



Green Space and Biodiversity in Healthcare: A Draft Strategy for Fraser Health

Simon Fraser University
Master of Public Health Capstone Project

Team **Green**  **Health**

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Executive Summary

Fostering biodiversity helps mitigate climate change impacts and supports healthy ecosystems, both of which have significant positive downstream implications for human health. Our team, Green Health, noticed the relevance of having biodiversity, planetary health, and green spaces in health facilities for improving patient health. Highlighting the importance of biodiversity in planetary health and human health is especially relevant in British Columbia (BC), as the province boasts having the most biodiversity in Canada while also having the highest number of species that are at risk of extinction nationally.¹ In 2021, Ecojustice and the Wilderness Committee released the [“BC Government Biodiversity Report Card”](#)¹ on which it received a C- in parks and other protected areas and a failing grade in the rest of the areas including protection and recovery of species at risk, protections and recovery of at risk ecosystems, protection of natural habitats of all species and ecosystems, and other laws to protect biodiversity.¹ Taking into consideration BC’s challenges and opportunities to improve biodiversity as well as the studies demonstrating that access to biodiversity and green space enhances human health, Green Health’s team consulted with Fraser Health Authority (FHA) to examine ways in which FHA can be an active participant in the revival of biodiversity in the province. The resulting research question that Green Health’s team and FHA have put forward is: *What can a health system do to support linkages with the natural environment/biodiversity for both patients and the broader community it serves?*

Through an equity-centred design process and a focus on decolonization, consultations, research scans, and key informant interviews were utilized for data collection to best inform this document. We have chosen “Pathways linking biodiversity to human health: a conceptual framework” ([Appendix A](#)) to help us ground our research and conceptualize links between biodiversity and health. The most common way that patients can connect with ecosystem biodiversity is by exposure to local green space.² Allowing patients to experience biodiversity can be a non-medical intervention³ to benefit patient health via reducing harm (bettering air quality), restoring capacities (increasing stimulation, social connection, and mental health) and building capacities (improving mobility).² As advised by one of our key informants, ensuring that we are utilizing a framework that does not pan-Indigenize and captures the perspectives of all groups—Indigenous and non-Indigenous—is a starting point until more communities contribute to this living document. Building sustainability requires decolonizing planetary public health. Embedding decolonial praxis in healthcare systems and institutions requires a paradigm-shift in all levels of the organization, and not only in the delivery of care. It demands sustained reciprocity with and for Indigenous communities.

To best inform our Ideation and Prototype stages, we created an empathy map and user profile ([Appendix B](#) and [C](#)), and then conducted a root-cause analysis to better understand the factors, circumstances, and events leading up to our problem. From this process, we determined a root cause ([Appendix D](#) and [E](#)). At this point of the project, we focused on the issue of understimulation, lack of autonomy, poor mental health, and loneliness in patients and users of healthcare services in the FHA region ([Appendix E](#)).

An [environmental scan](#) was conducted to best inform recommendations from across Canada and the world. These recommendations are summarized into four core areas:

1. Improving community health through planetary health via biodiversity;
2. Global conceptualization of green space and cross-jurisdictional review;
3. Implementation strategies of planetary health in a healthcare system; and
4. Indigenous ways of knowing, decolonization, and planetary health.

Core area one provides an overview of the impacts of green spaces, biodiversity and planetary health interventions. The second core area demonstrates how initiatives were implemented nationally and internationally. Core area three separates the implementation strategies into behavioural, structural, and community-based. The last core area discusses the Indigenous Knowledges, the Determinants of Planetary Health and the seven re-Indigenization principles for transforming biodiversity conservation. Summaries of these core areas can be found in Tables 1-5 in [Appendix F](#).

To develop this draft strategy, [key informant interviews \(KII\) and stakeholder consultations](#) from multiple areas of practice were conducted. Equity, social prescribing, partnerships and implementation were overarching themes across these consultations. Decolonization, trauma-informed and inclusive initiatives, and place-based initiatives were components of the equity theme. The differences between social prescribing and social prescription are necessary for implementation, though challenges may arise in the current state of healthcare delivery. Partnerships are imperative to continue this work as Indigenous community partners, a multidisciplinary group in FHA, and technical partners are needed. Lastly, navigating the complexities of a health authority to achieve large scale impact requires starting from a small point while considering financial options.

[Recommendations](#) from this draft strategy revolve around establishing accessible healthcare delivery as a priority, continuously engaging communities, creating educational activities to increase awareness of social prescribing among staff and patients, and ultimately, assessing the cost/benefit of implementing biodiversity, planetary health and green space initiatives in FH.

When incorporated into green space projects, biodiverse spaces implicitly promote ecosystem health, benefitting local flora and fauna while reducing environmental health hazards. Biodiverse spaces that grow local native plants also act to decolonize green environments by facilitating access to Indigenous medicines, traditions, and practices. Finally, biodiverse spaces can promote community engagement, both between people and with their surroundings.

Equity-Centred Design Process

Our team used an equity-centred design process developed by Anaissie et al.⁴ to create and test our prototype which is this living draft strategy document. The design process consists of several stages—notice, empathize, define, ideate, reflect, prototype, test, and reflect—and is meant to be iterative, where the designers can return to any of the stages at any time whenever needed. We believe that implementation of green space and biodiversity initiatives requires an equity lens to ensure that all of the communities in FHA's service area are represented as well as to provide FHA's patients, caregivers, and staff with the nature-centred environments that can help them thrive. Therefore, the equity-centred design process would be a useful tool for FHA to employ as the health authority embarks on planning their green space and biodiversity initiatives. As a guide on how to use our draft strategy, we have created a detailed journey map (see figure 1), a simplified flowchart (see figure 2), sets of questions to explore in each design stage (see figure 3), and recommended action steps for each design stage (see figure 4). Our team added an extra stage at the end called "revisit." Although this stage is not part of Pinedo et al.'s design, its purpose is to illustrate the iterative nature of the equity-centred design process which is an aspect of the design that Pinedo et al. emphasize.

Figure 5 depicts an eight-panel storyboard we created to visualize one potential use for this draft strategy. In the first panel, an elderly patient stares blankly out of a hospital window; her attending nurse, new to the hospital, notes the view of asphalt and parked cars with sadness. Panel two highlights the dearth of green space and biodiversity surrounding the hospital. In panel three, the nurse presents her concerns during a facility-wide staff meeting; she believes that lack of green space access is harming patients' mental and physical wellbeing, especially among patients with mobility issues or those in long-term care. She points to some of the co-benefits of fostering biodiverse green spaces within healthcare facilities, including improving human health, promoting climate mitigation and resilience, and—as population health improves—decreasing healthcare costs long-term. Administration is intrigued, but not convinced by the few studies presented; they brush her off. Undeterred, panel four depicts the nurse searching hospital archives for information, uncovering Green Health's draft strategy. Hospital administration is impressed with the compiled evidence and swayed by the easy-to-follow guidelines. In panels five and six, the healthcare facility and Green Health consultants engage communities and stakeholders to inform their design process. As a result, in panel seven the healthcare facility campus is an ecosystem replete with native flora and fauna that have significance to the communities that the healthcare facility serves. Finally, in panel eight, the hospitalized patient inside feels better just from looking out his window at the verdant scenery below, and there is another patient outside who is happy to be walking outside in nature, enjoying the fresh air.

EQUITY-CENTRED DESIGN STAGES JOURNEY MAP*

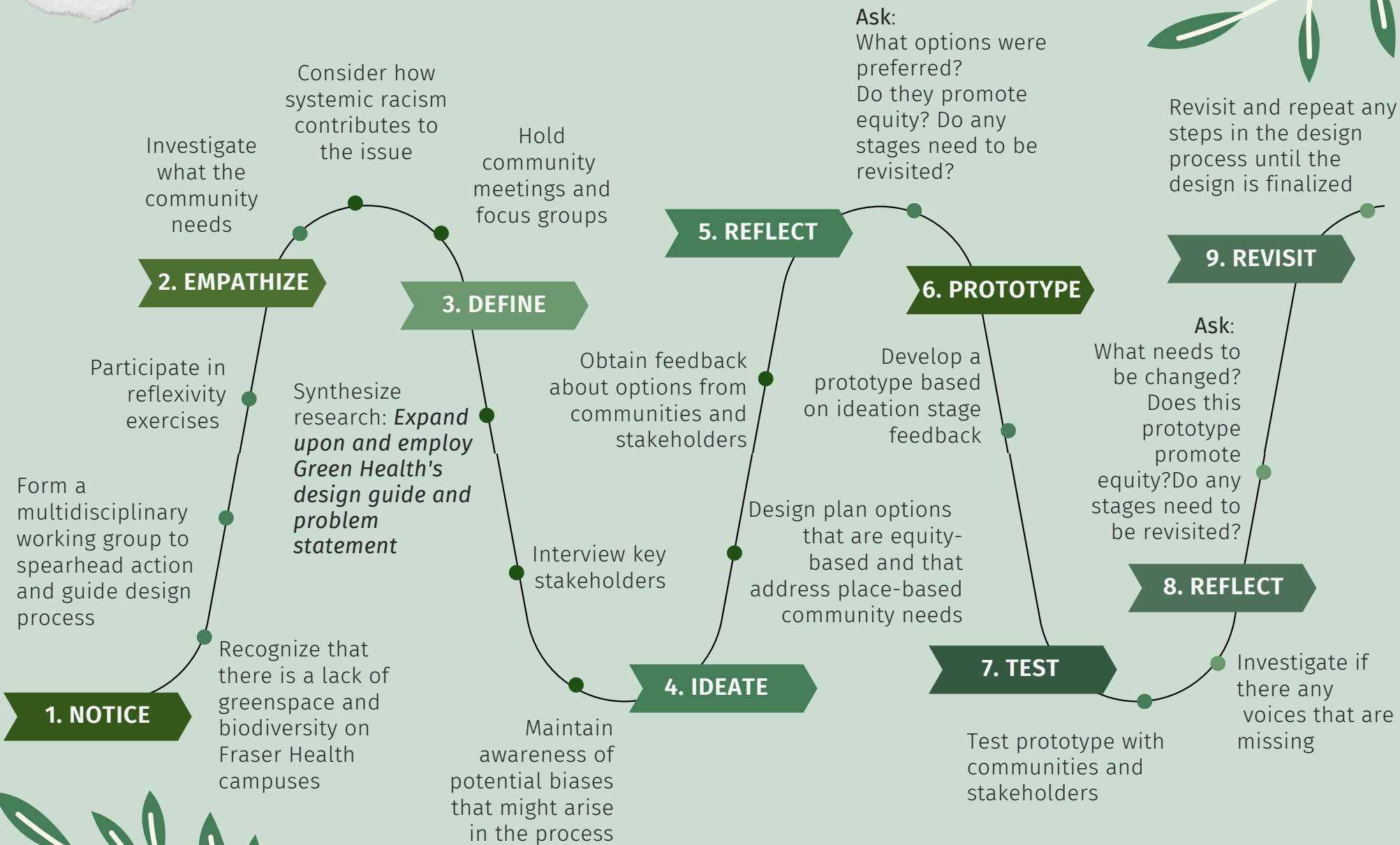


Figure 1: Equity-Centred Design Stages Journey Map

*ADOPTED FROM PINEDO, 2021 AND ANAISSIE ET AL. 2021

EQUITY-CENTRED DESIGN STAGES FLOWCHART*

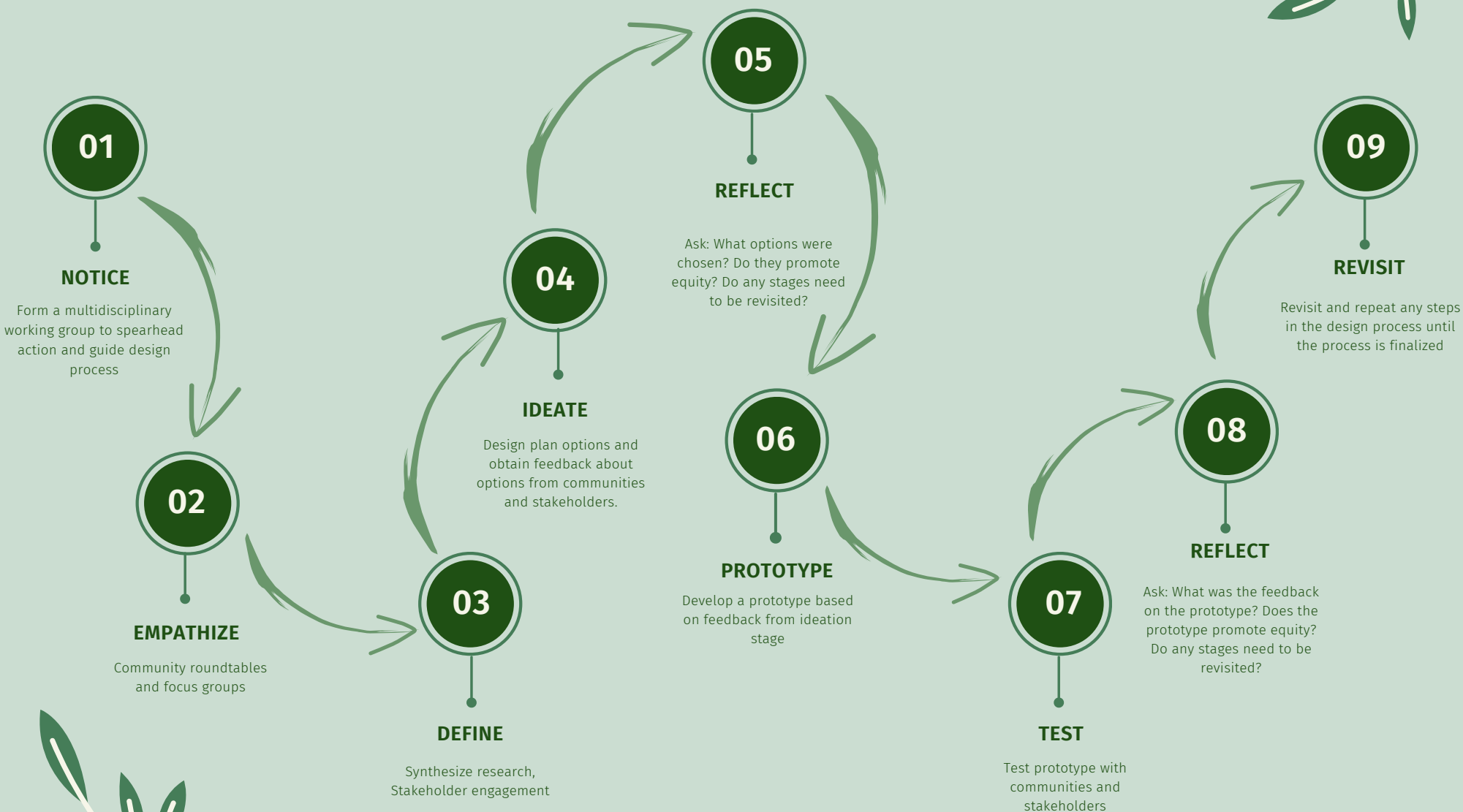


Figure 2: Equity-Centred Design Stages Flowchart

*ADOPTED FROM PINEDO, 2021 AND ANAISSIE ET AL. 2021

EQUITY-CENTRED DESIGN STAGES: QUESTIONS

Questions to consider for each stage of the equity-centred design process*



01

NOTICE

Self-awareness and self-reflexivity

- **Identity:** Who are we as designers? Who are the people and communities that Fraser Health serves? Who is impacted by Fraser Health's lack of greenspace and biodiversity?
- **Power:** What is our social positionality? What is the positionality of Fraser Health?
- **Context:** What is the equity challenge regarding access to greenspace and biodiversity?
- **Partnership:** How can we work collaboratively to promote and foster equity in greenspace and biodiversity initiatives?

02

EMPATHIZE

Understanding users' perspectives

- **Identity:** How do our social positions and roles in this project affect how others communicate with us and what they talk to us about?
- **Bias:** How do we keep aware of our biases and how can we challenge our biases so that we can better serve Fraser Health's communities?
- **Community:** What do the communities say that they need in regards to improving their access to greenspace and biodiversity?
- **Systemic oppression:** How does systemic oppression affect 1) the communities that Fraser Health serves and 2) access to greenspace and biodiversity?

03

DEFINE

Synthesize research and create a problem statement (*may utilize and add to Green Health's research and problem statement*)

- **Bias:** How can we ensure that our understanding of the problem is not being manipulated by biases?
- **Perspective:** What are the larger issues surrounding our problem and what factors influence those issues?
- **Problem statement by Green Health (*may be altered as necessary*):** "How might we improve biodiversity (intended action) for Fraser Health patients and community (primary users) to support planetary health and decolonization and promote Indigenous reconciliation with the ultimate goal of enhancing population health, wellbeing, and resilience (desired effect)?"

04

IDEATE

Generate multiple potential equity-based solutions and obtain feedback from communities and stakeholders

- **Community:** Have we heard from all of the communities that will be affected by this project? Are we collaborating well with these communities?
- **Bias:** How can we ensure that those who participate in the design process are able to feel comfortable freely sharing their views and ideas? How can we also ensure that we are maintaining awareness of our biases through this process?

05

REFLECT

Reflect on the ideation and feedback process

- **Ask:**
 - What options were preferred and why?
 - Do our options promote equity?
 - Do any stages need to be revisited?

06

PROTOTYPE

Develop a prototype based on feedback from the ideation stage

- **Assumptions:** What questions and assumptions do we want to test in our prototype?
- **Simplicity:** How can we create a prototype that is simple and easy to understand?

07

TEST

Test prototype with communities and stakeholders

- **Safe to fail:** How can we design an environment in which we feel safe to experience if our prototype fails?
- **Community:** Have we included all of the voices and communities that need to provide feedback to us in our testing phase?

08

REFLECT

Reflect on the prototype and testing process

- **Ask:**
 - What was the feedback on the prototype?
 - Does the prototype promote equity?
 - Do any stages need to be revisited?

09

REVISIT

Revisit and repeat any steps in the design process until it is finalized

- **Ask:**
 - Have we finalized our design?
 - If not, as this design process is iterative, what stages do we need to revisit in order to further our equity-centred design?

Figure 3: Equity-Centred Design Stages: Questions

*ADOPTED FROM PINEDO, 2021 AND ANAISSIE ET AL. 2021

EQUITY-CENTRED DESIGN STAGES: ACTION STEPS

*Recommended action steps for each stage of the equity-centred design process**



01

NOTICE

Form a multidisciplinary working group to spearhead action and guide design process

- Recommend that participants include representatives from:
 - Indigenous Health, Population and Public Health, Planetary Health, Energy and Environmental Sustainability, Food and Nutrition Services, Facilities, Patient representatives, and Healthcare workers
- Consider cross-organizational collaboration with:
 - First Nations Health Authority as there are 32 First Nations in the Fraser Health service area
 - Métis Nation BC as Fraser Health provides care to 6 Métis Chartered Communities

02

EMPATHIZE

Engage the communities

- Hold **roundtables** and conduct **focus groups** with the communities that will be affected
 - Ensure all Indigenous communities are given a voice
 - Guarantee that all marginalized and vulnerable populations are included

03

DEFINE

Expand and synthesize research
Interview key stakeholders

- Utilize, expand upon, and revise as needed Green Health's design guide as well as their problem statement
- Conduct **key informant interviews** with pertinent stakeholders
 - **Recommended stakeholders to include:**
 - Indigenous Elders and Knowledge Keepers, Landscape Architects, Master Gardeners, Apiarists, Experts in agriculture and biodiversity, and Planetary Health professionals from other health authorities

04

IDEATE

Design plan options and obtain feedback about options from communities and stakeholders.

- **Brainstorm** options that are equity-based and that address place-based community needs
- Choose around **3 options** to refine and then send for **informal review** by communities and stakeholders

05

REFLECT

What options were chosen?
Do they promote equity?

- Discuss with others on the team the **feedback** from the ideation stage
 - What was liked and why? What was not liked and why?
 - What recommendations were made to adjust the options?
 - What was the preferred option? And does that option promote equity?

06

PROTOTYPE

Develop a prototype based on feedback

- Choose the option from the ideation stage that received the best feedback
- **Refine the design** based on the critiques from the communities and stakeholders
- Prepare the prototype for testing

07

TEST

Test prototype with communities and stakeholders

- Send the prototype out for testing with communities and stakeholders
- Investigate if there **are any communities or stakeholders missing**

08

REFLECT

Does the prototype promote equity?

- Discuss with others on the team the **feedback** from the testing stage
 - What was liked and why? What was not liked and why?
 - What recommendations were made to adjust the prototype?
 - Does this prototype promote equity?

09

REVISIT

Revisit and repeat any steps in the design process until the design is finalized

- Discuss with others on the team what the **next steps** will be
 - Does the feedback indicate that the prototype needs to be updated and tested again?
 - Does the feedback indicate that community and/or stakeholder engagement need to be revisited?
- Based on that discussion, as this design process is iterative, **determine which stages need to be revisited and repeated**
- Revisit and repeat the stages until the design is finalized

Figure 4: Equity-Centred Design Stages: Action Steps

*ADOPTED FROM PINEDO, 2021 AND ANAISSIE ET AL. 2021



Figure 5: Green Health Strategy in Action - A Storyboard

Employing Decolonial Methods

Decolonization is a global and diverse phenomenon, defined and utilized in countless ways by countless peoples. Generally, it refers to an embodied ideology that seeks to dismantle oppressive structures, systems, and beliefs imposed through colonization.⁵ Decolonial praxis often involves centering Indigenous ways of knowing, working to dismantle systemic oppression and facilitating Indigenous sovereignty. However, its operationalization and use heavily depend on the “who”, “how”, “where”, and “why”.⁵

Within the arena of planetary health, global decolonial philosophies and knowledges are instrumental in developing ecosocial solutions. Indigenous peoples worldwide have fostered sustainable ways of life for millennia and offer relational, holistic ways of engaging with animals, plants and planet lacking in Western colonial individualism.⁶ Effective decolonial praxis in healthcare institutions includes embedding decolonial philosophies within our organizations and ourselves, engaging in sustained and reciprocal relationships with Indigenous communities, and prioritizing Indigenous stewardship.⁵ This requires a complete paradigm-shift that disrupts and challenges existing systems rather than simply existing within them.

Co-benefits of decolonizing planetary public health

- ❖ Improves health outcomes for all
- ❖ Promotes equitable & sustainable health systems
- ❖ Fosters unity & understanding
- ❖ Draws on millennia of global Indigenous knowledges re: sustainability

Strategic measures for Indigenous stewardship

- ❖ On-reserve:
 - Work with the First Nations Health Authority (capacity-dependent)
- ❖ Off-reserve:
 - Connect with local Indigenous organizations
 - Develop urban-Indigenous strategy
- ❖ All locations:
 - Convene leadership tables & facilitate nation-to-nation governance

Decolonial Praxis: Best Practices

Employing decolonial methodologies

- ❖ Consider and articulate underlying conceptual values
- ❖ Embed decolonial praxis within all aspects of work/across whole organization
- ❖ Ground praxis in global Indigenous wisdoms & intercultural thought
- ❖ Employ holistic, intersectional, and ecosocial lens
- ❖ Challenge colonial hegemonies & advocate for Indigenous rights
- ❖ Consult, employ, or otherwise engage a variety of Indigenous peoples and viewpoints
- ❖ Foster collaboration within and between diverse staff, stakeholders, and sectors
- ❖ Incorporate diverse perspectives comprehensively, embracing conflict

Decolonializing healthcare facilities & programs

- ❖ Foreground risks, impacts, and interventions regarding systemic racism and institutional trauma
- ❖ Employ decolonial frameworks, methods, and philosophies across all sites, within all programs, and for all staff training
- ❖ Consider how programs, procedures, staff behaviour, or the physical site may reproduce institutional trauma, facilitate patient feedback to assess this, and take steps to reduce potential for harm
- ❖ Utilize interventions that are culturally specific, trauma-informed, evidence-based, and grounded in lived experience
- ❖ Facilitate local Indigenous stewardship of sites, resources, and programs

Fostering & sustaining reciprocal relationships

- ❖ Ensure intended collaboration is long-term, reciprocal, and community-driven
- ❖ Form advisory group; connect with existing networks; and seek partnerships
- ❖ Provide engagement strategy that includes explicit reciprocal commitments, describes how they will be upheld, and details evaluation strategies to monitor progress
- ❖ Embody decolonial philosophies: employ active self-education, enmesh oneself with community, take personal responsibility for enacting values
- ❖ Embed reciprocity into organizational practice
- ❖ Conduct transparent performance evaluations on a consistent schedule and take steps to address emerging issues

Environmental Scan

Purpose

The purpose of this environmental scan was to highlight interactions between the health of people and planet by presenting an overview of current knowledge, interventions, and programs that utilize green spaces for co-health benefits.

Core area 1: Improving community health through planetary health via biodiversity

Biodiversity is fundamental not only for a healthy planet, but for the health of all living things. Impacts from ongoing industrialization including deforestation, pollution, and climate change contribute to widespread biodiversity loss.⁷ Downstream effects of such loss include housing, food, water, and income insecurity; forced migration; and increased risk of infectious disease.⁷ The conceptual framework “Pathways Linking Biodiversity to Human Health” helps underscore the complex connections between biodiverse environments and human health at the planetary, community, and individual level.²

Fostering biodiversity has many positive impacts at multiple levels. In terms of planetary health and climate resilience, biodiversity can mitigate flood risk, cool urban settings, improve air quality via trees, and reduce the need for pesticides.³ For human physical health, biodiversity promotes access to clean water,⁷ strengthens nutrition and biomass,⁷ boosts the immune system,⁸ supports the creation of medicine,⁷ reduces noise pollution,⁷ and increases physical activity.³

Access to green spaces has been linked to increased social interaction and improved mental wellbeing.³ Green space can help reduce stress and social tensions, promote positive emotions, and improve social cohesion.⁸ Although research on the impacts of biodiverse green space is limited,³ promoting green space that is biodiverse has the potential to produce myriad positive impacts for human, animal, and planetary health. Some existing allied health organizations advocating for biodiversity are listed in Table 1 with their central goals.

Table 1: Allied health organizations advocating for biodiversity in Canada, the U.K., and the U.S.

Resource	Goals
Health Care Without Harm ^{9,10} Location: United States	<ul style="list-style-type: none"> - Protect public health from threats of climate change - Reduce carbon footprint - Create climate-resilient health systems - Advocate for climate change to be declared a public health issue - Advocate for switch to renewable energy - Support community health & resilience - Promote land stewardship - Foster healthy ecosystems to protect natural resources
Practice Greenhealth ¹¹ Location: United States	<ul style="list-style-type: none"> - Create practical and cost-effective programs to support greenhealth practice among allied health professionals - Educate, motivate, and engage allied health partners - Improve care standards by incorporating green space
NHS Forest (Green Space for Health) ¹²⁻¹⁴ Location: United Kingdom	<ul style="list-style-type: none"> - Support green space creation for NHS healthcare sites - Create accessible green spaces for patients, staff, families/caregivers, and the wider community to improve health and wellbeing
CASCADES Canada ¹⁵ Location: Canada	<ul style="list-style-type: none"> - Strengthen the Canadian healthcare system's capacity to promote & deliver sustainable healthcare - Professional collaboration - Support social prescribing services (for non-clinical social/support needs)
Doctors for Planetary Health ^{16,17} Location: Canada (BC)	<ul style="list-style-type: none"> - Grassroots organizing to foster a just world - Mutual respect and reciprocity between people and the planet - Situate ecohealth as central to understanding the interconnectedness of human and planetary health - Foster a healthy planet for the health of all people now and forever - Protect land and water ecosystems - Prioritize ecosystem health and biodiversity via law/policy - Recognize the right to healthy environments for humans, animals, and planet
Canadian Association of Physicians for the Environment (CAPE) ¹⁸ Location: Canada	<ul style="list-style-type: none"> - Protect nature and natural ecosystems - Connect people to nature - Situate access to nature as a human right, and lack thereof as an equity issue - Advocate for the Canadian government to fulfill international protected natural areas commitments

Core area 2: Global conceptualization of green spaces

As green space transformation in healthcare settings has gathered momentum globally, multiple care settings including pediatric and adult care hospitals have implemented green spaces through community collaboration and private partnerships. These spaces can be used by patients, family members, staff, and the community. With public and private funding, donations, and awards, healthcare settings can transform spaces within and outside its infrastructure and buildings where these can minimize costs of design, construction, and maintenance of the spaces. With examples from the United States, Ireland, the United Kingdom (UK), Spain, Chile, Thailand, Japan, Australia, Sweden, Denmark, Norway, Finland, and Mexico, implementing green spaces can be designed from building conception for new projects or repurposed for existing infrastructure.

Green space implementation in and around healthcare centres can vary widely, from traditional medicine gardens and hospital-based community gardens^{19,20} in clinical buildings, sensory gardens,^{21,22} meditation gardens,²³ a private sanctuary garden,²⁴ healing gardens,^{12,25–29} gazebos,^{30,31} fairy gardens for children,³² food cultivation,^{33,34} hydroponic gardens,³⁵ memorial gardens,³⁶ and improving woodlands.³⁷ Some projects include gardens with access from intensive care unit (ICU) rooms,^{38,39} and others have been designed keeping in mind those patients who have intravenous catheters, who use wheelchairs,⁴⁰ or who are confined to hospital beds.⁴¹

Changing the appearance of doors in hospital rooms to include greenery⁴² and art from surrounding nature⁴³ are ways to incorporate green spaces into facilities. Also, plant materials can be used with patients as recreational art. For example, fallen branches and leaves can be used as sensory materials for painting. These can also be used for arts and crafts such as constructing picture frames or other creative outputs like making wooden stick people. Bird and insect boxes can be made for the garden by the community or patients.⁴⁴ Moreover, hospital gardens can increase community support by offering small plots for members of the public.⁴⁵ These gardens can also be tended by volunteers from the community, staff, caregivers, and patients alike.

Cross-Jurisdictional review

Across Canada, health authorities and healthcare settings have adapted their infrastructure to include green spaces. Nova Scotia Health Authority has implemented multiple strategies such as healing gardens, vegetable gardens, community gardens and therapeutic gardens in multiple sites including hospitals and health centres.⁴⁶ Additional examples of biodiversity implementations from other provinces can be found in Table 2.

Table 2: Cross-Jurisdictional Review

Description	Location
Indigenous gardens and healing circles	Ajax by the Lake, ON ⁴⁷ Alberta Children's Hospital, Calgary, AB ⁴⁸ Michener Institute of Education, ON ⁴⁹
Beekeeping in hospital rooftops	Saint John Regional Hospital, NB ⁵⁰
Hospital Garden	London, ON ⁵¹ BC Children's Hospital, Vancouver, BC ⁵² St. Paul's Hospital, Vancouver, BC ⁵³ Mazankowski Alberta Heart Institute, AB ⁵⁴ Bethesda Hospital, MB ⁵⁵ Penticton Regional Hospital, BC ⁵⁶
Traditional medicine	Island Health ⁵⁷
Indigenous Memorial Healing Garden	Colchester East Hants Health Centre, NS ⁵⁸

Core area 3: Implementation strategies of planetary health in a healthcare system

Healthcare strategies to support planetary and human health are widespread and diverse, often specific to location and service provision. Broadly, these strategies can be separated into behavioural, structural, and community-based.

Behavioural strategies seek to provide planetary/green health education to patients, staff, or community.^{37,52,59–62} These are defined by a push to reframe the way we conceptualize and treat poor health among both people and planet. By engaging people in creative, novel ways to interact with their outdoor environment for One Health^[1] benefit, the health of humans and ecosystems can prosper.

Structural strategies generally refer to bringing green infrastructure into clinical settings, including hospice and other long-term care centres to improve the health and wellbeing of patients and planet alike by engaging patients and staff with their environmental surroundings through outdoor activities like art or exercise.^{12,37,52,53,59,61,62} Incorporating green spaces into care settings may improve

¹ A [One Health](#)⁶³ approach examines the interconnectedness of people, animals, and the planet.

both health outcomes and the care delivery experience by incorporating social interaction, education and play time.⁴⁶ These strategies also benefit the community writ-large, as they invest in green spaces for community use.

Community-based strategies utilize the wealth, land and infrastructure of existing institutions to transform natural green space not only for staff and patients but for the broader community.^{12,53,62} These strategies may target biodiversity, food security, community engagement, social cohesion, isolation, and both physical and mental health and wellness. Current strategies from several countries employed by allied health professionals that promote the health of people and planet are listed in Table 3.

Table 3: Existing Implementation Strategies

Strategy	Summary	Benefits
<p>NHS, Social Prescribing, and the Green Gym Program^{60,64}</p> <p>Location: United Kingdom</p> <p><u>Behavioural</u></p>	<ul style="list-style-type: none"> - In a social prescribing (also called a Green Rx or GRx) approach <ul style="list-style-type: none"> - The concept of 'prescribing' time spent in nature is an alternative to other medical prescriptions (where applicable) - Healthcare providers prescribe time spent outdoors to improve physical and mental health - The Green Gym is a social prescribing program where attendees participate in practical activities related to gardening or path upkeep. Educational activities such as learning about plant and animal species are included. <ul style="list-style-type: none"> - In an NHS program at St. Austell Healthcare in England, patients participated in horticultural therapy groups and walking groups 	<ul style="list-style-type: none"> - Skill acquisition for patients in learning how to maintain green spaces and how to interact with local flora and fauna - Increase in confidence - Enhanced mental and physical wellbeing - Green space is adequately maintained for community enjoyment - Reduced reliance on healthcare system and pharmaceuticals - Downstream impacts of GRx include reduced healthcare-related GHG emissions by fostering a healthier lifestyle, reducing subsequent healthcare and pharmaceutical needs
<p>NHS and the Centre for Sustainable Healthcare^{13,37,65}</p> <p>Location: United Kingdom</p> <p><u>Structural & Behavioural</u></p>	<ul style="list-style-type: none"> - Centre for Sustainable Healthcare develops knowledge, resources, and projects to help NHS reach net zero - Projects include NHS Forest which plants trees across the UK, creates gardens in care facilities (including pollinator-specific and chemotherapy gardens), and establishes green health routes to connect green spaces in a community <ul style="list-style-type: none"> - NHS Forth Valley in Scotland transformed woods around hospital into a usable green space, employed 'hospital ranger' for ground maintenance and expertise, and provided outdoor cardiac rehab program, including: tai chi, photography, willow sculpting 	<ul style="list-style-type: none"> - Enhanced skills for staff, patients and their families in finding nearby green space and utilizing outdoor space to improve physical and mental health and wellness - Cultivated existing green space for improved community use

Bringing the Outdoors In ⁶¹ Location: United Kingdom <u>Structural & behavioural</u>	<ul style="list-style-type: none"> - NHS-developed guide to help healthcare workers support patients who are unable to go outside - Suggested activities include an app with bird songs, bringing in herbs and flowers for patients to smell, creating nature-themed art or making art with natural resources, reading nature-based books 	<ul style="list-style-type: none"> - Could help counteract negative mental health impacts that arise from being unable to go outside - Could benefit healthcare workers in terms of patient care/recommendations by highlighting the importance of accessing nature to overall human health
Dementia Friendly Garden Design ⁵⁹ Location: Australia <u>Structural & behavioural</u>	<ul style="list-style-type: none"> - Mixed-methods study examining impact of a dementia-friendly outdoor environment - DFG design included: pollinator-friendly plants, access to vegetation at a variety of heights, water features, birdbath and feeder, benches, familiar decorations, signage to help orient, and a garden shed with tools 	<ul style="list-style-type: none"> - Improved environmental stimulation - Improved engagement with care - Improved social engagement - Reduced apathy among residents
Sunny Hill Health Centre ⁵² Location: Canada (BC) <u>Structural & behavioural</u>	<ul style="list-style-type: none"> - BC's only pediatric rehabilitation centre rebuilt their facilities - Includes an outdoor garden with varied terrain and a natural outdoor patio for relaxation and active therapy 	<ul style="list-style-type: none"> - Outdoor garden helps improve patient mobility - Patio supports a calm nervous system and provides a space for outdoor therapy
Nourishing Our Community ¹⁰ Location: United States <u>Structural, behavioural, & community</u>	<ul style="list-style-type: none"> - Food pantry circa 2001 with accessible 'food prescriptions' - Teaching kitchen circa 2003 where patients learn to prep healthy meals - Rooftop farm circa 2017 where 25 crops grow for patients, staff, and community 	<ul style="list-style-type: none"> - 7,000 patients and their families fill 'food prescriptions' each year (total of ~75,000 people) - >5,000lbs of produce produced each year - Behavioural teaching interventions equip patients and families with take-home skills
Possilpark Health and Care Centre Redesign Project ¹² Location: Scotland <u>Structural & community</u>	<ul style="list-style-type: none"> - Redesigned vacant lot into a community garden, providing free fresh foods for the community and a site for healthcare providers to refer patients as part of GRx - Planted trees along street to provide shade 	<ul style="list-style-type: none"> - Trees cool urban environment and benefit air quality - Access to green space benefits community and patient health and wellness, both mental and physical - Provides community space for increased social cohesion and decreased isolation - Boosts food security

Downtown Intercultural Gardeners Society Project ⁵³ Location: Canada (BC) <u>Structural & community</u>	<ul style="list-style-type: none"> - Residents of Vancouver's Downtown Eastside began a community garden project for locals in 2010 - One location, on a hospital rooftop, is comprised of raised garden beds & boxes with edible plants and flowers for local pollinators 	<ul style="list-style-type: none"> - Engages a structurally vulnerable community to reduce isolation, enhance social cohesion, and promote health & wellbeing - Enables people to come together, grow free and healthy foods, spend time outside
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Core area 4: Indigenous ways of knowing, decolonization, planetary health

Indigenous ways of knowing across Turtle Island^[2] underscore the interconnectedness of people and planet, viewing the two as inexorably linked.⁶ Pre-colonization, Indigenous peoples evolved alongside their changing natural environment. Recognition that over-hunting plants and animals would result in starvation prompted a holistic view of life on earth as deeply enmeshed.⁶ As such, Indigenous ways of knowing situate plant and animal health as equally important as human health.

In 2021, a team of Mi'kmaq peoples and settler allies developed a thorough document forwarding Indigenous principles for biodiversity conservation.⁶⁷ Grounded in the ancestral knowledges of Elder Albert Marshall, it highlights seven foundational concepts for decolonized conservation: embracing Indigenous worldviews of ecologies and M'sit No'kmaq, or land as kin; learning from Indigenous languages of the land; natural laws and Netukulimk, or ancestral beliefs, traditions and sovereignty; correct relationships; total reflection and truth; Etuaptmumk or 'two-eyed seeing'^[3]; and storytelling/listening.⁶⁷ Table 4 details each concept.

Another recent report on planetary health from an Indigenous perspective, developed through the collaboration of Indigenous scholars, practitioners, land/water defenders, Elders, and knowledge holders from around the globe, defines several determinants of planetary health across three 'levels'.⁶⁹ Levels include Mother Earth determinants, Interconnecting determinants, and Indigenous Peoples' determinants.⁶⁹ Interactions between each level help elucidate the complex ways in which Indigenous peoples and planet earth are mutually impacted by myriad factors, all underpinned by colonization.⁶⁹ Table 5 provides a means of understanding planetary determinants of health via global Indigenous knowledges as per this report.

² What [North America](#)⁶⁶ was called pre-colonization

³ An [approach coined by Elder Albert Marshall](#)⁶⁸ that merges Indigenous and Western ways of knowing

These documents provide considerations for ways to decolonize planetary health via Indigenous community collaboration regarding the use of green space. For example, green space can function as an educational and health promotion tool in decolonizing planetary health. One approach could be placing plaques next to native plants that include the names of the species in the local Indigenous language(s), instructions on how to pronounce the Indigenous names for non-Indigenous language speakers, their medicinal uses, and what kind of care they require. Plants needed for the garden can be sourced from Indigenous communities, patients, family members, staff, and the community, with a focus on the needs of all facility users and by placing native plants at the forefront of design.

Table 4: Seven re-Indigenization principles for transforming biodiversity conservation⁶⁷

Principle	Conceptual meaning
1. Embrace Indigenous worldviews of ecologies and <i>M's̥t No'kmaq</i>	<p>Think, act, behave, and organize governance institutions on the basis of relationships of ecologies, with a foundational tenet that "all life forces are sacred and connected".</p> <p>All ways of knowing, laws, responsibilities, relationships and practices are embedded in relations with natural ecologies. Relationships are central and are expressed and experienced in alignment with ecological realities and attunement with intersecting life forces and ecological realms, in ways that lead to socially and ecologically just relationships. The "highest form of existence" is "living in harmony with the life forces active in different ecological realms", with "knowledgeable respect for all life forces and relationships of balance."</p> <p>As expressed in <i>M's̥t No'kmaq</i>, "all my relations" refers to your "overall" family, which is your "natural world" and "every living thing". Humans are not the superior beings, but a small part and parcel of it. <i>M's̥t No'kmaq</i> reminds us how we are all related and dependant within the living world.</p>
2. Revitalize and learn from Indigenous languages of the land	<p>The primary expression of Indigenous worldviews, ways of knowing, relationships, and ecologies is Indigenous languages. From Indigenous languages, we can learn the stories of the plants, animals, and the land and of the changes over time. Indigenous languages are derived from the land, "from the sounds and rhythms of ecology, nature in action". By contemplating the nature and structure of Indigenous languages and their implicit meanings, we can gain a different filter through which to perceive, conceive, and understand the world and each other.</p> <p>Indigenous languages are repositories of science: they tell of relationships, they reveal history, and they hold Indigenous identity. Reclaiming and embracing Indigenous languages and the knowledges they express will help us learn "how to live" in relationship with the land, ecologies, life forces and one another.</p>
3. Recognize the supremacy of Natural laws and guidance for living within them from traditional laws like Netukulimk	<p>Natural laws explain the relationships, responsibilities, and obligations that all forms of life have to one another. They emerged from the land and apply to all forms of creation; they were not created by humans; and are not required to be mandated by Western legal systems to be actualized.</p>

	<p>Natural laws hold that the very essence and source of life—water, air, and soil—is the right of every living thing and should be our overarching objective. The Laws of Nature must supersede the laws of man.</p> <p>As expressed in Netukulimk, “man and nature are one,” “everything comes from the land,” and “all that the earth holds is sacred.” These values and belief systems are at the core of how we should govern and conduct ourselves on the lands and waters. Understanding natural laws can give us the power to act in a good way.</p> <p>Netukulimk is achieving adequate standards of community well-being without jeopardizing the integrity, diversity, or productivity of our environment. As we go about sustaining ourselves, we need to take care, to become “the eye, the ear and the voice, for the ones that cannot defend themselves, in human form”.</p>
4. Honour and deepen correct relationships with each other and all ecologies	<p>The importance of working together in correct relationships is entwined with principles of justice, equity, and rights and centered around balance and harmony. A primary duty is to foster alliances. The survival of one is always related to that of others.</p> <p>A premium is placed on diversity and difference, encouraging respectful behaviour in dealing with others.</p> <p>Justice for nature also depends on justice for people. When the people are in correct relations, it will be possible for all to come together with their insights and actions: “When all peoples come together... each will be able to give forth the gifts that they have been given.”</p> <p>Many Treaties reflect respectful relationships and alliances; it is the responsibility of both parties to honour those alliances. We are all treaty people.</p>
5. Gain insights through “total reflection” and reveal the truth	<p>Before we can enter into respectful alliances and dialogues and gain insights about where we are going, we need to deeply reflect on the “truth” of who we are, where we are coming from, and why we are here.</p> <p>Insights come from the heart, mind, spirit, and body. It starts with “total reflection” on what has been done in the past and how to transform those into lessons learned for where we are going.</p> <p>We have to remind ourselves that we have a cognitive mind. And with that we have the ability to transform our natural world. With total reflection, really looking at the mistakes, at some of the things that have been done in the past, and transforming those, as lessons learned, and abiding by those lessons, we will stand a chance.</p>
6. Hold other ways of knowing as valid: Etuaptmumk, or “two-eyed seeing,” and “strong like two people”	<p>Indigenous ways of knowing must be respected as distinct and valid systems of knowledge, standing side by side with Western systems. Only when both ways of knowing are recognized may they be woven together to honour both.</p> <p>Indigenous ways of knowing are conceived as spirit, emphasize the importance of sharing and encouraging learning, are deepened through relationship, and reflect interconnectedness. Through Indigenous ways of knowing we can deepen understanding and relationships in fundamentally crucial ways.</p> <p>Etuaptmumk, or “two-eyed seeing,” similar to a Tłıchǫ concept of “strong like two people,” offers space for recognizing and honouring the value and legitimacy of Indigenous knowledge systems and establishes pathways to move forward in partnership, collaboration, and respect, “learning to use both eyes together, for the benefit of all”.</p> <p>We can begin to “bring forth perspectives that are heavily weighed in both knowledges, not just one”. This opens opportunities to reflect, in ethical space, on what needs to be included as we move into the future.</p>

<p>7. Deepen relationship and knowing through “story-telling, story-listening”</p>	<p>Stories are the platform for teaching Indigenous worldviews, values, culture, and how to live with and uphold responsibilities to the land. The sharing of stories constitutes and deepens relationships, while honouring Indigenous ways of knowing, teaching, and learning.</p> <p>Telling, re-telling, listening, and re-listening to stories is an important part of a life-long process of learning about laws, roles and responsibilities and understanding how to share ecological space, to ensure community for every life force.</p> <p>Both story-telling and story-listening are important for revealing nuances and insights. The value of the exchange of stories is in generating insights that are deeper than facts, because the flow of information is through the heart, mind, spirit, and body. In the Mi'kmaw practice of caring for M'sit No'kmaq—all my relations, watching, listening and doing are as important as sharing the lived experience with others: “what constitutes a real relationship is the exchange of stories”.</p>
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Table 5: The Determinants of Planetary Health - An Indigenous Consensus Perspective⁶⁹

Mother-Earth Determinants	Indigenous Peoples' Determinants	Interconnecting Determinants
<p><i>Respect of the feminine</i></p> <ul style="list-style-type: none"> - Some Indigenous societies traditionally matriarchal - Women as caretakers of land/environment and cultural identity in many nations <p><i>Ancestral legal personhood designation</i></p> <ul style="list-style-type: none"> - Capitalist imperial political & economic narratives make invisible the rights of our natural environment (land, water, air) - Sacred indigenous traditions & knowledges mandate the need to speak on behalf of natural resources and advocate for better treatment 	<p><i>Land rights</i></p> <ul style="list-style-type: none"> - Indigenous land stewardship is a fundamental right, especially in unceded territory - 80% of global biodiversity is stewarded by Indigenous peoples, yet these peoples reside on just 22% of Earth - Indigenous control over natural resources that follows traditional knowledges will ensure biodiversity and ecosystem conservation <p><i>Languages</i></p> <ul style="list-style-type: none"> - Direct link between language preservation and ancestral knowledge regarding natural resource preservation - ~1 Indigenous language dies every 2 weeks due to the impacts of ongoing colonization - When language is lost, so too is knowledge necessary for planetary health preservation <p><i>Health</i></p> <ul style="list-style-type: none"> - Access to land is intimately tied to culture and sovereignty - Each are vital for counteracting intergenerational 	<p><i>Humans ↔ nature</i></p> <ul style="list-style-type: none"> - Humans are inexorably linked with their natural environment - Disconnection with environment → sense of ownership over environment (exacerbated by colonial ideologies) <p><i>Relationships</i></p> <ul style="list-style-type: none"> - Interconnectedness, both between humans and with their environmental surroundings, maintains balance & wellness - Children in collectivistic societies learn this early <p><i>Modern scientific paradigm</i></p> <ul style="list-style-type: none"> - Existing (neocolonial) paradigm as “linear, reductionistic, & mechanistic” - Necessitates shift to Indigenous paradigm that is “contextual, holistic, symbolic, non-linear, and relational” - Shift prioritizes upstream thinking for planetary health improvement centring systems, ecology, & networks

	<p>effects of ongoing colonization, and each contribute to health and wellbeing</p> <p><i>Elders & Children</i></p> <ul style="list-style-type: none"> - Elders as knowledge keepers from whom children learn - Their roles are vital for creating intergenerational households which extend to the natural environment 	<p><i>Governance & law</i></p> <ul style="list-style-type: none"> - Indigenous Natural/First Law is a form of self-governance underpinned by mutual responsibility & reciprocity between people and planet - Facilitating Indigenous self-governance that follows this law prioritizes the rights and health of all living things
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Synthesis

Taken together, these four core areas provide a blueprint for creating health system initiatives that benefit human health while targeting upstream determinants related to planetary health and decolonization. Centring biodiversity and Indigenous reconciliation within green space projects is a simple, practical, and inexpensive way of supporting wider goals related to planetary health and decolonization while improving healthcare delivery.

Fostering biodiversity helps mitigate climate change impacts and supports healthy ecosystems, both of which have significant downstream implications for human health. When incorporated into green space projects, biodiverse spaces implicitly promote ecosystem health, benefitting local flora and fauna while reducing environmental health hazards. Biodiverse spaces that grow local native plants also act to decolonize green environments by facilitating access to Indigenous medicines, traditions, and practices. Additionally, biodiverse spaces can promote community engagement, both between people and with their surroundings. Climate change impacts can be mitigated by effective nature-based solutions while improving overall ecosystem health and offsetting carbon emissions.^{70,71}

Biodiversity is also intimately connected to Indigenous rights, knowledges, and sovereignty. Most biodiverse ecosystems are currently stewarded by Indigenous peoples, and ancestral Indigenous knowledges possess vital ways of caring for specific ecosystems. Promoting Indigenous leadership within biodiversity projects thus strengthens Indigenous rights as laid out by the Truth and Reconciliation Commission (TRC) while providing important ways of understanding and improving human, animal, and planetary health that Western knowledge bases lack.

Western biomedical frameworks tend to silo aspects of human health, examining each as parts: physical health is divorced from mental/spiritual and human health is divorced from planetary health. Western ways of knowing are also individualistic and hierarchical, influencing healthcare delivery. Within this worldview, human physical health is situated at the top, to the detriment of

all else. Indigenous ways of knowing change how health is conceptualized, enabling a fuller examination of holistic health, both within humans and between us and our planet.

Indigenizing healthcare delivery not only forwards One Health goals, but also those outlined in the TRC report⁷². Examples of how Indigenizing and biodiversifying healthcare delivery could help meet these calls to action are outlined below.

1. Hiring local Indigenous knowledge keepers to plant biodiverse native plants and label them with their original Indigenous name(s) (TRC goal 14.i,iv,v)
2. Hiring Indigenous practitioners who are knowledgeable about traditional healing practices when creating/implementing green health programs (TRC goal 22)
3. Growing plants used in traditional Indigenous healing practices (TRC goal 22)
4. Facilitating local band sovereignty over ancestral lands, such as by returning stewardship of land occupied by healthcare facilities to its original nation (TRC goal 47)
5. Requiring local Indigenous band consultation, stewardship, and hiring for all projects that occupy ancestral lands and resources (TRC 92.i,ii)

The importance of healthy natural environments and access to green space on human health is profound. As healthcare institutions increasingly recognize this interaction and create green health programs, centering biodiversity and Indigenous reconciliation within these projects promotes One Health goals for the benefit of all living things.

Stakeholder Engagement






This draft strategy is informed by a collective of key informants and stakeholders. Our overall strategy, recommendations, and equity considerations are compiled by our team using insights from several virtual interview sessions and informal consultations by email. GreenHealth kept fastidious notes of our engagement sessions and compiled key themes in the [What We Heard](#) section of this strategy, which is key to the formation of our recommendations.

Although the stakeholders listed below have led to rich discussion, we caution that engagement doesn't stop here. Community Engagement, including engaging residents of the FHA region, local Indigenous communities, and primary users of FHA services is a crucial piece to this strategy. Without input from these groups, our recommendations and strategy are incomplete.



Stakeholder Engagement Summary



5 Key Informant Interview Participants

-  Dr. Lyana Patrick Assistant professor, Simon Fraser University
-  Dr. Kiffer Card Assistant professor, Simon Fraser University
-  Sonja Janousek Environmental Sustainability Manager, Vancouver Coastal Health, GreenCare
-  Darryl Quantz Environmental Public Health Consultant, FHA
-  Amy Lubik Environmental Health Policy Analyst, FHA

2 Stakeholder Consultations

-  Florrie Levine, Fraser Health Senior Project Manager, Burnaby Hospital Redevelopment Project, FHA
-  Rick Molnar, Fraser Health Manager of Facilities Maintenance and Operations, FHA

Who we have engaged (so far)

Dr. Lyanna Patrick

Dr. Patrick is an Assistant Professor for the Faculty of Health Sciences, and her work focuses on challenging colonial constructions of community planning as it connects to health and wellbeing. She was chosen for this engagement for her expertise in Indigenous health and justice, urban Indigenous community planning, Indigenous community health and wellbeing, and institutional change.

Dr. Kiffer Card

Dr. Card is an Assistant Professor for the Faculty of Health Sciences, and his work focuses on health and social policy. Dr. Card's expertise in social prescribing, particularly his work for the Canadian Institute for Social Prescribing, as well as his breadth of knowledge on Implementation Science and Knowledge Mobilization informed our ideation and prototype phases.

Sonja Janousek

Sonja is the Environmental Sustainability Manager with the Energy and Environmental Sustainability Team at FHA, and is our primary stakeholder contact at BC GreenCare. She was selected by our team for an interview as her role uniquely positions her to inform this project through a lens of staff engagement, climate resilient facilities, and capital projects regarding green space, water use, and green prescribing.

Darryl Quantz and Amy Lubik

Darryl and Amy were engaged in a conjoined key informant interview. Darryl is the planetary health lead for FHA, with unique insight on green space initiatives as he has worked with the NHS to continue the narrative on the importance of green space to improve the health/wellbeing for patients staying in facilities, as well as Green Social Prescribing. Amy is a policy analyst for FHA, with a focus on enhancing environmental health and health protection through an equity lens. Her work with the healthy-built environment team and promoting green space positions her to provide feedback on the interplay between the natural environment, reconciliation, and incorporating biodiversity within healthcare spaces.

Florrie Levine

As a Senior Project Manager at FHA, Florrie is working on the Phase 2 of the [Burnaby Hospital Redevelopment Project](#).⁷³ We connected with Florrie about experiences in managing current and/or future initiatives that foster biodiversity, expected barriers and facilitators, and inquired on advice for incorporating a project like this into a healthcare facility at FHA.

Rick Molnar

Rick is the Manager of Facilities Maintenance and Operations at FHA. To gain an area-specific and logistical perspective on incorporating biodiversity initiatives at healthcare facilities, we connected with Rick to discuss barriers and facilitators regarding the implementation, maintenance, and operation of biodiversity/green space initiatives on FHA campuses.

What We Heard

On Equity...

Utilizing our Reflect and Empathize modules for these engagements, our conversations with stakeholders in implementing an initiative like this were informative and highlighted important considerations for equity. Some key points made towards incorporating equity in this process included:

1. Decolonizing planetary health

- Centering Indigenous perspectives from a decolonial planetary framework is an important step towards creating more culturally responsive, equitable, and effective initiatives that support human and environmental health.
- Local Indigenous Stewardship is at the forefront of a project that is aimed at decolonization and reconciliation. Examples of projects that have been steered by the Indigenous communities that they served include the [Yukon Hospitals' Traditional Food program](#)⁷⁴ and the [Kilala Lelum Indigenous health clinic](#)⁷⁵ in downtown Vancouver.
- It is important to include plants that are important to Indigenous communities where applicable, with native resilient trees, as well as to make space for native vegetation used for local Indigenous medicinal practices.

2. Ensuring the initiatives are trauma-informed and inclusive

- Trauma is a common experience among Indigenous peoples, resulting from the intergenerational impacts of colonialism, residential schools, and other forms of systemic violence. Institutions such as hospitals inherently embody trauma for Indigenous communities. This is particularly important to consider when designing an initiative to embed equity in healthcare facilities.

- “Nothing about us without us”; there is a need to hear Indigenous voices and needs in the design and delivery of this initiative, which involves working collaboratively with community members to co-create programs and services that are responsive to their needs. Without this collaboration, there is risk of eliciting and/or triggering trauma through uninformed activities of the initiative.

3. Place-based initiatives

- A number of our stakeholders highlighted the importance of FHA’s location and number of regional/geographical communities that it serves. This is important to consider in a biodiversity initiative in regard not only to the flora and fauna that may be introduced, but also to the ways of knowing, cultural practices, food sovereignty, and traditional medicine that is present in a geographical area. Without proper place-based community engagement and research, there is a risk of applying a “cookie cutter” program or project to this initiative, which is not only culturally unsafe, but may have ecological and environmental impacts.

On Green Social Prescribing Practices...

Social prescribing describes a care process that goes beyond traditional, biomedical, individualistic notions of health and wellbeing to examine holistic, upstream determinants like poverty, social isolation, and access to nature. It entails linking patients in primary care to community support through various sources including physical and community activities.⁷⁶ Practitioners or allied health professionals “treat” maladies via social prescription. Forms of social prescription are wide and varied, ranging from free transit passes, walking or hiking groups, green gyms, and gardening projects, to programs involving arts, dance, and music.^{77,78} Prescribing that involves nature-based activities such as biodiversity conservation through farming or horticulture and walking surrounded by nature are considered to be green social prescribing or GRx.⁷⁹ Social prescribing has been implemented within FHA for preventing frailty and promoting healthy aging.⁸⁰ Key considerations for increasing the reach of social prescribing in a healthcare authority include:

1. It is not without its challenges

- Social prescribing is not content dependent; it’s person dependent. Patients require basic provider trust to facilitate decision-making. The process looks largely the same for providers and patients, but needs to be tailored considering time for follow-up. For example, patient personality may change how social prescribing and social prescription are perceived.
- Additionally, an initiative like green social prescribing represents a commitment from a health authority. It’s a costly process, as it may require hiring more workforce to facilitate referrals to resources. However, it can be a benefit in the long term and contribute to savings elsewhere.
- Avoiding paternalism and ableism
 - i. Special attention must be paid that green social prescribing needs to be met with users’ abilities.

Implementing a green social prescribing mechanism must consider how to facilitate the physical, mental, and emotional costs of social prescription and developing pathways of care. Asking questions such as *“What is this person capable of, and what would be good for them?”* and *“What’s their individual readiness?”* is among one of many ways to ensure equity is being embedded in this approach.

2. Other planetary health and biodiversity implementations

- We heard that green social prescribing can embody programs that meet multiple needs for differently abled users, address social support needs, and education. For example, social prescribing can look like online training vs. in-person training in a community centre.
- Community-based activities can build capacity by achieving multiple goals by looking at synergies. Some examples of biodiversity-based and/or planetary health initiatives that could potentially be socially prescribed are:
 - i. Climate change, sustainable living, and sustainable soap making.
 - ii. Activities to get people in touch with the environment.
 - iii. How to live sustainably: Food and foraging skills, hunting skills, and connecting more with nature.
- Implementing programs that are in touch with people’s basic needs are incredibly relevant in terms of social prescribing. It’s important to consider in which ways the initiative can connect people back into their environment, build resilience, target mental health, and improve social connectedness while also stimulating biodiversity in our communities.

On Partnerships...

A key theme of our discussions surrounded the integral external and internal partnerships that need to happen to see a biodiversity initiative succeed. The following points were mentioned as key partnerships and/or ideas to consider:

1. A working group of multidisciplinary FHA staff to spearhead action

- This working group could include passionate staff from (a) the facilities management side, (b) environmental and sustainability leaders and researchers, (c) clinical leads, and (d) board of directors and management (perhaps the Executive Director of Planetary Health).

2. Indigenous community partners

- Partnering with the First Nations Health Authority (FNHA) was a key theme in our conversations with stakeholders. This partnership could potentially facilitate networks and advisory committees to ensure the project outputs are informed by an Indigenous perspective.

- Connect with existing networks or advisory committees:
 - i. Indigenous Health Team (IHT) at FHA
 - ii. [Fraser Health Facilities' Indigenous Design Guidelines](#)⁸¹
 - iii. Traditional conservation programs⁸² run by Indigenous Partners
- Form an advisory group with local Indigenous leadership.

3. Technical partners

- FHA as an organization is focused on the delivery of healthcare, which means their capacity for operationalizing the technical aspects of a biodiversity/green space initiative (e.g., landscaping, engineering, gardening, beekeeping) may be limited. This presents a fantastic opportunity to partner with an external organization with specialties in green space and biodiversity-focused items.

On Implementation...

Stakeholders that were familiar with the barriers and facilitators regarding implementing and maintaining biodiversity initiatives that are similar in scope to a green spaces, community gardens, beekeeping activities etc. shared the following factors that may impact implementation:

1. Financing as a key consideration

- Installation, maintenance, and operations of items for biodiversity projects can be expensive. Hidden costs and potential damages should be factored into a budget to control for financial barriers down the road.
- Granting bodies could play a key role in funding, but this requires robust business cases and proposal writing. This is especially relevant if the initiative can be tied together with a research/scientific objective.
- Shifting mindsets to “Lifecycle costing”, or circular economy thinking rather than extraction and manufacturing costing. Co-benefits to the initiative can and should be highlighted where applicable.

2. Navigating the complexity of FHA to achieve change outside of primary care delivery

- Education and awareness
 - i. There is a substantial need to increase education and awareness around the importance of the natural environment and biodiversity, not only on the individual level, but also on how they can support adaptation and resilience, they are cost beneficial in many cases.
 - ii. Knowledge translation (e.g., infographics, executive summaries) can be an important vehicle for stimulating some of this education and awareness for both the general public and public health leadership at FHA.
- Buy-in

- i. Barriers to this are external pressures on FHA from primary care service delivery. Often, biodiversity initiatives are “at the bottom of the list”.
- ii. Increasing organizational and political conversations on climate change (e.g., Commitment to Net Zero by 2050) are a unique opportunity to highlight some of this work and push it to the forefront. Language in climate change strategy proposals can be adapted to increase the capacity of the projects and move them forward.
- iii. Value-based story telling as a vehicle to increase buy-in from funders and political leadership. This could be done through a variety of community groups, and may entail a story similar to our [empathy map/user profile](#). Highlighting human health (physical, spiritual, and mental wellbeing) and community connectedness as a product of biodiversity on FHA campuses. There is opportunity here to further involve cross-disciplinary students who have an interest in the intersection of human-centered stories (e.g., through visual arts, media, film) and environmental health.

3. Starting small

- Due to financial barriers and potential lack in uptake, starting small could be of benefit. “Prototype” initiatives in key and visible areas could encourage interest while keeping costs and liability low.
- Space is a premium on the grounds of a hospital, there are multiple considerations to be made on the actual space the initiative takes up, including operational space (e.g., waste management, electricity and water competition, parking spots, access on roofing)

Recommendations

Accessible health care delivery as a priority: All of our stakeholders agreed that biodiversity and green spaces within healthcare facilities are a necessary and important idea. However, we also heard very important considerations about the relationship between health care delivery and racialized, discriminated, and underserved communities. There is an undeniable need for reform in health care delivery in FHA, British Columbia (as evidenced by the [In Plain Sight report](#)⁸³, and across Canada. This includes basic acute care services such as accessibility to hospital beds, rehabilitation services and emergency departments. Simply, accessibility to health care should be prioritized by FHA. Where there is opportunity to combine increasing accessibility with a biodiversity/green space idea, this should be championed.

The following are three recommendations put forth by the GreenHealth team, to further this prototype into an official strategy and facilitate the incorporation of green space and biodiversity into healthcare facilities at FHA:

Recommendations to facilitate the incorporation of green space and biodiversity into healthcare facilities at FHA

1. Community Engagement to continue to inform this strategy

Our first recommendation is to implement a Phase 2 of this project, which is largely focused on community engagement to inform a biodiversity/green space initiative. There are several stakeholders that should be engaged as a part of Phase 2. With the [What We Heard section](#) as a guide, we recommend the following key groups that GreenHealth has not had a chance to engage with as a part of our capstone/Phase 1:

- **Local residents and community groups:** One of the most important groups to engage with is local residents and community groups who live near the healthcare facilities. These groups can provide valuable input on what types of green space/biodiversity features would be most beneficial and desirable for the community, as well as any concerns or barriers that should be taken into consideration. Some ways to engage with these groups might include hosting town halls, conducting surveys or focus groups, or establishing a community advisory committee.
- **Healthcare facility staff and patients:** It's also important to engage with staff and patients at the healthcare facilities themselves. Staff can provide valuable insights on how the initiative could be integrated into the healthcare facility and how it could best support patient care and staff wellbeing. Patients can provide valuable feedback on how the green space/biodiversity features could improve their experience and recovery outcomes. Some ways to engage with these groups might include conducting surveys or focus groups, hosting staff meetings, or collaborating with patient advisory councils.
- **Indigenous communities:** Given the importance of centering Indigenous perspectives when promoting biodiversity in healthcare facilities, it's essential to engage with Indigenous communities in the local area. These communities can provide valuable insights on the cultural significance of local plants and ecosystems, as well as opportunities for collaboration and partnership. Some ways to engage with Indigenous communities might include partnerships with FNHA, connecting with existing FHA Indigenous Health teams, hosting a consultation meeting with Indigenous leaders, partnering with local Indigenous organizations, or developing a Traditional Ecological Knowledge (TEK) protocol for the initiative.

When engaging with these groups, it's important to use culturally appropriate and respectful engagement methods that prioritize their voices and perspectives. This may involve partnering with local organizations, using translators or interpreters, providing honoraria or other forms of compensation for participation, and adapting engagement methods to meet the needs of diverse community members.

2. Start educational activities in FHA to increase buy-in and awareness

Our engagement sessions to date have highlighted the need for increased education, awareness, and buy-in from FHA staff, leadership, the general public, funding bodies, and politicians. We recommend increasing attention to educational activities within FHA (and surrounding communities) with the following methods:

- **Appointing a dedicated staff to biodiversity education:** A full-time dedicated staff role for biodiversity education can provide the leadership, expertise, and support needed to ensure the success of green space/biodiversity initiatives at FHA. This role can develop and deliver educational programs that raise awareness about the importance of biodiversity in healthcare facilities, and play a critical role in building partnerships and networks with local organizations, as well as in evaluating and reporting on the progress of the initiatives. By collecting and analyzing data on the impact of the initiatives on patient and staff wellbeing, as well as on local ecosystems, the staff member can help to demonstrate the value of the initiatives and secure ongoing support from FHA staff and leadership.
- **Developing the internal and external communications plan:** By further developing the existing internal communications that highlight the benefits of biodiversity/green space initiatives, staff members can gain a better understanding of the importance of the initiatives, which can increase their buy-in and advocacy for the initiatives. Highlighting the benefits of biodiversity/green spaces in external communications can help to raise awareness among the general public about the importance of these initiatives, and can increase public pressure on politicians and funding bodies to support the initiatives. The communications plan(s) can potentially help to influence policy by developing targeted communications aimed at politicians and policymakers, which may increase funding and address common barriers to this work.
- **Partnerships with students:** Knowledge translation partnerships with students, such as through an MPH practicum or capstone project, can bring many benefits to the biodiversity/green space initiative at FHA, including fresh perspectives and ideas, building capacity, fostering collaborative learning, bridging research and practice, and tapping into student/university networks to increase awareness. Additionally, recruiting interdisciplinary students from a range of faculties (Urban Planning, Environmental Science, Psychology) could support buy-in from a wider

range of departments and academic arenas, increasing awareness while bolstering the diversity of strengths brought to the team by practicum students. Urban Planning students could help Allied Health professionals identify how to create biodiverse green spaces; Environmental Science students could provide specific knowledge and research about how to foster and grow biodiverse environments; and Psychology students could inform the evidence-base on how green space access impacts patient mental health and wellbeing. By working with students, FHA can enhance the success and sustainability of the initiative over the long term while fostering partnerships with the education sector.

3. Highlight cost and benefit

We recognize that one of the main barriers to proceeding with green space/biodiversity initiatives is funding. Without a compelling argument to demonstrate that the initiatives will be financially beneficial, it will be difficult to convince FHA's administration to fund projects designed to increase green space/biodiversity presence on healthcare facility campuses. Therefore, we recommend the following methods to illustrate that the benefits of implementing green space/biodiversity initiatives will outweigh the cost:

- **Perform a cost-benefit analysis:** FHA staff knowledgeable in health economics along with health economist consultants from local universities can perform a cost-benefit analysis to reveal the long-term benefits and risks to proceeding with green space/biodiversity initiatives. The cost-benefit analysis should not only include financial indicators but also human health indicators, as demonstrated by the co-benefits of implementation of green space/biodiversity on FHA campuses. While improving population health does positively impact FHA financially due to decreased healthcare usage, the North Star of FHA should not be the bottom line but rather enhancing community health as a whole.

Appendix A - “Pathways linking biodiversity to human health: a conceptual framework”

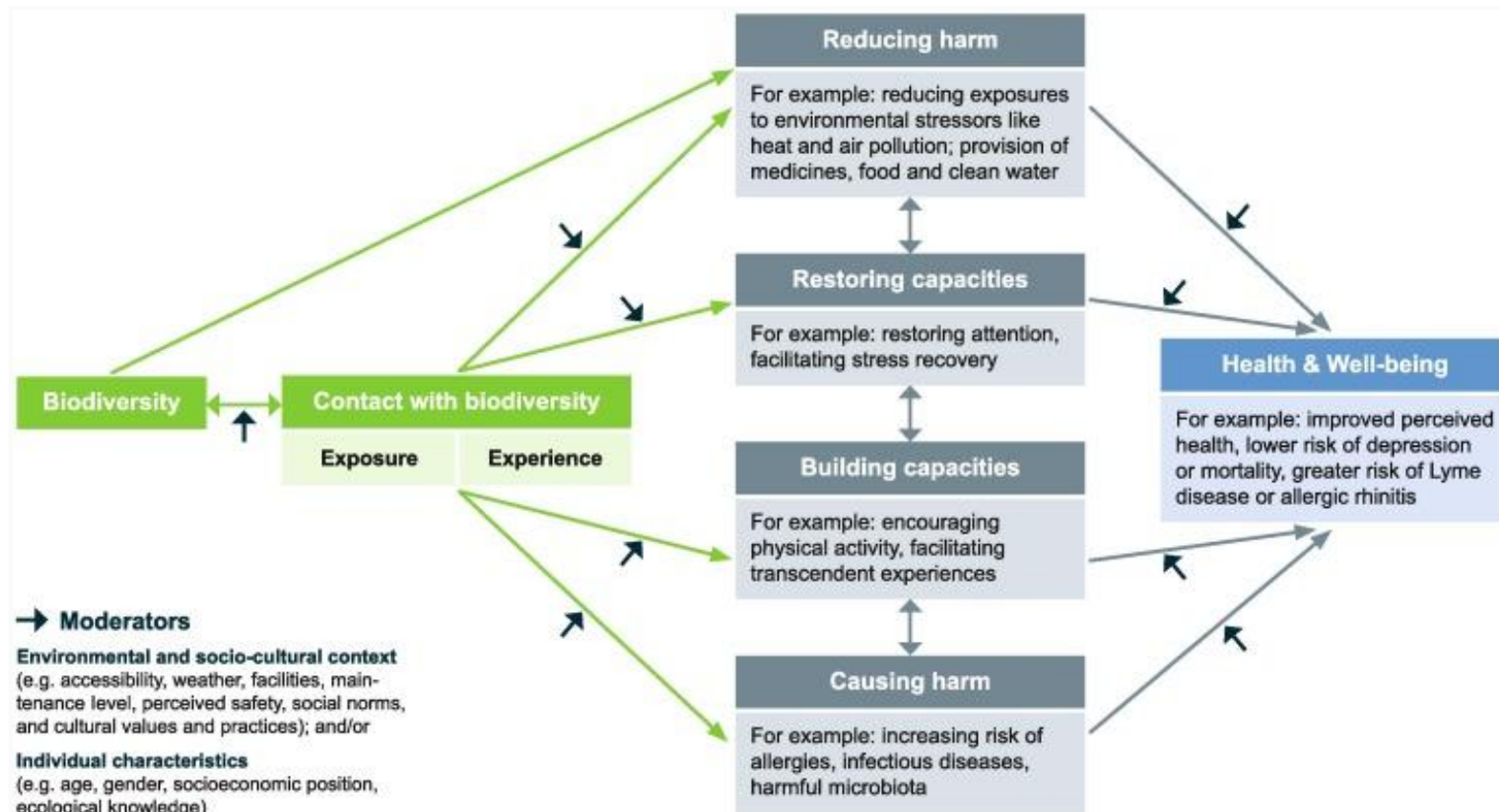
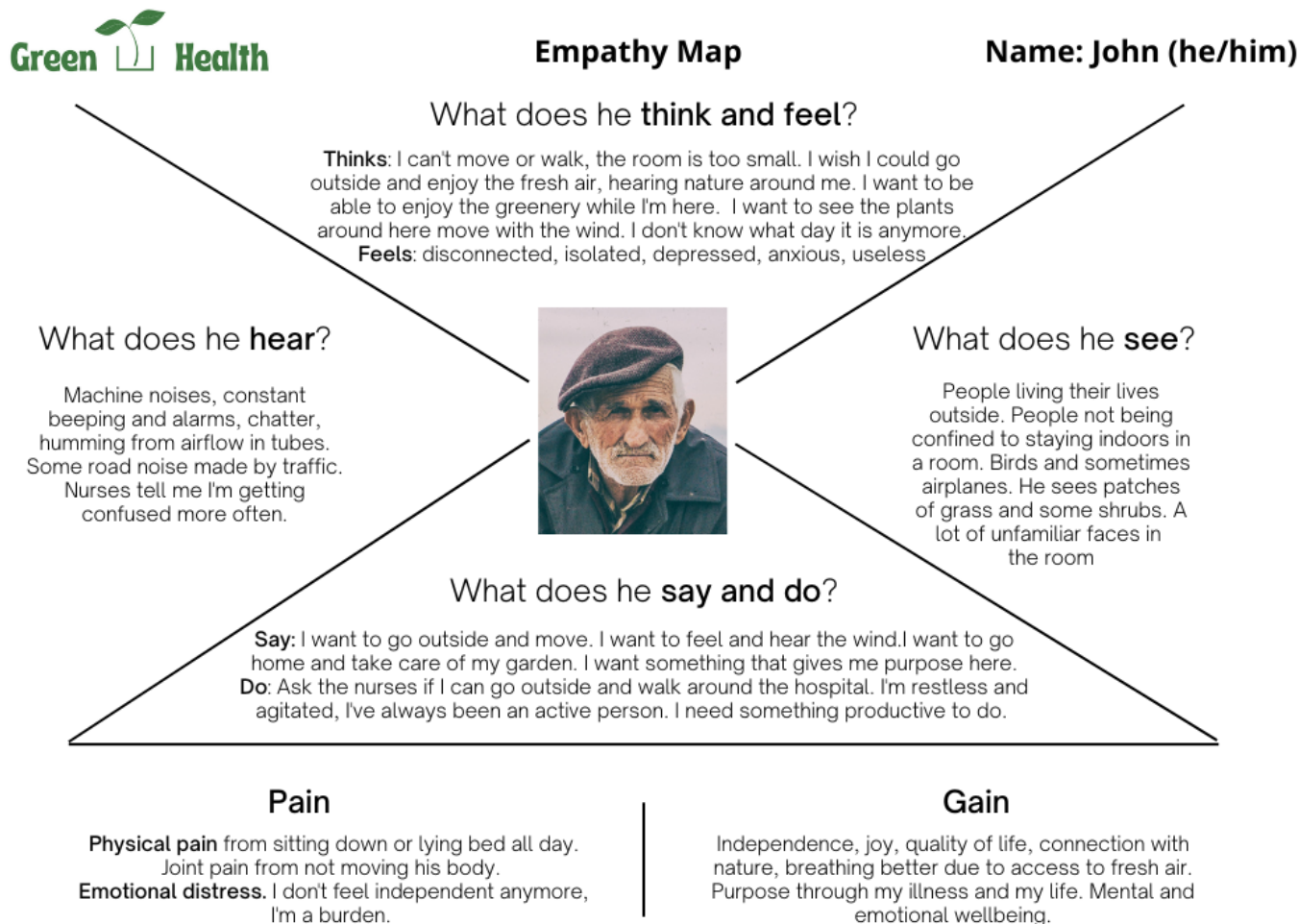


Fig. 6. Pathways linking biodiversity to human health and well-being. Four domains of pathways linking biodiversity and health involve contact with biodiversity (i.e., exposure and possibly experience). An additional pathway runs directly through the reducing harm domain, which implies that biodiversity may affect health without an individual or group having contact with biodiversity (e.g. biodiversity improving upstream water quality through bioremediation). Each domain may be related with all others (for ease of presentation, only adjacent relationships are shown). Two-headed arrows between the domains speak to the potential for reciprocal relationships. Associations between variables are subject to modification by the environmental and socio-cultural context or individual characteristics.

Appendix B - Empathy Map



Appendix C - User Profile

I am 78 years old, and I live in Surrey. I used to work as a lineworker for BC Hydro. I loved my work because I enjoyed being outside, seeing the trees and the mountains, getting to climb, and working with my hands. I also felt like I was always making a difference by maintaining and restoring electricity for those who had lost power. I also used to have a large garden where I would spend most my freetime, as I delighted in growing food for my family - my wife, three children, and now 5 grandchildren. Sitting in the garden always reminded me of my early childhood back in Poland when I would help my father plant vegetables and weed flower beds. When we would finish with our chores, I would just sit in the sun and watch the bees in the flowers around the house. I retired a few years ago, and I have noticed that as I have aged I get tired quicker and I am not as strong as I used to be.

Unfortunately, I had a heart attack a couple of weeks ago, and since being in the hospital I have gotten a type of infection that makes me not be able to leave my room.

I am pretty miserable in here. I stare at the same four walls all day long, my family can't visit me as much as I'd like, and my nurses tell me that sometimes I get confused. My body aches from not being able to move around much, and I always have to ask for help to get out of bed. The hospital smells are just awful - especially when it's mealtime - machines beep incessantly and bed alarms keep going off. Outside my window, I see a parking lot, a few patches of grass, and maybe the mountains on a clear day. I miss being outside where I can breathe in the fresh air and listen to the birds and just enjoy looking at nature. I would like to go back to take care of my garden. I think that being able to get out into nature would help me feel better and maybe even get out of the hospital faster.

Appendix D - Root Cause Analysis: 5 Why's

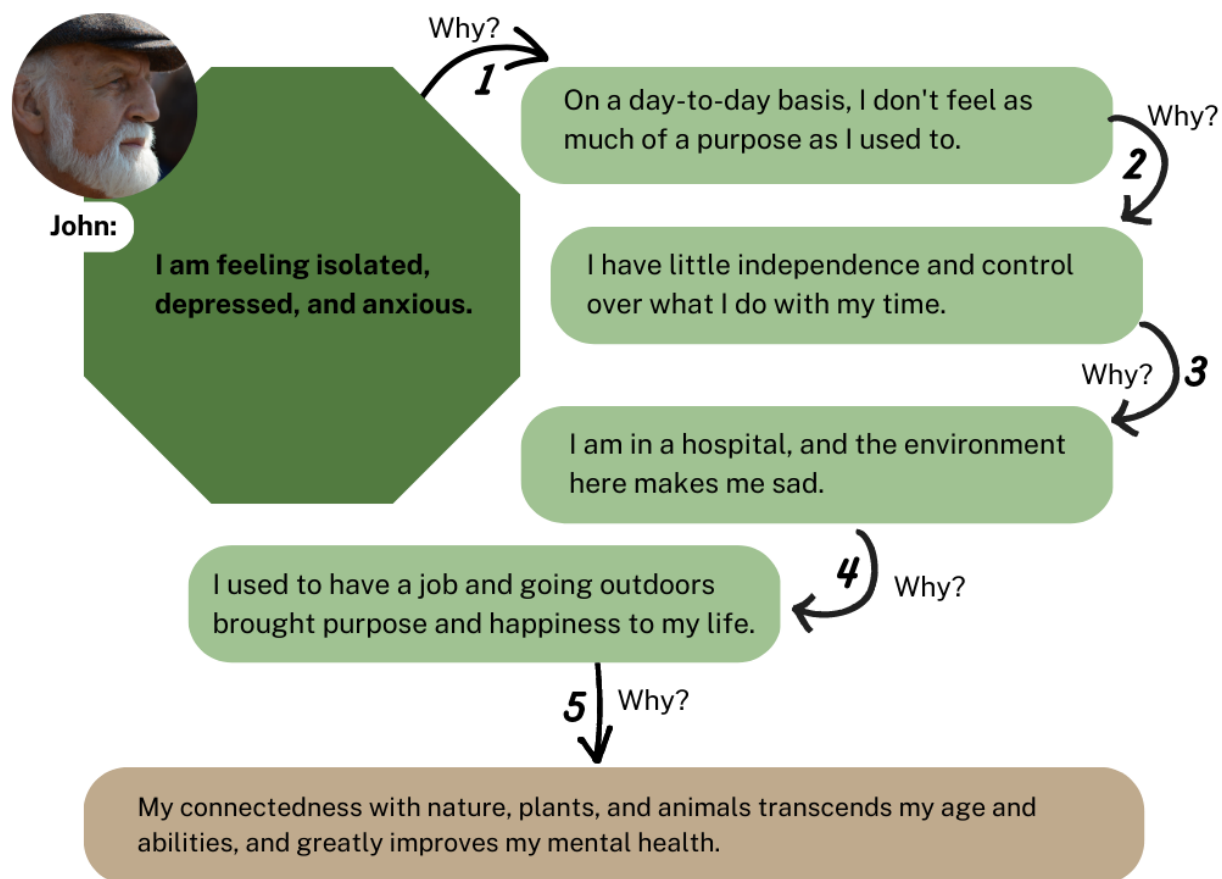
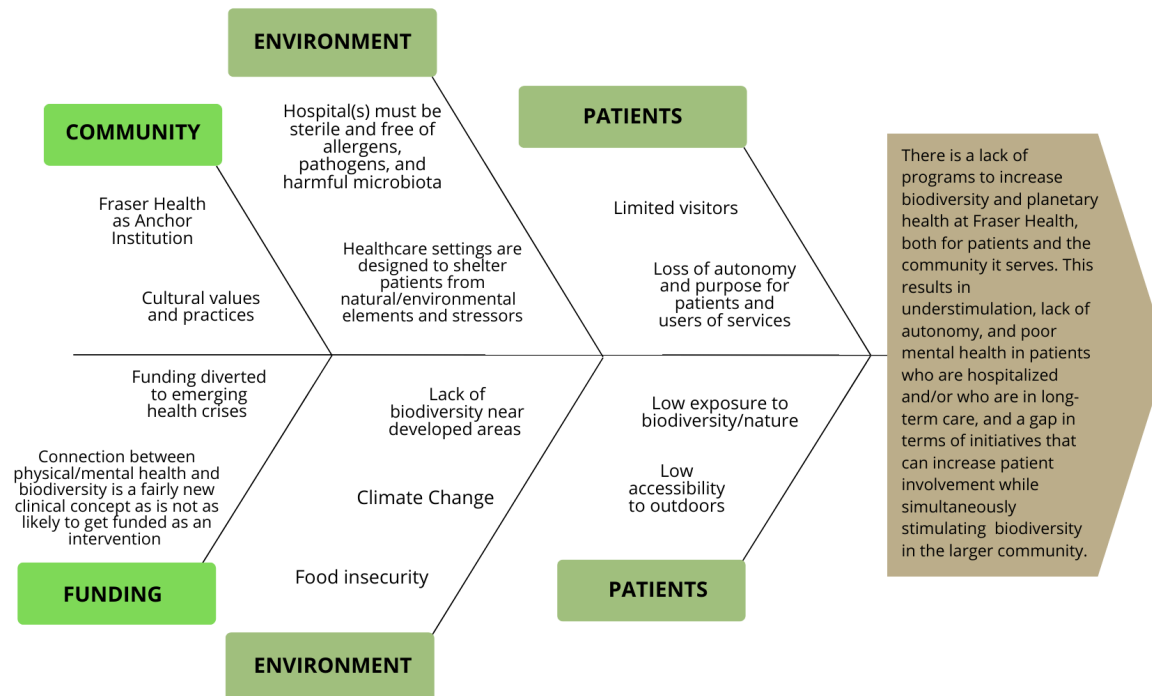


Figure 7. Root cause analysis using the "5 Why's" diagram from the user's perspective

Appendix E - Root Cause Analysis: Fishbone Diagram



The Fishbone is a tool to search for the different causes of a problem. This visual tool reminiscent fish skeleton graphically represents the causes leading to a situation or a problem.

Figure 8. Root cause analysis using the Fishbone Diagram from a structural perspective

Appendix F - Tables

Table 1: Allied health organizations advocating for biodiversity in Canada, the U.K., and the U.S.

Resource	Goals
Health Care Without Harm ^{9,10} Location: United States	<ul style="list-style-type: none"> - Protect public health from threats of climate change - Reduce carbon footprint - Create climate-resilient health systems - Advocate for climate change to be declared a public health issue - Advocate for switch to renewable energy - Support community health & resilience - Promote land stewardship - Foster healthy ecosystems to protect natural resources
Practice Greenhealth ¹¹ Location: United States	<ul style="list-style-type: none"> - Create practical and cost-effective programs to support greenhealth practice among allied health professionals - Educate, motivate, and engage allied health partners - Improve care standards by incorporating green space
NHS Forest (Green Space for Health) ¹²⁻¹⁴ Location: United Kingdom	<ul style="list-style-type: none"> - Support green space creation for NHS healthcare sites - Create accessible green spaces for patients, staff, families/caregivers, and the wider community to improve health and wellbeing
CASCADES Canada ¹⁵ Location: Canada	<ul style="list-style-type: none"> - Strengthen the Canadian healthcare system's capacity to promote & deliver sustainable healthcare - Professional collaboration - Support social prescribing services (for non-clinical social/support needs)
Doctors for Planetary Health ^{16,17} Location: Canada (BC)	<ul style="list-style-type: none"> - Grassroots organizing to foster a just world - Mutual respect and reciprocity between people and the planet - Situate ecohealth as central to understanding the interconnectedness of human and planetary health - Foster a healthy planet for the health of all people now and forever - Protect land and water ecosystems - Prioritize ecosystem health and biodiversity via law/policy - Recognize the right to healthy environments for humans, animals, and planet

Canadian Association of Physicians for the Environment (CAPE) ¹⁸ Location: Canada	<ul style="list-style-type: none"> - Protect nature and natural ecosystems - Connect people to nature - Situate access to nature as a human right, and lack thereof as an equity issue - Advocate for the Canadian government to fulfill international protected natural areas commitments
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Table 2: Cross-Jurisdictional Review

Description	Location
Indigenous gardens and healing circles	Ajax by the Lake, ON ⁴⁷ Alberta Children's Hospital, Calgary, AB ⁴⁸ Michener Institute of Education, ON ⁴⁹
Beekeeping in hospital rooftops	Saint John Regional Hospital, NB ⁵⁰
Hospital Garden	London, ON ⁵¹ BC Children's Hospital, Vancouver, BC ⁵² St. Paul's Hospital, Vancouver, BC ⁵³ Mazankowski Alberta Heart Institute, AB ⁵⁴ Bethesda Hospital, MB ⁵⁵ Penticton Regional Hospital, BC ⁵⁶
Traditional medicine	Island Health ⁵⁷
Indigenous Memorial Healing Garden	Colchester East Hants Health Centre, NS ⁵⁸

Table 3: Existing Implementation Strategies

Strategy	Summary	Benefits
<p>NHS, Social Prescribing, and the Green Gym Program^{60,64}</p> <p>Location: United Kingdom</p> <p><u>Behavioural</u></p>	<ul style="list-style-type: none"> - In a social prescribing (also called a Green Rx or GRx) approach <ul style="list-style-type: none"> - The concept of 'prescribing' time spent in nature is an alternative to other medical prescriptions (where applicable) - Healthcare providers prescribe time spent outdoors to improve physical and mental health - The Green Gym is a social prescribing program where attendees participate in practical activities related to gardening or path upkeep. Educational activities such as learning about plant and animal species are included. <ul style="list-style-type: none"> - In an NHS program at St. Austell Healthcare in England, patients participated in horticultural therapy groups and walking groups 	<ul style="list-style-type: none"> - Skill acquisition for patients in learning how to maintain green spaces and how to interact with local flora and fauna - Increase in confidence - Enhanced mental and physical wellbeing - Green space is adequately maintained for community enjoyment - Reduced reliance on healthcare system and pharmaceuticals - Downstream impacts of GRx include reduced healthcare-related GHG emissions by fostering a healthier lifestyle, reducing subsequent healthcare and pharmaceutical needs
<p>NHS and the Centre for Sustainable Healthcare^{13,37,65}</p> <p>Location: United Kingdom</p> <p><u>Structural & Behavioural</u></p>	<ul style="list-style-type: none"> - Centre for Sustainable Healthcare develops knowledge, resources, and projects to help NHS reach net zero - Projects include NHS Forest which plants trees across the UK, creates gardens in care facilities (including pollinator-specific and chemotherapy gardens), and establishes green health routes to connect green spaces in a community <ul style="list-style-type: none"> - NHS Forth Valley in Scotland transformed woods around hospital into a usable green space, employed 'hospital ranger' for ground maintenance and expertise, and provided outdoor cardiac rehab program, including: tai chi, photography, willow sculpting 	<ul style="list-style-type: none"> - Enhanced skills for staff, patients and their families in finding nearby green space and utilizing outdoor space to improve physical and mental health and wellness - Cultivated existing green space for improved community use
<p>Bringing the Outdoors In⁶¹</p> <p>Location: United Kingdom</p> <p><u>Structural & behavioural</u></p>	<ul style="list-style-type: none"> - NHS-developed guide to help healthcare workers support patients who are unable to go outside - Suggested activities include an app with bird songs, bringing in herbs and flowers for patients to smell, creating nature-themed art or making art with natural resources, reading nature-based books 	<ul style="list-style-type: none"> - Could help counteract negative mental health impacts that arise from being unable to go outside - Could benefit healthcare workers in terms of patient care/recommendations by highlighting the importance of accessing nature to overall human health

<p>Dementia Friendly Garden Design⁵⁹</p> <p>Location: Australia</p> <p><u>Structural & behavioural</u></p>	<ul style="list-style-type: none"> - Mixed-methods study examining impact of a dementia-friendly outdoor environment - DFG design included: pollinator-friendly plants, access to vegetation at a variety of heights, water features, birdbath and feeder, benches, familiar decorations, signage to help orient, and a garden shed with tools 	<ul style="list-style-type: none"> - Improved environmental stimulation - Improved engagement with care - Improved social engagement - Reduced apathy among residents
<p>Sunny Hill Health Centre⁵²</p> <p>Location: Canada (BC)</p> <p><u>Structural & behavioural</u></p>	<ul style="list-style-type: none"> - BC's only pediatric rehabilitation centre rebuilt their facilities - Includes an outdoor garden with varied terrain and a natural outdoor patio for relaxation and active therapy 	<ul style="list-style-type: none"> - Outdoor garden helps improve patient mobility - Patio supports a calm nervous system and provides a space for outdoor therapy
<p>Nourishing Our Community¹⁰</p> <p>Location: United States</p> <p><u>Structural, behavioural, & community</u></p>	<ul style="list-style-type: none"> - Food pantry circa 2001 with accessible 'food prescriptions' - Teaching kitchen circa 2003 where patients learn to prep healthy meals - Rooftop farm circa 2017 where 25 crops grow for patients, staff, and community 	<ul style="list-style-type: none"> - 7,000 patients and their families fill 'food prescriptions' each year (total of ~75,000 people) - >5,000lbs of produce produced each year - Behavioural teaching interventions equip patients and families with take-home skills
<p>Possilpark Health and Care Centre Redesign Project¹²</p> <p>Location: Scotland</p> <p><u>Structural & community</u></p>	<ul style="list-style-type: none"> - Redesigned vacant lot into a community garden, providing free fresh foods for the community and a site for healthcare providers to refer patients as part of GRx - Planted trees along street to provide shade 	<ul style="list-style-type: none"> - Trees cool urban environment and benefit air quality - Access to green space benefits community and patient health and wellness, both mental and physical - Provides community space for increased social cohesion and decreased isolation - Boosts food security
<p>Downtown Intercultural Gardeners Society Project⁵³</p> <p>Location: Canada (BC)</p> <p><u>Structural & community</u></p>	<ul style="list-style-type: none"> - Residents of Vancouver's Downtown Eastside began a community garden project for locals in 2010 - One location, on a hospital rooftop, is comprised of raised garden beds & boxes with edible plants and flowers for local pollinators 	<ul style="list-style-type: none"> - Engages a structurally vulnerable community to reduce isolation, enhance social cohesion, and promote health & wellbeing - Enables people to come together, grow free and healthy foods, spend time outside

Table 4: Seven re-Indigenization principles for transforming biodiversity conservation⁶⁷

Principle	Conceptual meaning
8. Embrace Indigenous worldviews of ecologies and <i>M'sít No'kmaq</i>	<p>Think, act, behave, and organize governance institutions on the basis of relationships of ecologies, with a foundational tenet that "all life forces are sacred and connected".</p> <p>All ways of knowing, laws, responsibilities, relationships and practices are embedded in relations with natural ecologies. Relationships are central and are expressed and experienced in alignment with ecological realities and attunement with intersecting life forces and ecological realms, in ways that lead to socially and ecologically just relationships. The "highest form of existence" is "living in harmony with the life forces active in different ecological realms", with "knowledgeable respect for all life forces and relationships of balance."</p> <p>As expressed in <i>M'sít No'kmaq</i>, "all my relations" refers to your "overall" family, which is your "natural world" and "every living thing". Humans are not the superior beings, but a small part and parcel of it. <i>M'sít No'kmaq</i> reminds us how we are all related and dependant within the living world.</p>
9. Revitalize and learn from Indigenous languages of the land	<p>The primary expression of Indigenous worldviews, ways of knowing, relationships, and ecologies is Indigenous languages. From Indigenous languages, we can learn the stories of the plants, animals, and the land and of the changes over time. Indigenous languages are derived from the land, "from the sounds and rhythms of ecology, nature in action". By contemplating the nature and structure of Indigenous languages and their implicit meanings, we can gain a different filter through which to perceive, conceive, and understand the world and each other.</p> <p>Indigenous languages are repositories of science: they tell of relationships, they reveal history, and they hold Indigenous identity. Reclaiming and embracing Indigenous languages and the knowledges they express will help us learn "how to live" in relationship with the land, ecologies, life forces and one another.</p>
10. Recognize the supremacy of Natural laws and guidance for living within them from traditional laws like Netukulimk	<p>Natural laws explain the relationships, responsibilities, and obligations that all forms of life have to one another. They emerged from the land and apply to all forms of creation; they were not created by humans; and are not required to be mandated by Western legal systems to be actualized.</p> <p>Natural laws hold that the very essence and source of life—water, air, and soil—is the right of every living thing and should be our overarching objective. The Laws of Nature must supersede the laws of man.</p> <p>As expressed in Netukulimk, "man and nature are one," "everything comes from the land," and "all that the earth holds is sacred." These values and belief systems are at the core of how we should govern and conduct ourselves on the lands and waters. Understanding natural laws can give us the power to act in a good way.</p> <p>Netukulimk is achieving adequate standards of community well-being without jeopardizing the integrity, diversity, or productivity of our environment. As we go about sustaining ourselves, we need to take care, to become "the eye, the ear and the voice, for the ones that cannot defend themselves, in human form".</p>

11. Honour and deepen correct relationships with each other and all ecologies	<p>The importance of working together in correct relationships is entwined with principles of justice, equity, and rights and centered around balance and harmony. A primary duty is to foster alliances. The survival of one is always related to that of others.</p> <p>A premium is placed on diversity and difference, encouraging respectful behaviour in dealing with others.</p> <p>Justice for nature also depends on justice for people. When the people are in correct relations, it will be possible for all to come together with their insights and actions: "When all peoples come together... each will be able to give forth the gifts that they have been given."</p> <p>Many Treaties reflect respectful relationships and alliances; it is the responsibility of both parties to honour those alliances. We are all treaty people.</p>
12. Gain insights through "total reflection" and reveal the truth	<p>Before we can enter into respectful alliances and dialogues and gain insights about where we are going, we need to deeply reflect on the "truth" of who we are, where we are coming from, and why we are here.</p> <p>Insights come from the heart, mind, spirit, and body. It starts with "total reflection" on what has been done in the past and how to transform those into lessons learned for where we are going.</p> <p>We have to remind ourselves that we have a cognitive mind. And with that we have the ability to transform our natural world. With total reflection, really looking at the mistakes, at some of the things that have been done in the past, and transforming those, as lessons learned, and abiding by those lessons, we will stand a chance.</p>
13. Hold other ways of knowing as valid: Etuaptmumk, or "two-eyed seeing," and "strong like two people"	<p>Indigenous ways of knowing must be respected as distinct and valid systems of knowledge, standing side by side with Western systems. Only when both ways of knowing are recognized may they be woven together to honour both.</p> <p>Indigenous ways of knowing are conceived as spirit, emphasize the importance of sharing and encouraging learning, are deepened through relationship, and reflect interconnectedness. Through Indigenous ways of knowing we can deepen understanding and relationships in fundamentally crucial ways.</p> <p>Etuaptmumk, or "two-eyed seeing," similar to a Tłıchǫ concept of "strong like two people," offers space for recognizing and honouring the value and legitimacy of Indigenous knowledge systems and establishes pathways to move forward in partnership, collaboration, and respect, "learning to use both eyes together, for the benefit of all".</p> <p>We can begin to "bring forth perspectives that are heavily weighed in both knowledges, not just one". This opens opportunities to reflect, in ethical space, on what needs to be included as we move into the future.</p>
14. Deepen relationship and knowing through "story-telling, story-listening"	<p>Stories are the platform for teaching Indigenous worldviews, values, culture, and how to live with and uphold responsibilities to the land. The sharing of stories constitutes and deepens relationships, while honouring Indigenous ways of knowing, teaching, and learning.</p> <p>Telling, re-telling, listening, and re-listening to stories is an important part of a life-long process of learning about laws, roles and responsibilities and understanding how to share ecological space, to ensure community for every life force.</p> <p>Both story-telling and story-listening are important for revealing nuances and insights. The value of the exchange of stories is in generating insights that are deeper than facts, because the flow of information is through the heart, mind, spirit, and body.</p>

In the Mi'kmaq practice of caring for M'sit No'kmaq—all my relations, watching, listening and doing are as important as sharing the lived experience with others: “what constitutes a real relationship is the exchange of stories”.

Table 5: The Determinants of Planetary Health - An Indigenous Consensus Perspective⁶⁹

Mother-Earth Determinants	Indigenous Peoples' Determinants	Interconnecting Determinants
<p><i>Respect of the feminine</i></p> <ul style="list-style-type: none"> - Some Indigenous societies traditionally matriarchal - Women as caretakers of land/environment and cultural identity in many nations <p><i>Ancestral legal personhood designation</i></p> <ul style="list-style-type: none"> - Capitalist imperial political & economic narratives make invisible the rights of our natural environment (land, water, air) - Sacred indigenous traditions & knowledges mandate the need to speak on behalf of natural resources and advocate for better treatment 	<p><i>Land rights</i></p> <ul style="list-style-type: none"> - Indigenous land stewardship is a fundamental right, especially in unceded territory - 80% of global biodiversity is stewarded by Indigenous peoples, yet these peoples reside on just 22% of Earth - Indigenous control over natural resources that follows traditional knowledges will ensure biodiversity and ecosystem conservation <p><i>Languages</i></p> <ul style="list-style-type: none"> - Direct link between language preservation and ancestral knowledge regarding natural resource preservation - ~1 Indigenous language dies every 2 weeks due to the impacts of ongoing colonization - When language is lost, so too is knowledge necessary for planetary health preservation <p><i>Health</i></p> <ul style="list-style-type: none"> - Access to land is intimately tied to culture and sovereignty - Each are vital for counteracting intergenerational effects of ongoing colonization, and each contribute to health and wellbeing <p><i>Elders & Children</i></p> <ul style="list-style-type: none"> - Elders as knowledge keepers from whom children learn 	<p><i>Humans ↔ nature</i></p> <ul style="list-style-type: none"> - Humans are inexorably linked with their natural environment - Disconnection with environment → sense of ownership over environment (exacerbated by colonial ideologies) <p><i>Relationships</i></p> <ul style="list-style-type: none"> - Interconnectedness, both between humans and with their environmental surroundings, maintains balance & wellness - Children in collectivistic societies learn this early <p><i>Modern scientific paradigm</i></p> <ul style="list-style-type: none"> - Existing (neocolonial) paradigm as “linear, reductionistic, & mechanistic” - Necessitates shift to Indigenous paradigm that is “contextual, holistic, symbolic, non-linear, and relational” - Shift prioritizes upstream thinking for planetary health improvement centring systems, ecology, & networks <p><i>Governance & law</i></p> <ul style="list-style-type: none"> - Indigenous Natural/First Law is a form of self-governance underpinned by mutual responsibility & reciprocity between people and planet - Facilitating Indigenous self-governance that

	- Their roles are vital for creating intergenerational households which extend to the natural environment	follows this law prioritizes the rights and health of all living things
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