

Sustainable Living Indoor Gardens

Team Members

Afagh Mohagheghi

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Mehrdad Moallem

- Professor, School of Mechatronic Systems Engineering, Simon Fraser University

Pablo Vimos

- Gardens Manager with the Embark Sustainability Society, Simon Fraser University

Kilim Park

- Manager, Research Sustainability, SFU Sustainability, Simon Fraser University

Marina Van Driel

- Program Coordinator, Campus Sustainability, SFU Sustainability, Simon Fraser University

Tamara Shulman

- Manager, Research Sustainability, SFU Sustainability, Simon Fraser University

Motivation/Challenge

Why?

Reducing food costs

Improving quality

Energy efficiency

Reducing carbon footprint

Sustainable Indoor gardens with energy saving strategies

Increased Carbon footprint of Farming



Depletion of Resources

Land, Water, energy

50% Food Demand Increase by 2030



Population Increase

How?

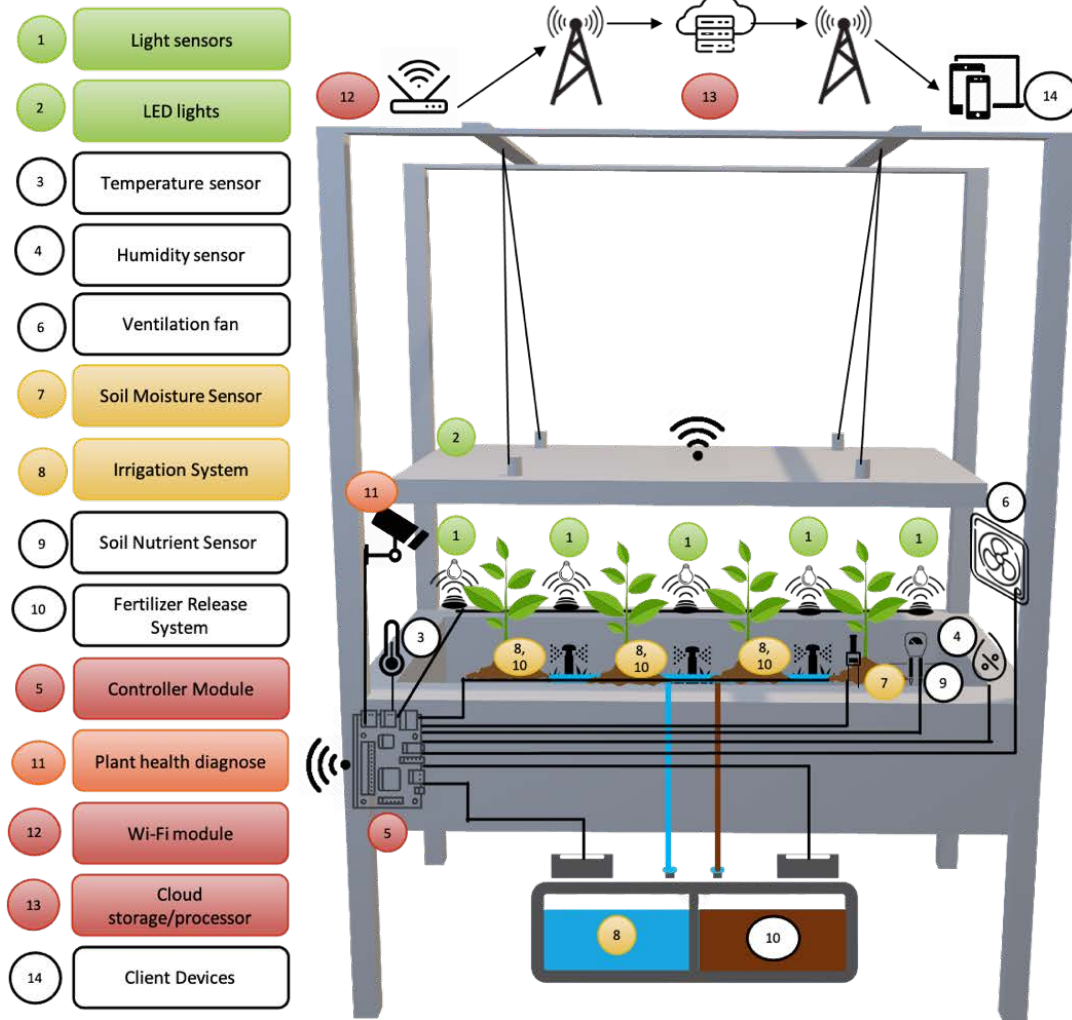
Maximum possible usable parts of plants with the highest values

Minimum amount of resources (RUE)

A minimum release of pollutants into the environment

The lowest costs for resources and for recovering environmental pollution

Solution



Process

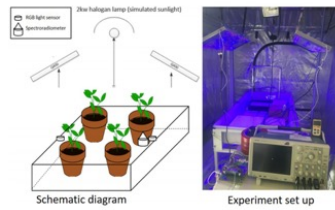
Start

Jan.

Feb.

March

April



Planning, Purchases, Lab tests



Authorizations, Setting up



Side: East
Crops: Lettuce
Weight: 436

Side: North
Crops: Lettuce
Weight: 211g

Side: West
Crops: Basil, lettuce
Weight: 205 g

Side: South
Crops: Lettuce
Weight: 387g



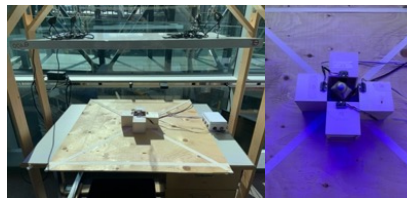
Plant Tests Cycle 1

May

June

July

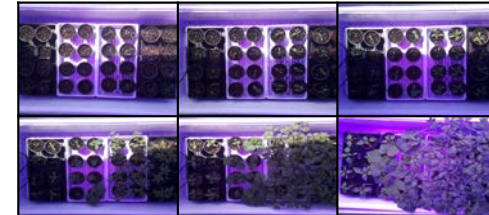
Aug.



Data Collection, Algorithm Development



Plant Tests Cycle 1 Harvest



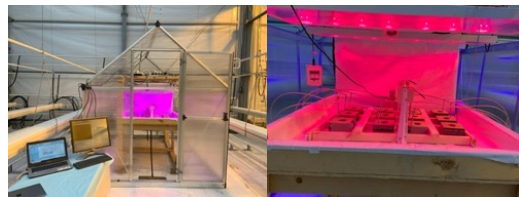
Plant Tests Cycle 2

Sept.

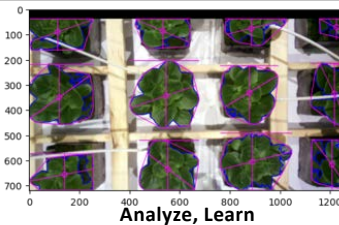
Oct.

Nov.

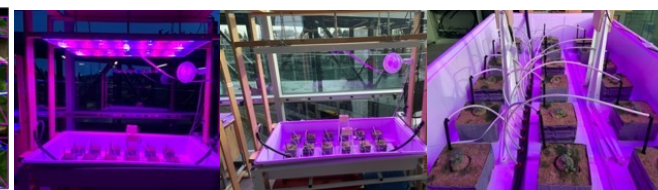
Dec.



Deploying to Mini Greenhouse



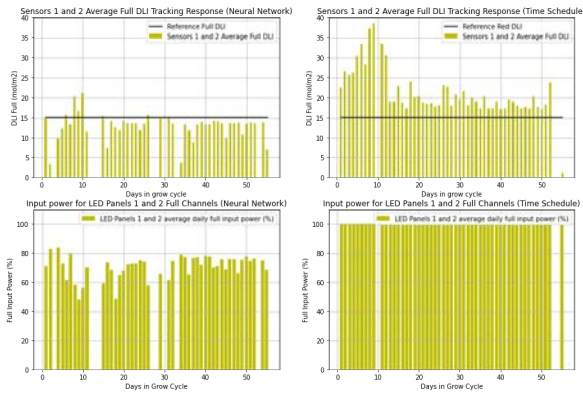
Analyze, Learn



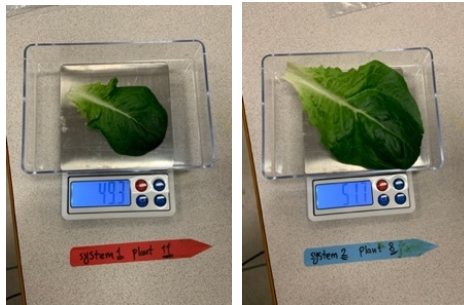
Re-deploying to Surrey Campus

Keep Learning

Results



20% Lighting (electrical) Energy Savings



Increased Leaf Area Index



Farm to Fork



Energy Usage



Food Safety



Carbon Footprint



Food Security



Plastic Usage



Local Food Production



Increased plant health, quality, shelf-life



Accessible to Diverse Communities



Scalable Solution

Thank You

Special Thanks to SFU Sustainability, Embark Sustainability Society, and
SFU Living Lab Team

An aerial photograph of a lush green landscape. A winding river flows through the center, surrounded by dense trees with vibrant green and yellow foliage. A paved path curves through the upper left, and a small bridge crosses the river in the lower center. The scene is captured from a high angle, showing the intricate patterns of the natural environment.

Smart nature-based solutions for smart, sustainable communities

Principal Investigator: Dr. Lorien Nesbitt

Co-Investigators: Dr. Susan Day (Faculty of Forestry), Dr. Edmond Cretu (Faculty of Applied Science), Dr. Mike Kennedy (Sauder School of Business and Urban Data Lab)

Partners: Rogers Communications, UBC Ecosystem Services Action Team, Campus Biodiversity Initiative: Research & Demonstration (CBIRD), UBC Sustainability Initiative

OUR GOAL

NATURE-BASED SOLUTIONS:

Urban forests provide a range of **multi-faceted and vital services** that improve urban sustainability, resilience, and wellbeing.

Understanding social-ecological systems dynamics can help us develop **smart, equitable nature-based solutions** that support **climate resilience**.



THE TEAM



Lorien Nesbitt, PI
Assistant Prof
Forestry



Mike Kennedy, Co-I
PDF
Sauder/UDL



Susan Day, Co-I
Professor
Forestry



Edmond Cretu, Co-I
Professor
ECE



Sophie Nitoslawski
PhD candidate



Johanna Bock
PhD student



Dr. Angela Rout
PDF



Ibrahim El-Chami
PDF



Ecosystem Services Action
Team, Campus Biodiversity
Initiative: Research &
Demonstration (CBIRD)





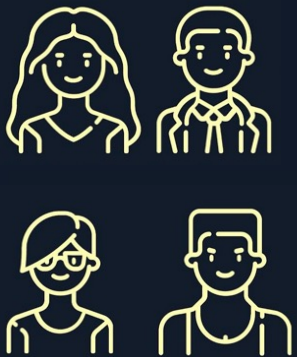
Accelerometers

Data Logger (Raspberry Pie)

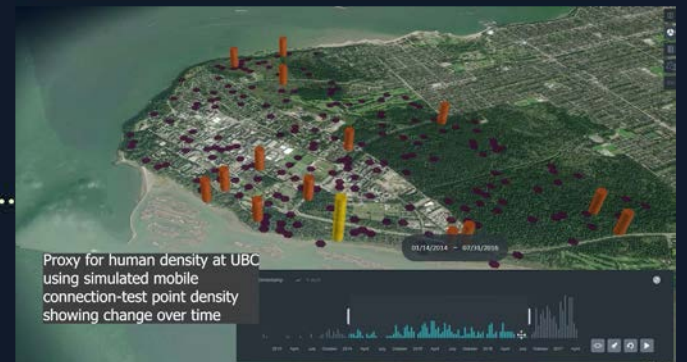
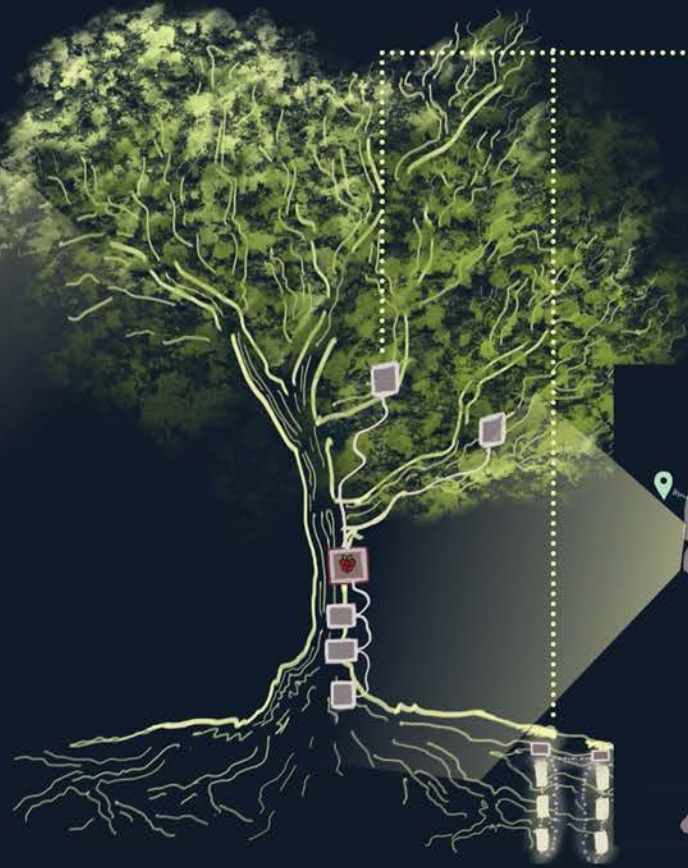
.....Data Logger

.....Soil Sensors

.....Smartphone Location Data



Graphics: Sophie Nitoslowski



Graphics: Sophie Nitoslowski

SMART NATURE-BASED SOLUTIONS

OUR SYSTEM

- Tree & ground sensors **predict tree failure**
- RPAS data detail **ecological conditions** & detect **tree stress**
- Mobile phone data uncover patterns of **park usage incl. during extreme heat**
- Interviews and surveys help us understand **motivations for park usage & system applications**



SMART NATURE-BASED SOLUTIONS

Multi-system & multi-scalar data collection supports **equitable climate change resilience** in urban systems

OPPORTUNITIES

- **Equity-focused** analyses & applications
- **Scaling up** across campuses/contexts





Graphics: Sophie Nitoslowski

Intersections of Environmental, Climate, and Justice



February 10, 2022

PICS - Campus as a Living Lab Session
Dr. Deb L. Morrison - Community Partner

Living Lab
Network



jharris



dr. nick stanger (he/him)



Maeve Lydon



Peter Pare



Judith Lyn Arney



Mavis Underwood



Leslie Brown



John Taylor



Tye Swallow



sarahjim



Kris (he/him)



John Lutz



Bruce Kilpatrick (he/him)



Natalie Baloy



Darcy Mathews



Lyndsey Joseph



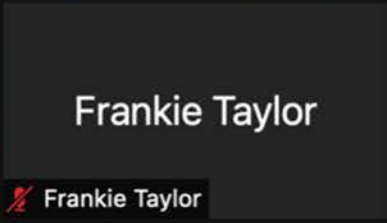
Tracey Murphy



Melisa Yestrau



Esther Morris



Frankie Taylor

Frankie Taylor



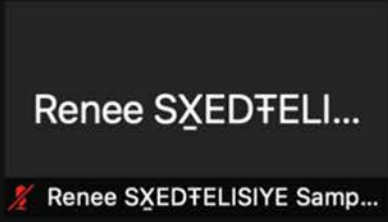
Ellie Dion - Songh...

Ellie Dion - Songhees Natio...



lydia

lydia



Renee SXEDFELI...

Renee SXEDFELISIYE Samp...



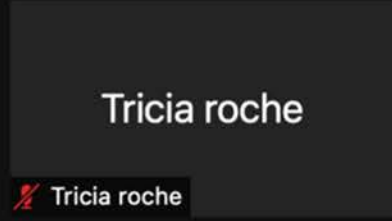
Nancy Shackelfor...

Nancy Shackelford (she/her)



Rhianna Nagel

Rhianna Nagel



Tricia roche

Tricia roche

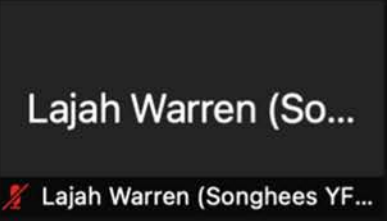


Maya Hamel Esqu...

Maya Hamel Esquimalt Nation



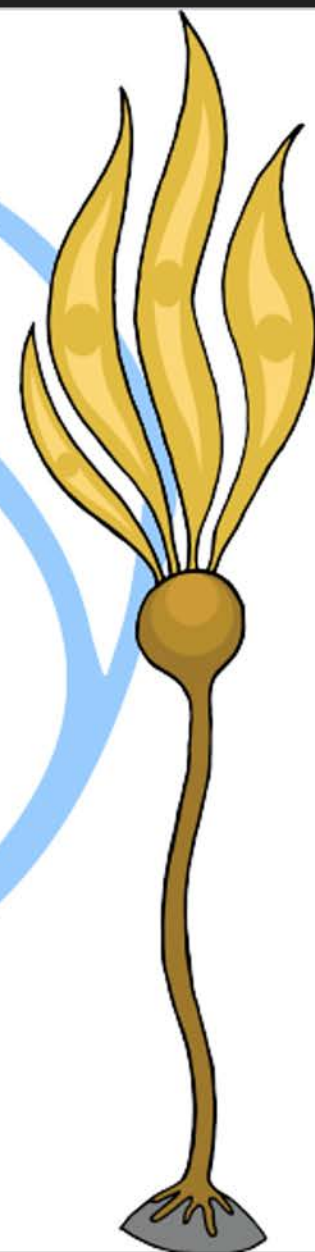
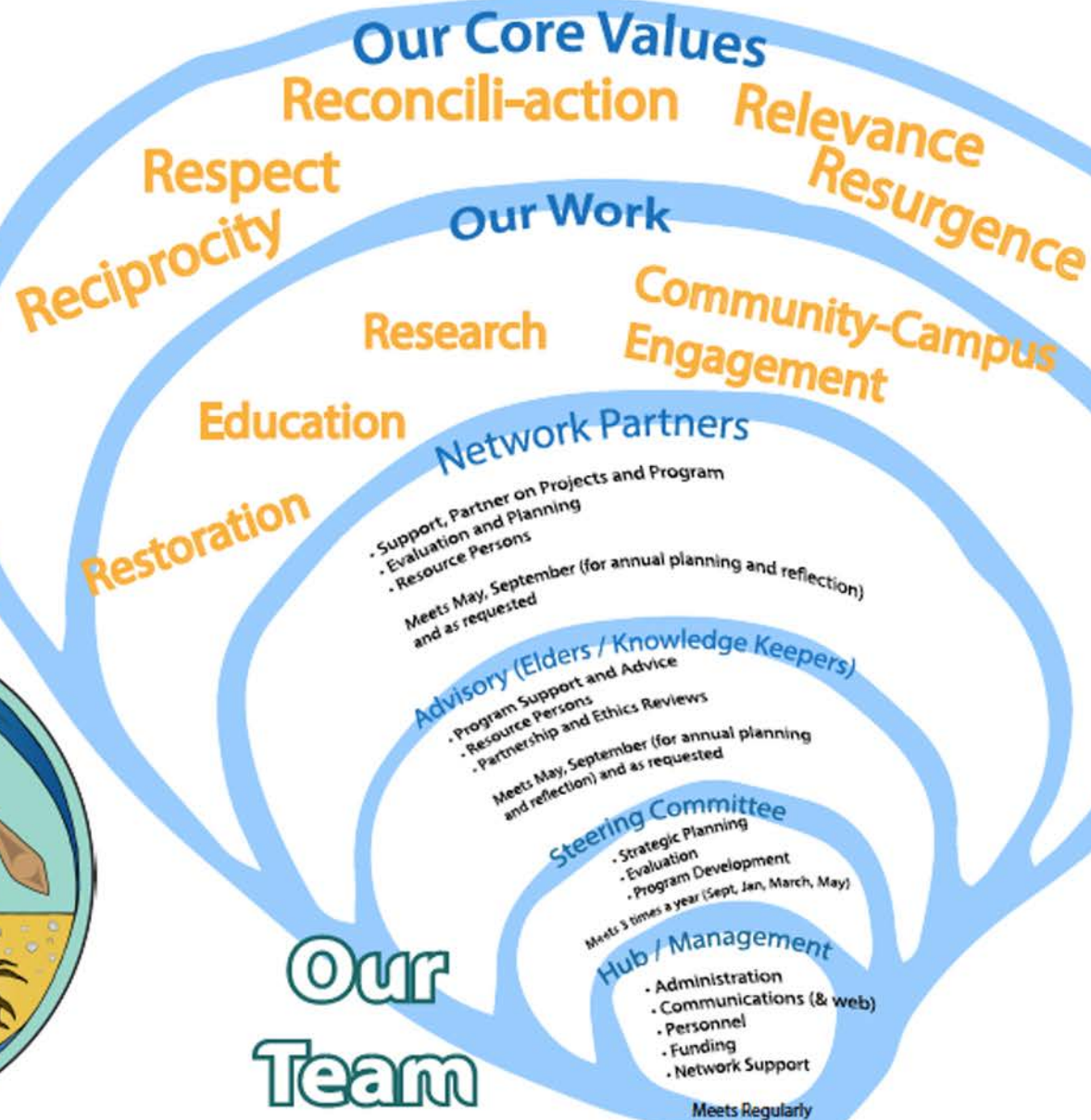
Chelsea Thomas



Lajah Warren (So...

Lajah Warren (Songhees YF...

The Living Lab Project





Where does the Living Lab work primarily?
 Map credit: Stefan Freelan

Land/Sea-based pedagogies

The environment and all living things were important to and inseparable from Indigenous worldviews. Indigenous peoples related to the land and were a part of a dynamic living system. The land was not something to be controlled, and transformed for monetary capital gain, it was something to be respected, as all living beings are. The environment, the land, and all living things are important, and more than that, integral to an Indigenous worldview.

(N.X. Claxton, 2020 from Indigenous Land-based Healing Pedagogies)

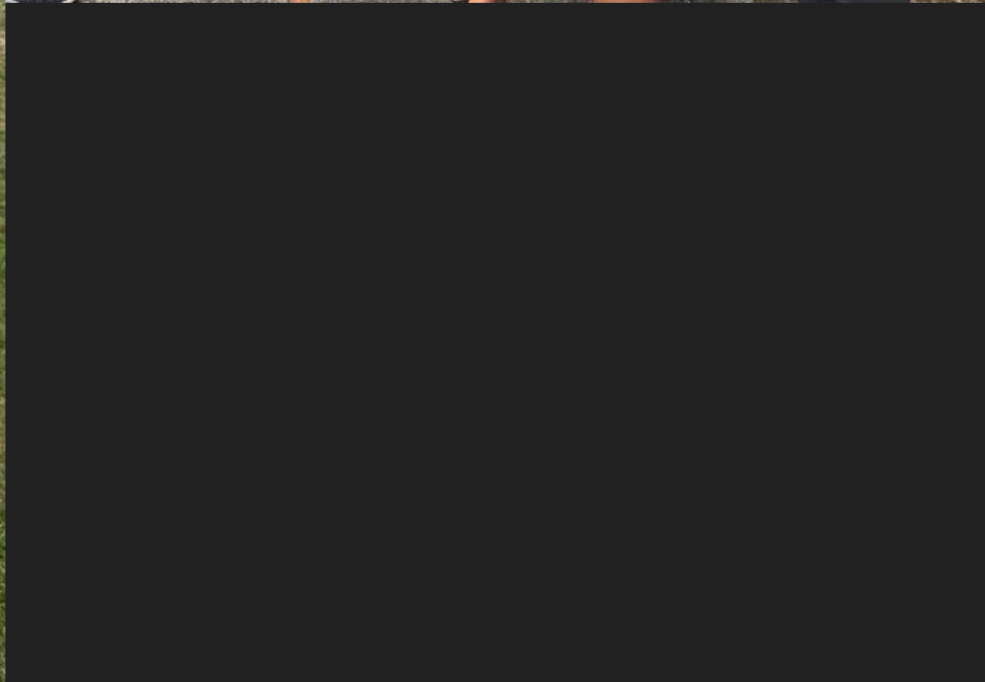




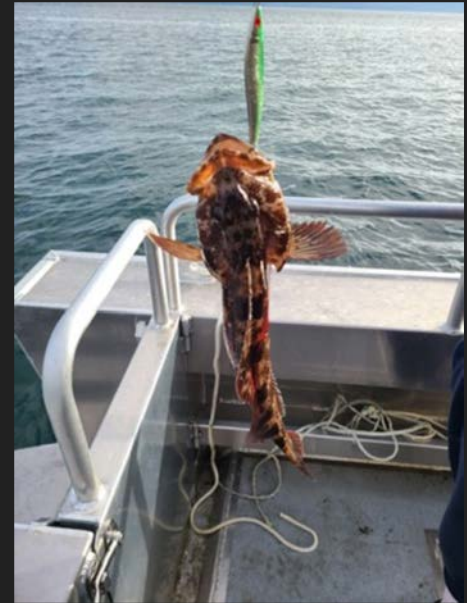
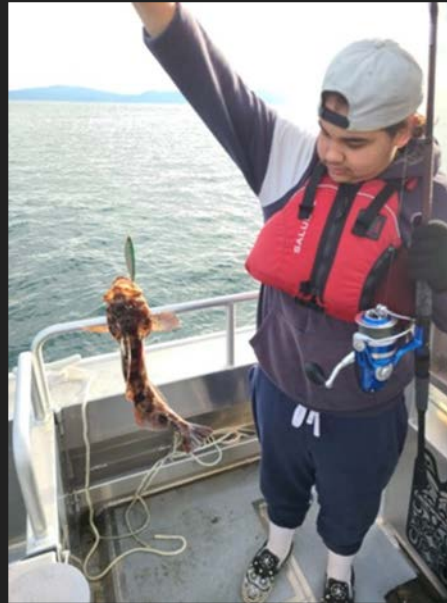
Youth Eco Stewardship Program







Camping on D'Arcy Island - Esquimalt High School



SXOLE, (Reefnet) Project





TETÁĆES and WSÁNEĆ School Board

SXEDTELISIYE, Tye Swallow, Peter Pare





Tl'ches: Community-based Archaeology & Ethnoecology

Darcy Mathews, Sellemah, Lindsey Joseph

Schools and Land-based Learning with Teachers



Tracey Murphy, Kathy Sanford

PEPÁKEN HÁUTW & Living Lab



Judith Lyn Arney & Sarah Jim
PEPÁKEN HÁUTW Foundation





Emerging W̱SÁNEĆ Land Stewards



WSÁNEĆ Youth: Restoration of Sacred Places





OUR VALUES

LY SWKÁLEGEN

Good Feelings. We support this Coast Salish (SEMCOTTEN) expression which means bringing good feelings in our work with each other.



COMMUNITY-DRIVEN

Our projects and programs prioritize community-driven initiatives and capacity building and must be developed and designed by or with the clear consent of community partners.



GIFT AND ASSET BASED

We recognize and build from the unique gifts and strengths of each person and the diversity and potential that already exist in ourselves and our communities.



CONTACT & INFO

Nick Claxton - Academic Director

Maeve Lydon - Program Director

Want to receive our newsletter? Email us at
livinglabproject@gmail.com

Check out our website for other news and updates at
www.livinglabproject.ca



THE Living Lab Project

OUR GOALS

Restoration and Resurgence

Organize community-driven ecosystem and climate action projects which affirm Indigenous knowledge, rights and access to/ use of traditional lands and waters

Capacity Building and Engagement

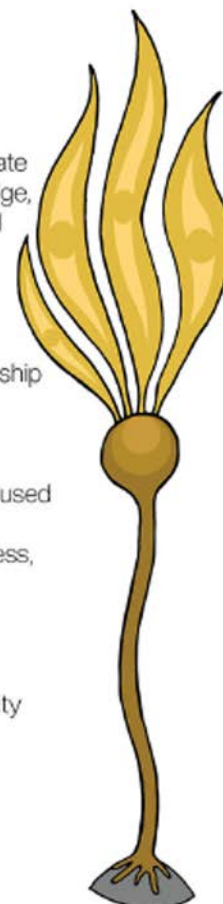
Create community skills and capacity building activities and a regional Indigenous eco-stewardship program focused on children and youth

Educational Change

Develop Land-based learning and resources focused on local Indigenous priorities, sustainability and science education, student well-being and success, and transformation of the education system

Community-Driven Research

Lead and support community-driven research projects which respect Indigenous and community knowledges, engages Indigenous students and restores connection to the land/ waters



Contact us

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HÍSWKE SII,ÁM!



www.livinglabproject.ca

