



United Nations
Educational, Scientific and
Cultural Organization



**MOUNT
ARROWSMITH**
BIOSPHERE REGION

Mount Arrowsmith Biosphere Region

2021 Annual Report

The Mount Arrowsmith Biosphere Region (MABR) includes roughly 1200 square kilometres on Eastern Vancouver Island, spanning from Nanoose Bay to Qualicum Bay, and from the highest peak of Mount Arrowsmith (1817 metres) down 300 metres into the Salish Sea. This extensive vertical elevation and the incredible biodiversity are what make the MABR unique among Canadian Biosphere Regions. The boundaries of the MABR are defined by five watersheds – Englishman River, Little Qualicum, French Creek, Nanoose Creek, and Bonnell Creek. The MABR encompasses many unique ecosystems ranging from high alpine and coastal forests to intertidal and marine habitats.

The MABR acknowledges and thanks the Qualicum, Snaw-naw-as, Snuneymuxw, K'ómox, Tseshaht, Hupacasath, and Ditidaht First Nations, on whose traditional lands the Mount Arrowsmith Biosphere Region is situated within.

Cover photo courtesy of Arrowsmith Media



⋮ MABR Vision, Mission, and Mandate

The Mount Arrowsmith Biosphere Region (MABR) inspires a positive future on the east coast of Vancouver Island, British Columbia, Canada, by facilitating collaboration, coordinating participatory research, and supporting community initiatives that promote environmental, social, cultural, and economic sustainability.

Our Vision

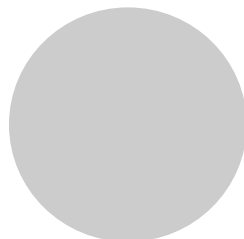
MABR is a place where communities work together to inspire a positive future for people and nature.

Our Mission

The MABR works with diverse communities and organizations to develop and implement policies, practices, and initiatives that promote environmental, economic, cultural, and social sustainability. Different worldviews and ways of knowing are shared to ensure that our mission has meaning for all.

Our Mandate

The MABR's mandate is to promote the conservation of biological and cultural diversity, support the development of sustainable communities and livelihoods, and facilitate collaboration, reconciliation, and knowledge sharing in the MABR.



Executive Summary

Much like 2020, most of this year was spent working remotely, social distancing, and meeting virtually; something we have all adjusted to due to the COVID-19 pandemic. Despite some challenges, our team has adapted well, shown resilience, and leveraged improved skills to complete another successful year and continue to make positive change in our Biosphere Region. Throughout 2021, we successfully continued with and even increased our capacity for research, knowledge sharing, and community engagement. Several projects were completed, ongoing projects were continued with good momentum, and some new projects have begun. Although in-person community engagement and outreach initiatives were limited in some circumstances, we sustained ongoing relationships with community members and groups, as well as implemented some new collaborative initiatives.

This report showcases some of the main accomplishments throughout 2021 that helped to uphold the vision, mission, and mandate of the MABR. We anticipate another busy year ahead, and look forward to continued collaboration on efforts that make the MABR a beautiful and unique region to live, learn, and connect.



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⋮ MABR Governance

Roundtable Governance

The MABR Roundtable meets quarterly and functions as the governing body of the MABR, providing direction to the MABR and the Mount Arrowsmith Biosphere Region Research Institute (MABRRI). The Roundtable aids MABRRI staff by identifying priority action areas and research to be pursued in the short, medium, and long-term. Through diverse representation, the MABR Roundtable itself is a model for how people with different interests and mandates can work together in a respectful, collaborative, and effective way. Members have collectively developed a Culture of Engagement that ensures that everyone feels comfortable, engaged, and eager to return.

In 2021, MABR Roundtable gatherings were hosted online using the platform Zoom © to allow for social distancing and the safety of all members. We hope to resume in-person meetings in 2022.

Current Roundtable Members

Steve Adams, Mosaic Forest Management, Resource Technologist

Kim Burden, Parksville & District Chamber of Commerce, E.D.

Chris Burger, MABR Liaison for the City of Parksville

Jamie Dubyna, Islands Trust

Marnie Eggen, Islands Trust

Mandy Hobkirk, MABR Coordinator

Cheryl Jones, Snaw-naw-as First Nation, Councillor

Geraldine Manson, Snuneymuxw First Nation, Elder in Residence at Vancouver Island University

Ceri Peacey, MABR Roundtable Community Representative

Michael Recalma, Qualicum First Nation, Chief

Graham Sakaki, MABRRI, Research & Community Engagement Coordinator

Blain Sepos, Parksville Qualicum Beach Tourism, E.D.

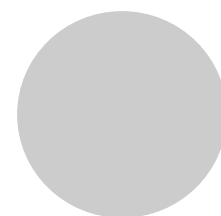
Pam Shaw, MABRRI, Research Director

Jannah Stavroff, Community Representative

Haley Tomlin, MABRRI, Assistant Research & Community Engagement Coordinator

Lehann Wallace, Regional District of Nanaimo, Electoral Area G Director

Teunis Westbroek, Town of Qualicum Beach, Councillor



: The Mount Arrowsmith Biosphere Region Research Institute

About MABRRI

MABRRI is an academic entity at Vancouver Island University (VIU) that supports and conducts natural and social science research in the MABR and surrounding areas. MABRRI was established at VIU in 2014 when the MABR transitioned from a charitable not-for-profit model to a regional Roundtable partnership model spearheaded by VIU and the City of Parksville. The research institute conducts, supports, and facilitates research that meets the environmental, social, cultural, and economic sustainability goals of the MABR and upholds the mandate of the UNESCO MAB Programme.

MABRRI is the engine behind the MABR's research and educational programs. MABRRI's mission is to advance a program of inquiry that involves regional stakeholders in meaningful explorations of issues of local relevance. By harnessing the knowledge of the MABR community and the interdisciplinary strengths of students and faculty at VIU, MABRRI is a centre for collaborative research, innovation, and knowledge sharing that elevates the relationship between people and nature in the Biosphere Region.

MABRRI contributes to the success of the MABR through research and education, which is one of the four main functions of all UNESCO Biosphere Reserves. MABRRI envisions, funds, and coordinates research projects and educational programs or initiatives that advance environmental, economic, and social (including cultural and spiritual) sustainability.

Strategic Plan

MABRRI's Strategic Plan for Research and Education aims to provide the foundation for the research institute to become a regional, national, and international leader in community-based, student-led environmental, social, and economic sustainability research. The Plan outlines the next steps for MABRRI, which include objectives for conducting research in the MABR, research themes and priority areas for focus over the next three years, and our vision for collaborating with stakeholders in the region. A link to the strategic plan is available [here](#), or on the 'resources' page of MABRRI's website.

2021 MABRRI Research Team

MABRRI employed a total of 45 student researchers in 2021. Some of the projects they contributed to included Coastal Forest Plant Phenology and Monitoring, Forage Fish Spawning Habitat Monitoring, the View from 2117, and Promoting the Sustainable Development Goals (SDGs) in the MABR. Additionally, MABRRI also employed 14 full-time staff and recent graduates.

: MABR and the Sustainable Development Goals

Adopted in 2015 by the United Nations (UN) as part of the 2030 Agenda for Sustainable Development, the 17 Sustainable Development Goals (SDGs) are a blueprint to achieve improved sustainability by 2030¹. The SDGs hold significant importance as they call all world nations - regardless of their economic status - to action to achieve a more sustainable future for all, while leaving no one behind¹. The SDGs incorporate a holistic approach to sustainable development, aiming to address a wide range of issues including: ending poverty and hunger, addressing climate change, reducing inequalities, and protecting and conserving biodiversity and ecosystems¹.

Although the SDGs were developed for nations, their achievement requires collaboration and solutions from all levels, including the local level². As a UNESCO Biosphere Reserve, the MABR plays a significant role in promoting and contributing to the SDGs locally. Biosphere Reserves are areas that model solutions for a sustainable future, celebrate cultural and biological diversity, and empower positive relationships between humans and nature³. The MABR involves partnerships between various community members, stakeholders, and organizations. Through these partnerships and its role as a UNESCO Biosphere Reserve, the MABR is in a position to make meaningful local contributions to the SDGs.

Globally and within Canada, the vision and goals of Biosphere Reserves can make connections to the SDGs. Acting as models for a sustainable future, Biosphere Reserves connect to the 2030 Agenda as a whole, by representing all 17 SDGs. By working towards solutions for conservation of biological and cultural diversity and climate change, while also promoting economic and social development, Biosphere Reserves inherently connect to SDGs 8, 11, 13, 14, and 15. SDG 4 also connects to Biosphere Reserves as they aim to facilitate education for sustainable development.

As the MABR focuses on sustainability, each of the projects conducted by the MABR and MABRRI touch on the SDGs in some way. Throughout this report, icons of the SDGs that each project or initiative relate to will be found following their description.



¹United Nations. (2020). *The 17 goals*. <https://sdgs.un.org/goals>

²United Nations. (2021). *Goal 17: Revitalize the global partnership for sustainable development*. <https://www.un.org/sustainabledevelopment/globalpartnerships/>

³UNESCO. (2019). *Biosphere reserves*. <https://en.unesco.org/biosphere>

2021 Accomplishments

Biosphere Reserves work to promote the conservation of biological and cultural diversity in addition to economic and social development. In each Biosphere Reserve, community partners work together to find innovative ways to achieve a balance between the needs of humans and nature.

UNESCO Biosphere Reserves have four strategic objectives:

1. Conserve biodiversity, restore and enhance ecosystem services, and foster the sustainable use of natural resources.
2. Contribute to building sustainable, healthy and equitable societies, economies and thriving human settlements in harmony with the biosphere.
3. Facilitate biodiversity and sustainability science, education for sustainable development and capacity building.
4. Support mitigation and adaptation to climate change and other aspects of global environmental change.

In Canada, we also strive towards a fifth objective; reconciliation with Indigenous Peoples.

The remainder of this report has been divided into the above objectives, providing a snapshot of the MABR's accomplishments in 2021.

Conservation

Forage Fish Spawning Habitat Monitoring

The forage fish project began in 2017 when Phillip Dionne, a research scientist from the Washington State Department of Fish and Wildlife, travelled to Nanaimo to train the MABRRI team to sample for forage fish eggs, specifically Pacific sand lance and surf smelt. MABRRI began sampling in December 2017, focusing on the Parksville-Qualicum Beach Wildlife Management Area. In mid-2018, MABRRI began hosting training sessions for local community stewardship groups in order to build the capacity of the project. By involving citizen scientists, MABRRI has been able to expand the geographical range far beyond what they would be able to do on their own.

By the end of 2021, MABRRI had 9 dedicated citizen science groups (Gabriola Island Shore Keepers Association, Thetis Island Nature Conservancy, Mid-Vancouver Island Habitat Enhancement Society, Qualicum Beach Streamkeepers, Cowichan Estuary Restoration and Conservation Association, Cowichan Valley Naturalists Society, Cowichan Secondary School, Pender Islands Conservancy Association, and Saturna Island Marine Research & Education Society) and 7 individual volunteers spanning from Nanoose Bay to Cowichan Bay. MABRRI hopes to continue to expand the citizen science component into the future. To date, MABRRI and the citizen scientists are now monitoring over 80 sites regularly along the Vancouver Island and Gulf Island coastlines. Sites span from Cowichan Bay, north to Deep Bay, including sites on Gabriola Island, Thetis Island, Pender Islands, and Saturna Island. Overall, in 2021 MABRRI and citizen scientists collected 42 samples containing forage fish eggs from 25 different beach stations, all Pacific sand lance.

Interest in the topic of forage fish continues to grow along the coast. As a result, MABRRI's collaborations in this project continue to expand, now working with individuals from a wide variety of organizations. The partnerships have allowed us to create the BC Forage Fish Network which includes Peninsula Streams Society in Victoria; Project Watershed in Courtenay/Comox; Parks Canada on the West Coast and southern Gulf Islands; the Sunshine Coast Friends of Forage Fish, Ruby Lake Lagoon Society, and Pender Harbour Ocean Discovery Station from the Sunshine Coast; a Masters student from the University of British Columbia; Tsleil-Waututh Nation; the Department of Fisheries and Oceans at the Pacific Biological Station; and

Át'ka7tsem/Howe Sound Biosphere Region. We look forward to continuing our monitoring efforts, expanding our range, and collaborating with the BC Forage Fish Network on restoration events.

MABRRI could not do this work without the continued support of our sponsors at the Sitka Foundation, the Pacific Salmon Foundation, and World Wildlife Fund Canada. Data from all participating groups is uploaded to the Pacific Salmon Foundation's Strait of Georgia Data Centre.

The Forage Fish project supports SDGs:



Determining the Impacts of Harvesting on Clam Beds in the Nanoose Bay Recreational Shellfish Reserve

In collaboration with the Nanoose Economic Development Corporation (NEDC), this project aims to determine whether recreational and commercial clam harvesting pressures could be impacting clam habitat in the public use area at the Nanoose Bay Recreational Shellfish Reserve. This study aims to provide a comprehensive outlook of the current harvesting practices in the study area and provide recommendations to improve the sustainability of harvesting practices.

Phase one of the project began in 2020 with a literature review and field observations during the clam harvesting season to identify the extent of harvesting activity, as well as characteristics and patterns of harvesting in the study area. Field observations were conducted at the study area over multiple visits during low tide events to record the number of clams removed from the site by harvesters. Interviews were then conducted to provide insight into historical patterns and the significance of clam harvesting to supplement the study.

In 2021, researchers began phase two of the study, which included additional data collection to address the limitations discovered in phase one. Clam abundance surveys were completed in April and August to gain a baseline understanding of clam species and abundance throughout the harvest area and how these populations changed during the harvest period. Field observations of clam harvesting took place from mid-April to early August, 2021.

Moving forward, MABRRI will continue conducting abundance surveys pre- and post-peak harvesting season, as a larger dataset can help infer changes to population over time and between different harvest seasons.

The Impacts of Harvesting on Clam Beds project supports SDGs:



Wetland Mapping in the Regional District of Nanaimo

In 2016, MABRRI partnered with the Regional District of Nanaimo's (RDN) Drinking Water and Watershed Protection (DWWP) program with the goal of reducing existing data gaps with regards to where wetlands are located, how wetlands are classified, and what role wetlands play in groundwater recharge. All project work is conducted under the guidance of Julie Pisani, Coordinator of the RDN's DWWP program and Dr. Alan Gilchrist, VIU Geography Professor.

To date, mapping and classifying wetlands throughout the seven water regions of the RDN has resulted in the establishment of six priority sites: two in the Big Qualicum Water Region; two in the French Creek Water Region; one in the Little Qualicum Water Region; and one in the Cedar-Yellow Point Water Region. Each of the six priority sites were selected for long-term monitoring and are visited seasonally to observe vegetation, hydrology, and water quality. At three of these priority sites, the MABRRI team installed instrumentation, including piezometers, trail cameras, and rain gauges to collect data that can help determine connectivity between the wetlands and underlying aquifers, and whether there may be recharging or discharging relationships.

In 2021, a citizen science network was established to support seasonal fieldwork for each of the six priority sites. A total of 14 volunteers were trained, including members from the Arrowsmith Groundwater Alliance, Qualicum Beach Streamkeepers, and Quennell Lake Watershed Stewardship Society. Citizen science volunteers supported MABRRI staff by visiting the priority sites once each season (January, April, July, and October) to make field observations and collect instrumentation data. Through continued monitoring of the priority sites in 2021, we were able to build on data collected in previous years regarding both seasonal changes observed in the wetlands, as well as what role they may play in groundwater recharge/dischage. Over the next year, the MABRRI team will continue to work closely with citizen science groups to monitor the priority sites and contribute to a long-term dataset. Building a dataset that encompasses several years will allow us to identify any changes that may be occurring in these wetlands over time, as well as inform future protection or restoration efforts, if needed.

To learn more about wetland mapping and monitoring in the RDN, periodic project updates and all reporting can be found on the [RDN's Get Involved webpage](#).

The Wetland Mapping project supports SDGs:



: Research and Education

MABR Youth Program

Due to COVID-19, we were unable to facilitate youth program workshops in the classroom in 2021. In an effort to adapt to health regulations, we modified our programming to engage youth in topics related to sustainability science, while also maintaining social distancing. To continue providing learning opportunities in the safest way possible, we developed materials that could be utilized while following COVID protocols.

In 2021, 10 course packages were put together to help educators across the region engage youth in curriculum-based sustainability lessons and activities. These teaching resources put an emphasis on place-based learning, and use local examples, where possible, to further connect youth to their local environment. The course packages, or “Biosphere Booklets”, include a lesson plan and a variety of interactive activities for students. Each booklet is based on the BC curriculum and focuses on an aspect of sustainability. Currently, available booklets are tailored for grade 6-7 students. However, additional booklets will be launched for multiple grade levels in March 2022, resulting in a package developed specifically for students in grades 1-2, 3-5, and 6-7.

Students who complete five or more booklets will be awarded a UNESCO MABR Certificate of Sustainability. Each biosphere booklet can be viewed and downloaded directly from the MABR’s website, [here](#). Looking ahead, our team hopes to resume facilitating youth program workshops in 2022, and is optimistic that we will reach even more students in the upcoming year.

The MABR Youth program supports SDGs:



MABR Annual BioBlitz

From April 16th through 18th, 2021 the MABR hosted its first ever Biosphere-Wide Blitz. The event was a modification of the Annual MABR BioBlitz, which was restructured to allow for social distancing and to obtain a broader view of the biodiversity in our region. This rapid biological survey of flora and fauna utilized the iNaturalist app, with observations collected within the MABR’s boundaries across the three days.

Roughly 30 participants were involved in the event, contributing to a growing understanding of the biodiversity of our region. A grand total of 817 observations were recorded, including 382 distinct species. The [2021 MABR BioBlitz Summary Report](#) includes details of all the flora and fauna species recorded as part of this year’s event.



Image by leftcoaster

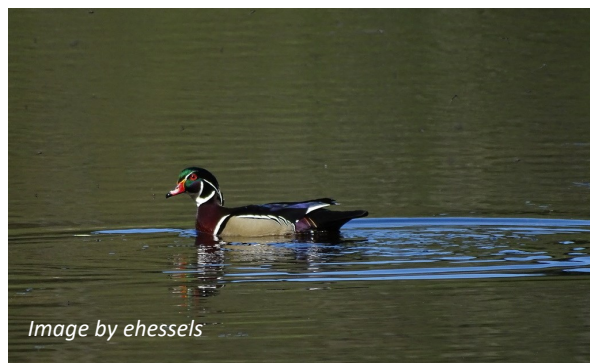


Image by ehessels



Image by bradenjudson

Marine Debris Surveying in the MABR

In July 2021, MABRRI began a citizen science initiative to conduct marine debris surveys along beaches in the MABR. The survey approach follows the National Oceanic and Atmospheric Administration's (NOAA) methods for marine debris surveys, as part of their Marine Debris Monitoring and Assessment Project. Through NOAA's survey methods, MABRRI is providing data to an international database that amalgamates data collection from local beaches into a larger context.

Thanks to our volunteers, MABRRI is helping to fill a gap in the NOAA database for the east coast of Vancouver Island, and will continue conducting debris surveys four times per year, once each season. This project currently includes two sites in the MABR (French Creek and Qualicum Beach), and may be expanded to include additional sites in the near future.

**Marine Debris
Surveying project
supports SDGs:**



International Journal of UNESCO Biosphere Reserves

The International Journal of UNESCO Biosphere Reserves is, in perpetuity, a digital, open access, subscription-free publication, making this a cost-effective publication, reducing the ecological footprint of the journal and allowing for full-colour/full-spectrum production across a range of digital formats. This journal is part of a wave of new journals that are abandoning the confines of paper publications and embracing a digital future that includes video, audio, full-colour mapping, and interactive formats that are not limited by the challenges of publication costs and hard copy dissemination. This format also allows for a much shorter delay between submission and publication.

The journal is fully interdisciplinary and instead of focusing on a selected scientific research sub-area, it is a resource for sharing information across disciplines and into practice, promoting the cross-pollination of ideas and creating new research connections. It can therefore be regarded as a contribution to the implementation of the Lima Action Plan for the MAB Programme and its World Network of Biosphere Reserves (WNBR) (2016-2025). This calls for not only applied research in Biosphere Reserves, but also for an active and open interdisciplinary network of scientists and knowledge holders working in and with Biosphere Reserves, with a joint research and knowledge exchange agenda. The journal was launched in 2017, and included five volumes by the end of 2021.

**The International Journal of
UNESCO Biosphere
Reserves supports SDGs:**



: Sustainable Development

Promoting the SDGs in the MABR

The Promoting the SDGs in the MABR project aims to increase awareness of the UN SDGs in the MABR. Through regional and national partnerships and its role as a UNESCO Biosphere Reserve, the MABR is situated to make meaningful local contributions to the SDGs. With the goal of highlighting how the SDGs are supported and implemented within the MABR, this project worked through a bottom-up approach to achieve two main objectives: 1) promote awareness of the 17 SDGs in the MABR, and 2) determine how members of the community in the MABR are currently contributing to the SDGs. Thanks to funding received from Colleges and Institutes Canada's (CICan) Career-Launcher Internship program in 2020 and 2021, MABRRI was able to hire two SDG Interns to complete this work.

To achieve the objectives, five main activities took place: 1) interviews with local businesses and organizations, 2) online surveys, 3) a social media campaign, 4) the creation of a video series, and 5) an online symposium. Through the interviews and online surveys, the team was able to make alignments between the work taking place in the MABR and the SDGs. These alignments will be summarized in a final report and some have been highlighted through a social media campaign. The social media campaign, along with the creation of the video series and the symposium, were developed with the purpose of raising awareness of the SDGs. The symposium, titled Getting to Know the SDGs, was hosted on February 23, 2021 via Zoom and was open to the general public. Presentations from the MABRRI team and local groups and organizations highlighted connections between the MABR and the SDGs and fostered discussions around why the SDGs are important and how the MABR can further contribute to the SDGs. The Promoting the SDGs in the MABR project will be completed in the summer of 2022 with a final report that will provide an overview of how the MABR is contributing to the global agenda.

Universities and the SDGs: Engaging the campus community with the 2030 Agenda

In January 2021, MABRRI received funding from the Government of Canada's SDGs Funding Program for the Universities and the SDGs project which aims to promote and advance the 17 SDGs at VIU and in surrounding communities. This project is a continuation of MABRRI's previous VIU and the Sustainable Development Goals project which took place throughout 2018 and 2019 and investigated how VIU was contributing to the SDGs. The VIU and the SDGs project included a thorough website review, over 80 meetings with VIU faculty and staff, and three community engagement events to collect data for the final report and list of recommendations which were presented to VIU's Office of the President in January 2020.

To promote and advance the SDGs at VIU and in surrounding communities, the Universities and the SDGs project involved a series of initiatives and events throughout 2021. These initiatives and events included: 1) The World's Future social simulation, 2) SDG booths at RockVIU, 3) SDG Launch, 4) SDG Scavenger Hunt, 5) SDG Training Sessions for Community Groups, 6) SDG Youth Community Grant Funding program, and 6) Symposium for Municipal Planners. In addition to these engagement initiatives, the MABRRI team delivered presentations on the SDGs to several VIU classes and produced a number of educational materials on the SDGs such as a video series, a training video for community groups, a package for community groups, and a booklet for elementary students. The overall purpose of the Universities and the SDGs project was to increase exposure and knowledge of the SDGs at VIU and surrounding communities. This increased awareness can then foster collaboration for projects amongst VIU and surrounding local organizations to further address the SDGs locally and regionally.

Promoting the SDGs in the MABR and the Universities and the SDGs projects support all the SDGs.



SDG Youth Community Grant Program

The MABR, in partnership with MABRRI, the Parksville & District Chamber of Commerce, and School District 69, launched the SDG Youth Community Grant Program in the fall of 2021. The program is a competitive award program aimed at funding youth-led sustainability projects in the MABR to launch local initiatives that contribute to one or more of the SDGs. The SDG Youth Community Grant Program intends to provide students with the opportunity to develop and execute an initiative in their own community, contributing to the SDGs at a local scale and implementing positive change.

In 2021, a student group from Kwalikum Secondary School won the award to revitalize their school garden and address food insecurity. The funding will enable the student group to clean up the garden space, build garden beds, plant a pollinator garden, and grow fruits and vegetables. Through the garden, the students hope to provide food for their school community and utilize the garden as an educational space teaching youth how to be self-sustainable in food production. The produce grown in the garden will be used by programs at Kwalikum Secondary School, such as one that provides students in need with access to food. The garden will also incorporate Traditional Hul'q'umi'num plant names, the traditional language of the Qualicum First Nation.

MABRRI and the MABR hopes the SDG Youth Community Grant program will be a sustained program that will promote SDG implementation in the MABR for years to come. It is anticipated that the program holds potential to impact the wider MABR community and foster continued SDG advancement.

The SDG Youth Community Grant Program supports all the SDGs.

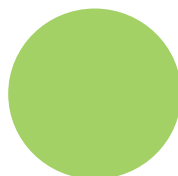
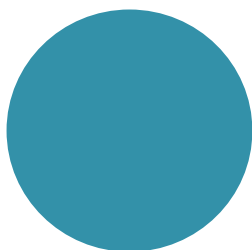


Amazing Places

The Amazing Places project is a Canadian UNESCO Biosphere Reserve initiative brought to British Columbia in 2017 through a collaboration between the MABR, Parksville Qualicum Beach Tourism Association, Destination British Columbia, and VIU. The project connects people with nature and educates residents and visitors about the ecological significance of our incredible local outdoor spaces.

The primary goals for the Amazing Places project in 2021 were to continue promotion of this project among residents and tourists by engaging them in our website and social media, as well as by encouraging visitation to the Amazing Places locations. With travel restrictions imposed by the pandemic, the Amazing Places project was promoted to local residents as a way for those living in the MABR to enjoy their surroundings in a safe manner.

The International Journal of UNESCO Biosphere Reserves supports SDGs:



The View from 2117: Human Actions, Consequences, and Perspectives on Mountain Regions

In 2019, MABRRI received three years of funding from the Canadian Mountain Network for The View from 2117: Human Actions, Consequences, and Perspectives on Mountain Regions. The project seeks to address the research question: What are the ways in which individual and collective behavior, population growth, regulatory regimes, and societal change have affected and will affect First Nations, mountain communities, and mountain environments in the MABR over the next century? The title of the project, The View from 2117, references both the vertical extent of the MABR from the peak of the mountain to the base within the Salish Sea and the timeframe under consideration in this research. The project looks to the past to map the human impacts on the MABR and then into the future to determine how new policy and regulatory frameworks, ways of being, and advanced knowledge can be used to mitigate or eliminate these impacts. To answer the main research question, there are five sub-studies: 1) Comprehensive demographic analysis, 2) Community profile, 3) Ecosystem analysis, 4) Governance and regulatory study, and 5) Sense of place study.

Throughout 2021, The View from 2117's interdisciplinary team of researchers and students have worked diligently on the five studies. Data collection continued for the comprehensive demographic analysis, the ecosystem analysis, and the governance and regulatory study. For the community profile and sense of place study, data analysis was completed and the focus was shifted to knowledge dissemination. Notably, Dr. Sylvie Lafreniere and her team finalized and launched the first community profile for the MABR - [The MABR in Bloom: A Community Profile](#). The MABR in Bloom is the first community profile for the MABR that evaluates community vitality and health through social, economic, and environmental factors. This community profile can help provide local governments, policy makers, planners, and community organizations within the MABR with valuable information regarding socioeconomic characteristics of the population. Due to COVID-19, The View from 2117 project received an extension into a fourth year (2022) for the remaining studies to finalize their data analysis and knowledge dissemination. Overall, The View from 2117 project aims to create a shift in the MABR that will lead to lessened human/nature impacts.

The View from 2117 project supports SDGs:

- 11 SUSTAINABLE CITIES AND COMMUNITIES**
- 13 CLIMATE ACTION**
- 15 LIFE ON LAND**
- 17 PARTNERSHIPS FOR THE GOALS**



: Climate Action

Global Observational Research Initiative in Alpine Environments (GLORIA)

In the summer of 2016 MABRRI partnered with Kristina Swerhun, to continue long-term alpine monitoring on four summits of Mount Arrowsmith. The purpose of the Global Observation Research Initiative in Alpine Environments (GLORIA) research is to develop a long-term, world-wide database of standardized observations of alpine biodiversity, vegetation patterns, and mountain-top temperatures. Every five years, the MABRRI team collects vegetation and temperature data on the four summits to assess any visible changes. Information aims to capture the effects of climate change on these unique alpine ecosystems and contribute to local and international efforts to mitigate biodiversity and habitat losses.

In July 2021, two members of the MABRRI team hiked up Mount Arrowsmith to recce the two lower summits, and replace the temperature data loggers that were initially installed in the 2016 expedition. Each site has four loggers that record hourly temperature data. Among other climatic features, alpine vegetation is highly influenced by temperature and snow cover. These parameters are easy to measure with small temperature data loggers, which are buried 10cm below the surface. This allows for continuous temperature data that can be directly linked to the health of the alpine vegetation.

In 2022, the research team is seeking funding to replace the remaining temperature data loggers on the highest two summits and conduct the vegetation surveys on all four summits.

*The GLORIA
project supports
SDGs:*



Coastal Plant Phenology Research and Monitoring Project

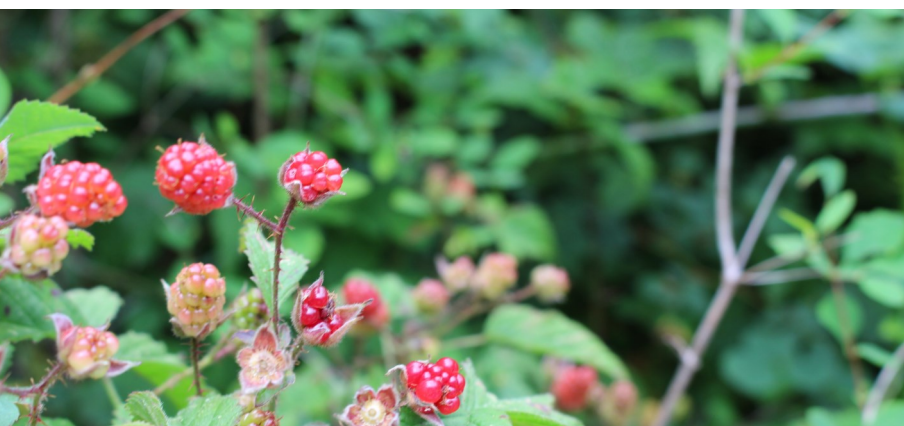
In partnership with the Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Milner Gardens & Woodland, and BC Parks, MABRRI is working to assess and monitor climate change impacts on local plant phenology – the timing of seasonally reoccurring events such as bud break, leaf size, flower development, and ripe fruit. By monitoring the growing seasons of different coastal plants, and by comparing these growing seasons to microclimate data, we can work to identify any potential changing trends in the growing seasons of Vancouver Island’s ecosystems.

We are monitoring phenological changes in native plant species at seven research sites: Milner Gardens & Woodland, Thetis Lake Regional Park, Koksilah River Provincial Park, Bowser Ecological Reserve, VIU Woodlot, North Cowichan, and on Mount Arrowsmith. It should be noted that the Mount Arrowsmith site has been on hold since 2019 due to lack of funding, accessibility, and restrictions associated with the COVID-19 pandemic (e.g., unable to social distance in a helicopter). We collect the timing and intensity of all phenophases for each of our identified plant species using two observation techniques: in-person and field camera observations. The field camera observation technique is used at all of the study sites; however, in-person observations are only collected at Milner Gardens & Woodland.

In 2021, we were awarded funding to expand the project and established the two study sites at VIU Woodlot and North Cowichan. The equipment for the new sites was installed in late summer, which includes microclimate stations and a series of trail cameras in order to link phenological records to local climate. The project team also continued to collect in-person observations at Milner Gardens & Woodland, which occurred biweekly during the growing season and monthly during the fall and winter. Data collection will continue for a number of years in order to see how growing seasons may be shifting with changing climate patterns.

During the academic school year, MABRRI hired two students to conduct the data analysis phase of the project. Students are hired to quality check the microclimate data and interpret and analyze field camera photos to determine the species’ phenophase development and any other observable concerns. The research team also completed a preliminary microclimate data and red huckleberry leaf onset and fall phenology comparison between the research sites. The team identified some interesting trends between and across all the sites, including the onset of fall phenology much earlier than previous years. This could be one of the impacts of the heat dome that was experienced across BC this summer. Recent extreme weather events reinforce the importance of monitoring plant phenology and microclimate to ensure we capture the response of plants and to understand how plants may respond to projected warmer, drier conditions.

The Plant Phenology project supports SDGs:



: Reconciliation

Snaw-naw-as Garden of Spiritual Healing

In 2017, a collaborative partnership between Snaw-naw-as First Nation, VIU, MABRRI, and several other funders and sponsors, resulted in the establishment of the Garden of Spiritual Healing at the Snaw-naw-as Health Centre. The Garden of Spiritual Healing has been designed to incorporate four complementary functions: (1) enhanced food security; (2) the development of a platform for education, outreach, and knowledge mobilization; (3) creation of a sense of community and an increase in community capacity; and, (4) increased health and wellness. These key functions guide our overall goals and objectives for the project.

Since its inception, several phases of the project have been completed, including a dozen planter boxes for fruits and vegetables, as well as a tool shed, greenhouse, traditional smokehouse, fencing, and pathways. In addition, an educational platform called The Garden Café was implemented to help increase healthy food knowledge, cooking skills, and promote the Garden of Spiritual Healing. In the spring of 2021, the MABRRI team continued to work with Snaw-naw-as First Nation to construct more aspects of the site, including expanding the fruit gardens. The team also helped to clean up the site and added more soil to prepare for the upcoming growing season.

*The Snaw-naw-as
Garden supports
SDGs:*



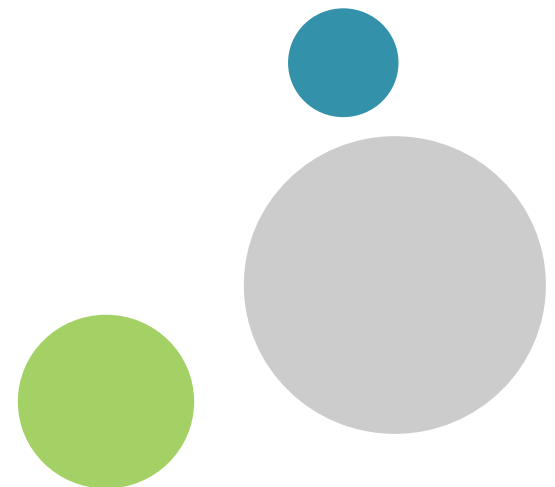
Braiding United Nations Global Agendas: Supporting the SDGs and UNDRIP through the Canadian Mountain Network

The UN SDGs are a top priority for meeting the 2030 Agenda for Sustainable Development and reaching global sustainability. To advance all-inclusive and holistic sustainability, the human rights of Indigenous peoples must be upheld, protected, and preserved. In this sense, the SDGs must be considered in tandem with the UN Declaration on the Rights of Indigenous Peoples (UNDRIP), an international instrument establishing a framework for the minimum standards for the dignity and well-being of Indigenous peoples of the world.

For the Braiding United Nations Global Agendas project, MABRRI is working with the Canadian Mountain Network (CMN) to highlight the significance of collaboration between Indigenous and Western knowledge systems in research and knowledge mobilization. Funded by the Government of Canada, CMN is a research and knowledge mobilization network that supports the health and resilience of mountain systems and communities, with a focus on braiding Indigenous knowledge and Western science. Braiding knowledge systems acts as a critical step towards achieving the SDGs in a way that is informed by and aligns with UNDRIP, therefore leveraging capacity to advance reconciliation. The key outcome of this project intends to inform the Government of Canada of the important and necessary work of CMN, highlighting an approach to research and knowledge mobilization that supports Indigenous-led work and knowledge co-production. Additionally, this project aims to raise public awareness of the SDGs, their interconnectedness with UNDRIP, and that braiding knowledge systems is a critical step in the advancement of reconciliation.

To ensure this project takes an informed and respectful approach, MABRRI spent the later months of 2021 reviewing literature, government policies and documents, and CMN strategies to set the context for data collection in 2022. Additionally, MABRRI established a Technical Advisory Committee, made up of a diverse panel of experts in sustainable development, human rights of Indigenous peoples, and governmental processes to support and guide the project. In 2022, MABRRI will interview CMN researchers to gain an in-depth understanding of how their work can exemplify the necessity of learning together, sharing knowledge, and finding collaborative solutions to longstanding problems faced by mountain systems and communities. These interviews, along with the background information collected in 2021, will support the development of deliverables that will inform the Government of Canada, as well as communities across Canada, on the significance of CMN's work and the importance of braiding Indigenous and Western knowledge for sustainable development.

The Braiding Global Agendas project supports all the SDGs.



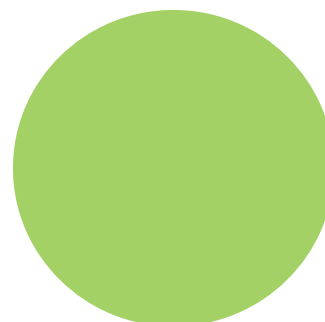
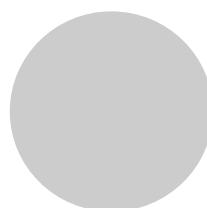
: Acknowledging All Collaborators

The MABR and MABRRI were fortunate to receive support from many individuals and organizations in the region this year. Support came in many forms, from networking and idea sharing, to providing funding and student learning opportunities. We would like to take this opportunity to thank these individuals and community groups for their ideas, inspiration, and dedication to helping the MABR achieve its full potential. Upholding the vision, mission, and mandate of the MABR could not be done without the ongoing support and enthusiasm from community individuals, groups, and partners. Our accomplishments are centered around collaborative efforts, and we are grateful to all who helped make this year a success. We look forward to another great year ahead, full of learning together and working on initiatives that matter most to communities of the MABR!

Mid-Island Stewardship Caucus

Also in 2021 was the formation of the Mid-Island Stewardship Caucus (MISC), a collaborative stewardship group which allows environmental organizations in the mid-Island region to connect, collaborate, and share resources and expertise. The caucus creates space for members to come together and discuss stewardship activities and initiatives, identify gaps, and support each other to achieve their goals. MISC provides a way for us to ensure we are doing our best work, collaborate where possible, and use various resources and the strengths of organizations to meet our goals collaboratively and effectively.

By the end of 2021, MISC included representatives from: Nanaimo & Area Land Trust (NALT), Hamilton Marsh Committee, Save Estuary Land Society, Arrowsmith Naturalists, Qualicum Beach Streamkeepers, Friends of French Creek Conservation Society, Mid-Vancouver Island Habitat Enhancement Society, Mount Arrowsmith Biosphere Region, Mount Arrowsmith Biosphere Region Research Institute, and BroomBusters.





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