to ecosystem health and warrant regulatory attention. The Office of the Auditor General of Canada recently suggested that the Canadian federal government needs to improve control risks of toxic substances. Using a toxicity-based approach may help decision makers in the Canadian federal government effectively control risks of toxic substances and help to inform decision makers, regulators, and Canadians about those risks.

Clayton CA. **Walker TR.** Bezerra JC. Adam I. 2020. Policy responses to reduce single-use plastic marine pollution in the Caribbean. *Marine Pollution Bulletin.* 111833.

Caribbean economies depend heavily on a healthy marine ecosystem, but the region includes ten of the top global marine polluters per capita. Regional marine pollution is driven by illegal plastic waste dumping due to poor waste management systems with limited recycling, and weak enforcement. Governments recognize the impacts of marine debris on their social and economic well-being and have responded with policies to curb plastic pollution. Most focus on bans of single-use plastic and polystyrene, which comprises ~80% of Caribbean marine litter. However, there is little comparative analysis of policy responses to determine their efficacy. This paper reviews current policies in 13 English-speaking Caribbean countries, exploring tools used and process of implementation. Eleven have introduced legislative policies, with seven including fines and penalties for non-compliance. All successful policies involve multiple tools, including primary stakeholder engagement, sufficient lead time between policy announcement and implementation, and extensive public education campaigns.

Ashrafi M. **Walker TR.** Magnan GM. Adams M. Acciaro M. 2020. A review of corporate sustainability drivers in maritime ports: a multi-stakeholder perspective. *Maritime Policy and Management.* 47(8):1027-1044

Maritime ports play a pivotal role in facilitating trade, serving as key nodes in global transport chains. Competitive pressure exists for port managers and operators to search for ways to deliver consistent improvements in productivity and profitability. Additionally, external effects associated with port activities have been given more attention in recent years, thus favouring a holistic integration of sustainability into port planning and operations. In this process, factors driving ports to become more sustainable need to be examined. This study, which is based on a systematic review of literature published since 1987, synthesizes various research perspectives for corporate sustainability drivers in maritime ports using the lens of stakeholder theory. Thirty drivers of corporate sustainability were identified, classified into 10 main drivers and further grouped into five clusters, serving as the basis for development of a multi-stakeholder perspective. This study also discusses examples of actions taken by ports in response to perspectives of various stakeholders using selected case examples from existing literature. This study provides an understanding of how decisions for adopting corporate sustainability are motivated in ports according to a multi-stakeholder perspective, and highlights how ports have responded to shifts through developing and implementing sustainability strategies using global case examples.

Goodman AJ. **Walker TR.** Brown CJ. Wilson BR. Gazzola V. Sameoto JA. 2020. Benthic marine debris in the Bay of Fundy, eastern Canada: Spatial distribution and categorization using seafloor video footage. *Pollution Bulletin.* 150:110722.

Marine debris, particularly plastic and abandoned, lost and discarded fishing gear, is ubiquitous in marine environments. This study provides the first quantitative and qualitative assessment of benthic debris using seafloor video collected from a drop camera system in the Bay of Fundy, Eastern Canada. An estimated 137 debris items km⁻² of seafloor were counted, comprising plastic (51%), fishing gear (including plastic categories; 28%) and other (cable, metal, tires; 21%). Debris was widespread, but mainly located nearshore (within 9 km) and on the periphery of areas with high fishing intensity. This baseline benthic marine debris characterization and estimate of abundance provides valuable information for government (municipal, provincial and federal) and for other stakeholders to implement management strategies to reduce plastic and other categories of benthic marine pollution at source.

Strategies may include limiting plastic use and reducing illegal dumping through improved education among fishers.

Karbalaei S. Golieskardi A. Watt DU. Boiret M. Hanachi P. **Walker TR.** Karami A. 2020. Analysis and inorganic composition of microplastics in commercial Malaysian fish meals. *Marine Pollution Bulletin*. 150:110687

Presence of microplastics (MPs) in a broad range of wild and cultured marine organisms is well-documented, but transfer mechanisms by which cultured organisms are contaminated with MPs is poorly understood. MP loads in three Malaysian commercial brands of fish meal were investigated. Chemical composition of extracted MP-like particles was confirmed using micro-Raman spectroscopy. Inorganic composition of MPs and pigment particles were assessed through energy-dispersive X-ray spectroscopy (EDX). Out of 336 extracted particles, 64.3% were plastic polymers, 25% pigment particles, 4.2% non-plastic items, and 6.5% were unidentified. Fragments were the dominant form of MPs (78.2%) followed by filaments (13.4%) and films (8.4%). This study demonstrates that cultured organisms could be exposed to high levels of MPs via MP contaminated fish/shellfish used in fish meal production. Fish meal replacement with other sources of protein including meat meals and plant-based meals may mitigate MP exposure to cultured or farmed organisms.

Alimohammadi M. Tackley HA. Lake CB. Spooner I. **Walker TR.** Jamieson R. Gan C. Bossy K. 2020. Effect of different sediment dewatering techniques on subsequent particle sizes in industrial derived effluent. *Canadian Journal of Civil Engineering*. 47(10):1145-1153

A paucity of literature has compared geotextile dewatering methods to more conventional dewatering methods (i.e., centrifuge, sedimentation) in the context of how geotextile dewatering performs at reducing particulate matter in dewatering effluent. Particulate matter is the primary source of inorganic and organic contaminants (i.e., dioxins and furans) in an unconsolidated sediment (estimated 577,000 m³) that has accumulated in a wastewater stabilization basin in Nova Scotia, Canada. Physical and chemical properties of contaminated sediment were initially characterized, and subsequent laboratory experiments were carried out for three common dewatering methods: sedimentation, centrifugation, and geotextile filtration. Filtrate quality of suspended solids (number, particle size distribution of particles) was examined for differences based on three dewatering techniques assessed. All three methods provided effective removal of particulate matter during dewatering, but geotextile dewatering could be a more cost-effective and practical solution for dewatering of these sediments.

Alimohammadi M. Tackley HA. Holmes B. Davidson K. Lake CB. Spooner I. ... **Walker TR.** 2020. Characterising sediment physical property variability for bench-scale dewatering purposes. *Environmental Geotechnics*. Article in press

A field sampling programme was undertaken to assess the variability of physical characteristics of contaminated sediments in a large (160 ha) effluent stabilisation lagoon. The objective of this paper is to use this 'field lab' as a basis for comparing different sampling techniques (i.e. discrete and composite) for remediation-based evaluations (i.e. sediment volume estimates and bench-scale dewatering studies). The distribution of sediment thickness measured throughout the lagoon by gravity core sampling is presented for context. Selected gravity core sediment samples are evaluated with respect to physical property (water/solids content, bulk density and particle size) variability in both the vertical (i.e. within a single gravity core) and spatial directions (among gravity cores). Composite samples are created by way of homogenisation of a single entire gravity core to compare their properties to the discrete and

average physical properties of a nearby gravity core. Vacuum-based samples are also compared to gravity core samples in terms of particle size. It is demonstrated that by understanding sediment variability, composite samples can be shown to be an efficient method of obtaining representative samples. When large samples for dewatering trials are required, vacuum sampling can produce samples with similar mean particle size to discrete and composite samples.

Chaudhary M. Quanz M. Williams J. Maltby E. Oakes K. Spooner I. **Walker TR.** 2020. Assessment of metal (loid) concentrations using Diffusive Gradient Thin (DGT) films in marine, freshwater and wetland aquatic ecosystems impacted by industrial effluents. *Case Studies in Chemical and Environmental Engineering*. 2, 100041

Bioavailable metal(loid)s in aquatic ecosystems pose potential ecological risks to aquatic organisms. In situ passive sampling using diffusive gradient thin (DGT) films is an effective technique to measure bioavailable contaminants in aquatic ecosystems. Contaminated sediments impacted by industrial effluents in Nova Scotia, Canada are poised for remediation following detailed site characterization. This study explored used DGTs to measure bioavailable contaminants at the sediment/water interface to inform potential ecological risk. Eighty DGTs discs were deployed in one marine and three freshwater sites. DGTs were used to measure metal(loid), total mercury (THg) and methylmercury (MeHg) concentrations within 5 cm of the sediment/water interface in marine and freshwater sites to help with site characterization. Of eighty discs, forty contained chelex binding gel (for As, Cd, Cr, Cu, Pb and Zn analysis) and forty contained 3-mercaptopropyl-functionalized silica (MFS) binding gel for THg and MeHg analysis. Bioavailable metal(loid) and THg concentrations were low and MeHg concentrations were below detection levels across all sites. Results suggest that ecological risk to aquatic organisms is low. Use of in situ passive sampling techniques may help inform risk management decision making during remediation planning.

Hadad M. Tardif JC. Conciatori F. Waito J. **Westwood A.** 2020. Climate and atmospheric circulation related to frost-ring formation in *Picea mariana* trees from the Boreal Plains, interior North America. *Weather and Climate Extremes*. 29:100264

Earlier spring and earlier onset of growth, as a consequence of climate change, may expose trees and crops to increased risk of exposure to frost damage. In this study, we compare the frequency of frost rings in three regions [Porcupine Provincial Forest (PPF; north-latitude); Duck Mountain Provincial Forest (DMPF; mid-latitude) and Riding Mountain National Park (RMNP, south-latitude)] located in the Boreal Plains of interior North America. In each of PPF and DMPF, twenty upland black spruce [*Picea mariana* (Mill.) BSP] trees were sampled using stem analysis and others were sampled at breast height or below. In RMNP, multiple coniferous tree species were sampled at breast height or below to allow comparison among species. Results from stem analysis indicated that frost rings were more frequent in DMPF than PPF (north of DMPF). Frost rings identified up to a height of 16 m and were formed predominantly in the early cambial age zone. As a general pattern, frost rings recorded in PPF occurred more abundantly in years with warm April temperatures and this association was less prevalent in DMPF. Frost rings were formed following extreme frost events in late May - early June and frost-ring years corresponded to years with cooler June temperatures. A significant positive association was found between frost-ring frequency and the El Niño Southern Oscillation. In the absence of an early spring, black spruce trees were less affected by frost damages. Stem analysis provided a better record of spring frosts than solely sampling at breast height or below. The multi-species approach used in RMNP revealed many years with synchronous frost rings among species. The development of a large network of frost-ring chronologies from tree species of various age classes and/or from stem analysis will help with assessing the impact of

late spring frosts on forest dynamics and to document large-scale climate anomalies in areas with low climate data coverage and/or prior to instrumental records.

Westwood AR. Barker NK. Grant S. Amos AL. Camfield AF. Cooper KL. Dénes FV. Jean-Gagnon F. McBlane L. Schmiegelow FKA. Simpson JJ. Slattery SM. Sleep DJH. Sliwa S. Wells JV. Whitaker DM. 2020. Toward actionable, coproduced research on boreal birds focused on building respectful partnerships. *Avian Conservation & Ecology*. 15(1):26:1-28

Recent research on boreal birds has focused on understanding effects of human activity on populations and their habitats. As bird populations continue to decline, research is often intended to inform conservation and management policies and practices. Research produced under the typical “loading dock” model by Western-trained researchers often fails to achieve desired conservation outcomes. There is growing global consensus that science is most actionable when produced in collaboration between scientists, potential end-users of the science, and communities implicated in or affected by the research and its outcomes. A fully collaborative research process, which we call “coproduced research,” involves partners in the design, execution, and communication of research. To coproduce research, it is first important to understand the sociocultural context of a research project. For boreal bird conservation in Canada, this context includes complex linkages between Indigenous communities, governments, and rights-holders, multiple levels of government, nonprofit organizations, companies, and industry consortiums, civic communities, and others. We explain this context, and give particular attention to best practices for coproduction of research between non-Indigenous researchers and Indigenous partners. We also introduce a self-assessment tool for researchers to gauge the strength of their relationships with potential partners. We highlight the challenges of doing coproduced research, including cross-cultural communication and lengthy timelines to build relationships. We propose a guide for coproduced research in four stages: (1) identify potential partners; (2) build relationships; (3) identify mechanisms to inform policy and management; and (4) execute research and communications plans. We illustrate the stages with examples of “bright spots” to demonstrate successful coproduction partnerships. Although we focus on research to improve knowledge for boreal bird conservation and management, many of the lessons we share for adopting a coproduced research model would apply to terrestrial or marine wildlife, or any natural resource.

Sexton EK. Sergeant CJ. Moore JW. **Westwood AR.** Chambers DM. McPhee MV. Nagorski SA. O’Neal SL. Weitz J. Berchtold A. Capito M. Frissell CA. Hamblen J. Hauer FR. Jones LA. Knox G. Macnair R. Malison RL. Marlatt V. McIntyre J. Skuce N. Whited DC. 2020. Canada’s mines pose transboundary risks. *Science*. 368(6489):376-377

No abstract available.

Westwood AR. Lambert JD. Reitsma LR. Stralberg D. 2020. Prioritizing areas for land conservation and forest management planning for the threatened Canada warbler (*Cardellina Canadensis*) in the Atlantic northern forest of Canada. *Diversity*. 12(2):61

Populations of Canada Warbler (*Cardellina canadensis*) are declining in Canada's Atlantic Northern Forest. Land conservancies and government agencies are interested in identifying areas to protect populations, while some timber companies wish to manage forests to minimize impacts on Canada Warbler and potentially create future habitat. We developed seven conservation planning scenarios using Zonation software to prioritize candidate areas for permanent land conservation (4 scenarios) or responsible forest management (minimizing species removal during forest harvesting while promoting

colonization of regenerated forest; 3 scenarios). Factors used to prioritize areas included Canada Warbler population density, connectivity to protected areas, future climate suitability, anthropogenic disturbance, and recent Canada Warbler observations. We analyzed each scenario for three estimates of natal dispersal distance (5, 10, and 50 km). We found that scenarios assuming large dispersal distances prioritized a few large hotspots, while low dispersal distance scenarios prioritized smaller, broadly distributed areas. For all scenarios, efficiency (proportion of current Canada Warbler population retained per unit area) declined with higher dispersal distance estimates and inclusion of climate change effects in the scenario. Using low dispersal distance scenarios in decision-making offers a more conservative approach to maintaining this species at risk. Given the differences among the scenarios, we encourage conservation planners to evaluate the reliability of dispersal estimates, the influence of habitat connectivity, and future climate suitability when prioritizing areas for conservation.

Kattge J. Bönlisch G. Díaz S. **Westwood A.** ... et al. 2020. TRY plant trait database – enhanced coverage and open access. *Global Change Biology*. 26(1):119-188

Plant traits—the morphological, anatomical, physiological, biochemical and phenological characteristics of plants—determine how plants respond to environmental factors, affect other trophic levels, and influence ecosystem properties and their benefits and detriments to people. Plant trait data thus represent the basis for a vast area of research spanning from evolutionary biology, community and functional ecology, to biodiversity conservation, ecosystem and landscape management, restoration, biogeography and earth system modelling. Since its foundation in 2007, the TRY database of plant traits has grown continuously. It now provides unprecedented data coverage under an open access data policy and is the main plant trait database used by the research community worldwide. Increasingly, the TRY database also supports new frontiers of trait-based plant research, including the identification of data gaps and the subsequent mobilization or measurement of new data. To support this development, in this article we evaluate the extent of the trait data compiled in TRY and analyse emerging patterns of data coverage and representativeness. Best species coverage is achieved for categorical traits—almost complete coverage for ‘plant growth form’. However, most traits relevant for ecology and vegetation modelling are characterized by continuous intraspecific variation and trait–environment relationships. These traits have to be measured on individual plants in their respective environment. Despite unprecedented data coverage, we observe a humbling lack of completeness and representativeness of these continuous traits in many aspects. We, therefore, conclude that reducing data gaps and biases in the TRY database remains a key challenge and requires a coordinated approach to data mobilization and trait measurements. This can only be achieved in collaboration with other initiatives.

Bullock RCL. Zurba M. Parkins JR. Skudra M. 2020. Open for bioenergy business? Perspectives from Indigenous business leaders on biomass development potential in Canada. *Energy Research and Social Science*. 64:101446

Canada is one of the world's top five energy producers and, within Canada's energy sector, the bioenergy economy is rapidly expanding. This research was conducted to identify perceived risks, barriers, benefits, and opportunities relating to the development of biomass energy by Indigenous business leaders and/or their communities. Eighteen Indigenous business leaders from forestry, energy, and allied natural resource sectors were interviewed to understand their perspectives on bioenergy. Results included that views on bioenergy feasibility differed between business leaders in northern versus southern Canada. There was no agreement among business leaders as to risks and benefits (neutral, positive, negative) for Indigenous businesses and communities engaging in bioenergy initiatives. Many of the benefits of bioenergy were related by participants to opportunities for increasing

community self-reliance and increasing connectedness to Canadian mainstream economic and governance systems. Indigenous-led policy interventions are especially important in new industries like bioenergy in the boreal where Indigenous traditional territories, communities and businesses intersect and thus are likely to be impacted by new developments and partnerships.

Park A. Williams E. **Zurba M.** 2020. Understanding hope and what it means for the future of conservation. *Biological Conservation*. 244:108507

Academic papers and media commentaries frequently appeal to hope as a necessary bulwark against despair for the conservation community. Such claims are often made in the absence of a rigorous discussion of the nature of hope. In this review, we investigate the importance of hope as it applies to conservation workers, educators, and others involved in environmental protection. We define hope in its many dimensions, ask whether having hope is necessary to motivate people to engage in environmental action, and inquire whether hope can be revived or reframed when conservation actions fail. Hope is a multi-faceted emotional state or motivational attitude with many subtypes, including authentic (or active), passive, false, and radical hopes. The conservation literature generally refers to active hope, although the type of hope considered is often left unstated. Whether hope leads to environmental engagement or action depends on many factors, including goal orientation and feasibility, societal and personal norms, personality traits, and group identity. Organizational attributes like leadership, consistent vision, and interpersonal communication affect the experience of hope among conservation practitioners, environmental educators, and the public. Grief and hopelessness are frequently part of the “emotional labour” of conservation and environmental work, but these may be buffered by a sense of agency and feasible objectives, which encourage authentic hope. Although there has been progress in understanding the role of hope in conservation, conservation communities can continue to learn from the rich body of psychological theory and practice that has been used to study hope in other fields.

Zurba M. Bullock R. 2020. Bioenergy development and the implications for the social wellbeing of Indigenous peoples in Canada. *Ambio*. 49(1):299-309

In this article, we focus on wellbeing as an important concept relating to bioenergy development in Canada. We use a three-dimensional or social approach to understanding wellbeing, which includes subjective and relational aspects in addition to the more traditional material dimension of wellbeing (e.g. financial resources, a healthy environment). Indigenous business leaders engaged in forestry, energy, and related resource sectors were recruited through our partner organization, the Canadian Council for Aboriginal Business, as a representative sample of key people to be engaged in the scoping of existing and future bioenergy partnerships in Canada. Participants often responded in ways that did not discretely fit into categories, but instead reflected a perspective on their own and their community's dimensions of social wellbeing, which we captured through open coding for emergent themes. Our findings on material wellbeing illustrate that relationships between different wellbeing dimensions need to be considered for community-appropriate bioenergy development.

Bullock R. **Zurba, M.** Reed MG. McCarthy D. 2020. Strategic options for more effective Indigenous participation in collaborative environmental governance. *Journal of Planning Education and Research*. Article in press

This research focuses on how Indigenous peoples might participate in collaborative environmental governance initiated by networked nongovernmental organizations (NGOs). Fourteen Indigenous and six

non-Indigenous board members and partners of Canadian Model Forests were interviewed and discussed seven aspects of collaborative governance affecting Indigenous participation: purpose and vision; decision-making structure(s); roles and responsibilities; engagement; capacity; leadership; and cultural suitability. Participants described four possible participation structures: external advisory committee; internal board subcommittee; hybrid internal–external advisory board; and internal ad hoc group. Here, design options and implications of each model are considered, offering choices for engagement where NGOs seek to lead collaborative approaches.

Zurba M. Stucker D. Mwaura G. Burlando C. Rastogi A. Dhyani S. Koss R. 2020. Intergenerational dialogue, collaboration, learning, and decision-making in global environmental governance: The case of the IUCN intergenerational partnership for sustainability. *Sustainability (Switzerland)*. 12(2):498

This article provides evidence and a rationale based on adaptive governance studies for why creating meaningful youth engagement should be understood in terms of intergenerational dialogue, collaboration, learning, and substantive decision-making in global environmental governance. We have centered our discussion on the International Union for the Conservation of Nature (IUCN), as the largest global conservation organization. Through an organizational ethnography approach, we have demonstrated how generational concerns within the IUCN have been framed in terms of participation, and then present the IUCN Intergenerational Partnership for Sustainability (IPS) as a case study of a grassroots movement that is focused on transforming the IUCN towards being a fully intergenerational global governance system for nature conservation. We have described the development of intergenerational thinking and action within the IUCN, and discussed intergenerational governance as being essential for addressing nature conservation challenges faced by local communities in times of increasing global uncertainty. We conclude by providing recommendations for enhancing intergenerational dialogue and building intergenerational governance structures within global conservation organizations.