Towards a Community of Practice for

Natural Asset Management in Canada

Natural Assets Initiative
MAKING NATURE COUNT

January 2025

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While reasonable efforts have been made to ensure the accuracy of the report's content, any statements made are made only as of the date of the report and such information and data are subject to uncertainties, inaccuracies, limitations and to changes based on future events.

CRI and NAI acknowledge the Indigenous Peoples of all the lands that we are on today and recognize the importance of the lands, which we each call home. We do this to reaffirm our commitment and responsibility to UNDRIP in improving relationships and ethical space to share knowledge systems, and to improving our own understanding of local Indigenous Peoples and their cultures. From coast to coast to coast, we acknowledge the ancestral and unceded territory of all the Inuit, Métis, and First Nations Peoples that call this land home. We continually seek ways to reflect and acknowledge the harms and mistakes of the past and to consider how we can collectively move forward in a spirit of reconciliation and collaboration.

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1 Purpose of Document

This document explores roles that a Community of Practice (hereafter "CoP") could play in advancing nature-based solutions (hereafter "NbS") generally, and natural asset management (hereafter, "NAM") specifically; and, to propose a model to this end.

2 Framing the Issues and Inquiry

What is a Community of Practice?

A CoP can be defined as a group, or groups of people "who share a concern or passion for something they do and learn how to do it better as they interact regularly" (Wenger et al. 2002).

Points of emphasis may differ, but **mobilizing knowledge and interactions to increase learning** is identified in the literature as a central outcome of CoPs. For example, the World Bank (2021) notes that CoPs "create a body of actionable knowledge through collaboration". Other authors frame the knowledge function less in terms of "creating" and more in terms of **identifying and disseminating relevant knowledge** (Catana et al., 2021, p.12); or, **managing and deepening knowledge** (Dubé et al., 2006). In this way, CoPs can serve to "sustain innovation" in a given field (Dubé et al., 2006).

There are other hallmarks of CoPs. The World Bank (2021) notes that CoPs are motivated by the desire to **cross organizational boundaries**. CoPs encourage the sharing of tacit knowledge which is often harder to formalize but vital to innovation (Ardichvili et al., 2003). This sharing helps improve organizational performance by **leveraging collective intelligence and bringing diverse knowledge perspectives** into collaboration (Catana et. al., 2021). A useful distinction can be drawn between networks and CoPs by noting that the latter "act as the bridge between networks and knowledge centers" (Catana et al., 2021).

Points of emphasis are as follows: determining how to do something in progressively better ways; interactions, in particular across various boundaries; developing, curating and mobilizing knowledge in various ways; and collective versus strictly individual success.

One might be tempted to ask why CoPs are not present in every field of human endeavor that is underpinned by knowledge. Bicchi (2024) provides one answer, noting that CoPs are often formed **in response to real-world problems that are socially meaningful**. For instance, a community of cybersecurity experts might emerge around the common challenge of improving digital defenses. Members share tools, strategies, and best practices to address these challenges, learning from one another's experiences. Bicchi (2024) emphasizes that CoPs often emerge from a *practical need* and then work together to enhance both individual and collective performance.

Why Explore CoPs for NbS or NAM?

A CoP for the field of NbS and/or NAM was suggested as being worth exploring in a report prepared for Environmental and Climate Change Canada, *Nature-based solutions: exploring opportunities for sector-based projects* (ECCC, 2023). This document looked at barriers to NbS, of which there are many documented examples (MNAI, 2023), and specifically, how to improve the effectiveness of ECCC's Nature Smart Climate Solutions Fund (NSCSF). ECCC (2023) did not make a specific argument for CoPs. Rather, the interviews and report surfaced a sense amongst interviewees that some barriers, and in particular silo mentalities, risk aversion, lack of awareness, skilled knowledge brokers, and a lack of standards and guidance (MNAI, 2023) could potentially be addressed in part by the development of a CoP and specifically increase success of the NSCSF.

According to the International Union for Conservation of Nature and Natural Resources, NbS are approaches that "leverage nature and the power of healthy ecosystems to protect people, optimise infrastructure and safeguard a stable and biodiverse future" (IUCN1). NbS represents a broad field that includes everything from regenerative agriculture to sustainable timber and planting mangroves to protect coastal areas. NAM, by contrast, could be considered as a subset of NbS and is based on three central ideas.

- The first, which is shared with NbS more generally, is that natural assets — which can be defined as features of an ecosystem that provide, or could be restored to provide, essential services and benefits — are essential to the air we breathe, the water we drink, the food we eat, critical infrastructure services we receive, and overall wellbeing. Natural assets serve multiple purposes. For example, parks may reduce flooding risks and provide recreational and health benefits. Wetlands can provide water, store carbon, filter waste, and may have cultural and heritage significance (NAI, 2023).
- The second is that, historically and despite their importance, nature's services have rarely underpinned investment, land-use or many other decisions. As examples, almost 90% of land in Canada is publicly owned. International and Canadian public-sector accounting standards exclude non-purchased natural resources from financial statements. Governments are often unaware of the goods and services that a specific natural asset provides, let alone the dollar value of those goods and services, other than when they are sold as commodities (Eyquem et al., 2022; CSA, 2023).
- The third is that transferrable, scalable systems are required if nature is to be better integrated into wider decision-making; and, asset management provides such a system because its use is required by all Canadian public sector entities. Asset management platforms have been adapted for the unique considerations of nature, and over 150 local governments across Canada, in every province and in the Northwest Territories, have, since 2016, undertaken NAM efforts. This includes

efforts like conducting inventories, modelling, valuing, and managing natural assets. Furthermore, the rate of such activities is increasing (Eyquem et al., 2022, p. 18-19).

Exploring a CoP

The research and analysis for this report set out to explore the relevance of, and options for, a CoP for NbS and NAM. Efforts were guided by two main questions:

- If a Canadian CoP for NbS were to be successful over the next 2-3 years, what would this mean and what might it look like?
- Based on where things stand now, what is needed to bring about this end-state, once defined?

The method consisted of: a literature review; semi-structured interviews; two roundtables; a validation workshop; and analysis of the foregoing, as described in more detail in *Appendix A*.

The remainder of the report focuses on what was heard and learned through the literature review and interviews, analysis, and the presentation of a potential model for a future CoP.

3 What we Heard

Overall, there was strong convergence between the literature, the interviews, and the roundtables undertaken for this report. Therefore, this section is expressed primarily in terms of the literature, with points of strong alignment or discrepancy from the interviews and roundtables noted.

Key Elements of a COP

Based on the literature, there are three essential elements to a CoP: domain; community; and practice.

DOMAIN

The domain is the area of interest or knowledge. It represents a shared commitment in a specific field, which distinguishes the members from others outside the group (Wenger, E., 2009; da Silva et al., 2020). This domain creates a sense of identity and purpose within the community. As Wenger explained, a domain "has an identity defined by a shared domain of interest" and membership implies "a shared competence" that goes beyond casual relationships (2009, p. 2). In a CoP, the domain legitimizes the community, aligning their learning efforts and framing the goals they pursue (World Bank, 2021).

COMMUNITY

The second element is the social structure of the group. This community aspect emphasizes regular interaction, mutual engagement, and relationship-building. Wenger (2009) highlights that community members "engage in joint activities and discussions, help each other, and share information," contributing to their collective learning. This distinguishes a CoP from a group of people with the same job title that do not regularly interact or learn from each other. The strength of a CoP comes from its members' active and sustained participation, which fosters trust, belonging, and a deepened connection over time (Wenger, E., 2009).

PRACTICE

The practice element refers to the actual work or activity the community engages in and includes developing, refining, and sharing tools, stories, problem-solving strategies, and resources. CoPs are not just groups with a common interest; they consist of practitioners actively engaged in a shared practice. As Wenger (2009) and others have pointed out, this takes time and continuous interaction to develop. The shared practice leads to the creation of a "repository" of communal knowledge, including strategies, tools, and techniques that members use to solve real problems (da Silva et al., 2020). This ongoing refinement of practice ensures that the community is not static but evolves as its members contribute new insights and experiences (Wenger, E., 2009; Bicchi, F., 2024). Of note is that 'practice' can extend beyond knowledge and learning to co-creation in the sense of pilots and projects.

Good Practice Characteristics

In addition to the three elements listed above, successful CoPs typically have other defining characteristics. The following summary of 'good practice' characteristics is based on the Communities of Practice Success Wheel, developed by Catana, Debremaeker, Szkola, and Williquet (2021) and shown in Figure 1.

- **Vision and Goals:** A clear purpose, goals, and objectives are essential to guide CoP activities. SMART objectives (Specific, Measurable, Achievable, Relevant, and Time-bound) are particularly useful. This point was strongly emphasized by many during the interviews.
- **Governance and Leadership:** Effective governance, including decision-making processes and strong leadership, is key. Leadership should be present both from sponsors and core members. Interviewees specifically noted that structured facilitation is required from the outset of the project to help provide legitimacy to the program, as well as to build and maintain momentum.
- **Collaboration and Cooperation:** Facilitating co-creation and cooperation among members is critical to building knowledge assets collectively. Providing a space where people feel safe to contribute openly is critical to success.

- **User Experience:** Providing a member-centric experience helps sustain engagement and ensures that tasks and member needs are met.
- **Measurement and Evaluation:** Monitoring community vitality and adjusting practices based on feedback is crucial to maintaining relevance and value.
- **Norms and Trust:** Establishing institutional norms, trust, and open communication encourages a culture of knowledge-sharing.
- **Knowledge Sharing and Storytelling:** Storytelling plays a significant role in weaving together the community and fostering informal learning.

2.1. The Communities of Practice Success Wheel

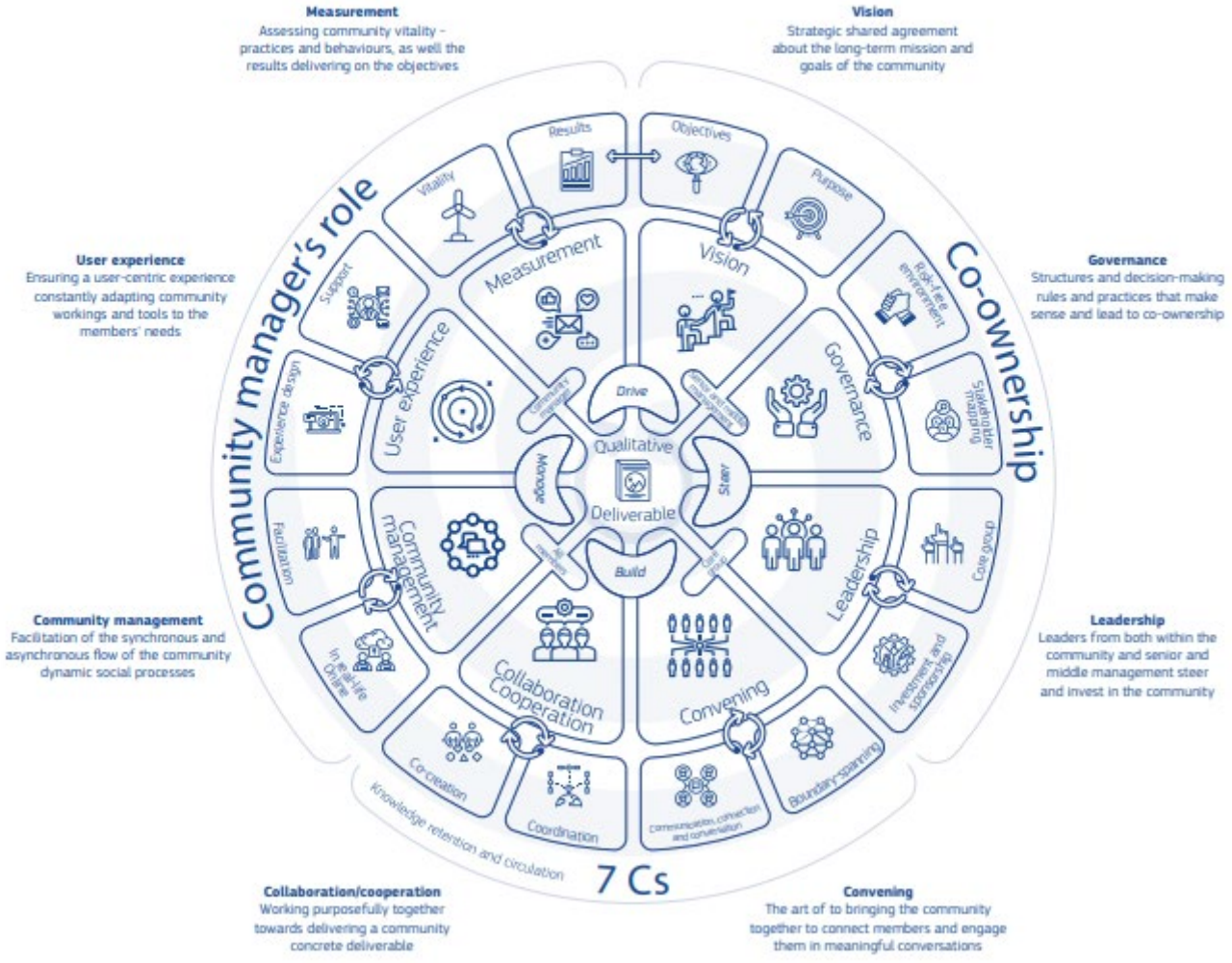

***Figure 1**: Communities of Practice Wheel*
Source: Catana et al., 2021, p. 19

Adding Value

Static forms of learning like reading an article can help people improve their individual understanding of a topic. However, CoPs go beyond this, by encouraging knowledge exchange as a *collective good* rather than individual benefit, and promoting moral obligation and professional commitment to sharing and co-creation (Ardichvili et al., 2003; World Bank, 2021).

In addition to exchanging knowledge, CoPs also have the potential to provide value through:

- Providing a platform for collaborative problem-solving, allowing members to seek expertise and reuse knowledge (Catana et al., 2021).
- Creating conditions for creative thinking and idea generation to foster innovation, rather than just sharing existing knowledge (Catana, et al., 2021).
- Helping members integrate new knowledge and skills through conversations and networking (Ardichvili et al., 2003).
- CoPs create a supportive environment of open knowledge exchange and storytelling, which can be a powerful tool in bringing individual experiences together to foster collective learning (Bicchi, F., 2024).
- CoPs help prevent duplication of effort by providing a space to share resources and expertise (World Bank, 2021).

Structure, Functions, and Features

Regardless of potential benefits, CoPs cannot be successful without ongoing engagement and active member participation. Sustained interest is maintained by fostering a collaborative, creative, and trust-filled environment where knowledge is freely shared and new insights are co-created. The exact mix of features and functions for individual CoPs will differ by topic and group, but the following are three main structural elements to be considered when developing a CoP:

- **The Space:** Face-to-face interactions often lay the groundwork for communities, but as they evolve, virtual platforms can be used to maintain engagement through discussion boards, the sharing of resources and information, and virtual events. A hybrid of face-to-face and virtual interactions is often the most effective (Ardichvili et al., 2003).
- **Facilitation:** Rather than managing the exchange of knowledge, facilitators can be used to curate an environment that promotes free discussion, exchange of information, and innovation (World Bank, 2021). Their role is to make space for members to share stories and ideas, leading to deeper learning (Ardichvili et al., 2003).
- **Practitioner and Business Support:** CoPs offer a space for practitioners to ask questions, seek references, and share expertise to collaboratively find new approaches to challenges amongst the collective (World Bank, 2021; Catana et al., 2021). With the proper tools and facilitation in place, they can also help organizations in recruiting technical experts, conducting peer reviews, and piloting new approaches (World Bank, 2021).

The interviews and roundtables conducted for this project were generally aligned with these success characteristics, ways to add value, and functions and features. However, there were points of emphasis, as follows.

First, dedicated resources — and specifically, funding to support a CoP — were noted as being of fundamental importance. One interview respondent put it succinctly: "The CoPs that work are the ones that have funding." Funding was understood as vital to support facilitation or moderation of group activities. Timing of funding may also be important: it was noted if CoPs start poorly with insufficient resources, it may not simply diminish efforts, but "kill them". Related to timing, it was also noted that early CoP activities should not be devoted to "sorting out terms of reference" but rather, seeking early wins and progress. Funding is likely intrinsic to many other goals, specifically supporting collaboration, cooperation and a positive user experience.

Second, there was agreement in the interviews and roundtables on the centrality of trust and norms. Interviewees placed particular emphasis on inclusivity and diversity as a source of strength in a CoP. Some respondents emphasized finding ways to include quieter people who are less likely to share in a group setting. The role of Indigenous Peoples was explored by some respondents. Based on a principle of inclusivity, Indigenous people should be welcome in any set of activities they may wish to join, while leaving open the possibility that some may wish to have discussions focused on topics of particular relevance to them.

Notwithstanding the importance of diversity, there was general agreement that a CoP for NAM and NbS should not be based on a representative model (i.e., one in which people from specific organizations were mandated to attend) but rather, one in which the people who are part of the CoP are the ones who want to be there. There was also a recognition that with diversity would come a plurality of worldviews in which some CoP participants may view nature quite holistically and place emphasis on its intrinsic value, and others viewing it more functionally - for example, in terms of healthy wetlands reducing flooding risks to homes. Respondents felt that a CoP should accommodate a spectrum of views, but that facilitation would be required to make this productive.

Some points of emphasis arose from the fact that NbS and NAM are multidisciplinary. Specifically, respondents felt that a CoP focused on these topics might help to overcome silos. Silos were understood to those between professions as well as domains, for example, land-based and coastal natural features, and mitigation and adaption. In this context, some respondents noted that NAM is based on the underlying process and set of approaches known as asset management, and that a potential risk would be if a COP created schisms with this practice.

In terms of governance and priorities, interview respondents emphasized that the fields of NbS and NAM are fast-growing. In the words of one interviewee, there is an "explosion" of tools and information. It is important that a CoP be able to set priorities and allow for content and membership to evolve.

Some tools were singled out as being less helpful. Chats and message boards were thought by interviewees to be lacking in value. Face-to-face interactions were thought to be useful by interviewees if that could be managed within the scope of a CoP. Searchable resources were also seen as valuable to enable users to find relevant and applicable content efficiently.

Finally, along a continuum of information sharing to co-creation, a clear preference was expressed by respondents for a CoP that could encompass co-creation.

Risks and Barriers Related to CoPs

CoPs rely on active member participation. Without adequate motivation, members may not contribute. Intrinsic motivation (e.g., personal interest) tends to drive better participation than extrinsic rewards like monetary incentives or administrative requirements (Ardichvili et al., 2003). The following list, drawn from the literature review, outlines potential barriers to successful design and implementation:

- **Fear of Sharing Knowledge:** A significant barrier to knowledge sharing is the 'fear to lose face,' where members hesitate to share because they worry about the accuracy or relevance of their contributions (Ardichvili et al., 2003). Members may also be afraid of criticism or believe their knowledge is insufficient, which hinders open communication (Ardichvili et al., 2003). This can lead to disengagement and a failure to achieve community objectives.
- **Groupthink and Lack of Conflict:** When CoPs are too harmonious, there is a risk of groupthink, where dissenting opinions are suppressed, leading to stagnation (Wenger et al., 2002). Differences must be openly discussed and contribute to learning, but when they are avoided, it prevents critical thinking and innovation (Wenger, E., 2009).
- **Geographic Dispersion:** High geographic dispersion can pose challenges, such as time zone differences and less frequent face-to-face interactions (Dubé et al., 2006).
- **Process and Management Issues:** Time-consuming approval processes, concerns about security and confidentiality, and unclear guidelines on what to post or share can impede the flow of knowledge (Ardichvili et al., 2003). Additionally, some members prefer direct, private communication (e.g., email) over sharing with the broader group, which weakens the CoP's collaborative potential (Ardichvili et al., 2003).
- **Challenges with Virtual CoPs:** Ardichvili, Page, & Wentling (2003) outline three major challenges to virtual communities: how process-oriented problems may be hard to address collaboratively online; how overwhelming amounts of feedback from ongoing discussions can complicate the search for quick answers; and how verifying responses and ensuring their accuracy can be time-consuming, reducing the efficiency of virtual knowledge sharing.

The interviews generally aligned with these barriers with, as noted, issues related to funding being identified as substantial barriers, and the potential to create a schism between asset management and NAM identified as a risk.

4 CoPs in Canada

This section outlines the scope and elements of two Canadian CoPs to provide insight into possible structures and functions of CoP related to NbS and NAM.

Public Infrastructure Engineering Vulnerability Committee (PIEVC)

Launched in 2023, the PIEVC Practitioners' Network (PIEVC PN) brings together practitioners and others, both in Canada and internationally, who are dedicated to enhancing the resilience of existing and planned infrastructure projects to climate change. The PIEVC PN operates through an online platform, enabling members to connect, seek guidance, participate in discussion, and share resources and information on a range of topics related to advancing climate-resilient infrastructure. The network offers opportunities for members to enhance their professional practice, share expertise, and learn from peers, infrastructure owners, and operators. This encompasses, among other things, deepening their understanding of and utilization of the PIEVC Family of Resources, including the renowned PIEVC Protocol.

The PIEVC PN is housed within CanAdapt[1], a vibrant peer network platform created for Canadian professionals, practitioners, and others dedicated to helping create well-adapted and low-carbon communities, businesses, and sectors resilient to the impacts of climate change. CanAdapt serves as a pioneering model for communities of practice and peer networks, aiming to address the complex challenges of the 21st century through collaboration, innovation, and shared knowledge. It offers a platform where users can find courses, connect with mentors, collaborate with partners, and access resources on climate resilience. Its goal is to support efforts towards a paradigm shift in thinking and action, moving toward a systems view of life that promotes living in balance with the earth system. Visit *canadapt.network/* to learn more.

The PIEVC PN was officially launched during the PIEVC Global Forum held in 2023, which brought together over 160 experts from 11 countries to address the need for climate resilient infrastructure. The PIEVC PN grew out of an expressed interest and need from infrastructure practitioners for a mutual online meeting space to connect, share ideas, information and lessons learned, collaborate on projects, and generally bring about a renewed sense of shared purpose for those whose practice involves planning for and building climate resilient built environments, communities, and economies.

1 *The PIEVC PN is currently being migrated to a new, upgraded and improved version of the CanAdapt platform, which will officially launch in 2025.*

The following PIEVC PN activities were chosen to help foster knowledge exchange, collaboration and peer-to-peer learning. Through these, members acquire new knowledge and ideas, contribute to the development of climate solutions, and effectively address the challenges they encounter in their practice, whether individually or collectively.

Practitioner mapping exercise to identify practitioners' interests, positions, alliances, knowledge, and skills pertaining to their potential contribution to or involvement in the network. Routine engagement and surveys reveal member interests, values, and expectations, and help to inform the activities and services offered through PIEVC PN. This is based on the idea that for communities to be successful, they must respond to members' needs.

Foster membership growth to create a member base with diverse expertise, skills, and geographic locations within Canada and internationally. Growing membership is important for achieving the critical level of active members that is required for maintaining momentum, particularly in a newer network like the PIEVC PN.

Geographically focused groups for members who share common interests, challenges, and expertise within a specific geographic area. Regional groups often foster a stronger sense of community and camaraderie among members as they can relate more closely to each other's experiences, especially in the contexts of infrastructure and climate change. This localized engagement allows members to connect, collaborate, and exchange insights tailored to the unique regional context they operate in.

Cultivate a sense of community through a member onboarding process. New members receive personalized welcomes that makes them feel valued and helps them perceive the community as an active place where it is safe to share thoughts, ideas, and questions.

Create a risk-free environment by posting Community Participation Guidelines. Members are more likely to actively participate, interact and contribute their ideas, opinions and knowledge if they feel comfortable and safe to do so.

Membership to PIEVC PN is free and open to anyone with an interest in climate change vulnerability and risk assessments for infrastructure.

There is no predetermined standard or expectation regarding the extent or frequency of member engagement within the network. Instead, the PIEVC PN offers members different formats and types of ways to participate, engage and generally contribute according to their own needs, interests, and availabilities. Current network features include:

- **Surveys:** to gather feedback from peers to inform decision making
- **Projects:** create and invite others to join a collaborative space dedicated to a project, initiative, or topic
- **Direct Messaging:** send emails and chat to the membership lists or individuals

- **Directory:** Access lists of members and filter by location and topic of interest
- **Requested Action:** submit action requests to help solve problems or answer questions
- **Updates:** post or browse for updates on projects or on specific topic areas
- **Resource Library:** access tools, publications, guidance documents, news articles, reports, past webinar recordings and more
- **Job Board:** post or browse job opportunities
- **Events Calendar:** view or post upcoming (or past) events
- **Resource Library:** Access and add to the repertoire of tools, publications, guidance documents, news articles, reports, past webinar recordings, and more.
- **Actions:** Submit an action request, such as help solving a problem or answering a question.

New features are expected to be available under the upgraded platform when it is launched.

PIEVC PN is currently facilitated by the Climate Risk Institute as part of CanAdapt. The network has been created under the Global Project *Enhancing Climate Services for Infrastructure Investments* (CSI) that is implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of the German Federal Ministry for Economic Affairs and Climate Action.

The PIEVC PN delivers a series of convening activities that encourage knowledge exchange, build and foster new connections, and ultimately allow members to collaborate and learn from each other. Examples of convening activities include e-Learning events, member meetings, peer-assist events, knowledge-exchange sessions, webinars, and training opportunities. Since it was launched in April 2023, the PN has attracted over 260 members and has made available almost 90 resources, promoted 36 different events, and provided space for various ideas, polls, surveys and help requests as well.

Nature-Based Coastal Solutions Community of Practice

The Nature-Based Coastal Solutions (NbCS) Community of Practice focuses on advancing nature-based approaches to managing coastal zones in Canada. Its mandate is to support and steward the effective use of living shoreline ideas and principles in the context of a changing climate, for application in cold regions. Objectives include fostering collaboration among practitioners, promoting knowledge exchange, and developing design standards for living shorelines. It does so by providing a platform for members to connect, share knowledge, and collaborate. Members work together to support the development of regional- and national-level design standards and building codes and policies. The platform also provides an opportunity for knowledge exchange and capacity building through education, outreach and advocacy.

The NbCS CoP has regional chapters (Atlantic, Great Lakes, Pacific, and Arctic) for localized engagement. They gather quarterly or bi-annually and contribute to national initiatives and facilitate knowledge transfer by sharing resources and networks with fellow practitioners. There are opportunities for the regional groups to meet at larger conferences as well.

The NbCS CoP is governed by an executive committee that stewards regional platform development and advances ideas and principles for living shorelines within the community. The executive committee is appointed by the Coastal Zone Canada (CZC) board of directors and consists of four members that represent different geographical areas and have experience to guide the CoP development.

Main NbCS CoP features are webinars, case studies, resources and in-person gatherings, including conferences and regional meetings to support climate adaptation in coastal areas. Webinars topics within the CoP are listed on the platform and links are available on the CZC YouTube channel.

Case studies for nature-based coastal solutions in Canada can be submitted to the Engineering With Nature® Project Mapper (ProMap) for tracking; the executive committee has set a target of 2-3 submission annually for each regional chapter. Resources are shared through a searchable document library. The platform also provides users with the option of joining a mailing list so that individuals can stay up-to-date on what the organization is doing.

This CoP delivers ongoing opportunities for individuals and organizations working in coastal areas to learn and participate in the growing discussion around coastal zone issues. While it currently acts more as a space for education and teaching, it is evolving into a space where people are able to work more collaboratively on common issues and ideas. They have gotten over 100 attendees who work with coastal nature-based solutions to participate through their mailing list, showcase webinars, and seminars. This platform also provides an opportunity to share resources and tools available to move coastal NbS work forward, like through updates to the Coastal Zone Canada map.

5 Analysis and Conclusions

The literature review and interviews indicated clearly what it would take to make a CoP successful. They also provided partial insights regarding unique ways in which a CoP might add value in the context of NAM and NbS. However, they tended to lead to several generic conclusions that could be applied to a CoP for any type of social challenge such as housing, homeless, the emergence of AI and so on. Thus, additional analysis is provided to shed light on:

- **i/** Whether the CoP should focus on NbS and NAM, or both;
- **ii/** Whether there are unique or particular aspects of NbS and NAM that make it advisable to have a CoP;
- **iii/** What success might look like if a CoP were to be implemented beyond the general proposition of "advancing NAM or NbS"; and,
- **iv/** Whether the investment in a CoP should be a priority over any number of other investments that could be in advancing the field of NbS and NAM.

Analysis of these questions is discussed below in this section and form the basis of the structure and function presented in the recommendations.

NbS or NAM?

NbS encompass multiple approaches including ecosystem restoration, green infrastructure, sustainable agriculture, sustainable forestry, wetland management, carbon sequestration, disaster risk reduction, and more (IUCN). NAM, by contrast, is a single, albeit multi-sectoral and multi-faceted, approach. It can be considered as a subset of green infrastructure, as illustrated in *Figure 2*, and is typically represented as an adaptive management cycle based on standard asset management practices, as illustrated in Figure 3. NAM is an increasingly important business process to achieve outcomes including cost-effective service delivery, extending the life of engineered assets, climate change resilience, mitigation, and adaptation.

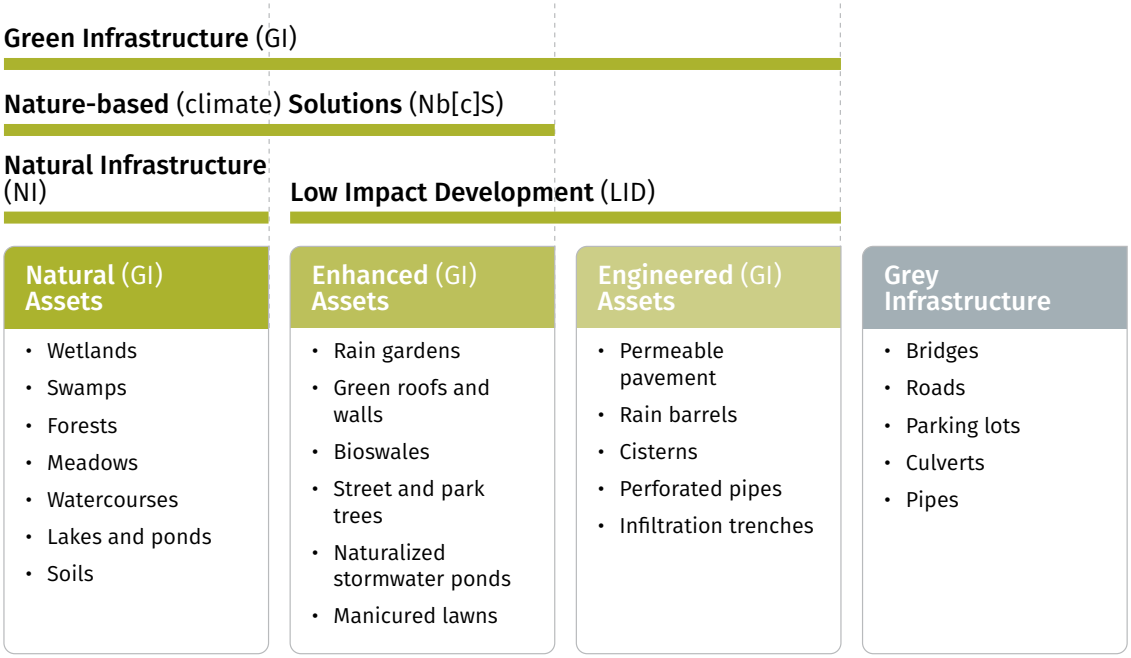

Figure 2: Categories of Green Infrastructure, adapted by NAI from Green Infrastructure Ontario

Figure 3: Natural Asset Management Process, adapted by NAI from Asset Management BC's Asset Management Wheel

There is no 'right' decision as to whether a CoP should focus on NbS broadly, or NAM specifically. However, given that NbS consists of multiple related but different approaches, it may risk undue complications identifying an appropriate domain, community and area of practice. Wetland management alone, as one NbS approach, could occupy the attention of an entire CoP.

For practical reasons of scope, it is suggested that the CoP discussed in this report should initially focus primarily on NAM. Sufficient leeway should be given, however, to recognizing that NAM links to many other disciplines and that any place-based application will likely touch upon these and other forms of infrastructure. If there is a sound argument for expanding a CoP to other NbS approaches, then this can be addressed in time, perhaps through sub-networks or working groups.

Why a CoP for NAM?

Whether a CoP is useful for NAM (or anything else) depends on *goals, context, and the uses* to which it is put.

In terms of a goal, the assumption here is that NAM can and should evolve to become a broadly based, or commonplace, practice across Canada. Achieving this goal is the mission of organizations such as NAI, and a topic that was discussed at the validation workshop. It was noted while NAM activities may express themselves differently according to context (e.g., geography), many aspects are — and must be — common, for example, developing inventories, levels of service and creating investment plans in comparable, replicable ways. An analogy was drawn to green buildings — a LEED or Passivhaus building would undoubtedly look different in Yellowknife and Halifax but would have common features and/or performance requirements, with the latter being essential to ensuring the concept has meaning.

Therefore, a CoP should be considered for NAM to the extent that it provides an effective means to substantially move NAM towards the goal of becoming a mainstream practice across Canada. There are several interconnected reasons it could do so, which are described below.

CONTEXT: OVERCOMING NAM-SPECIFIC BARRIERS

As noted, there are some barriers to the uptake of NAM and NbS including silo mentalities, risk aversion, lack of awareness, lack of skilled knowledge brokers, and a lack of standards and guidance (Sarabi et al., 2020). These barriers could in part be addressed by a CoP through its role in supporting collaboration across disciplines and increasing and mobilizing knowledge. A CoP could contribute to the success of NAM by addressing these barriers.

CONTEXT: NAM AND RAPID EVOLUTION

NAM started in its modern incarnation with a single initiative in the Town of Gibsons, British Columbia, around 2016. It has spread from there, with support from organizations such as NAI, to over 150 examples of local governments and

others undertaking NAM in Canada. There are three noteworthy characteristics to this growth:

i/ The *distribution of examples* (see Figure 4) and maturity of examples, or "progress around the NAM wheel" (see Figure 3) are uneven. For example, most of the ~150 examples are clustered in the assessment phase of the NAM wheel, with fewer examples in the planning and implementation phases, as would be expected in a new practice.

ii/ The number of NAM examples, while large relative to a baseline of 1 in 2016 and has spread beyond innovators into domain of early adopters (see Figure 5), is still small relative to the total number of entities that *could* undertake NAM.

iii/ The *pace of growth* is increasing, and it is reasonable to expect many more examples, emerging more quickly (Molnar, 2024).

In this context, it will be vital to ensure that:

- Where practice is limited, examples are provided and shared to help others become early adopters. Examples include helping lower-capacity communities embark on NAM and helping, e.g., the planning profession accelerate its currently promising but limited activities[2].
- Where there are already a number of adopters and a number of outcomes have been demonstrated, practices are shared and consolidate into guidance and trainings to broaden diffusion. Examples include levels of service, for which there is now guidance material and multiple communities undertaking the practice but still in a limited manner.
- Where there is guidance and a wide array of experiences, develop norms and standards. Examples include the development of natural asset inventories, for which there is now a National Standard to help broaden diffusion.

Together, this suggests that NAM is at the stage where it is important to "learn better and build faster," in the words of one interviewee; and at which "innovation and knowledge sharing must be sustained and expanded" if it is to become mainstream but not haphazard. These are precisely areas where, based on the literature and interviews, a CoP could be useful.

2 *See this discussion on recent efforts with professional planners in Alberta and Saskatchewan naturalassetsinitiative.ca/how-planners-can-build-better-communities-with-nature*

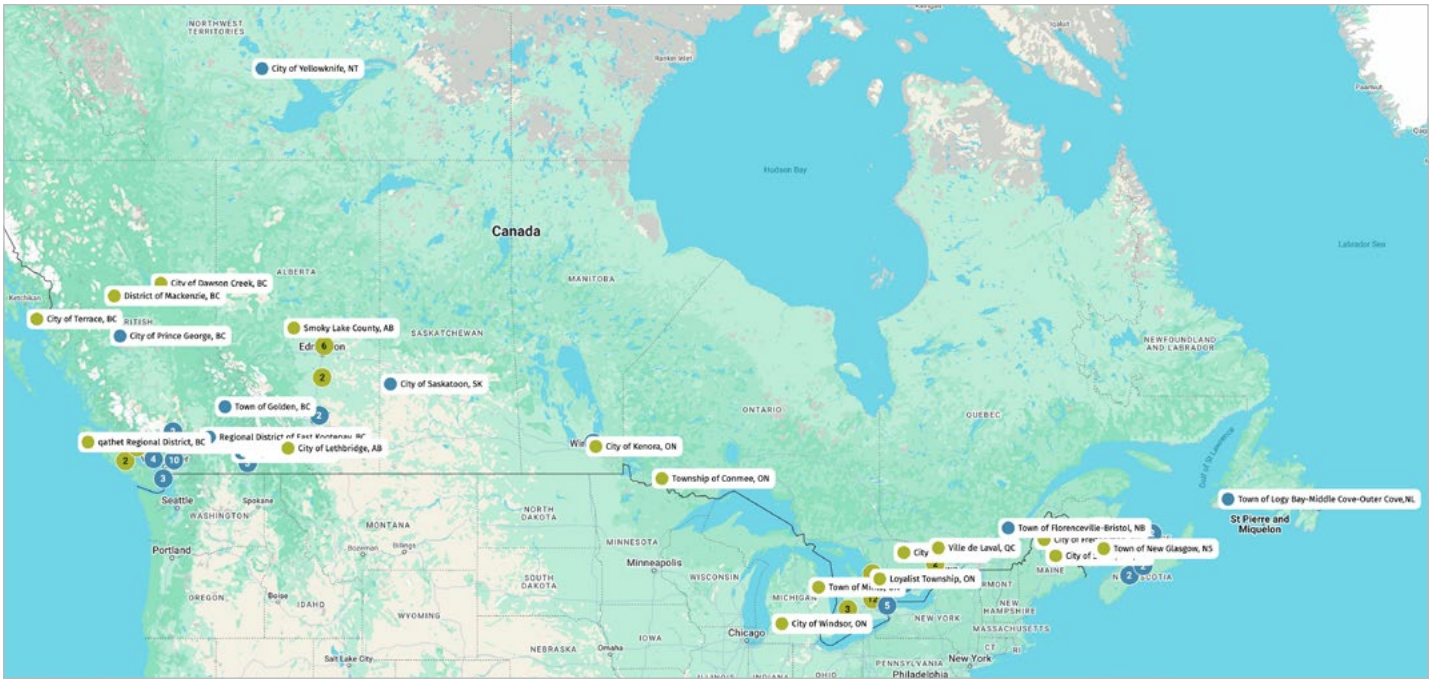

Figure 4: Map of Selection of NAM Efforts by Local Governments Across Canada

Note: Green labels indicate the local government has completed an introductory activity (i.e., Roadmap), while blue labels indicate natural asset inventory projects, as well as comprehensive NAM projects (e.g., an inventory as well as condition and risk assessments, service valuation, and policy analysis). This is not an exhaustive list of NAM projects.

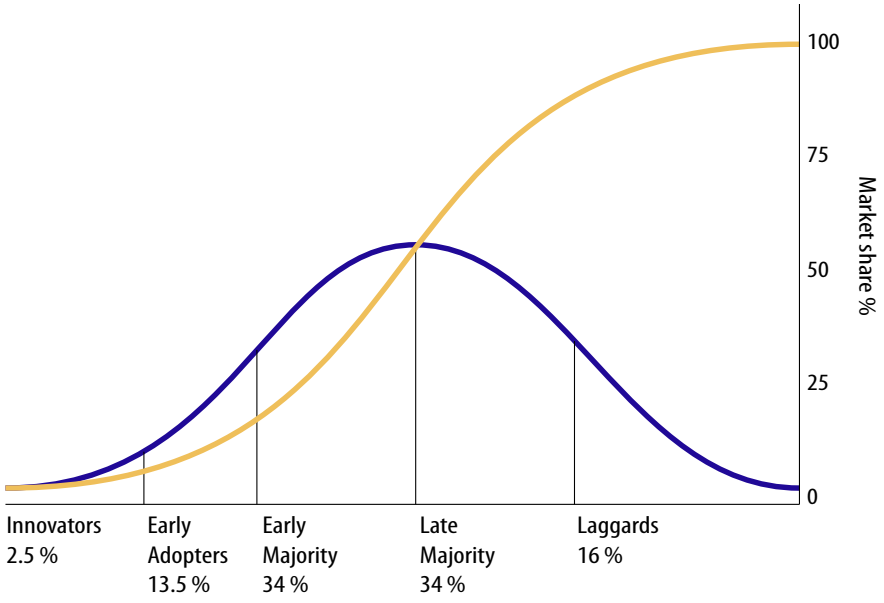

Figure 5: Diffusion of Innovation Curve.
Source: Rogers (1962)

Both/And: Considering the role of other organizations

Providing services to continue the rapid evolution of NAM and specifically many of the community-related functions in the preceding subsections are the daily business of NAI, to cite on example. Indeed, NAI has created a variety of smaller

communities of practice in each of the aforementioned areas. One challenge, however, is that the community stewardship aspects of efforts are often project-based and do not have a larger, generative community as their focus. It is reasonable to conclude that a range of supports will be needed in these areas, including from organizations such as NAI, and that the specific, additional functions a CoP can provide would be helpful.

Uses of a CoP: Considering lower-capacity organizations

Some entities have sufficient resources to sift through the growing body of available NAM material and decide how best to use it, but many do not. For example, there are approximately 3,600 local governments in Canada and the vast majority of these are small, with relatively limited capacity and many competing priorities. It is unrealistic to assume most will have capacity to review multiple paths to, and through, NAM; it is more realistic to think that their journey could be successful if conducted using curated information in conjunction with likeminded cohorts, areas with which a CoP could be helpful.

Uses of a CoP: Managing an "explosion" of tools

As noted by one respondent, there is a "explosion" of tools and information for NAM including case examples, new guidance material, a new national standard, and the early extension of the practice to work with Indigenous Peoples. This largely knowledge-based expansion of information requires management and curation to optimize success and ensure deliberate learning rather to avoid the duplication of mistakes. This is a function relevant to a CoP.

Uses of a CoP: ECCC's NSCSF and other funding programs

As noted earlier, the origin of research for this document was an exploration of how to improve the effectiveness of the NSCSF. Based on ECCC (2023) and this report, it is probable that time-bound support through a CoP could help applicants consider and address the reduction of greenhouse gas emissions through NAM projects funded by that program. More specifically, a "room" could be created that is dedicated to NSCSF projects to bring participants who are working through their projects together, and boost interest for others who may be looking for ideas to develop their own applications. It is reasonable to expect that CoP efforts could also help overcome needless fragmentation between mitigation and adaptation efforts by advancing solutions that inherently address both. Regarding the mitigation component of NAM, the total greenhouse gas emission reductions from those projects could be tracked and highlighted on the CoP website as an ongoing tally to also measure success as it relates to the program and its desired outcome. Success could include the advancement of the amount of information and resources made available within the CoP around carbon accounting as it relates NAM, and the advancement of low-carbon resilience efforts that simultaneously address mitigation and adaptation through the NSCSF.

The same logic likely applies to other funding programs. For example, in November 2024, the federal government announced that natural infrastructure is an eligible capital expenditure within the Canada Housing Infrastructure Fund. It is reasonable to expect that some applicants will need support to conceptualize and design meaningful projects. This will likely require a range of supports, for example, expert advice from consulting firms; and potentially the specific, additional functions a CoP can provide.

In summary, a CoP is unlikely to be a prerequisite for NAM to continue to flourish. However, the analysis undertaken for this report suggests that many of the functions that a CoP can perform are ones that would align well with specific barriers faced by NAM and its current stage of evolution. Executed correctly, a CoP would not supplant but rather deepen and broaden the efforts of other organizations, with a specific focus on community development and making NAM a commonplace practice.

Reasonably speaking the CoP could be expected to help alleviate the following specific challenge areas identified by interviewees:

1/ **Community isolation / lack of widespread awareness**: CoP activities can help close this gap by broadening understanding, experience and good practice for areas that are already beginning to become commonplace and help accelerate uptake. An example might be the development of inventories where the goal is to encourage uptake of the new national standard.

2/ **Lack of case studies and applicable examples**: a CoP can provide a platform to accelerate knowledge development and share experience in areas where there is limited / newly emerging practice and evidence. Examples might include the development of levels of service for NAM, the development of natural asset management plans, and integrating NAM into community plans. In each of these areas there is some guidance, and a modest body of experience.

3/ **Lack of guidance on practical implementation**: a CoP could support the development and testing of new knowledge in areas where there is very little if any evidence, but a demonstrated or emerging need. Examples might include determining how best to integrate NAM into subdivision or zoning bylaws. In these areas there is no specific guidance and few if any solid and/or documented examples.

In this way the CoP would contribute to progress along a “practice trajectory” and along a “practice to norms” trajectory as described in the blog, “A Tale of Two Trajectories” (NAI, 2024). It would make sense to develop a time-bound CoP, for example, for five to seven years, until NAM emerges as a self-sustaining, mature practice.

6 Proposed Model and Elements

This section proposes a model and elements of a CoP for NAM.

Purpose and Value Proposition

The **purpose** of the CoP is to help NAM to become a widespread practice in Canada, characterized by:

- A large and growing number of entities undertaking NAM, making continued progress through the adaptive management cycle, and creating a corresponding demand for service and supports
- A growing number of market players that can effectively meet the demand for NAM support and services
- An overarching set of norms and standards to help ensure that NAM is undertaken in ways that are demonstrably comparable, replicable, and effective
- NAM increasingly and demonstrably upholding UNDRIP, including by interweaving Traditional Ecological Knowledge and western science approaches
- A robust learning ecosystem that includes professional directives, credentialling, curriculum and professional development.

The **overall CoP value proposition** is that it can help accelerate the achievement of this end-state. The **user value proposition** is that it will help them navigate their NAM journeys faster and more effectively than working alone or through the confines of individual projects. It will do so by:

- Structuring more collaboration and co-creation of solutions with more people than is currently occurring
- Enhancing the number of people to whom users can turn for support, guidance and co-creation of work
- Increasing the number and quality of tools that are available to users, at the appropriate time, to support them in their journeys
- Facilitating connectivity across disciplines and knowledge domains
- Supporting a continuous adaptive management journey

One important tension flagged by an interviewee is the need to navigate between satisfying the needs of individual members while also maintaining focus on the collective value proposition; individual and collective value propositions have to be aligned and balanced.

Conceptual Model

CoPs can be as simple or complex as deemed appropriate for the given topic. Tools are available through virtual platforms that allow users to navigate CoPs based on broad and/or specific interests. Given the breadth and depth

of information and examples available to discuss regarding NbS and NAM, a tiered conceptual model is recommended for the proposed CoP. The tiers would include an overarching landing spot for all interested in the topic generally, that leads individuals to more specific topics of discussion.

A house emerged as an analogy for model of this CoP (see Figure 6). The structure of the house represents the purpose and scale of the CoP. These are elements that are determined at the outset and relatively static over time, although adjustment can always be made. For example, an expansion to the purpose of the CoP would be represented as an extension being built onto the house, or another level being added. The 'rooms within the house' represent different activities or areas of focus within the CoP. A facilitated cohort of local governments working on subdivision development and design bylaws; the development and sharing of case studies particular to engineers or small local governments; or detailed discussions on levels of service, might each have their own room within the house. The rooms can be adjusted over time, with walls and partitions as needs evolve, and the set-up within rooms can be organized for particular short-term events such as the arrival of a visitor, which might be analogous to a lecture series hosted through the CoP. Importantly, at the validation workshop, it was also mentioned that once a room no longer serves a purpose because the objectives have been achieved, it should be closed out so that new topics can emerge.

***Figure 6**: Visual Demonstrating Concept of a CoP as a House*
©Trisha McMillan via Canva.com

Governance, Funding, Priorities and Timeframes

A sound governance structure is key to selecting on-target priorities and functions.

It is proposed that a group of 'NAM champions' form a **voluntary steering group**, analogous to a not-for-profit board of directors. This group would formally establish the terms of reference for the CoP (or the 'house structure' in the conceptual model); these terms could use the contents of this document as a basis.

A minimum viable CoP would require:

- **A full-time equivalent CoP Coordinator.** This person would be accountable to the steering group and responsible for day-to-day operations aligned with a 1- or 2-year workplan
- **Operating funding** for (a) IT and related costs; (b) hiring of convenors and facilitators for specific activities within the CoP; and (c) for one or more meetings of groups or sub-groups; and to foster relationships at the outset
- **Project funding** to support co-development activities that some groups within the CoP will undertake to advance practice

Clearly, the more operating and project funding available the faster and better efforts will advance.

The CoP Coordinator, operating funding and project funding should be managed by an existing organization(s) that is active in NAM to avoid a proliferation of mechanisms, new silos, and to reduce transaction costs.

Based on their own knowledge and some discussion with a group of proposed users, the coordinator and steering group should identify a series of topics and activities for the first 12 months (akin to creating the 'rooms' in the conceptual model). It has been recommended by the interviewees and noted in the literature review that meetings be conducted in person to help with the initial creation of the CoP and its policies in order to build stronger connections with the working groups.

There is no shortage of promising priority topics, and they could be organized in different ways, including:

- By audience, for example, support of various kinds for the smallest local governments, or new planners in rural communities
- By profession, for example, having planners work together in a given province on a topic that is of particular importance
- By topic, for example, having various entities collaborate on implementing levels of service
- By province or region, for example, there could be a focus on water issues in the Prairies or communities adjacent to or in the Ontario Greenbelt

- The evolution of NAM, for example, discussing what areas could most benefit from new national standards or how inventories could be improved

These topics could form the basis of a **first year workplan**, with evaluations at fixed intervals.

The workplan would, as a function of resources, spell out the **functions** through which priorities will be considered. As described earlier in the report, these should include at a minimum a **searchable** document repository and curated distribution; **regularly** facilitated discussions on key topics; and, ideally, co-creation – for example, from the emerging body of work around levels of service, a 'seed document' for a national standard could emerge.

Facilitated matchmaking and networking opportunities should be a cross-cutting function of everything that is undertaken such that participants emerge with a growing number of people whom they can rely on for help and support. Periodic "virtual coffees" could be organized on new/emerging topics that are of strategic, programmatic and operational relevance.

There may be innovative ways to determine priorities between the coordinator and CoP users. For example, Plastrik (2024) noted that the Urban Sustainability Directors Network convenors would propose different topics to members, in addition to those suggested by members, and the ones that advanced were the ones where a minimum threshold of members, and two voluntary co-chairs, agreed to participate.

In terms of timeframes, a three-year funding and effort window is likely the minimum period that would make a CoP worthwhile.

Scope, Growth and Evolution

As suggested in Section 5, the CoP should **initially** have a focus on NAM rather than NbS more generally. However, terms for the CoP should not be doctrinaire as this may risk pointless definitional debates and may ignore the reality that NAM exists within a system that will include engineered assets and various forms of green infrastructure.

The CoP should be allowed **and encouraged** to change and evolve over time. The issues and challenges are unlikely to be identical from 2024 to 2027, and there may be topics of specific interest such as accounting or insurance that arise, and specific types of extreme weather events may prompt different types of discussion. Topics should be scoped to address known or identified challenges as opposed to things that are of general interest. The topics that can be considered within the CoP will be limited by the resources available to moderate and manage them and, subject to resources, likely increase over time. Links to asset management should be explicit so that that the CoP does not perpetuate silos or erode the very foundation that has allowed it to flourish.

POTENTIAL LINKAGE TO THE COP – EMERGING AI DATA

To keep up with the proliferation of examples, natural asset management monitoring techniques are beginning to evolve from traditional methods to innovative semi-autonomous systems.

Initially, monitoring relied heavily on structured interviews which, while fostering stakeholder engagement, proved time-consuming, limited in scope, and challenging to scale.

Recognizing these limitations amid rising complexities in the field, NAI is developing a semi-autonomous monitoring system, supported by RBC Foundation and the Province of British Columbia. This new system will employ web-crawling, web-scraping, and natural language processing (NLP) to gather and analyze real-time data, enhancing efficiency and enabling swift responses to changes in the environment and policy landscape. A pilot version scaled to BC and Alberta should be available in autumn 2025.

This could be relevant to a Community of Practice. For example, CoP participants could develop more informed and agile approaches to NAM by harnessing real-time data. It may also well be possible to target the monitoring to support specific areas of practice and inquiry within the CoP.

Source: *naturalassetsinitiative.ca/the-evolution-of-natural-asset-management-monitoring*

Geography

The CoP should be national in scope, in the sense of being able to focus on or incorporate issues irrespective of where they arise in the country. However, it is reasonable to expect that within the CoP there will be geographic areas with greater or lesser focus in any given year, and these may change as a result of a range of factors including participant interests and/or extreme weather events.

CoP Users

The audience or users of a national NAM CoP should focus on those with genuine interest rather than simply filling roles with representative models; ideal participants are those who want to engage and contribute. Diversity among participants is crucial, as it brings energy and varied perspectives to discussions. Recruitment efforts should deliberately target individuals from diverse backgrounds, including smaller and less-resourced local governments, which could benefit significantly from the CoP's insights. This suggests the potential formation of a steering group to ensure that these voices are included. Over time, the audience will likely evolve as the effectiveness of the CoP is assessed and improved.

It will be important to create an inclusive environment for Indigenous Peoples in all discussions. However, many Indigenous individuals are understandably weary of being tasked with solving issues that are not of their own creation. While some may be open to sharing their Traditional Ecological Knowledge (TEK), they may not be willing to provide formal training. Recognizing and respecting this perspective is vital for fostering meaningful participation.

Audiences that may be involved in the CoP include environmental planners and coordinators, public works staff, skilled practitioners from the private sector, urban planners, and asset management staff. Each of these groups brings unique expertise and insights, contributing to a richer dialogue and more effective collaborative efforts.

In the validation workshop and some interviews, it was noted that there are existing CoPs available for related topics throughout Canada and beyond. It was mentioned at the workshop that some CoPs are developing as we speak, some with potentially overlapping focus. It was recommended that before launching a new CoP for NAM that a programme-level understanding how existing CoPs might nest into one another be developed. For example, it is possible that a national scale CoP with a focus on NAM could be associated with existing CoP of similar topics that are more regionally focused, providing the audience base with opportunities to access a larger network while maintaining their connections to the smaller more focused group work.

Indicators

Performance indicators need to show two things related to the purpose of the CoP: whether it is helping the field of NAM evolve; and whether users are benefitting more from being in a CoP then being on their own.

Basic performance indicators for events could include:

- Number of attendees/participants
- Number of responses to surveys
- Number of projects being added to map
- People who report benefits
- Diversity of attendees/participants

Enhanced performance indicators could include:

- Whether connectivity between users is increasing[3]
- Whether the CoP is facilitating new and/or emergent activities
- Sense of connectedness
- Whether continuous progress through an adaptive management cycle is being made

Should there be an opportunity to highlight or have a ‘room’ focused on the NSCSF program and related projects, performance indicators could include the number of case studies for projects shares, interactions between participants on a discussion board or sharing of resources, and the totally summary of greenhouse gas emissions reductions anticipated to be achieved by the projects collectively.

3 *Plastrik (2024) notes that the Urban Sustainability Directors Network mapped and tracked relationships developing amongst urban sustainability practitioners. They did so by having members assign ratings to indicate degrees of connection, for example, whether they knew a person; collaborated with them periodically or extensively, or turned to them for advice.*

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Appendix A: Methodology

This project was divided into three main phases. In **Phase 1** the Project Team created a foundation for investigating the utility and viability of a CoP to discuss NbS. This included outlining the scope of the review and defining CoPs and NbS. Preliminary insights were gathered by the project team and presented to ECCC Staff to confirm the scope of the project. A literature review was also conducted to gain a better understanding of the development and use of CoPs, looking at what some of the strengths and weaknesses might be.

Phase 2 consisted of one-on-one interviews with two groups of individuals; those who have experience developing or running a CoP and those who may be a potential user of a NbS specific CoP. A list of candidates was created, and interviewees were selected. A short backgrounder about the project and a list of interview questions was circulated to interviewees in advance of their interview to provide context. A draft report combining the findings from the literature review in Phase 1 and the results of the interviews from Phase 2 was provided to ECCC for review. The report summarizes preliminary findings and provides draft recommendations for the structure and application of a NbS CoP.

In **Phase 3**, the Project Team conducted a workshop with available interviewees and ECCC staff to present preliminary findings from Phases 1 and 2. The workshop was also used discuss and vet this information and provide interviewees a chance to give further comment or to ask questions.

Literature Review

A systematic review protocol was used as the approach of this project. The approach aims to collate all relevant evidence that fits specified criteria to answer key research questions (Shamseer et al., 2015). The application of systematic methods helps minimize bias in selecting, synthesising, and summarising studies to provide reliable findings. This review protocol includes: 1) a clearly stated set of objectives with an explicit, reproducible methodology, 2) a systematic search that attempts to identify all studies that would meet the eligibility criteria, 3) selection based on assessment of the validity of the study findings, and 4) systematic presentation and synthesis of the characteristics and findings of the included studies (Shamseer et al., 2015). As there are few publications addressing NbS CoPs specifically, document selection was targeted towards those that speak to CoPs generally including the advantages, disadvantages of using CoPs and what elements are necessary for the development and maintenance of a successful CoP. The main sources for publications were found through internet searches using the Google browser and a journal search through the Laurentian University online library. In both cases, the same search terms were applied (Communities of Practice, Virtual CoPs, CoP management, CoP evaluation, CoP strengths and weaknesses).

The review explored:

- i/ Defining features of CoPs
- ii/ Current examples of CoPs, the purpose and scope
- iii/ Success and appropriateness criteria for CoPs
- iv/ Benefits, pitfalls, challenges and opportunities of CoPs
- v/ Existing CoP related to NbS in Canada

Semi-Structured Interviews

Between July and September 2024, twelve semi-structured key informant interviews were held, focussed on existing communities of practice, intermediary organizations and potential beneficiaries or users, with the following people.

Adlar Gross	ICLEI
Jo-Anne Rzadki	Conservation Ontario
Amaury Camarena	Representative from the Coastal Zone Canada CoP
Josée Methot	IISD
Kim Fowler	Regional District of Nanaimo
Michelle Collins	Alberta Professional Planners Institute
Patience Cox	Thnyk Leadership
Peter Plastrik	Innovation Network for Communities
Shannon Larocque	Town of Pelham
Shannon O'Connell	Halifax
Rebecca Sterritt	Government of British Columbia
Dustin Carey	Federation of Canadian Municipalities

Roundtables

Roundtable Discussion 1 – February 22, 2024

The following people kindly shared their insights on the potential for a CoP during a semi-structured discussion, based on the *Troika Consulting method* from Liberating Structures.

- **Kerra Chomlak**, Executive Director, Climate West, *kchomlak@climatewest.ca*
- **Vanessa Carney**, City of Calgary, *vanessa.carney@calgary.ca*
- **Erica Yaholnitsky**, Water Resources Engineer, City of Calgary, *erica.yaholnitsky@calgary.ca*

Roundtable Discussion 2 – Thursday March 14, 2024

The following people kindly shared their insights during a semi-structured discussion using a back-casting approach, during a virtual meeting.

- **Craig Harding**, Nature Conservancy of Canada
- **Rebecca Row**, Saskatoon North Partnership for Growth
- **Josée Methot**, IISD
- **Scott Millar**, North Saskatchewan Watershed Alliance
- **Ashely Rawluk**, IISD
- **Guy Greenaway**, Corvus Centre for Conservation Policy

Validation Workshop

This step included summarizing the results of the foregoing steps and presenting them in an online workshop held on October 28, 2024.


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