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Strategic foresight in forestry: How Canada and the United States use a neglected tool to build a green, healthy and resilient future

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Abstract

Strategic foresight is a tool for understanding the ways in which the future might unfold. It is a valuable tool for identifying and mitigating areas of risk while identifying opportunities for our forests, particularly in an age of uncertainty and accelerating change. In recent years, foresight has increasingly been adopted by governments, large organizations, and forward-looking business enterprises as a method to reduce risk for their operations. But forestry agencies have been relatively slow to adopt strategic foresight methods and perspectives. A key principle of foresight is the idea of multiple alternative futures. Rather than predicting exactly how the future is likely to unfold, foresight analysts identify several plausible futures. Foresight is a guide to identify potentially influential decisions, ideas, opportunities and threats. Both the Canadian Forest Service (CFS) and the United States Forest Service (USFS) are developing strategic foresight programs to help plan and operate in an environment of growing complexity, uncertainty and rapid change. The USFS has engaged in foresight in the agency's R&D branch since 2010. The CFS's foresight team provides advice to policymakers from within its strategic policy division and it builds capacity for forward thinking within the organization. The two organizations have recently partnered to share their findings and approaches. To that end, this paper shows how strategic foresight can help planners, managers, and policy makers understand the future of global forests, using insights from our respective agencies. We outline what foresight is, the suite of foresight tools and how they support proactive analysis and decision making, foresight's usefulness for the forest sector, how it is practiced in North America, and how it may be beneficial for forestry globally.

Keywords: Policies, knowledge management, innovation, research, partnerships

Introduction

Strategic foresight is a social science field that is unfamiliar to most forestry professionals but is rich in novel methods and perspectives to create better understanding of the ways in which the future might unfold (Bengston *et al.* 2012; Cook *et al.* 2014). The goal is to develop foresight, i.e., insights into how and why the future could be different than today (Lum 2016), to use the insights gained to improve current planning and decision-making, and to build resilience in organizations and systems. Futurists have developed or adapted many innovative methods to generate foresight that are widely used in

business, the military, and intelligence agencies. However, few forestry professionals or researchers are familiar with these methods or recognize foresight as a distinct field of social science that can make important contributions to forest planning and policy, with the exception of scenario planning.

In this paper, we define strategic foresight, describe key tools used in foresight and how these tools support planning and decision-making, outline foresight's usefulness for the forest sector, explain how it is practiced in the Canadian Forest Service and United States Forest Service, and suggest how it may be beneficial for forestry globally.

What is strategic foresight?

Foresight, also called futures research, began to emerge as a distinct field during the early post-World War II era. From its origins in the military and then expanding into the private sector, foresight has become a well-established field with many methods for generating practical information to improve decision-making. For many organizations, a motivating factor for adopting foresight approaches is the accelerating pace and complexity of change, and the resulting increased uncertainty about the future.

The essence of foresight is exploring a wide range of alternative futures – possible, plausible, and preferable – rather than focusing on a single future. As shown in Figure 1, traditional forecasting in many fields uses models and data from the past (i.e., what we know today) to forecast a single future, often including a sensitivity analysis in an attempt to account for uncertainty in key variables. In contrast, foresight recognizes fundamental uncertainties, both in key drivers of change and the possibility of "unknown unknowns" that could shape the future, and therefore uses a variety of methods to explore a range of alternative futures. The goal is to help decision-makers prepare for multiple plausible and possible futures. In the context of climate change, where baselines are shifting, individual and collective behaviours are changing, and outcomes are uncertain, exploring a range of alternative futures is more valuable than ever in planning and decision-making.

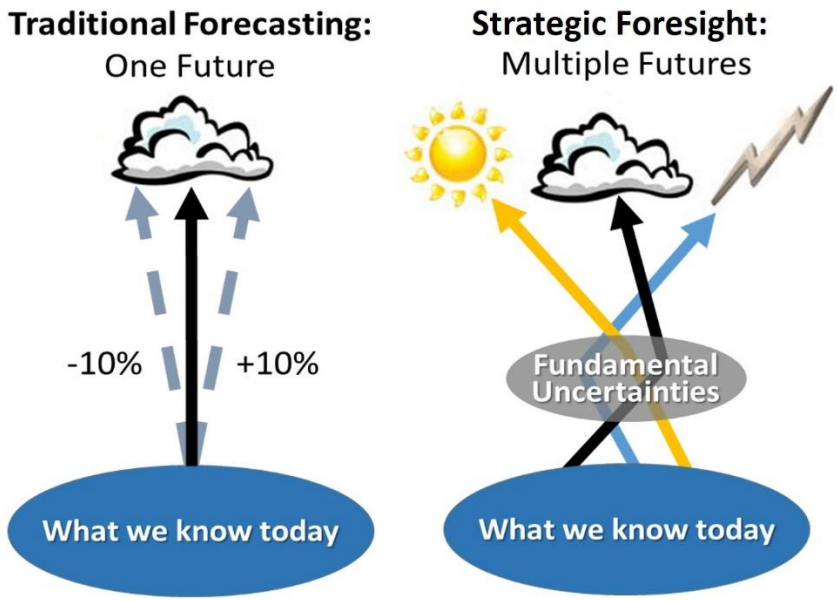

Figure 1: Traditional forecasting contrasted with strategic foresight. (Source: Adapted from Weeks *et al.* 2011)

Foresight methods

This section presents a brief introduction to four core foresight methods: Horizon scanning, scenario planning, assumptions testing, and the futures wheel. These methods are widely known and used in

applied foresight, including the foresight work of the Canadian and US forest services. This overview of selected methods provides a glimpse into key approaches that could be applied more broadly in forestry and related fields to generate useful foresight and improve planning and decision-making. Scores of additional futures research methods have been developed or adapted from other disciplines, including backcasting, causal layered analysis, foresight panels, serious games, science and technology road mapping, science fiction prototyping, and visioning.

Horizon scanning

Horizon scanning is a technique for identifying, compiling, and exploring possible meanings of emerging issues, trends, and other signals of change that may be relevant for an organization or a field of interest (Hines et al. 2018). The main goal is to find early indicators of change in order to detect potential future opportunities and threats. Most horizon scanning systems include the basic elements of scoping, scanning, collecting, and interpreting. *Scoping* is deciding how broadly to scan for signals of change. If the scope is too narrow, there is a risk of being blindsided by external surprises (e.g., a forest products scanning system that does not include advances in other materials that could replace wood-based products). At the other extreme, if the scope for scanning is too broad there is a danger of overwhelming decision makers with irrelevant signals. *Scanning* entails searching a wide range of information sources for indicators of emerging trends and issues, called scanning hits. Scanning is typically carried out by a team of diverse and trained scanners. *Collecting* involves categorizing and storing scanning hits. This lays the groundwork on which emerging trends of significance are identified. Horizon scanning hits are tagged with descriptors and stored in a searchable database. Finally, *interpreting* consists of analyzing the database of scanning hits to identify patterns and gain insights about their significance for planning and policy. A wide range of techniques is used to prioritize and make sense out of the diverse scanning hits collected.

Although horizon scanning is a common method in foresight, its application in forestry has been limited. An exception is the USFS "Forest Futures" horizon scanning system, created in cooperation with the graduate program in foresight at the University of Houston (Hines *et al.* 2019). This ongoing scanning system includes a team of volunteer scanners, uses an online database for collecting scanning hits, and produces a wide range of products (e.g., the database of scanning hits, blog posts, and in-depth articles and technical reports that explore emerging issues). The output of horizon scanning (i.e., early signals of change) is an input into many other methods used in foresight, including scenario planning. The CFS has also created its own horizon scanning team that links with both its US counterparts and a broader foresight network within the Government of Canada. It has created a library of a few hundred "weak signals" of change affecting forests and the forest sector in the past three years.

Scenario planning

Scenario planning is the most widely known and applied foresight method. Scenarios have been defined in many ways. However, they are generally characterized as stories that describe plausible futures, connect the present to the future using cause and effect links, and illustrate key events, decisions, and consequences in the narrative (Glenn and The Futures Group International 2009). Many different approaches have been developed to create scenarios for different purposes (Bishop *et al.* 2007). The product of a scenario planning exercise is a set of wide-ranging but plausible stories. These help readers understand how the future could unfold, with care taken to ensure that the scenarios are not just minor variations on a single business-as-usual future. Scenarios are not predictions and should be understood instead as highlighting areas of potential change: together,

they portray an array of plausible futures to help decision-makers prepare for change by building adaptive capacity and resilience.

Unlike most foresight methods, scenario planning has been used extensively in forestry and natural resource contexts in recent years. For example, Hoogstra-Klein *et al.* (2017) reviewed and evaluated 129 scenario studies focusing on forest management in Europe that were carried out in the preceding decade. Scenario planning has been applied at all geographic scales, from global environmental analyses (e.g., Carpenter *et al.* 2005) to participatory scenario planning with local forest communities (e.g., Evans *et al.* 2010).

An example from the authors is the CFS project developing a series of scenarios entitled "2035: Canada's forests in the future." Each scenario describes a different direction within the cone of plausibility (Figure 2). The scenarios are being used to highlight how likely and less-likely changes to forests, to forest industries, and to social values may affect forest health, use, and benefits. Building on the method developed by Policy Horizons Canada (2016b), the scenarios reflect the future in four states: the status quo, gradual improvement, gradual decline, and rapid transformation.

These scenarios are used to foster strategic conversations about what sort of futures are desirable and identify key decision points and actions to help ensure that those desirable futures come to pass. The goal is to think through possibilities now to know what decisions to take in order to avoid or prepare for a future crisis.

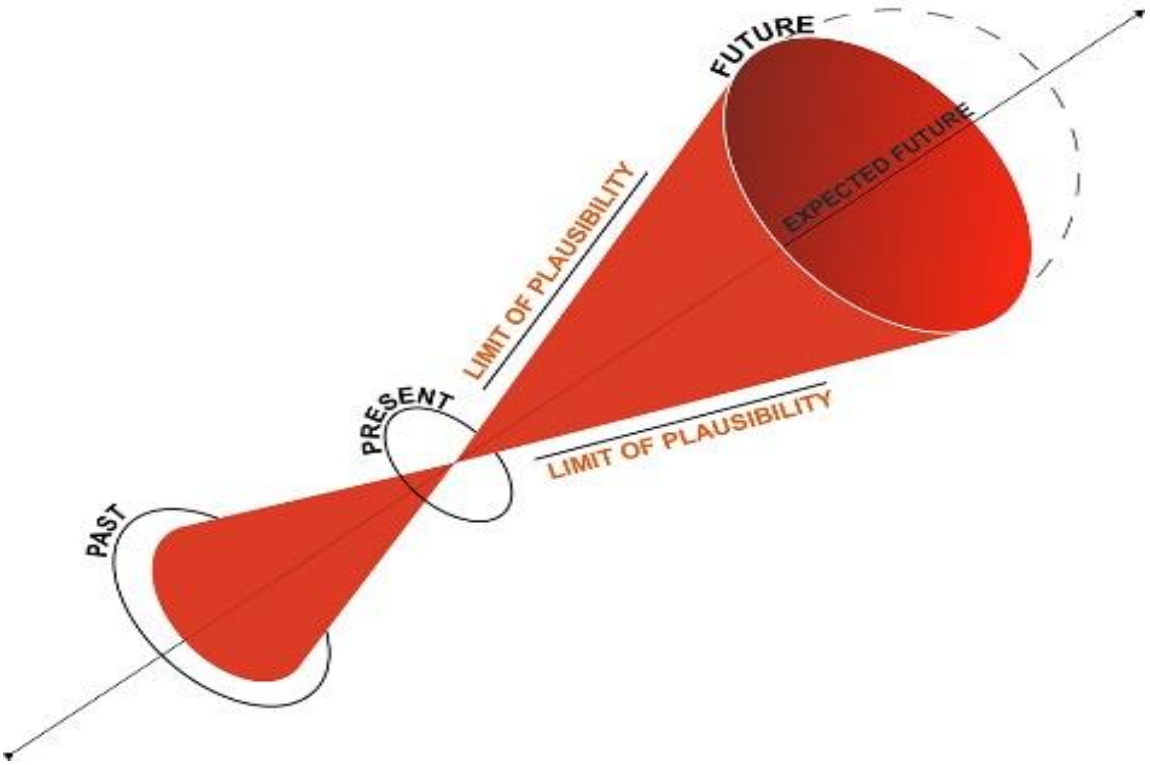

Figure 2: The cone of plausibility shows the range of plausible futures, and expanding possibilities the further we get from the present. (Source: Policy Horizons Canada)

Assumptions testing

Assumptions testing is a foresight technique used in scenario planning. It allows groups to identify the unseen gaps in thinking that are based upon implied or unspoken assumptions. Assumptions are general statements about what, collectively, people *believe* to be true. They are shaped by several elements, including experience, ideology, education, culture, facts, and religion. Assumptions can be

explicit, but most often they are not. Assumptions shape our perceptions, learning, thought, and decision-making processes (Policy Horizons Canada 2016a). As major sources of surprise and potential uncertainties, assumptions can be a source of weakness in a planning process if they are not assessed regularly. Assumptions testing is most valuable at the outset of a foresight project but can be used throughout to reveal uncertainties and vulnerabilities.

Assumptions testing is a five-step process. The first step is to identify assumptions, which can start with a document review or a group discussion. The goal is to uncover assumptions made by the group members themselves, their organizations, and/or others, such as the general public. The group discussion is essential as dialogue leads to unexpected revelations that individuals may not have been able to see on their own. In discussion, the group learns what is meant by a given assumption, to whom it applies, and what ambiguities are typically left unchallenged. The second step is to refine the identified assumption. The third step is to reverse the refined assumption. This step is fascinating because there are often several permutations of a reversal and the group must work to home in on the key elements. Once the reversal is complete, group members then search for evidence to support the reversed assumption, which is important because it adds rigor to the process. With evidence gathered, the fifth step is to categorize the original assumption as strong, uncertain, or weak. Strong assumptions have little evidence to support the reversed assumption; uncertain assumptions are supported by contradictory evidence; weak assumptions have strong evidence to support the reversal. The group can then use this assessment to decide how to proceed.

Within the CFS, research groups have used assumptions testing to inform yearly planning activities and to evaluate the progress of medium-term projects. One such exercise closely examined the assertion that Canada's forests currently act as a net carbon source—an assertion that is supported by publicly available data. Testing that assumption highlighted some of the limitations of the data used, which mostly captured the managed portions of Canada's forests leaving data gaps related to emissions and sinks from unmanaged forests. Understanding the limitations of the data allowed the group to redefine the scope of the project more accurately, inform future research, and identify areas for additional data collection.

The futures wheel

The futures wheel is a structured brainstorming technique used to identify possible direct and indirect, positive and negative consequences of change (Bengston 2016). Planners and policy makers can use the results of a futures wheel process to proactively consider possible longer-term and unanticipated effects of change to better prepare for it.

A futures wheel exercise begins with clearly defining the change to be explored (e.g., a social trend, technological innovation, emerging issue, new or modified policy, or any other significant future change). The change should be described in enough detail for a diverse group of non-expert participants to easily understand. Participants are briefed by the facilitator about the change and the ground rules for contributing, and then a group process is used to brainstorm possible consequences of the change. Participants' ideas are added to a wheel-like diagram with the change of interest in the center and first-, second-, and third-order consequences branching out from the center. Participants are encouraged to generate both positive and negative implications. Each of the implications may also be scored for perceived desirability and likelihood of occurrence. Scoring highlights the most important consequences and suggests opportunities and challenges. Identification of opportunities allows decision makers to take early action to encourage the desired change, and identification of challenges facilitates actions to reduce the likelihood of an undesirable outcome.

A recent application of the Futures Wheel approach in forestry explored a possible transformative technological change: A "coming age of wood" in which widespread adoption of many innovations in wood products technologies result in a significant increase in the use of wood-based materials throughout the global economy, substituting for a significant share of non-renewable materials (Bengston *et al.* 2020). Examples of these technologies include wood-based nanomaterials, tall wood buildings built with cross-laminated timber (CLT) and other "mass timber" technologies, 3D printing using cellulose from wood pulp, and many others. Two hundred possible first-, second-, and third-order implications were identified by participants, including implications related to major emergent themes such as negative ecological effects, positive economic effects, increased conflict between different stakeholders, and negative effects on rural communities.

How foresight is practiced in North American forestry

Strategic foresight is practiced in the Canadian and US forest services, but in different organizational contexts. Collaboration between the foresight groups in the two countries grew out of an *ad hoc* futures and resilience working group of the North American Forest Commission (Cleaves et al. 2014).

The USFS foresight project is located in the agency's Research and Development branch and its Northern Research Station. Initiated more than 10 years ago, the mission of the Strategic Foresight Group "… is to enhance strategic foresight to improve forest management in the Forest Service, other natural resource organizations, and all stakeholders" (https://www.nrs.fs.fed.us/units/foresight_response/). The research group collaborates with partners at universities and other organizations to carry out a program of foresight research and communicate the results through publications, presentations, and web-based products. The group has also produced a foresight board game called "IMPACT: Forestry Edition" designed to teach forestry professionals and stakeholders to think both critically and creatively about the future of forestry.

The foresight team at the CFS works within its Science Policy and Integration Branch and is part of the CFS's Policy Experimentation Team, which explores new approaches to support an evidence-based policy process. The CFS foresight team was established 3 years ago to develop and employ different ways of approaching policy development by unlocking expertise differently both within the CFS and in collaboration with non-governmental groups. The team grounds its work in strategic analysis, foresight, current assumptions assessment, and engagement to better anticipate future changes and provide advice on ways to proactively address issues that will affect the future of forests and Canada's forest sector. The team informs planning and feeds into policy advice and program development for the CFS by producing knowledge, insights, and plausible future scenarios that feed into the CFS's medium- and long-term planning processes. In addition, the CFS foresight team also feeds insights developed from scanning and foresight analysis into other experimentation projects, including the Government of Canada's Federal Foresight Practitioners Network.

Foresight's usefulness to the forest sector

There are many potential benefits of integrating strategic foresight methods and perspectives into forest planning, management, and policy. First, the timescales considered in foresight can help decision-makers develop and consistently maintain a longer-term perspective. The temporal scales considered in futures research are beyond the range usually used in planning and decision-making. This longer-term perspective may help identify issues of concern as well as opportunities that could be overlooked in the prevailing shorter-term view.

Second, foresight tools can help forest decision-makers identify strategic surprises or "wild cards," especially those arising in domains outside of forestry that could have a profound effect on forestry

and the forest sector in the future. Anticipating possible wild cards in advance can facilitate the development of proactive management strategies and help avoid being blindsided by unforeseen change.

Third, insights about possible and plausible futures can help decrease reaction time when events unfold rapidly. Using scenario planning, decision makers can "rehearse the future" by exploring possible responses in advance, thereby reacting swiftly to change as it occurs. A classic business example is Royal Dutch Shell's use of scenario planning and its subsequent quick response to the 1973-1974 OPEC oil embargo and price shock (Schwartz 1996).

Fourth, foresight methods such as the futures wheel can help decision makers anticipate unintended consequences of all types of change, including new technologies, proposed policies, and social and cultural trends. A better understanding of potential consequences of change can help in the design of policies that minimize undesirable consequences and encourage desirable consequences.

Fifth, strategic foresight can help promote "thinking big" in addressing challenges and opportunities. Foresight methods encourage creative and participatory problem-solving, multidisciplinary approaches, and a systems perspective.

Finally, visioning and other foresight methods can help shape a preferred future for forestry and forest organizations. A clear and shared understanding of the preferred future enhances options and possibilities in the present and can lead to truly *strategic* planning.

Conclusions

A broad range of foresight methods could make important contributions in forestry, given the context of accelerating and surprising change, the need to plan in the face of uncertainty, and the importance of developing forward looking policies. Perhaps the most significant contribution would be to spark widespread and continuous "strategic conversations about the future" (Schwartz 1996, p. 221) and help strengthen resilience within forestry organizations and communities. This is the ultimate aim of the ongoing foresight work of the Canadian and US forest services.

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