Annual Report 2016–2017

CAMPUS BIODIVERSITY INITIATIVE: RESEARCH AND DEMONSTRATION

ACKNOWLEDGEMENT

The UBC Vancouver Campus Biodiversity Initiative: Research & Demonstration (CBIRD) is honoured to be on the traditional, ancestral, unceded territory of the Musqueam xʷməθkʷəy̓əm people.

The name xʷməθkʷəy̓əm means place of məθkʷəy̓ and relates to the məθkʷəy̓, a flowering plant, which grows in the Fraser River estuary in the tidal flats and marsh lands. Musqueam people have lived on these lands for thousands of years. They moved throughout the territory to fish, hunt, trap and gather. In return for this abundance, the people were and still are the keepers of the lands and waters that sustain them. Today, the Musqueam people continue to use many of these resources for economic and traditional purposes.

CBIRD would also like to acknowledge all students, faculty, staff and community partners who worked with us over this past year, and contributed to this ambitious collaborative undertaking. Specifically, we would like to thank all our faculty and department participants for providing authentic and applied learning experiences for students; our staff and community partners for their dedication and sharing their expertise; and students for their contributions in working towards making UBC a living laboratory and advancing our sustainability goals here and beyond.

For more information on the individuals who contributed to this year's successes, please visit www.sustain.ubc.ca/biodiversity-ubc.

Thuja plicata
Credit: *Douglas Justice*
(CREATIVE COMMONS LICENSE)

Disanthus cercidifolius Maxim
Location: *UBC Botanical Garden*
Credit: *Dominic Janus*
(CREATIVE COMMONS LICENSE)

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Our Story

The Campus Biodiversity Initiative: Research and Demonstration (CBIRD) emerged from a window of opportunity. It started in 2016 with a Teaching & Learning Enhancement Fund (TLEF) grant. Together with the Faculty of Science, the Social Ecological Economic Development Studies (SEEDS) Sustainability Program applied for funding to expand its work in advancing sustainability on the Vancouver campus to a new thematic area — biodiversity. SEEDS mandate is to create partnerships between students, faculty, staff, and community partners to enable innovative and impactful research projects on campus and beyond. As a result, SEEDS harnessed this opportunity to support operational biodiversity leadership and founded CBIRD.

Following discussions with stakeholders across campus, an interdisciplinary Steering Committee of staff, faculty, and students was formed to:

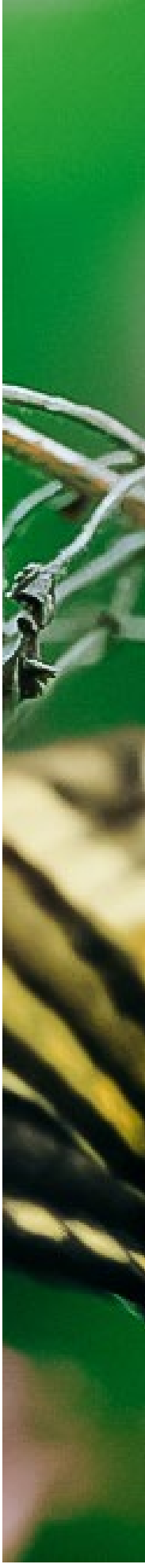
1. Establish CBIRD's vision and objectives that enhance biodiversity on campus through cross-faculty and cross-departmental collaboration.
2. Provide ongoing feedback throughout the year through quarterly meetings and online communications.
3. Plan, support, and review implementation of projects.
4. Promote the communication of research project outcomes.
5. Identify gaps in biodiversity research areas and opportunities to fill those gaps through applied projects.

SEEDS projects were integral to the original goals of the Steering Committee. These projects uniquely connect students, under the supervision of a faculty member, to applied research projects that support the University's efforts to advance sustainability strategies and operational priorities.

Since 2016, CBIRD has evolved both in breadth and depth. The Steering Committee was initiated to advance biodiversity by providing guidance on biodiversity priorities, advancing SEEDS projects and partnerships, and exploring ongoing funding opportunities.

Since then, it has grown into an interdisciplinary collaborative to develop a platform of networks, projects, and research that supports biodiversity plans, policies, strategies and actions at the UBC Vancouver campus. Although CBIRD has evolved since its beginning, the importance of SEEDS student research has remained a critical component.

Student research constitutes the centerfold of the initiative, and will form the foundation of multiple UBC biodiversity-affiliated policy initiatives and actions in the years to come.



Syringa sweginzowii 'Superba'
Location: *UBC Botanical Garden*
Credit: *Taisha Mitchell*
(CREATIVE COMMONS LICENSE)

Strategic Framework

With a Strategic Framework, 36 student projects underway, and a timeline for the development of a Campus Biodiversity Strategy, it is time to report and share CBIRD's 2016-2017 activities. We have developed and formalized new partnerships, initiated innovative projects on the Vancouver campus, and engaged hundreds of UBC students, faculty, staff and community partners to help advance a platform for biodiversity enhancement. We have achieved this through applied SEEDS research projects, meaningful community engagement, and the growth of a biodiversity network on campus.

We are excited to introduce you to CBIRD and look forward to your future involvement in the initiative.

Right: Fall colours on Main Mall
Credit: Don Erhardt

VISION

Enable the campus community to cultivate innovative ideas, research and actions that advance biodiversity policies and implementation, supporting a positive and nurturing relationship between the natural and built environment.

VALUES

1. Interdisciplinary
2. Whole-systems thinking
3. Empowerment
4. An action-orientated approach
5. Scalability + replicability

MISSION

To inform policy and practice that enhances biodiversity through research, education, campus and wider community engagement, and demonstration.

We will further our mission with the following objectives:

01

Cultivate biodiversity stewards by increasing public awareness and understanding of biodiversity issues and solutions.

Key actions:

- Engage, develop and sustain a network of stakeholders (students, researchers, faculty, staff, residents, campus visitors, and community partners) through opportunities for connection (community events), education (citizen science, applied research projects) and consultation (surveys, and public outreach).

02

Advance policies and practices which address and respond to key biodiversity issues.

Key Actions:

- Produce a baseline assessment of the current biodiversity landscape across the Vancouver campus by inventorying pre-existing data, identifying areas that lack data, and creating new projects on campus to aid in addressing data gaps.
- Create an online data platform that provides a geospatially referenced inventory of biodiversity and natural assets on the Vancouver Campus.

03

Utilize the Campus as a Living Laboratory.

Key Actions:

- Leverage the SEEDS Sustainability Program to facilitate connections between students, faculty, operational staff, and community partners.
- Advance student research projects that address the five strategic priority areas: baselining, demonstration, monitoring and evaluation, communication, and exploration of tools and mechanisms to support biodiversity on the Vancouver campus.

Why Biodiversity Matters

URBAN BIODIVERSITY AND EXTINCTION

The World's 6th mass extinction is underway. If allowed to continue, humans will soon be deprived of biodiversity benefits such as crop pollination, water purification, food sources, ecosystem services and cultural benefits (Ceballos et al. 2015).

The International Convention on Biological Diversity defines biological diversity as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems".[1] A biodiverse ecosystem provides crucial ecosystem services that form the foundation of social, economic, and ecological wellbeing. With a rapidly urbanizing world, changing how we use our land is the number one threat to biodiversity. In light of rapid biodiversity decline across international terrestrial and marine ecosystems, the challenge we face today is maximizing the potential of our urban environments in enriching biodiversity. By using the Campus as a Living Laboratory, CBIRD aims to model an innovative approach to biodiversity enhancement and protection in an urbanized setting. Our efforts will increase the ecological viability of the Vancouver campus, support ecosystem services and increase the social wellbeing of the campus community.

COLLECTIVE MOMENTUM: LOCAL TO GLOBAL

Local

We do not stand alone in our efforts. CBIRD is part of a broader movement to conserve and enhance biodiversity from the regional to international scale.

Cities in the Metro Vancouver area are showcasing innovation with the sheer multitude of emergent biodiversity policies. Since 2008, the region has developed the following strategies:

1. The City of Vancouver's Biodiversity Strategy (2016);
2. The City of Surrey's Biodiversity Conservation Strategy (2014);
3. The City of Richmond's Ecological Network Management Strategy (2015);
4. The Biodiversity Conservation Strategy partnership's Strategic Directions for Biodiversity Conservation in Metro Vancouver (2008); and,
5. Metro Vancouver's Ecological Health Plan (2011)

The borders of ecosystems and biomes extend beyond and across political and administrative jurisdictions. Supporting biodiversity requires collaboration and leadership to ensure biodiversity at all scales is enhanced.

[1] *http://www.biodiv.be/biodiversity/about_biodiv/biodiv-what*

Global

The innovation seen at the regional level aligns with global policies and initiatives. In 2015, the UN released 17 Sustainable Development Goals.[2] These goals conform to a global consensus that the maintenance and enhancement of our ecological systems are inextricably linked to social and economic wellbeing. In 2008, the City Biodiversity Index was developed to provide metrics for urban biodiversity for cities around the world.

There is an international movement to support biodiversity that extends beyond the government level.[3] Internationally, universities are aligning with regional priorities to conserve and develop wildlife habitat to support biodiversity. Notable examples of this have emerged from the University College London (UCL), University of California (UC) Berkeley, and Cornell University. UCL has aligned their Biodiversity Strategy and Action Plan with the goals of the neighbouring Westminster and Camden area Biodiversity Action Plans, and the National actions.[4] UC Berkeley stands out among the UC Schools through its demonstrated commitment to habitat restoration, as the importance of maintaining ecological diversity and developing wildlife habitat is clearly articulated in their campus landscape plan and connected to community involvement and values through the Creeks of UC Berkeley initiative.[5] Through their Campus Plan, Cornell has committed to establishing biodiversity goals and metrics, measuring ecosystem services, establishing soil and vegetative management policies, and resilient design.[6] These initiatives have all contributed measurable actions toward biodiversity enhancement and protection through designing innovative, natural storm water management methods, increasing their tree canopy, shifting to more native and climate resistant plant species, and supporting native pollinator populations.[7]

Biodiversity at UBC

Frameworks pertaining to whole systems approaches to biodiversity retention and enhancement are being developed at the local and global scales. As a world leader in research and sustainability, UBC's engagement in the global momentum towards biodiversity conservation and enhancement is critical.

The UBC Vancouver campus is host to a multitude of biodiversity assets and ecosystem services. For instance, we are located along the Pacific Flyway — an important bird migratory route; we neighbour 800 hectares of second growth forest at Pacific Spirit Park; and we are home to the UBC Botanical Garden, a living museum of local and international plant species. With these assets in our midst, it is our turn to join the international momentum and demonstrate UBC's position as a global change-maker through our actions to enhance biodiversity.

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[2] *http://www.undp.org/content/dam/undp/library/SDGs/English/Biodiversity_2030_Agenda_Technical_Note.pdf*

[3] *http://eresources.nlb.gov.sg/infopedia/articles/SIP_1765_2011-02-11.html*

[4] *https://www.ucl.ac.uk/greenucl/resources/policy/ucl-biodiversity-strategy-2*

[5] *https://sustainability.berkeley.edu/sites/default/files/2015-2016_sust_report_v3.pdf*

[6] *http://csc-production.s3.amazonaws.com/2018/01/24/16/20/28/6d53d903-ebf4-4412-b32e-a0d5264cf410/Cornell%20University%20Campus%20Sustainability%20Plan%20-%20Draft%20Goals%20and%20Plan%20Outline%20-%2001.24.18.pdf*

[7] *https://www.nwf.org/en/EcoLeaders/Campus-Ecology-Resource-Center/Reports/The-Campus-Wild*

Revolving Gardens
Credit: *Paul Joseph, UBC Communications and Marketing*

CBIRD AT A GLANCE

2016–2017 SUMMARY

CBIRD is the first campus-wide initiative of its kind in Canada, and has made significant progress in its first year of operation.

36

Projects completed contributing to biodiversity on the UBC Vancouver campus.

150+

UBC students engaged from nine departments in seven faculties and schools, including:

Faculty of Science | Faculty of Forestry | Faculty of Arts | Faculty of Applied Science | School of Community and Regional Planning | School of Architecture and Landscape Architecture | Sauder School of Business

23

Courses engaged.

26

Faculty members provided oversight and expertise to students.

30+

Staff and community partners engaged on biodiversity issues, using student research and findings to inform biodiversity-related decisions on the UBC Vancouver campus.

As a result of this collaborative effort, CBIRD contributed to the development of emerging sustainability plans and strategies including the Green Building Plan, Urban Forest Management Plan and Biodiversity Strategy.

Our Partners

EMBEDDED IN CAMPUS OPERATIONS: THE SEEDS SUSTAINABILITY PROGRAM

This initiative is embedded in the SEEDS Sustainability Program. SEEDS employs a whole-university approach, drawing on principles of whole systems thinking to advance sustainability on the Vancouver campus through applied student research projects. Projects are framed around one of many interdisciplinary research clusters, from biodiversity to wellbeing. Each cluster is supported by a guiding committee comprised of stakeholders representing a multitude of research specializations and operational sectors of the University. Each project builds off findings and recommendations from previous projects, which are often outside the student's discipline. In this way, SEEDS provides a unique opportunity for collaborative, problem-focused learning through the partnerships made between students, faculty, staff and, community partners. These projects integrate students' energy and enthusiasm for sustainability, faculty members' research experience, and the commitment and expertise of staff to advance sustainability on campus and beyond.

Since 2001, SEEDS has engaged over 7,500 students across 12 faculties and colleges in over 200 courses with Campus as a Living Laboratory sustainability projects. This has resulted in over 1,500 publicly-accessible research reports on the UBC SEEDS Sustainability Library. This work informs the development and implementation of UBC's strategic sustainability priorities. These student research projects engage the Campus as a Living Lab, and support the integration of academic and operational work on sustainability.

SPEARHEADING INTERDISCIPLINARITY

The SEEDS Sustainability Program provides a conduit to cross-disciplinary research by aligning student research with high-level operational priorities for sustainability policy and action at UBC. Projects build off findings and recommendations from previous projects which are often outside the student's discipline. For example, projects which examine the ecological and social value of trees support the advancement of operational priorities, ranging from Wellbeing at UBC, the Green Building Plan, emerging Urban Forest Management Plan and a future Biodiversity Strategy. Because operational sustainability is inherently interdisciplinary, SEEDS Program participants (student, faculty, and staff alike) are mutually supported in order to work with groups and concepts that extend beyond their discipline. Interdisciplinary collaboration is not limited to the students who are involved in SEEDS research, extending to the faculty and staff who work together on each project.

BIODIVERSITY STEERING COMMITTEE

The Steering Committee relies on interdisciplinary collaboration. It is comprised of biodiversity stakeholders across 17 UBC departments and operational units, who provide high-level oversight and guidance to CBIRD. Through the extended networks of the committee's individual members, the Steering Committee helps advance interdisciplinary relationships across faculty and operational units.

Collectively this collaboration continues to transform UBC into a living laboratory and a global leader in sustainability research and practice.

FACULTY OF APPLIED SCIENCE

School of Architecture and Landscape Architecture

- Cynthia Girling, Professor of Landscape Architecture

School of Community and Regional Planning

- Jennifer Pearce, PhD student

FACULTY OF LAND AND FOOD SYSTEMS

Centre for Sustainable Food Systems at UBC Farm

- Fiona Simmance, CSFS Research Manager

FACULTY OF FORESTRY

Urban Forestry

- Dr. Cecil Konijnendijk, Program Director, Bachelor of Urban Forestry, Professor of Urban Forestry
- Dr. Stephen Sheppard, Professor of Forestry and Urban Forestry, Director of the Collaborative for Advanced Landscape Planning
- Cindy Zhaohua Cheng, Urban Forestry Program Coordinator

Forest Resources Management

- Dr. Tahia Devisscher, Postdoctoral Fellow

Natural Resources Conservation

- Dr. Peter Arcese, Professor of Forestry, Forest Renewal BC Chair in Conservation Biology

UBC BUILDING OPERATIONS

- Jeff Nulty, Municipal Landscape Architect

CAMPUS RESIDENT REPRESENTATIVE

- Ralph Wells, Community Energy Manager

FACULTY OF SCIENCE

Botany

- Dr. Santokh Singh, Senior Instructor

Zoology

- Natalie Westwood, PhD student

Institute for Resources, Environment and Sustainability

- Dr. Matthew Mitchell, Postdoctoral Fellow

UBC Botanical Garden

- Dr. Tara Moreau, Associate Director, Sustainability and Community Programs
- Douglas Justice, Associate Director, Horticulture and Collections
- Tamara Litke, Sustainability and Community Programs Assistant

CAMPUS AND COMMUNITY PLANNING

Sustainability and Engineering

- John Madden, Director, Sustainability and Engineering
- Penny Martyn, Manager, Green Buildings

Community Development

- Liska Richer, Manager, SEEDS Sustainability Program

Planning and Design

- Dean Gregory, Landscape Architect

RESOURCE AND SUPPORT MEMBERS

- Dr. Sally Otto, Professor, Zoology
- Dr. Loren Rieseberg, Director of the Biodiversity Research Centre

FORGING NEW STRATEGIC PARTNERSHIPS

Given biodiversity's inter-jurisdictional nature, our biodiversity network requires alignment across administrative and political boundaries. This year we have emphasized the development of partnerships both internally at UBC and externally in the region to connect our work to that of our peers. This has culminated in Memorandums of Understanding (MoUs), project partnerships, and strategic support. In the 2016-2017 academic year, our team has collaborated with Environment Canada, the Cities Biodiversity Index Coalition, and Tree Canada.

Memorandums of Understanding exist to formalize partnerships, as well as identify opportunities for strategic collaboration. This year we have developed MoUs with:

- The Faculty of Forestry
- The School of Community and Regional Planning
- The School of Architecture and Landscape Architecture

KEY PARTNER: UBC BOTANICAL GARDEN

Ambassadors for Global Plant Biodiversity and Biocultural Diversity

UBC Botanical Garden has a 100-year history of plant conservation, community engagement and natural resource management on UBC's Vancouver Campus. As a museum of living plants, biodiversity and ecosystem services, the Garden and its staff are an important global and local resource for plant use, knowledge and conservation.

Globally, one in five plants are threatened with extinction. Botanical gardens around the world serve as a collaborative network for biodiversity conservation and management. Working under UBC's Faculty of Science and collaborating with academic partners across the campus, the Garden is well positioned to conduct, communicate, and amplify local, regional, and international biodiversity research initiatives.

The facilities and internationally renowned plant collection at UBC Botanical Garden provide exceptional outdoor opportunities for learning and public engagement. Annually, the Garden hosts over 100,000 visitors through admissions, tours, events, volunteer programs, and educational offerings. Through innovative community-based research and education programs such the Sustainable Communities Field School, UBC Botanical Garden is working to help businesses, students, communities, and organizations preserve, enhance, and regenerate biodiversity and ecosystem services.

Left: *Participants of the Sustainable Communities Field School cross the Greenheart TreeWalk at UBC Botanical Garden*
Credit: *UBC Botanical Garden*

Advancing Biodiversity at UBC

Above: Coordinators Emily Rennalls (L) , and Anna Thomas (R) welcome guests to the first annual Biodiversity Showcase

Connecting with the Community

Increasing public awareness and understanding of biodiversity issues and solutions is a key objective of this initiative's mission. To us this means providing opportunities for the campus community to get involved with CBIRD, representing the Initiative at academic functions, and sparking dialogue through engaging events. Notable examples include:

BIODIVERSITY SHOWCASE

On March 16th, 2017 the SEEDS Sustainability Program hosted its first annual Biodiversity Showcase at the Beaty Biodiversity Museum. The event celebrated the milestones achieved after the completion of the first year for CBIRD. It provided an opportunity to publicly showcase the year's student biodiversity research projects and outcomes, engage with the community about the project more generally, and to bring together the biodiversity community for networking and educational opportunities.

Approximately 100 people from a wide range of backgrounds listened to short talks from professors, practitioners, and eight student groups, under the Beaty Biodiversity Museum's iconic 30-metre whale skeleton. Student research was displayed at the event, and keynote speakers introduced the notion and implications of biodiversity across various disciplines. The event successfully showcased the progress of CBIRD and student, faculty, and staff collaboration to address real-life sustainability and biodiversity challenges on the Vancouver campus.

Above: Steering Committee Members Douglas Justice, Associate Director of Horticulture and Collections at UBC Botanical Garden (L) and Dr. Santokh Singh, Professor of Teaching in the Department of Botany (R) attend UBC's Sustainability Soiree.

SUSTAINABILITY SOIRÉE

CBIRD joined UBC's sustainability champions on May 16, 2017 for the Sustainability Soirée at the Robert H. Lee Alumni Centre. The event celebrated UBC's commitment to sustainability on campus and the abundance of student, faculty and staff contributions that make UBC a global sustainability leader.

Over 150 participants from the SEEDS Sustainability Program and the Sustainability Coordinator Program in offices and labs gathered for the event. They represent a small portion of the 1,000 + participants in applied campus sustainability research projects and employee engagement programs that help advance and support UBC's sustainability targets, operational priorities, international commitments, and sustainability learning.

POSTER PRESENTATION (TLEF)

CBIRD was represented by members of the Steering Committee at the annual Teaching and Learning Fund's (TLEF) poster presentations. Here, CBIRD was introduced to new sectors of the campus academic community and we formed new relationships with faculty and students.

BIODIVERSITY DATA

This year, students began to gather a wide range of data to help inform the status of biodiversity on the Vancouver campus. From tree species to bird species, biodiversity was inventoried in an outstanding proportion of SEEDS biodiversity projects. This research will inform a platform for the development of the emerging Biodiversity Strategy. For instance, a shrub inventory of Agronomy Road was conducted, identifying 34 unique native, exotic, and invasive species to inform the potential development of a green corridor. A series of tree inventory projects were launched that inventoried 85 trees along Agronomy Road from West Mall to Wesbrook Mall, and 534 trees in the Stadium Neighbourhood. Just under 30 bird species were identified at survey locations from January to March, and a conservative estimate of 10,110 building-related bird fatalities are expected to occur at UBC each year.[8] This project informed the creation of the first Bird Friendly Guidelines for the UBC Vancouver campus, to inspire bird-friendly design as part of campus development.

Collectively, these projects contribute critical data and findings to analyze and assess the status of biodiversity at the UBC Vancouver campus, and inform the development of guidelines and campus policies- such as the emerging Urban Forest Management Strategy and Bird Friendly Guidelines.

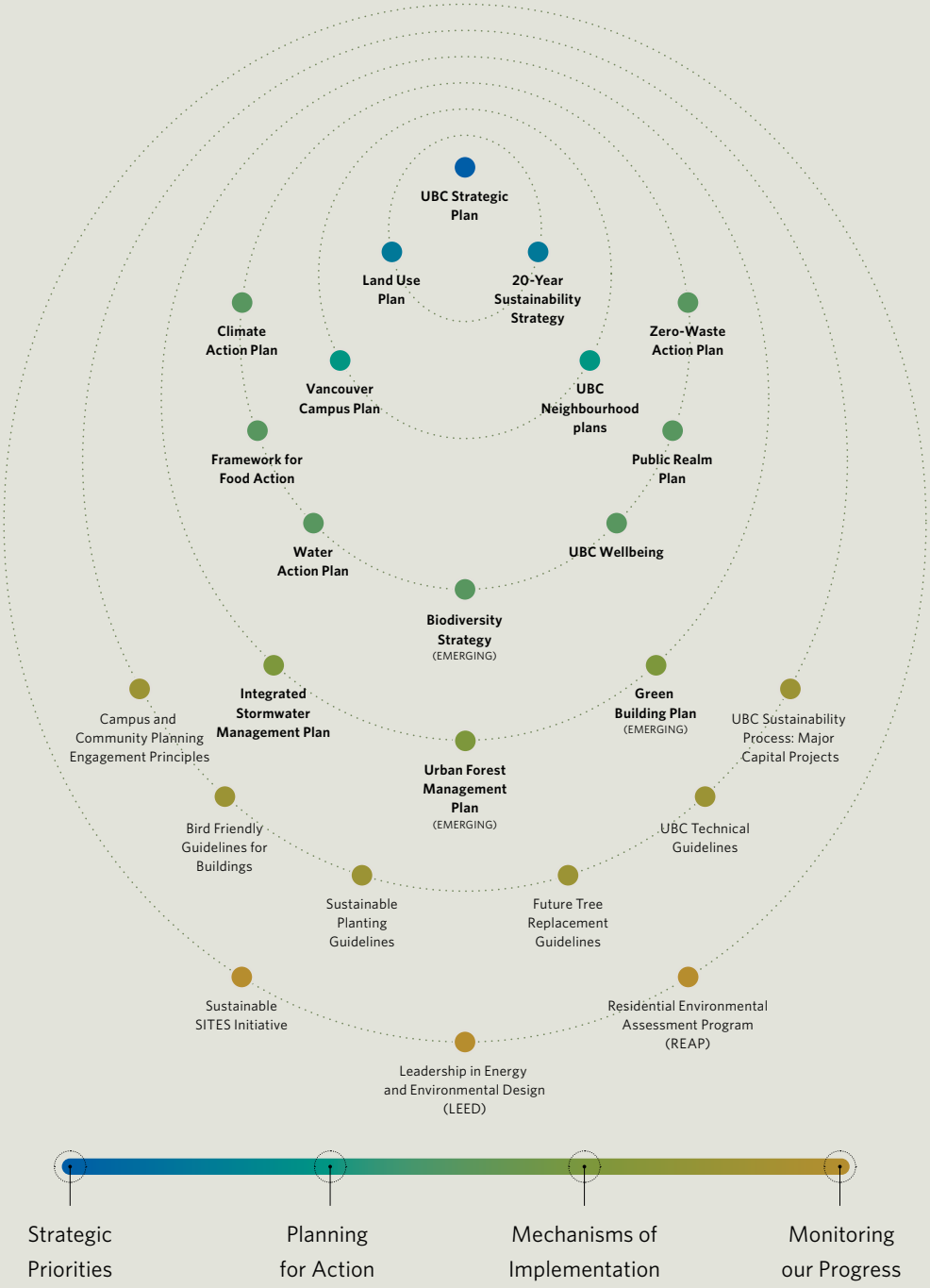
CBIRD is actively contributing to the advancement of biodiversity at UBC by aligning SEEDS projects with innovative operational biodiversity policy and actions. Furthermore, CBIRD encourages and creates new opportunities for collaboration, serves the public interest through research and community projects, commits to meaningful relationships with the broader community, advances knowledge mobilization, and contributes to campus sustainability. In the 2016-2017 year, CBIRD contributed to the development of emerging sustainability plans and strategies including the Green Building Plan, Urban Forest Management Plan and the future Biodiversity Strategy.

To read reports about these and other SEEDS Program projects visit the SEEDS Sustainability Library.

Below: *John Madden, Director of Sustainability and Engineering, students Jessica and Thomas, and Dr. Cecil Konijnendijk discuss tree replacement guidelines at the UBC Vancouver Campus*

[8] *DeGroot, K., Porter, A. (2017) The Effects of season, landscape and building design on bird-window collisions at the University of British Columbia. In Prep.*

UBC SUSTAINABILITY POLICY SNAPSHOT



All aspects of sustainability are intrinsically interconnected. At UBC, we see these interconnections not as a hierarchy (top-down), but as a holonarchy, (parts of an interconnected whole). While each strategy, plan, policy, or set of guidelines is nested in a broader plan, there is connection between each. For example, we cannot make a Climate Action Plan without addressing biodiversity or storm water management, and we cannot disconnect an Urban Forest Management Plan from a Public Realm Plan that informs how we design our outdoor public spaces. Above, we have outlined this series of relationships and how they contribute to operational planning at UBC.

URBAN FOREST MANAGEMENT PLAN

IDEAS FOR IMPROVED TREE MANAGEMENT

https://sustain.ubc.ca/sites/sustain.ubc.ca/files/seedslibrary/UBC SEEDS 2017- FINAL REPORT SEPT 5.pdf

Team

This series of projects was conducted by two forestry students, in collaboration with the Faculty of Forestry, UBC Building Operations, and Campus and Community Planning.

This project began with the objective to review tree retention and protection policies on campus. This analysis led to the recommendation for a comprehensive Urban Forest Management Plan (UFMP) to adequately protect trees where possible, or provide compensation based on ecosystem value. As such, the scope of this report expanded to provide recommendations to strengthen the implementation and enforcement of tree policies and procedures at the UBC Vancouver campus. In doing so, this report seeks to maintain and improve UBC's current urban forest and reflect the values and needs of campus stakeholders. The recommendations were based on an analysis of current plans and guidelines for the UBC Vancouver campus, interviews conducted with key actors involved with urban forestry on campus, and an analysis of urban forestry management plans of other major municipalities and university campuses.

The report proposes five main recommendations:

1. Improve implementation and enforcement of urban forest management policies and guidelines;
2. Maintain and improve distribution and cohesivity of the campus urban forest;
3. Incorporate aesthetics management into urban forest management as a part of campus landscape design;
4. Empower the campus community in urban forest management on campus and facilitate community involvement in its governance; and
5. Take into consideration potential future challenges and opportunities (including the effects of climate change and future development projects on campus) into urban forest management and create achievable, guiding long-term goals for campus urban forest.

These recommendations will help inform a future Urban Forest Management Plan emerging in 2018/19.

TREE INVENTORY

https://sustain.ubc.ca/sites/sustain.ubc.ca/files/seedslibrary/UBC%202017%20Stadium%20Neighbourhood%20Tree%20Inventory%20Project_0.pdf

Team

This series of projects was conducted by four forestry students, in collaboration with the Faculty of Forestry, UBC Building Operations, and Campus and Community Planning.

In 1998, UBC completed the first tree inventory of the Vancouver Campus. The inventory was updated in 2013 but lacked a comprehensive dataset of all campus trees. This presented an opportunity to integrate student research into a much needed dataset for the development of the emerging Urban Forest Management Plan. In response, CBIRD initiated a project to begin updating the campus' tree database. In the first phase, students were tasked with two key deliverables : (1) completing a tree inventory for the Stadium Neighbourhood and, (2) developing a handbook and methodology to maintain consistency across future tree inventories. This work informed the Natural Systems Assessment Report for future planning of Stadium Neighbourhood.

Tree inventories are a foundation of effective approaches to urban forest management. They allow planners to monitor and manage campus forest resources over time, quantify ecosystem services, provide data to prioritize tree and urban biodiversity management, and aid in future campus development.

With support from the Faculty of Forestry and operational partners from Building Operations, students inventoried a total of 534 trees in the Stadium Neighbourhood. All 534 trees were measured for their height (m), diameter at breast height (DBH in mm), crown width (m), ground cover (%), overall health condition, and risk of danger to the public. These metrics will be used to quantify ecosystem services for recreation, cultural value, and wildlife habitat, and will be valuable indicators of biodiversity with the development of the Urban Forest Management Plan and Biodiversity Strategy.

GREEN BUILDING PLAN

Target completion Spring 2018

UBC BIRD COLLISIONS WITH WINDOWS

https://sustain.ubc.ca/sites/sustain.ubc.ca/files/seedslibrary/BIOL448_Bird%20Collisions%20Phase%204%20Final%20Report_0.pdf

Team

This study was conducted by two science students in collaboration with the Faculty of Science, Campus and Community Planning, and an Environment Canada Landbird Biologist.

Bird strikes with urban structures are a major source of bird mortality in North America, which negatively affects bird biodiversity. As a follow-up project to several previous SEEDS projects that have documented bird strikes on the UBC Vancouver Campus, this study aimed to investigate whether there is a correlation between vegetation reflection on windows and bird collision rates at UBC.

Field surveys of 8 buildings on UBC Vancouver campus were conducted daily over the course of three weeks and then every other day for two weeks. Students searched for evidence of bird strikes, and performed a window image analysis to analyze whether window glazing and bird strikes are positively correlated.

Ultimately, this study concluded that facades of buildings with bird strikes may reflect more vegetation in the windows than those without bird strikes, although further studies are needed to interpret the significance of these findings. This student research provides insight into bird strike-related mortality on campus, and led to the development of the UBC Bird Friendly Guidelines as part of the Green Building Plan. This is part of a greater goal in the Green Building Plan to promote a healthier relationship between our built and natural environments. By continuing to conduct research that identifies factors that may harm songbirds, we can act retro-and pro-actively to contribute to the development of more bird-friendly and biodiverse environments.

MULTI-UNIT RESIDENTIAL BUILDING COMMUNITY GARDENS

https://sustain.ubc.ca/sites/sustain.ubc.ca/files/seedslibrary/PLAN 528A - Making Space for Urban Agriculture in MURBS_0.pdf

Left: The Centre for Interactive Research on Sustainability green roof. CIRS is UBC's first LEED Platinum certified building
Credit: Don Erhardt

Team

This project was conducted by a graduate student in the School of Community and Regional Planning (SCARP), in collaboration with the Faculty of Applied Science, Campus and Community Planning, Adera Homes, and E3 Eco Group.

The project had three key objectives: (1) identify trends in policy and development in Metro Vancouver with respect to urban agriculture; (2) understand demand and marketability of garden space to Metro Vancouver residents of multi-unit residential buildings; (3) provide a set of guidelines for developers to provide space for urban agriculture in multi-unit residential buildings.

A mixed-methods approach of both primary and secondary research was used to address the objectives of the project. A policy analysis was conducted to understand development trends and changing preferences. A survey was deployed in order to understand market preferences of existing residents in multi-unit residential buildings. Additionally, key informant interviews were conducted to understand challenges and opportunities in providing garden space in multi-unit residential buildings.

The report presents a set of guidelines for developers. First, key considerations on the physical characteristics, rights of use, and management models of spaces are provided. Following this, benefits and drawbacks are presented for four garden typologies: Patio Gardens, Allotment Gardens in a Common Area, Communal Gardens in a Common Area, and Rooftop Gardens. Policy recommendations are provided for both developers and policy makers as follows:

RECOMMENDATIONS FOR DEVELOPERS:

- Capitalize on early-adopters advantage by providing garden space now, before trends become policy;
- Provide a diversity of garden typologies to appeal to a broader market;
- Encourage formal management of garden space through negotiation with property managers;
- Conduct ongoing monitoring and evaluation to allow for improvements in future developments.

RECOMMENDATIONS OR POLICY-MAKERS:

- Incentivize developers by recognizing garden spaces in sustainability assessment tools;
- Differentiate between garden typologies according to their respective benefits;
- Require garden space is provided to 30% of residential units;
- Avoid development that adversely impacts existing garden spaces.

This project helped raise awareness and provided recommendations that informed the emergent UBC Green Building Plan. Key findings and recommendations have the potential to provide necessary green space and improve the social and ecological sustainability of campus developments.

FUTURE BIODIVERSITY STRATEGY

GREEN CORRIDOR

https://sustain.ubc.ca/sites/sustain.ubc.ca/files/seedslibrary/Green%20Corridor%20Green%20Infrastructure%20at%20UBC_0.pdf

Team

This project was conducted by a team of graduate students in the School of Architecture and Landscape Architecture (SALA), in collaboration with Campus and Community Planning.

To demonstrate the benefits of green infrastructure, this project proposed a green corridor design along Agronomy Road as a green infrastructure approach for stormwater management at UBC. The proposed corridor spans east-west across the UBC Vancouver campus with most parts located along Agronomy Road. The design uses an integrated green infrastructure approach which includes in-street infiltration area, green roofs, a bioswale, and underground stormwater harvesting tanks. Stormwater management is an important aspect of a green infrastructure approach and the ability of such an approach to enhance biodiversity was not overlooked in the design. Due to the interrelated relationship between ecosystem services and wildlife habitats, design considerations given to enhance and maintain ecosystem service on site could result in enhanced habitat value and resiliency on campus.

The team suggests stormwater cleansing, reduction of stormwater discharge, and an enhanced sense of place as benefits of a green corridor. This innovative approach is now actively being considered for future development on the campus as part of an emerging Biodiversity Strategy and other green stormwater management infrastructure. Moreover, the project considers the corridor's connection to the Metro boundary and aligns itself with broader regional priorities.

Above + Right: *Pollinator Park at 5th and Pine is the result of a collaboration between the UBC SEEDS Sustainability Program, the City of Vancouver, and CityStudio. Unique pollinator homes were installed here and on the Centre for Interactive Research on Sustainability's green roof.*

POLLINATOR HOMES

https://sustain.ubc.ca/sites/sustain.ubc.ca/files/seedslibrary/DM3_Pollinators_SALA1_0.pdf

Team

These projects were completed by graduate student teams in the School of Architecture and Landscape Architecture (SALA), in collaboration with the SALA Workshop, Campus and Community Planning, Building Operations, City Studio, and the City of Vancouver.

UBC SEEDS Sustainability Program, the City of Vancouver and City Studio each expressed an interest in creating habitat for a variety of pollinators in the form of engaging "pollinator homes". UBC SALA students delivered designs for "pollinator houses" for bumble bees, mason bees, wasps, butterflies, and other pollinators. These homes have been installed in a Pollinator Pop-up Park within the City of Vancouver's Fairview neighborhood and at select locations on UBC's Vancouver Campus.

Students took the opportunity to design and prototype "housing" for these small yet extremely critical Vancouver residents.

Collectively, each project represents a unique fabrication or material strategy. Each home or house was designed for a unique pollinator, based on strategies culled from multiple designs. Each house is a hybrid of ideas and techniques, and demonstrates how biodiversity enhancement can also be used as a community engagement tool on UBC Vancouver Campus.

Whole Systems Connection

Connecting whole systems involves the analysis of how elements in a system, and systems themselves, are interrelated influencers within a greater whole. For example, while the carbon cycle is one system, and stormwater is another, they are connected as part of a larger natural system when we start to include the role of biodiversity assets in storing carbon and water retention. While SEEDS projects connect to specific planning priorities of the University, we also want to ensure that the whole systems application of research is recognized. SEEDS applied research projects are strategically scoped to embody a whole system sustainability approach.

For instance, Dr. Santokh Singh, a long-time SEEDS faculty supervisor and active Steering Committee member, has supervised multiple applied research projects that study the carbon sequestration ability and water efficiency of a variety of plant species at UBC. This research has multiple benefits: it helps us quantify the ecosystem services of our biodiversity assets and helps landscape planners create more climate resistant planting designs that may support carbon reduction goals of the Climate Action Plan.

Connecting natural and social systems through education and community engagement has been a central goal of CBIRD. One of our key partners, UBC Botanical Garden, is a leader in this approach. Their mission is to assemble, curate, and maintain a documented collection of temperate plants for the purposes of research, conservation, education, community outreach and public display. The Garden has an internationally renowned collection of some 250 different maple (Acer) accessions representing 130 taxa and 70 unique wild collected taxa. In association with Canada's 150+ celebrations, a UBC Geography student developed a Maple Tree Map as part of a SEEDS project to animate the tremendous species diversity within maples at UBC Botanical Garden. Visitors connected the localized biodiversity at the Botanical Garden with our national symbol and by extension with Canadian culture—a powerful pairing of social and cultural value systems with natural systems.

Throughout the course of this initiative, we will continue to prioritize projects like these which work to foster interdisciplinarity, connect systems, and view every component of sustainability as nested within a larger framework.

Acer palmatum 'Seiryu'
Location: *UBC Botanical Garden*
Credit: *Daniel Mosquin*
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Illuminating Priorities: 2017–2018

As we reflect on our past year, we are excited by CBIRD's continued growth and momentum. Looking ahead, we will work towards the following priorities for the 2017/2018 academic year:

1. **Complete the campus tree inventory to inform urban forest management planning**

   Our desire is to inform the future Urban Forest Management Plan that provides a clear and balanced approach to enhancing and stewarding the campus urban forest. Doing so will be the first major step in forming a baseline of our campus urban forest. It will allow us to identify regional connectivity potential and begin analyzing ecosystem productivity and function.

2. **Continue the baseline inventory of our natural assets to inform the future Biodiversity Strategy**

   The completed tree inventory will be the first of multiple natural asset inventories. We have already begun work on baselining shrub species, native pollinators, and birds on campus. This work needs to continue so we have a foundational understanding of our campus biodiversity. While we baseline, we will explore the use of innovative technology and tools that will map and record natural assets on the Vancouver campus. Baselining will take place in a coordinated way through delineated campus zones. Our priority zone for the 2017/2018 year is the Stadium Neighbourhood.

3. **Begin an ecosystem evaluation of natural assets on campus**

   Following the baseline inventory, our priority is to analyze the ecosystem functions and services of our natural assets. This will support the social, ecological, and economic rationale for biodiversity enhancement.

4. **Create an online, interactive map of our natural assets with open-sourced data**

   Building upon precedents from the University of Hawaii - Manoa, MIT's Treepedia, and New York City's Street Tree Map, we aim to develop an online map using the data in our open-sourced UBCGeodata database. This will create a visual reference of how our assets change over time, provide essential data for researchers and practitioners both at UBC and in the region, and provide an informative, interactive tool that can facilitate collaboration through citizen-science, research, operations and knowledge-transfer related to biodiversity on campus.

   The first iteration of this will be a Biodiversity 411 Map. It will serve as a mechanism to visualize the natural capital, research, training, and operational activity that is supporting biodiversity on campus. This map will provide a simple inventory of UBC's natural assets, biodiversity experts, research projects, demonstration projects, and student involvement opportunities. As the inventory of natural assets grows, we will be able to increase the depth and breadth of our mapping activities.

5. **Expand our communication and outreach activities**

   As CBIRD expands, we want to communicate our progress. This Annual Report is the beginning of our external communication efforts. Moving forward, we will create a central web page as part of the greater UBC Sustainability web presence to communicate who we are, our ongoing project updates, and ways to get involved. We will continue to engage through our Annual Showcase to grow our network and community, and will leverage partnerships to increase opportunities for biodiversity enhancement and education.

Above: *Helichrysum splendidum* (Thunb.) Less
Credit: *Tamara Bonnemaison*
(CREATIVE COMMONS LICENSE)

6. **Demonstrate through pilot projects**

   While we place a high priority on baselining our current assets, we also want to exemplify a model of innovation through implementing demonstrative SEEDS projects. Projects may range anywhere from habitat hotels to rainwater gardens, to artwork that protects birds from fatal crashes into window glass. With growing momentum, we aim to increase the capacity of the SEEDS Sustainability Program to utilize the Campus as a Living Laboratory.

7. **Develop a comprehensive funding and partnership strategy**

   A funding strategy will set clear goals and milestones to inform the sustained growth of CBIRD. Securing predictable funding sources will increase capacity within CBIRD to further enable the development of a future campus Biodiversity Strategy through engagement, research, and demonstration.

This report was prepared by Emily Rennalls, Sarah Eshpeter, Liska Richer, Tara Moreau, and John Madden, with contributions from CBIRD members. Graphics and design by Ion Brand Design and Emily Rennalls. Photos provided by UBC Campus and Community Planning, UBC SEEDS Sustainability Program, and UBC Botanical Garden's Botany Photo of the Day.

Whether you have a question, suggestion or contribution, we would like to hear from you.
Find out how to get involved on our webpage at sustain.ubc.ca/biodiversity-ubc

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