



Habitat Stewardship on School Grounds

An educators' guide to restoring native habitats that sequester carbon
and enhance biodiversity

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Disclaimer

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EXECUTIVE SUMMARY

"We all have an important role to play and we're in a position where we can influence so many people just by being a teacher in the classroom." - Melissa, Kindergarten Teacher

"In today's society, a lot of people are disconnected from nature. Instead of caring for the earth, they're destroying it. If you're teaching children who are the future leaders of our society about the importance of nature and how to be a steward for habitat, then you're creating citizens who will be able to lead society in a direction of caring for the earth instead of destroying it." - Sam, Elementary Teacher

The dual crises of climate change and biodiversity loss threatens our ecosystems as well as human well-being. Industrialization, overexploitation of nature, and urbanization have destroyed natural habitats, threatening wildlife across our lands and waters. The replacement of native plants with non-native species is a key threat to global biodiversity. One way to address this is to restore habitats by planting native plants.

Educators and students have a crucial role to play by transforming school grounds into native habitat gardens. This provides rich outdoor learning spaces that support local biodiversity and connect people to nature. These habitats sequester carbon and are resilient against climate change.

Habitat restoration and stewardship activities take place on traditional territories of Indigenous peoples who are the original and rightful stewards of this land. Each section provides ways to respectfully incorporate Indigenous perspectives in your classroom.

This guide provides educators and students with the tools and resources for implementing habitat restoration and environmental stewardship on school grounds.

Section overview:

- *Section 1: Introduction to habitat stewardship*
- *Section 2: 3-step Call to Action and preliminary considerations*
- *Section 3: How-to manual for various types of habitats and garden designs.*
- *Section 4: Tools for stewardship, tracking progress and sharing success*

1. INTRODUCTION

1.1. Education and the Climate Crisis

In the face of the dual crises of climate change and biodiversity loss, educators are tasked with the challenge of preparing our youth for an uncertain future. Education is a tool for creating change and making the world a better place. When students learn to love and protect the planet and its biodiversity, they pass on this knowledge and wisdom to others and to the next generation. It is important for students to learn about local bioregions, ecosystems, and biodiversity in order to develop empathy and responsibility. This type of learning also connects students to their local environment and community.

“If we can teach our children to appreciate the Earth, how to plant native plants, how to give back and why it’s important, then that’s the next generation that will continue. And then they will teach their children and so on. If we don’t continue the cycle, it will stop and we will have nothing, so the ball has to keep rolling and we have to keep educating.” - Lesya, Elementary School Teacher

1.2. Habitat Stewardship as a Nature-based Solution to the Dual Crisis

Nature-based solutions are ways of tackling climate change with actions that protect, sustainably manage and restore natural or modified ecosystems while also providing human well-being and biodiversity benefits (Cohen-Shacham et al., 2016). Habitat stewardship is defined as actions taken by individuals or groups of people to protect, care for or responsibly use the environment (Bennett et al., 2018). Habitat or ecological restoration contributes to protecting biodiversity, improving human health and wellbeing, increasing food and water security, and supporting climate change mitigation, resilience, and adaptation. It is a solution-based approach to rebuild a healthier relationship between people and the rest of nature (Gann et al., 2019).

“Habitat stewardship is community building and taking care, where the kids are taking care of their class and the school grounds. It’s about teaching responsibility and empathy” - Alison, Educator

“Habitat stewardship means building a relationship with a specific place and being an advocate to ensure its safety and that it’s able to thrive.” - Sam, Elementary Teacher

“Habitat stewardship is taking care, not for the sake of human consumption, just for the sake of biodiversity and for the natural world having intrinsic value” - Linda, Classroom Teacher & Outdoor Classroom Coordinator

"We need to be good stewards of the land, as we are one with the land/water. We are interconnected and our survival and thriving depends on the survival and health of all species." - Diane, Vice-Principal

1.3. Indigenous Perspectives

When talking about habitat stewardship, it is important to remember that Indigenous peoples, who have taken care of the land since time immemorial, are the original and rightful stewards of [Turtle Island](#) (North America). For centuries, the colonial government of Canada has sought to dispossess Indigenous peoples of their lands, cultures, languages, and knowledge systems. For many years, science has been widely accepted as the only valid form of knowledge. It is now recognized that Indigenous knowledge systems and western science are equally valid and important: neither system has more weight or legitimacy than the other (ICE, 2018; Miller, 2020). Supporting Indigenous-led conservation, Indigenous knowledge systems, sovereignty and leadership is essential to the pursuit of reconciliation and equitable conservation across the country (ICE, 2018; Miller, 2020; Schuster, 2019; Currie et al., 2020).

For more information:

- Find out more about the territory you are on: <https://native-land.ca/>
- An educational video on the concept of Land Back: <https://www.youtube.com/watch?v=c2SGaGRhYZs>
- Information on terminology, Indigenous cultures, histories, and governance systems: <https://indigenousfoundations.arts.ubc.ca/home/>
- <https://idlenomore.ca/resources-education/>

2. GETTING STARTED

"I've been doing a mentor program through Natural Curiosity 2nd Edition, which is environmental inquiry through an Indigenous lens. I've learned that we need to focus on sustainability, and to me that is reciprocity with the land and taking care of the land not as superior beings but as deeply interconnected beings."

- Michele, OCT, Elementary Educator

2.1. Calls to Action for Educators: Connect Classroom to Habitat

Students are the future caretakers of our planet. It is crucial that we provide them with the best tools to foster caring relationships with the natural world. Educators are rethinking curricula by incorporating place-based, experiential and transformative learning, environmental inquiry, Indigenous and traditional knowledges (Sipos et al., 2008; van Eijk & Roth, 2010; Wals & Corcoran, 2012; Gruenewald, 2003; Restoule et al, 2017). Connecting classrooms to the local ecosystem is a way to remind people that we are all wildlife. From there, we can imagine and work towards a future where people and nature thrive together.

To do this, we suggest a 3-stage process:

1. **Learn:** Learn about your local ecosystem, its history, biodiversity, how it works and what it needs.
2. **Plant:** Actively engage in ecological restoration by planting locally sourced native plants.
3. **Steward:** Extend and deepen relationships through stewardship activities year-round.

What is an Outdoor Classroom?

To us, an outdoor classroom is a learning space embedded in nature and surrounded by biodiversity. It can be a habitat supporting the lifecycle needs of wildlife and the developmental needs of students. These are spaces intentionally designed to go beyond mere aesthetics: they have educational and health benefits and an ecological philosophy built-in. An outdoor classroom can support interdisciplinary and transdisciplinary learning that could involve:

- Community Science (native plants, ecosystem services, climate change mitigation and resilience)
- Social Studies (e.g., sense of place, community, geography, history),
- Math (e.g., measuring, geometry),
- Art (e.g., sketching),
- Language Arts (e.g., poetry, reading, journaling, drama),
- Foods and nutrition,

- Self-regulation and community service (watering plants, moving soil for releasing stress and managing behaviour).

Cognitive benefits of an outdoor classroom

Research has shown that children who spend more time learning in an outdoor classroom are able to focus better and require less management (Largo-Wight et al., 2018). For young children and children of low socio-economic status, learning and playing outdoors results in greater on-task behaviour (Lundy & Trawick-Smith, 2020). A combination of instruction and play time in nature and indoors contributes to children's social, cognitive, emotional and physical skill development through experiential learning (Coates & Pimlott-Wilson, 2019). Children are more likely to interact with peers with disabilities in outdoor spaces during active play activities (Hong et al., 2020).

Indigenous rights and ties to the land

Indigenous peoples have stewarded the land since time immemorial and have relationships with the land that are central to their knowledge systems (Little Bear, 2000). The strengths of Indigenous knowledges in understanding the local environment are crucial in addressing climate change (Miller, 2020). Indigenous worldviews and practices promote the understanding that humans are part of the ecosystem and must remain in balance with it in order to maintain healthy biodiversity (ICE, 2018).

Ongoing settler colonialism, urban land transformations and overexploitation of nature have deeply disrupted the livelihoods of Indigenous peoples and the health and integrity of our ecosystems. Respectfully incorporating Indigenous perspectives in outdoor classrooms can open up critical discussions about justice, equity and reconciliation.

What to plant in your outdoor classroom?

Your outdoor classroom also provides food and habitat for wildlife. Unfortunately, traditional horticulture and gardens are disconnected from the natural landscape. Ornamental gardens with imported plants don't support native birds, bees and butterflies that co-evolved with native plants. In fact, the imported varieties we normally plant often have little food or habitat value for wildlife. When we plant native species, we are restoring the health of the natural landscape, which supports local biodiversity and mitigates climate change (Kramer et al., 2019; Burghardt et al., 2009)

Should I remove invasive species?

There are different perspectives on this question, as removal and eradication of invasive species can be costly and disruptive. These plants may have a use or function, such that removal can be considered as a type of harvest. This way, invasive plants can be managed as part of stewardship. Consider: Is there a way to frame a positive or functional relationship here?

“How can we feasibly and imaginatively create a school ground that is both respectful of history and place, and accessible for many generations into the future? We are trying to put in as much biodiversity as we can and learning about what the land would have looked like before settlers, and how we can restore some of that within the school grounds and make it functional for everyone.” - Michele, OCT, Elementary Educator

Table 1. Plant Types, Definitions and Ecology

Type	Definition	Ecology
Native plant	<p>There is no single or simple definition, but time is the key. When a species has survived and reproduced in a given region for many generations (centuries or millennia), it evolves, becoming well-adapted to the local ecosystem.</p> <p>(For native species from different regions: see Section 3.3, as well as Appendix A. Resources)</p>	<p>Deep co-evolutionary relationships exist between these diverse species. Together with animals, fungi and microbes, they form a web that is resilient to stresses and changes, including Climate Change. They provide myriad benefits and are the foundation for healthy ecosystems.</p>
Introduced plant	<p>A non-native (exotic) species that is relatively new in a given area. These were most often accidentally or deliberately transported to the new location by human activity. They may become naturalized or invasive or neither and it is very hard to predict which.</p>	<p>Variable, but relationships with other species are often limited and tenuous. Plants may be out-of-synch with the seasons and may need extra care or may spread aggressively in certain conditions.</p>
Cultural plants	<p>Species that are used, cultivated and spread intentionally by humans; they are functional beyond mere aesthetic value (e.g., food, medicine, fiber, dye, building material) and are often represented in art and stories. Some are used locally in their native range; others may be dispersed through trade or alongside human migration.</p>	<p>Typically require human care and cultivation. Without watering/fertilizing/weeding, these species do not tend to thrive. Beyond their value to humans, they may or may not have relationships with other species; this depends largely on whether they have a long history in the area or were recently brought in by humans</p>

Naturalized plants	An introduced species that is in the process of integrating into the local ecosystem. They survive on their own, reproducing spontaneously in their niche, but have only been present in the region for decades to a few centuries rather than millennia.	These species may be common in certain conditions (often disturbed sites or adjacent to cultural areas), but they don't displace native species or disrupt ecosystem health/function. They are beginning to form deeper relationships with native insects, microbes and animal species etc.
Invasive plants	Introduced species which are spreading rapidly and causing harm. The damage may be ecological (displacing native species, using up resources), economic (damage to agriculture / infrastructure / waterways) or direct (harmful thorns, caustic oils, poisons etc.) Managing these species or stopping/slowing their spread is typically very costly and labour intensive. (Invasive Species Centre, 2021)	As they spread, they create large areas of monoculture, leaving no room for biodiversity to thrive in balance. Often, they have no predators and provide little or no nutrition to wildlife. Removing invasive plants may be a never-ending task, but if a use can be found for the removed material, then the plant can become functional, and removal can become a kind of harvest.
Weed	A subjective and non-scientific term to describe any plant that is undesired in a particular location. This may be due to aesthetics or behaviour (usually over-proliferation). These may be native, naturalized, invasive or cultural plants, and their apparent value may shift depending on the setting and given different human perspectives.	Variable and context dependent. In order to understand a plant's role in a given place, it would be better to assign it to one of the other categories in this list, then examine how it relates to the other species using the space and what function it has. Whether to keep or remove the plant should be based on those criteria

2.2. Community Engagement

Your habitat restoration will be more successful when you have the support and/or participation of multiple stakeholders from your school and the wider community. It can be tough if you are on your own. Having other teachers, staff, the administration, parents and community members as allies can make things a lot easier. It's good to form a team of people with different skill sets (e.g., gardening, constructing, grant-writing, botany, etc.) Community action requires a group of people coming together. It's a movement.

1. Students: let them lead!

Students are the most important stakeholders as they are the future caretakers of the planet. You can engage the students in your class, other classes, or have the whole school involved. Having your students lead this project can save you a lot of work. Students bring in fresh perspectives. They may have ideas about possible locations for habitat restoration. A great educational activity is to have students conduct research following their own interests (e.g., on plants, animals, colonial history, or reconciliation), and help design and measure the space for habitat restoration.

"My plan was to have my students create a vision of what they wanted to do. They decided to restore the kindergarten yard. They created a plan for this project on what they wanted, what we'd need, and how they would incorporate native plants that were edible for both wildlife and humans. They had a great time doing research and creating a list of all the delicious native plants. We ended up sourcing 43 native berry plants, the students were entirely responsible for all of this. I was just there to facilitate their learning." - Sam, Elementary Teacher

"Each of my students has taken on their own role in things that they have interest in. Some of them are passionate about animals so they're researching how we can create habitats for animals. Some of them are into plants, so they're looking into what kind of native plants we should be putting back here. Others are working on the history, our treaty agreements. We will be coming back as a knowledge circle where we can share what we have learned, and we can all benefit from everyone's projects." - Michele, OCT, Elementary Educator

John's story

Through project-based learning, John's students designed outdoor learning spaces with key criteria for biodiversity, access, potential lessons that could be incorporated, and seasonal uses. They had to calculate the area and the costs on a spreadsheet. They then used Minecraft and other software apps to model and map their spaces. Each student gave a presentation on their space, the key criteria, the cost breakdown and benefits to their school and where it might fit on campus. When students are engaged to learn, *"they are happier, healthier and smarter"* - John, Innovation Leader

2. Parents: bringing lessons home

Most schools have a parent advisory council (PAC). Parents are interested in what their kids are learning at school, and some parents are avid gardeners who can be a lot of help. Let parents know that you are working on habitat stewardship and ask if they would like to volunteer with planting. Parents may also have expertise that could come into use (landscaping, designing, constructing, woodwork, etc.). Developing a strong relationship with the PAC is a way to gain more support and funding through PAC funds and fundraising events. Stewardship doesn't have to be just on school grounds but can spread to the students' homes.

Many families from Myrna's school are immigrants, and gardening is familiar to them. *"The parents had gardens in their home country. Now they are in an apartment in Canada and have little access to gardening land. Some use the food bank. I started thinking, what can we do as a school to support these families? The parents have the knowledge. They have the need. But they don't have the place. I talked to our principal and said, could we have a community food garden? A group of parents were very keen, and they were going to join us in taking on this project."* – Myrna, Educator

3. Other teachers

Collaborating with other teachers at your school or at other schools can expand your project. All it takes is starting a conversation with your colleagues. Creating a visual presentation to showcase your project and sharing success stories at staff meetings and Professional Development meetings (Pro-Ds) can inform and gain others' support. Other teachers can share responsibilities and brainstorm with you.

4. Administration

Although your principal or vice-principal(s) may get moved every few years, they can still provide funding and other resources while they are at your school. You will need permission from your administration to get started on your project. Your administration can also help share your project with the wider community through outreach (e.g., school newsletter). They may also help you write grants as they may have extensive experience.

5. Maintenance staff

Let the maintenance staff at your school know about your project. You will need permission from them to get started. They may also provide you with knowledge about the space, and help with supplies and soil, as well as help take care of your garden.

6. Community members

Can community members access your space during after-school hours or in the summer? Creating signage and labelling plants is an important way to educate others in the wider community about your project, what you are growing, and how they can be a part of it.

7. Local sustainability network

Find out what habitat restoration initiatives and programs already exist in your community, reach out to local ecologists, botanists, educators, and environmental nonprofits and organizations. Make use of resources and expertise in your community. Bringing in guest speakers to host workshops can enrich your students' learning. Getting a botanist to assess your space and make suggestions for native species suitable for the soil of your region can be helpful, if budget allows.

8. School board

Many district school boards recognize the important role that school gardens play in students' learning. Talking to your school board about your project can help expand it, access more funding, resources, and/or donations of plants and soil. Find out what environmental programs your school board sponsors. You could also advocate for greening school grounds and ask your school board to sponsor/fund programs and make donations.

9. Local suppliers

Reach out to your local suppliers (small suppliers or large retailers) and tell them about your project. See if they could donate any soil or equipment or give a discount. Reach out to local nurseries early in the off-season, to ensure that their supplies have not run out.

10. Indigenous connections

If you are a non-Indigenous teacher hoping to involve Indigenous consultations and perspectives in your project, it is great to start with relevant curricula that respectfully incorporate Indigenous cultures, histories and worldviews. Non-Indigenous teachers across Canada are already teaching about colonial history and Indigenous cultures in their classrooms. It's good to 'do the homework' before reaching out to build a relationship with a local First Nation.

Ways to include Indigenous perspectives in your classroom:

- [First Peoples Principles of Learning](#)
- Reading books by Indigenous authors
- Learning about colonial history
- [TRC calls to action | Child friendly version](#)
- [Land Acknowledgement](#)
- Acknowledge where your knowledge came from/the source

“We talked a lot about the Indigenous understanding of The Three Sisters and how the plants grow together and help each other. The three sisters are corn, beans and squash. The corn is a stalk. It lets the bean grow around it. The bean leaves take in nitrogen from the air and send it down to the roots, where the corn can absorb it. The squash covers the ground and prevents drying out. The prickles on the squash vines and leaves stop raccoons from eating the corn.” – Myrna, Educator

Strengthening relationships

If your school or another staff at your school has a relationship with a local First Nation, an Elder or a knowledge keeper, deepen and honor these relationships by continuing to collaborate with them. There is value in inviting the same person/people back to the site on multiple occasions to comment on progress.

Indigenous Support Workers

Indigenous support workers provide academic support and assist with the personal growth of Indigenous students while recognizing the importance of each student’s cultural heritage and traditions. They also provide support to teachers to effectively service Indigenous students and their families. If you work with an Indigenous support worker, it can be great to get their perspective on your activities with habitat restoration and ways to implement cultural awareness in your classroom.

Nicole’s story

Nicole is passionate about land-based education and incorporating Indigenous perspectives; *“if we’re going to do this outdoor classroom, I really want the students to connect to the land before even doing anything else in our outdoor learning space”*. She works with Gretchen Sands-Gamble, the Elementary Indigenous Education Special Projects Teacher, who supports and extends learning that involves Indigenous content. On the first day, Gretchen welcomed students to the garden and read *Giving Thanks*. The primary students then did a Ziigwan (Spring) Scavenger Hunt and identified animals and plants, and why they are thankful for them.

In collaboration with her colleague, Kasey Martin, a learning opportunity was created to integrate Indigenous perspectives with the Ontario curriculum expectations for the older students. They learned to use a compass and followed the coordinates to different areas of the playground, leading them to a gift from Mother Earth (e.g., food, water, the sun, the moon). Afterwards, the class had a discussion about why they were grateful for those things, and how it’s their responsibility to protect them. An Ojibwe speaking student at the school was able to teach the class the cardinal directions in the Ojibwe language.

Nicole will also source the plants for her continued project in the fall from the greenhouse run by Aamjiwnaang First Nation. Her intention is to continue supporting and forming a connection with local Anishinaabe growers.

2.3. Barriers and Solutions

"With passion, the path will appear" – Myrna, Educator

"Just start with who you've got and follow the enthusiasm. People will come on board once they see something's working and has a value" – Linda, Classroom Teacher & Outdoor Classroom Coordinator

Table 2. Barriers and Potential Solutions

Barrier	Potential Solutions	Other Considerations
Accessibility to/ availability of native plants, soil, and equipment	<p>Start planning early for your habitat restoration project (winter is a good time for this!). Reach out to local nurseries early in the off-season, to ensure that their supplies have not run out.</p> <p>Reach out to local suppliers (small suppliers or large retailers) and tell them about your project. See if they could donate any soil or equipment or give a discount.</p> <p>Research programs that may be able to provide free native plants (see: Appendix A. Resources)</p>	<p>One of the pilot teachers noted an equity issue where some schools have lots of garden beds, and others had a lack of access to nature. She suggested that the School Board could sponsor habitat stewardship programs that directly provided cheap/free native plants, soil, and resources to teachers so that a teacher would not have to do so much work.</p> <p>A habitat restoration project is a lot of work and extra time for a teacher. Teachers may wish to ask for release time.</p>
Lack of knowledge of local native plants	<p>Connect with existing local stewardship projects, reach out to botanists, naturalists, enthusiasts etc. who might be parents or other teachers.</p> <p>Talk to others, people may surprise you with their knowledge and connections</p> <p>Conduct your own research</p>	<p>Use field guides and apps like iNaturalist to learn about the plants that grow near you, which are native species, which conditions they grow best in, which other species they grow alongside etc.</p>
Lack of support from administration	<p>Every school has a vision and improvement plan in which its priorities are stated. Tie your naturalization project to school priorities (science & technology, social emotional learning, inclusion etc.)</p> <p>Present relevant research on the benefits of outdoor education and</p>	<p>Ecology touches everything! Tune your language and goals to match your audience but keep the core message of restoration and stewardship there.</p>

	<p>experiential learning.</p> <p>Creating a visual presentation of your project and showing photos and videos of your class enjoying and learning in nature can attract supporters</p>	
Lack of time and resources	<p>Start small; habitat restoration is a slow process. Have conversations with and collaborate with other staff and teachers on the project to share responsibilities and workload.</p> <p>Start with what you have, others will naturally join when they see that you're passionate about what you're doing.</p>	<p>Gardens attract people; once it's started, other teachers, parents, community members usually want to help!</p> <p>Ecological transformations won't happen overnight, or even in one year. A test-plot as small as 3 m x 1 m is a valid experiment to learn what works and what doesn't.</p>
Classroom management (challenging behaviour from kids/ attention span)	<p>Split into small groups to take turns planting</p> <p>Be organized and structured. Have rotational activity in stations</p> <p>Have another teacher help watch a group if possible</p> <p>Come up with engaging educational activities that keep children active outside</p>	<p>Creating boundaries for risk management. Determine where kids can go, spaces that can be trampled (pathways, play area) vs. spaces where plants can grow</p> <p>Work alongside Maintenance Staff and Administration, the area being restored can be cordoned off and signage can be put up to explain the project and to protect it.</p>
Lack of funding	<p>You may be able to access funds/donations through PAC, administration, your City, district and School Board, or through fundraising with your students.</p> <p>Applying for funding and grants is time-consuming. If possible, partner up with someone with grant-writing experience (e.g., an administrator) can reduce the workload.</p> <p>Ask people to get involved by letting them know why your project matters, how it will help students learn and become better citizens, etc.</p> <p>Create a presentation and be specific about your vision, goals, and budget.</p>	<p>One of the pilot teachers received donations of soil from a local organization, by emphasizing why her project matters and getting community members involved</p> <p>You may be able to propagate seedlings or cuttings or purchase extra plants and sell them as a fundraiser for your project.</p>

3. HABITAT STEWARDSHIP: HOW-TO MANUAL

3.1. Where?

There are many different starting points for different types of gardens: a sunny area can become a pollinator meadow; a muddy puddle can become a mini wetland; a shaded spot can become a woodland; a paved area can become a container garden.

Choosing a possible location might be as simple as choosing to plant in an unused area of the school that's been neglected. It could also be enhancing an existing green space on your school grounds. Not all habitat restoration happens on the school ground. It could be getting your students to plant at home.

The first step is choosing your habitat restoration space and coming to understand the type of habitat it is or could become. Spending time assessing and observing your site with your students can help develop relationships to the space. Consider the bioregion, soil type and quality, and surrounding environmental conditions (light, moisture, biodiversity). You can come to deeply understand your space over time and from as many aspects/perspectives as possible. The plants and the space can teach you something new on each visit.

Light

For plants, light is food. So, how much direct sunlight will your plants receive? For how many hours? Some plants (summer vegetables) require at least 10 hours of direct sunlight, while other plants prefer cooler, shadier environments.

As a rule of thumb: "shade" is <4 hours of direct sunlight, part-shade/sun is 4-8 hours, and "full sun" is >8 hours. Keep in mind the length of tree and building shadows changes not throughout the day, but also over the course of a year. A fun activity is to have your students plot light maps of the space (See Appendix C: Habitat Stewardship Action Plan).

Moisture

Water is essential for all plants, especially in the weeks right after planting. Once established, some plants prefer moist soil while others can tolerate dry conditions. Here are some questions you can ask to better understand water and moisture on your site. How much rainfall does your region receive? Does extra rainwater collect in this area? Is there a downspout or drain nearby? Are there slopes/gradients on the site? (If the area is sloped, the higher spots will be drier and the low spots will be wetter). Is your soil dark and spongy/clayey (more retentive) or coarse and sandy/gravelly (less retentive)? Is your area close to a water hose?

It's a great idea to take a look at your site (safely!) during or just after a big rain event, as this is when you'll really be able to see how water flows and pools. A garden can be an excellent sponge in wet areas, and planting in a wet spot means you won't have to water as much!

Access

Consider the logistics and accessibility of your space for various activities. Is your space accessible by foot, by wheelchair, by cars and for a truck with soil supplement and equipment? Who gets to use this space (students, staff, families, community members etc.)? Consider the experiences of diverse people who may use the space, are there barriers that could prevent access for certain individuals?

Baseline

Before you plant, record as much as you can about your site so that you can track changes as your plants grow and the habitat becomes restored. Some important metrics to consider are the proportion of green area to grey area (planted vs. not planted); the proportion of native plants vs. non-native plants; the total number of plant species; green biomass (the volume of leaf/stems); wildlife and pollinator species and abundance. A useful tool for this is the In The Zone Garden Tracker, available at www.inthegardens.ca



3.2. Vision, Goals & Purposes for Your Habitat

Your habitat space has a purpose. Whether you are building an educational community garden or enhancing an existing green space, your habitat will help teach your students about environmental justice, food systems, and their responsibility to each other and the land. What type(s) of garden or habitat would you like to plant? It's good to set goals for yourself (# of species observed, a harvest of seeds or food, biomass increased, etc.)

Indigenous medicinal garden

Indigenous medicinal gardens are a visible way of reconciliation through place-making. They are a great way to learn about local Indigenous cultures, history of the land, traditional plant knowledge and Indigenous food sovereignty. However, creating a medicine garden without consulting and involving Indigenous peoples or communities can be seen as tokenistic, or a form of shallow “virtue signaling”. In order to make your medicine garden a true step in the direction of reconciliation, ensure that Indigenous peoples and communities are directly involved and supported through this space. For example, are there medicines/herbs/foods that you can grow, harvest and share with a local Friendship Center?

Furthermore, Indigenous rights to land can be supported by enabling long-term Indigenous control over how the space is managed, what plants are grown, how plants are harvested and used (Peach et al., 2020). Sharing the garden with community members and local Indigenous peoples can strengthen relationships for meaningful reconciliation.

Resources:

[xwǿǿsəm: Indigenous Health Research and Education Garden at UBC Farm](#)

[Indigenous Food and Medicine Garden at Western University](#)

[Sacred Medicine Garden](#) / [FoodScape Calgary](#)

[Indigenous Education Garden \(OISE\)](#)

[First Nations Traditional Plants and Uses \(Alberta Teachers' Association Walking Together Project\)](#)

Rain garden

A rain garden grows native shrubs, perennials, and flowers planted in a small depression, and is designed to collect and soak in rainwater runoff from roofs, driveways, and lawns. Rain gardens filter out pollutants in runoff, reduce water pollution, and provide habitat and food for wildlife. In addition, they provide stormwater and flood control for your school property. In very wet areas, it's possible to grow beautiful wetland or bog plants. In drier areas where water sometimes pools or flows, rain will help reduce the watering you need to do, but you should still grow plants for intermediate or dry conditions.

Pollinator Meadow

A pollinator garden or meadow is generally a part-sun or full-sun area with native plants that attract bees, butterflies and birds. In addition, you may create bug and bee houses with your students to support local bees and pollinators. Keep in mind that not all plants labelled as “pollinator friendly” are actually native species (they may simply be exotic “wildflowers” that are neonicotinoid or pesticide free). The best option for supporting biodiversity with nectar, pollen and leaf material is to plant masses of native plants in the Aster, Mint and Carrot families.

Diane’s story

At Diane’s school, the pollinator garden became a school-wide project to which everyone could contribute. Parents helped with the construction of seven large wooden planters and summer watering. With donations of plants and seeds from The Butterflyway Project, students from all grades were able to plant a number of seeds in peat pellets, care for them in the classroom and then help transplant them into the containers.

“We enjoyed the actual gardening and watching of flowers growing the most. It is exciting to see butterflies start to come and check out the plants.”

- Diane, Vice-Principal

Woodland Garden

A woodland garden connects with local ecology and provides habitat for birds, insects and small mammals. It usually consists of four layers: a canopy of very large and tall trees; a sub-canopy of smaller or younger trees; an understory layer of shrubs; and a ground-layer of grasses, sedges and herbaceous perennial plants.

Woodland (or forest) garden plants are excellent at capturing carbon in their tissues. Make sure you’re leaving dead leaves, sticks, stems and wood on the ground to decompose and convert that captured carbon into rich, fertile soil for long-term storage!

Enhancing Ecological Habitat

Your habitat restoration might not be a garden, but instead an enhancement of an existing green space such as forest or park area. Find out about the native plants that grow in the area and its environmental history.

Kristina & Pablo’s story

Kristina and Pablo led their students on field trips and hikes to learn about what a healthy forest looked like. Their students plotted light maps and measured the space. They also consulted with Metis herbalist and educator [Lori Snyder](#) about local native and medicinal

plants. *"The area that we are restoring is part of a green corridor within an urban area. It's a little green belt inside a completely developed area so it is very precious"* - Pablo, Master Gardener

"When we did our light mapping, that was really exciting because they [the students] started to think about how we look at a place, how we can understand what it needs, and who lives here and what they need" - Kristina, Classroom Teacher



Kristina and Pablo's ecological enhancement project. Photo by Kristina Carley.

Sensory Garden

Sensory gardens appeal to the senses, using plants that stimulate sound, touch, smell, taste or sight. Sensory gardens can be used for physical or emotional healing and therapy. Plants such as flowers, herbs, and edible fruits can be part of your garden. Use plants with different leaf textures, colours and hairiness for variety. Make sure all the species you choose are safe to touch and smell.

Food Garden

A food garden has a lot of value for teaching about food systems, planting, harvesting, cooking and tasting. Food-themed gardens include vegetable garden, pizza garden, herb garden, edible berries and fruit garden.

Balcony/container garden

All of the above options could exist in the form of a container garden. Students could be growing at home especially if they live in apartments.

Myrna's story

In her teaching, Myrna includes three core principles-- community, curriculum, and care. She asks critical questions: Who is part of the school community? What are their needs? How can the curriculum be used to enhance students' awareness of the world around them? How can they learn to see the wonders of nature, plants and water through math, music and stories? How can "caring" be taught? How can children learn to value themselves, each other, and the gifts from the earth?

The students Myrna teaches live in the middle of a busy city. Many families live in high-rise apartments; and while they have gardening knowledge, there is limited access to gardening land. When Myrna learned that many of her students' families were experiencing food insecurity, she asked her principal if the school could start a school community garden. The project changed to balcony container gardens to address the restrictions due to the Covid pandemic. With classes being taught online, there was an additional complication. Myrna said, *"And that's when I thought, at school I bring the students to the dirt, but what about sending the dirt to the students?"* Soil, seeds, pots and other supplies were delivered to the students' apartments. They planted and watched seeds germinate and grow. Online they showed each other the growing plants. Everyone was so excited. Myrna also planted, nurtured, coordinated the growing project and finally was able to deliver the container gardens.



Myrna's student and her container garden. Photo by Myrna Coleman.

3.3. What: Choose and Source Plants, Materials, and Tools

Native plants support and sustain a vast diversity of local insects, birds, and mammals. They are well-adapted to the environment and are low maintenance. Native plants are essential for our ecosystem as they help reverse biodiversity loss and sequester carbon.

Find local nurseries that specialize in native plants. Talk to your local grower and see what they recommend as suitable for your area. For materials, you will need soil, solid fertilizer (e.g., manure, compost, worm castings), watering can/hose, trowels, shovels. Some of these can be donated.

For more information about native plant species, see:

Across Canada

<https://can-plant.ca/>

<https://nanps.org/commercial-growers/>

<https://pollinatorpartnership.ca/en/ecoregional-planting-guides>

North Westcoast

<http://www.sfu.ca/halk-ethnobiology/html/main.htm>

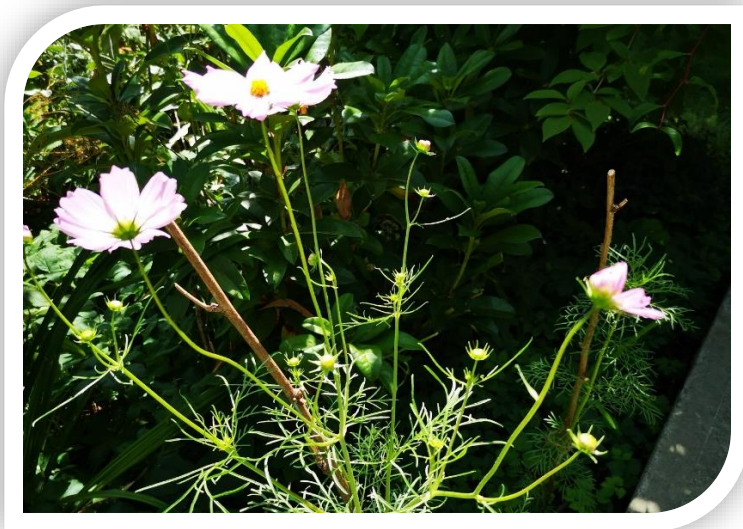
<https://ibis.geog.ubc.ca/biodiversity/eflora/>

<https://www.wnps.org/starflower>

East Coast

<https://inthezonegardens.ca/where-to-find-native-plants-ontario/>

<https://highparknature.org/resources-by-high-park-nature/>



3.4. How: Planting, Watering, Mulching, and Maintenance¹

Instructions for planting

1. Dig a hole as deep as the height of the plant pot
2. Turn the pot upside-down while holding one hand over the top of the pot, then gently squeeze the bottom of the pot until the soil and roots slide out. Massage gently with your fingers to loosen the roots.
3. Place the plant in the hole you made and fill any gaps with soil. Place your hands around the stem and press down firmly.
4. Water all the plants thoroughly.



¹ Adapted from the In The Zone Garden program, resources available at <https://inthezonegardens.ca/ontario/>

Maintenance: Season's wheel

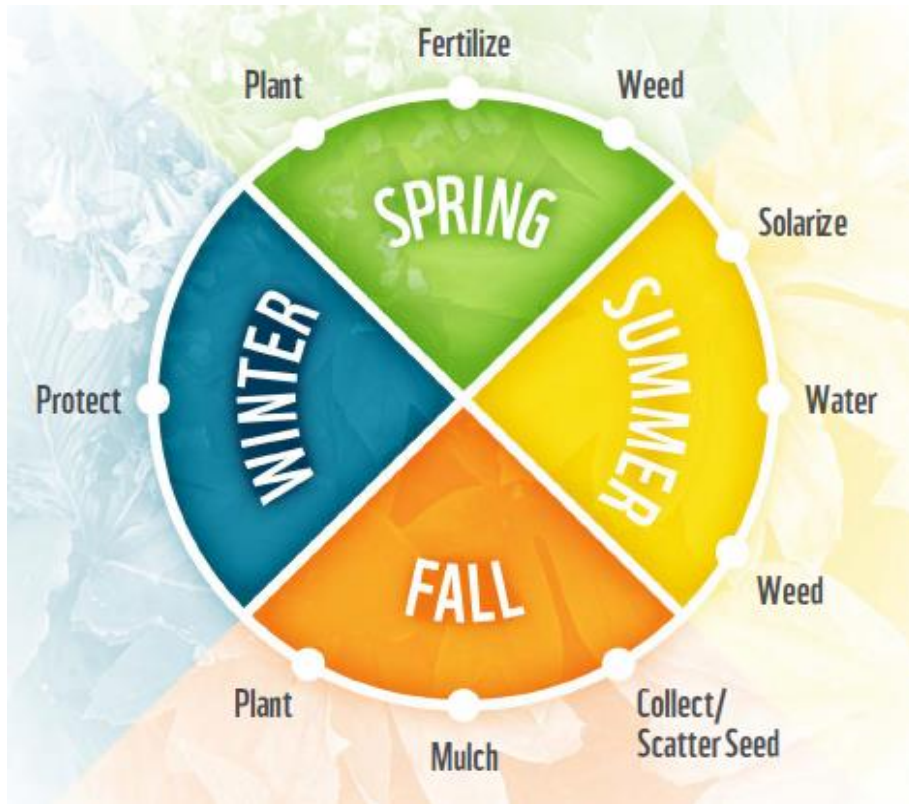


Figure 1. The wheel shows what your garden needs in each of the four seasons. The timing of these activities will vary from year to year and will depend on your regional conditions.

Table 3. A glossary of necessary steps for maintaining native plants in your habitat garden

Collect/ scatter seeds	Leave your plants to dry out and drop their seeds or spread seeds from a seed pack in a thin, even layer over the soil surface. For larger seeds, bury them in the soil about 2 times deeper than the seed width.
Fertilize	Spread 1L of solid fertilizer (e.g., compost or worm castings) per m ² of planting area on top of the soil. Gently mix it in using a garden trowel or small rake.
Mulch	Gather dried leaves, stems, small twigs and seed heads; scatter them to form a 5-10 cm thick layer at the base of your plants. This provides protective insulation in the winter and early spring.

Protect	Plants in the ground, native plants covered by a layer of leaf mulch will be perfectly safe from winter conditions. They may be at risk of damage from animals chewing on them: physical barriers like deer guards and wire cages can help prevent this.
Water	During the 4–6 weeks after planting, water plants once every 3–4 days if the soil is dry. Otherwise, water your plants thoroughly if you see signs of wilting (limp leaves or stems) or browning leaves: about once a week if they aren't getting rained on.
Weed	New plants may show up in your garden: these could be weeds, or they could be baby native plants! If you're not sure what something is, leave it, take a picture, and ask a garden expert before deciding whether to remove it.
Solarizing	Water the area you've chosen (e.g., section of lawn or weed patch), cover it with a tarp or thick plastic and weigh it down with bricks or stones. Let the sun's heat "bake" the area under the tarp for 4-6 weeks or until you're ready to plant. Remove the tarp and rake the area. This process sterilizes your soil so that all existing plants and seeds will be killed.

3.5. Indigenous Consultations

Your habitat garden is a great way to connect with the local history of the land. Knowing that Indigenous communities have stewarded the land for millennia, how did the land look like before settler-colonialism? Who are the local First Nations and Indigenous communities on your Treaty territory or unceded territory? How can you collaborate with and support local Indigenous communities through habitat stewardship?

Where to start?

If your school has existing relationships with Indigenous communities, it will help to deepen these relationships and partnerships. You may also consider purchasing plants from Indigenous-owned plant nurseries, as well as consulting with Indigenous ethnobotanists, herbalists and educators.

For Kristina and Pablo, it's about nourishing relationships. They have both worked with Metis herbalist and educator Lori Snyder previously, and decided to collaborate with her on their ecological restoration project. *"That was a really great way to build and strengthen the relationship that we have with her in particular... You can't have environmental education without really thinking about [Indigenous perspectives], principles, and pedagogy."* - Kristina, Classroom Teacher

4. NEXT STEPS

4.1. Deepening Relationships: Protecting for Long-term

The relationships you have with your surrounding environment are akin to your personal relationships; they need to be strengthened and deepened over time. This is the beginning of your habitat stewardship journey. Each time you return to your space you and your students will notice/learn something new. Record changes of your site as it flourishes and grows. A useful tool for this is the In The Zone Garden Tracker, available at www.inthegonegardens.ca.

Some important metrics to consider are the proportion of green area to grey area (planted vs. not planted); the proportion of native plants vs. non-native plants; the total number of plant species; green biomass (the volume of leaf/stems); wildlife and pollinator species and abundance. Other metrics include wildlife observations, and the number of people (volunteers) involved. (See Appendix C: Habitat Stewardship Action Plan).

4.2. Expanding

You might think about expanding your growing area and creating a greater impact at the community level. Is there potential to create interconnected green spaces or green corridors? You might also want to collect seeds and share these seeds with students, families and the greater community so that they may be able to continue planting at home and in the community.

Sharing your habitat stewardship story and journey with others (educators, community members, municipal and district officials, etc.) is important as it will inspire others to take action.

"The vision of these spaces is sometimes hard to create for people, they don't understand what it's going to look like. That's where the photos, the stories and the joyous moments are so important [...] Photographing the insects, the joy and the excitement of "look what I found, look at the size of this grasshopper, it's incredible!" That's what you go back with and say: "how do we make this happen more?" - John, Innovation Leader

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APPENDICES

Appendix A. Resources and Further Reading

Books

- Anderson, D., Chiarotto, L., & Comay, J. (2017). *Natural Curiosity 2nd edition: A resource for educators: The importance of indigenous perspectives in children's environmental inquiry* (2nd ed.). The Laboratory School, Dr. Eric Jackman Institute of Child Study, Ontario Institute for Studies in Education, University of Toronto.
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Links

- [Canadian Wildlife federation](#)
- [City before the city](#)
- [David Suzuki Foundation Butterflyway Project](#)
- [Jane Goodall Institute](#)
- [North American Native Plant Society](#)
- [Seeds of Diversity](#)
- [Plant a seed \(free books\)](#)
- [White Owl Native Ancestry](#)
- [WWF-Canada webinars](#)
- [WWF fabric pots \(fair trade\)](#)
- [Youth Action for Climate Change \(YACC\)](#)

Appendix B. Frequently Asked Questions

WHAT IS HABITAT STEWARDSHIP?

Habitat stewardship is defined as actions taken by individuals or groups of people to protect, care for or responsibly use the environment (Bennett et al., 2018).

WHY IS HABITAT STEWARDSHIP IMPORTANT?

Restoring and protecting native habitats will support and sustain biodiversity, improve human health and wellbeing, increase food and water security, and support climate change mitigation, resilience, and adaptation (Gann et al., 2019). It is a solution-based approach to rebuild a healthier relationship between people and the rest of nature .

WHAT ARE NATURE-BASED SOLUTIONS?

Nature-based solutions are ways of tackling climate change with actions that protect, sustainably manage and restore natural or modified ecosystems while also providing human well-being and biodiversity benefits (Cohen-Shacham et al., 2016).

WHAT IS AN OUTDOOR CLASSROOM?

To us, an outdoor classroom is a space embedded in nature and surrounded by biodiversity. This space has educational and health benefits and an ecological philosophy built-in. Students get to learn about native plants, ecosystem services, climate change mitigation and resilience.

WHAT ARE THE BENEFITS OF AN OUTDOOR CLASSROOM?

Research has shown that children who spend more time learning outdoors are able to focus better and require less management. A combination of time in nature and indoors contributes to children's social, cognitive, emotional and physical skill development through experiential learning.

HOW CAN I CONNECT MY CLASSROOM TO HABITAT?

To do this, we suggest a 3-stage process:

1. Learn about your local ecosystem, its history, biodiversity, how it works and what it needs.
2. Actively engage in ecological restoration by planting locally sourced native plants.
3. Extend and deepen relationships through stewardship activities year-round.

HABITAT RESTORATION SEEMS LIKE A BIG PROJECT FOR ONE TEACHER, HOW CAN I GET STARTED?

Start small; habitat restoration is a slow process. Have conversations with and collaborate with other teachers and staff on the project to share responsibilities and workload. Start with what you have, others will naturally join when they see that you're passionate about what you're doing.

I DON'T KNOW A LOT ABOUT LOCAL NATIVE PLANTS AND HABITATS, WHAT SHOULD I DO?

Reach out to local environmental organizations and connect with existing local stewardship projects. Reach out to botanists, naturalists, enthusiasts who might be parents or other teachers. Talk to others, people may surprise you with their knowledge and connections. Conduct your own research.

HOW CAN I GET MORE FUNDING FOR MY PROJECT?

You may be able to access funds/donations through PAC, administration, your city, district and school board, or through fundraising. Reach out to local suppliers (small suppliers and large retailers) tell them about your project, see if they could donate any soil or equipment, or give a discount. Partnering up with someone who often writes grants can reduce the workload.

WHAT SHOULD I PLANT IN MY OUTDOOR CLASSROOM?

Your outdoor classroom also provides food and habitat for wildlife. However, the imported varieties we normally plant often have little food or habitat value for wildlife. When we plant native species, we are restoring the health of the natural landscape, which supports local biodiversity and mitigates climate change.

SHOULD I REMOVE INVASIVE SPECIES?

There are different perspectives on this question, as removal and eradication of invasive species can be costly and disruptive. These plants may have a use or function, such that removal can be considered as a type of harvest. This way, invasive plants can be managed as part of stewardship. Consider: Is there a way to frame a positive or functional relationship here?

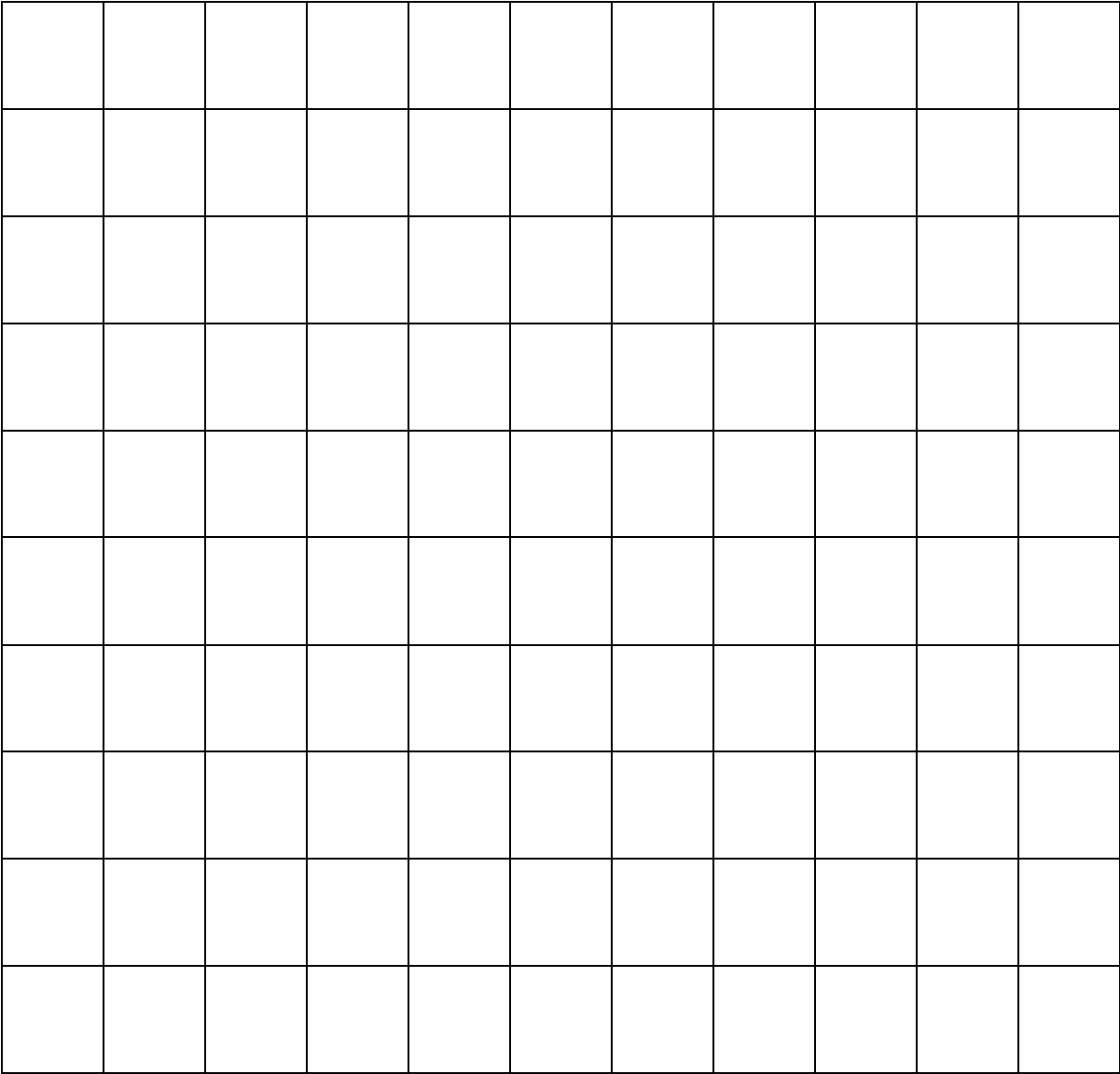
HOW CAN I INCORPORATE INDIGENOUS PERSPECTIVES INTO MY OUTDOOR CLASSROOM?

When talking about habitat stewardship, it is important to remember that Indigenous peoples, who have taken care of the land since time immemorial, are the original and rightful stewards of [Turtle Island](#). Non-Indigenous teachers across Canada are already teaching about colonial history and Indigenous cultures in their classrooms. Respectfully incorporating Indigenous perspectives in your outdoor classroom can open up critical discussions about justice, equity, colonial history and reconciliation.

Appendix C. Habitat Stewardship Action Plan

1. SKETCH YOUR SPACE

With the help of Google maps, use this page to sketch your school property. Plot grids over your sketch to help with scales and ratio.

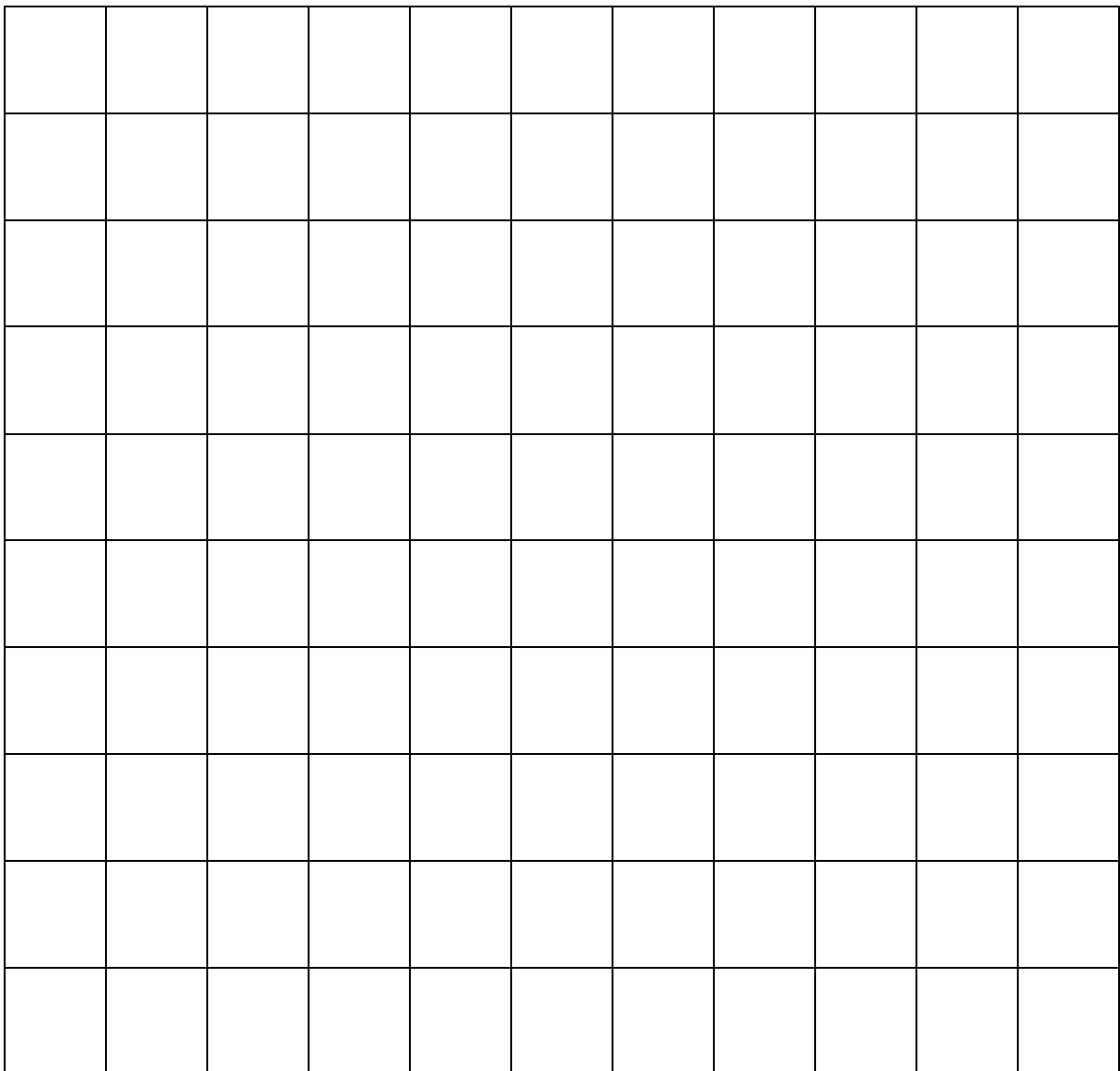


2. LIGHT MAPPING

Adapted from <https://www.gardeningknowhow.com/garden-how-to/info/making-a-sun-map.htm>

Light mapping can be a fun activity to do with your students. To make a sun map, you will need graph paper, a ruler, and colored pencils. Redraw the map that you've sketched of your habitat area onto a new graph paper. (Be sure to include buildings and other structures, such as tall fences, large trees and shrubs, and anything else that may cast shadows throughout the day.)

From first light to last light, mark down where sunlight is hitting the garden and where the shade is for every 2 hours. Use reds, oranges, and yellows to mark sun exposure and cool colors like purple, blue, and gray to indicate shade. (Each time, use a different colour/ orientation)



3. WATER MAPPING

After a rain event, map where water collects and flows on your property (use arrows to show the direction of water). Indicate puddles, ponds, wetlands, streams, down sprouts from roofs, slopes, dry vs. wet spots. (This may help for planning for rain gardens)

You may also wish to mark down the location of hoses, sprinklers, and irrigation.

OBSERVATIONS (OTHER ELEMENTS TO LAYER ON TO YOUR MAP)²

- ❖ **Soil quality:** compaction, particle and nutrient composition of the site, suitability for plants. Soil amendment.
- ❖ **Site context and connections:** Is your garden location close to a kitchen, washrooms, storage, and compost? How does the garden relate to the context of the site (What's around it)?
- ❖ **Buffer:** How much vehicle or foot traffic? Distance from sports fields and dog parks can reduce the possibility of conflict.
- ❖ **Materials:** Are there possibilities to reuse material from projects or operations nearby?
- ❖ **Microclimate:** Are there any prevailing winds or microclimate that might interfere with the project? If so, is there a way to mitigate it?
- ❖ **Distribution of resources:** Are there other stewardship projects or gardens nearby? Where are the areas of the city that do not have access to food or other garden projects? (possibilities for sharing seeds, spaces, collaborating with senior homes)

ENVISIONING YOUR SCHOOL YARD HABITAT GARDEN

- ❖ What are my educational and curricular goals that might influence the garden's shape and design?
- ❖ How will I get students involved in the process of building the garden?
- ❖ How can my garden design and curricular teachings include and address issues of access, inclusion and diversity of underrepresented groups?
- ❖ How will the greater community interact with your habitat garden?

² Adapted from: https://sustain.ubc.ca/sites/default/files/2015-15_Urban%20Agriculture%20Grow%20Guides_Gocova.pdf

4. HABITAT CALCULATOR

	Habitat Types	Definition	Technical terms	Percentage of property (0-100)	
A	WATER	Wet areas e.g. pond, stream, ditch, puddle	aquatic ecosystems, wetland habitat		Natural infrastructure <i>Add A+B+C*</i>
B	TREES	Wooded area e.g. forest, fruit trees, include shrubs	forest, woodland, savannah		
C	PLANTS	Planted for other uses e.g. gardens beds, planter boxes	cultural habitat, vegetation, agriculture		
D	SOFT	Surfaces that rain can soak through e.g. lawn, soccer fields, gravel, wood chips	permeable surfaces		Human infrastructure <i>Add D+E</i>
E	HARD	Rain runs off e.g. buildings, parking lot, paved driveway	impermeable surfaces		
	WHOLE PROPERTY	<i>Add all types A-E</i>		100	

*The higher the proportion of natural infrastructure, the **healthier, more resilient and more biodiverse** a landscape will be. Aiming for 30-50% is an excellent goal. You can achieve this by expanding existing natural infrastructure features (categories A, B, and C) and/or by converting human infrastructure (categories D and E) so that they include natural features.

5. HABITAT RESTORATION PROJECTS

Decide which categories you'd like to restore or enhance. Choose project ideas from the table below.

Area Type		First Steps	Next Steps	Longer-term Projects
A	WATER	<ul style="list-style-type: none"> Plant water-loving native plants 	<ul style="list-style-type: none"> Create a rain garden 	<ul style="list-style-type: none"> Grow natural buffers (e.g. bioswale)
B	TREES	<ul style="list-style-type: none"> Leave or add leaf litter, wood, stones 	<ul style="list-style-type: none"> Plant shade-loving native plants (e.g. groundcover, shrubs, vines) 	<ul style="list-style-type: none"> Plant more native trees to maintain canopy cover over time
C	PLANTS	<ul style="list-style-type: none"> Add a few native plants to your space 	<ul style="list-style-type: none"> Replace non-native /ornamental plants with diverse native species 	<ul style="list-style-type: none"> Grow garden beds for seed harvest and sharing
D	SOFT	<ul style="list-style-type: none"> Stop using pesticides/herbicides Reduce mowing 	<ul style="list-style-type: none"> Plant a garden bed Incorporate steppable native plants 	<ul style="list-style-type: none"> Convert to native plants and trees
E	HARD	<ul style="list-style-type: none"> Make a container garden or raised bed 	<ul style="list-style-type: none"> Grow a native tree over hard surfaces to increase habitat and save energy 	<ul style="list-style-type: none"> Create a rooftop garden