Lake Superior Stewardship Initiative (LSSI) Mini-Grant Application

School: Baraga High School

Project Title: School Garden Expansion, Sustainability & Stewardship Project

LSSI Project Advisor: Joan Chadde at 906-487-3341 or jchadde@mtu.edu

Lead Teacher: Lori Wisniewski
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Tim Marzcak
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John Filpus
High School Industrial Education Teacher
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Number of students participating in the implementation of the project: 154

150 Total Students

Mrs. Lori Wisniewski - Environmental Science: Grade 9 (20 Students)- gardening tasks/vermicompost

Mrs. Lori Wisniewski- Ecology: Grade 6-8 (26 Students)- composting maintenance

Mr. Ben Johnston - Integrated Science: Grade 9 (25 Students)- gardening set-up

Mr. Ben Johnston - General Biology: Grade 10 (44 Students) -green house maintenance

Mr. John Filpus- Industrial Education: Grade 11-12 (24 students)- building rocket mass heater and wood structures

Mr. Ben Johnston - Advanced Biology: Grades 11-12 (15 Students) -green house construction

Description of Project

Background

This is Baraga High School's second LSSI grant request. In our first 2-year project, we began to actively use our under-utilized fully operational seasonal greenhouse to start seedlings, created a school

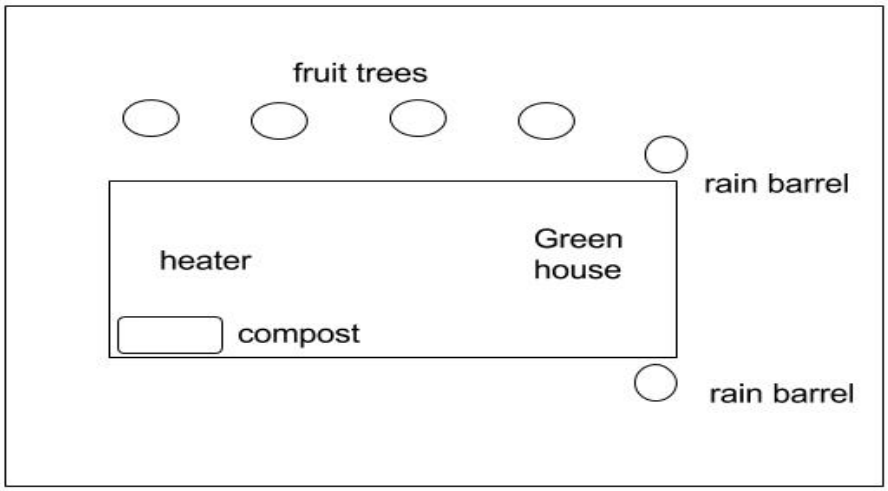
vegetable garden, compost area, and planted several fruit trees in an area behind the playground which is not used.

The ultimate goal of this project would include the student- led construction of an addition (a year round greenhouse) to our current The first project included:

(3) 4’ x 4’ Square Foot Gardens
(2) Rain barrels with rain gutter system for the green house
(1) Compost Bin
(2) Self fertile dwarf fruit trees
(1) Picnic Table
(2) Benches
(1) LSSI Project Sign

This new project will expand the existing garden and add:
(1) Year round greenhouse with rocket mass heater
(2) Rain barrels with rain gutter system for the green house
(1) Compost Bin
(4) Self fertile dwarf fruit trees
(1) LSSI Project Sign

A diagram of the new project is shown below:



1. **What stewardship need does the project address in your community as it relates to the Great Lakes Watershed? How was this need determined?**

This project addresses a school, community and ecosystem need by providing a strong example of sustainable resource management and local food production. We are concerned that an alarming number of Baraga High School students are not exposed to backyard gardening, sustainable farming, and are unaware of where their food comes from. Healthy food contributes to a healthy community. In addition, we are concerned that students do not truly understand our influence upon our watershed. This project will teach students how to responsibly grow their own healthy food, while at the same time, reducing our impact on the watershed. Our school and homes are located less than ½ mile from Keweenaw Bay in Lake Superior. How we use the land has the potential to directly influence the health of Lake Superior's ecosystem. Our garden project will demonstrate sustainable practices and research-based gardening methods. We will utilize a small rain collection system for watering the garden, and a compost/vermicompost system for continuously developing nutrient-rich soil to replenish the garden. Our project will be a model for what students and community members could construct and maintain in their own backyards. Our ultimate goal is to inspire students, as future members and homeowners in our community, to practice sustainable gardening in their own backyards. In addition, our community has high rates of obesity and diabetes. We frequently observe students who lack exposure to gardening and are totally disconnected from where their food comes from.

2. **What are the specific goals of the project related to student learning?**

a. Students will learn how to design, construct, and implement an effective compost system and vermicompost for recycling food and plant materials in order to reduce landfill waste and create rich fertile soil. Soil is the powerhouse of the garden so students need to know how to assess the texture, nutrient content (fertility), and moisture of the soil.
b. Students will be able to explain how organic waste decomposes into usable soil with the help of microorganisms and soil invertebrates.
c. Students will be able to manage garden water use---how much is needed for different plants, when is the best time of day to water, and how often? This addresses the wise use of water and conservation. Students will design and maintain the rainwater collection system using the roof of an existing greenhouse and purchased rain barrels.
d. Students will be able to practice companion planting and composting as an effective way to avoid the traditional use of pesticides and commercial fertilizer. Students will be introduced to companion planting and research which species, when planted next to each other, can act as a deterrent to pests.

e. Students will be able to practice "Square Foot Gardening" methods in order to maximize growing space in a small area.
f. Students will construct a rocket mass heater. A **rocket mass heater** is a space heating system developed from the rocket stove, a type of efficient wood-burning stove. They will use math and industrial education skills to gain an understanding of efficient, heating methods.
g. Students will share their knowledge of what they've learned in a variety of ways with fellow students, parents, and the broader community.

3. **What are the specific outcomes of the project for your community and Lake Superior Watershed?**

a. We will create a garden demonstration area at our school where students can experience growing food sustainably. Students will create memories that foster a love for gardening. We will educate future citizens how to be good stewards in their own backyards. We want to help students invest in a lifestyle of ecosystem responsibility. We want to foster something positive at our school, while at the same time, serve our community.
b. Regularly provide garden produce to local Senior Citizen Center and School Cafeteria.
c. Students will conduct garden tours for elementary school classes.
d. Students will conduct garden tours for the public during seventh grade orientation and fall parent teacher conferences.
e. Students will create a school bulletin board that describes their garden and their rocket mass heater.
f. Students will write an article and take photos for the school website.
h. Students will not only learn to grow healthy fruit and vegetable produce, they will learn how to prepare it. They will contact Marcy Erickson at the MTU Center for Science & Environmental Outreach and ask her to do a cooking demonstration class for students on preparing garden produce.

4. **What school improvement goals are addressed by the project?**

Science: Problem Solving
Improve problem solving across the curriculum. ASCD – "Integrating Thinking and Learning Skills Across the Curriculum."

Science: Vocabulary
Improve student vocabulary related to academic content area. Marzano – "Building academic vocabulary"

Science: Informational Text
Increase and improve the reading of informational text. ASCD Educational Leadership – "The Case for Informational Text"

5. **What Great Lakes Literacy Principles are addressed by the project?**
   http://greatlakesliteracy.net/

Principle 1: THE GREAT LAKES, BODIES OF FRESH WATER WITH MANY FEATURES, ARE CONNECTED TO EACH OTHER AND TO THE WORLD OCEAN.

E. The Great Lakes are an integral part of the water cycle and are connected to the region's watersheds and water systems. Changes in water systems affect the quality, quantity, and movement of water, including retention time.

I. Although the Great Lakes are large, they are finite and their resources are limited.

Principle 2: NATURAL FORCES FORMED THE GREAT LAKES; THE LAKES CONTINUE TO SHAPE THE FEATURES OF THEIR WATERSHED.

D. Erosion—the wearing away of rock, soil and other earth materials—occurs in coastal areas as wind, waves, and currents in rivers and the Great Lakes move sediments.

E. Sediments are a product of erosion and consist of fragments of animals, plants, rocks, and minerals. Sediments are classified by grain sizes, from silt and clay to sand, cobbles, and boulders. Sediments are seasonally redistributed by waves and coast

Principle 3: The Great Lakes influence local and regional weather and climate (monitor weather patterns (important for gardening!)

A. The Great Lakes affect weather and climate by impacting the basin's energy and water cycles. Changes in the Great Lakes' water circulation, water temperatures, and ice cover can produce changes in weather patterns.

B. The Great Lakes warm by absorbing solar radiation. Lake temperatures are also affected locally by the temperature of inflowing river waters. The Great Lakes lose heat by evaporation and by the warming of overlying air when the atmosphere is cool. After water vapor is released into the atmosphere, it condenses and forms precipitation, some of which falls within the Great Lakes basin.

C. The Great Lakes modify the local weather and climate. Because water temperatures change more slowly than land temperatures, lake waters gain heat in summer and release heat during cooler months. This results in cooler springs, warmer falls, delayed frosts, and lake-effect snow.

Principle 4: Water makes earth habitable; fresh water sustains life on land (Garden topics).

B. Water is essential for life. All living processes occur in an aqueous environment.

Principle 5: The Great Lakes support a broad diversity of life and ecosystem (garden topics).

C. The Great Lakes' watershed supports organisms from every kingdom on Earth.

D. Great Lakes biology provides many examples of life cycles, adaptations, and important relationships among organisms, such as symbiosis, predator-prey dynamics, and energy transfer.

Principle 6: The Great Lakes and humans in their watersheds are inextricably interconnected (Gardening, conservation of resources, soil, sustainability).

A. The Great Lakes affect many human lives. They supply fresh water to more than 40 million people. They are a source of drinking water and food, as well as mineral and energy resources.

B. One-third of the North American population lives in the Great Lakes' watershed. Some of the most urbanized regions in the United States and Canada can be found around the lakes.

C. The Great Lakes are affected directly by the decisions and actions of people throughout its watershed, which includes parts of the states of Illinois, Indiana, Michigan, Minnesota, Ohio,
Pennsylvania, New York, and Wisconsin, the Canadian provinces of Ontario and Quebec, and tribal lands.

D. Local and national laws, regulations, and resource management affect what is put into and taken out of the Great Lakes. Shoreline development and industrial or commercial activities
lead to point and non-point source pollution. Humans have altered the biology of the lakes and the viability of species through harvesting, species introduction, and nutrient loading.

E. Coastal regions along the Great Lakes are impacted by land-use decisions and natural hazards. Physical modifications (changes to beaches, shores, and rivers) can exacerbate effects of erosion,
storm surges, and lake-level changes.

F. To ensure continued availability of Great Lakes assets, people must live in ways that sustain the lakes. Individual and collective actions are needed to effectively conserve and manage Great Lakes resources for the benefit of all.

Principle 7: Much remains to be learned about the Great Lakes (Earth Month-educational content push focusing on Lake Superior, ecosystem monitoring).

A. Exploration and understanding of Great Lakes interactions and links among diverse ecosystems
and people are ongoing. Such exploration offers great opportunities for inquiry and investigation.

D. New technologies and methods of observation are expanding our ability to explore the Great Lakes. Fresh water scientists rely on such tools to monitor conditions in the Great Lakes and provide information to policy makers and leaders in coastal communities.

F. Exploring, understanding, and communicating about the Great Lakes ecosystem are interdisciplinary efforts. They require close collaboration among professionals in science,
technology, engineering, and math, as well as public outreach and education.

Principle *8. THE GREAT LAKES ARE SOCIALLY, ECONOMICALLY, AND ENVIRONMENTALLY SIGNIFICANT TO THE REGION, THE NATION, AND THE PLANET. (The garden area will provide a place-based learning environment to learn, play, experiment and relax)

A. The Great Lakes are a source of inspiration, recreation, rejuvenation, and discovery. They are also an important element in the heritage of many cultures.

6. **How will your community partner(s) participate in the planning and implementation of the project?**

Our community partner (Ojibwa Community College and the Program for the Enhancement of Academic Readiness PEAR) will provide OCC student to assist with gardening activities throughout the duration of the project. We will work together in order to prepare a community meal, supplemented by some of the food that we grow. The input from our community partner will determine the community outreach projects we participate in. Community partners will be invited to events at our garden and visit with students. Community partners can also help us decide what future needs and projects we could design and implement.

7. **What are specific outcomes of the Professional Learning Community (PLC) related to teacher learning? What are the PLC activities to accomplish the outcomes?**

The **specific outcomes of our PLC is to enhance teachers' knowledge of gardening techniques, such as soil improvement, fruit tree pruning, companion planting and other topics.** Our PLC will include three activities over the next 1-½ years. 1) We will read one book specific to sustainable food production.a discussion concerning the book where dinner will be served. 2) The PLC will review one film concerning sustainable food production or invite a guest, followed by a discussion and dinner. 3) The PLC will visit one local food growing operation (CSA) in order to learn about local resources. We will invite parents, Baraga Area School teachers and administrators, leaders of the OCC PEAR program, and KBIC's Natural Resources Department to participate in the PLC.

8. **How will you assess whether the student learning outcomes have been accomplished?**

In order to ensure student learning has taken place, students will participate in a pre-post survey that will assess student values and attitudes towards the big ideas surrounding our project. Every student that plays a role in the project will participate in the survey. In addition, students will encounter test questions as part of their regular classroom curriculum when the topics are appropriate. Students will also be asked to compose journals after each class period spent in the garden. These journals will be collected and used to create a school year garden log for the classroom.

Community Partners:

Name of Organization: Keweenaw Bay Indian Community Ojibwa Community College
Contact Person: Mr. Marc Madigan
Contact Phone: (906) 353-4606
Contact Email: mrmadiga@mtu.edu

Add Keweenaw Bay Natural Resources Department

Communication Plan:

Our communication plan includes five activities.

1. Teacher and student presentation to the school board.
2. Press coverage in the L'Anse Sentinel newspaper.
3. Project announcement and photos on school's popular Facebook page.
4. 7th grade orientation tours with parents.
5. Community partner work events.
6. Our involvement with the OCC PEAR program will become a gateway for communicating our project with the Keweenaw Bay Indian Community.

Proposed Timeline:

Feb 2016: Introduce students to the project plan. Provide Pre-Assessment Survey.
March 2016: Students and community partner create garden plan.
March 2016: Plan community partner events.
March – May 2016: Industrial education students construct square foot elevated beds, compost area and rocket mass heater.
March 2016: Students start seeds in greenhouse.
April 2016: Students plant dwarf fruit trees. Students begin compost program.
May 2016: Students care for growing plants in the greenhouse. Field trips to other gardens/farms.
June 2016: Students plant square foot gardens in greenhouse and help to construct new greenhouse.
Summer 2016: Students and community partners care gardens.
Fall 2016: Students harvest vegetables as they become available. Students provide vegetables to community partner.
September 2016: Students will host a community event for students, families, senior citizens.
Jan-June 2017: Maintain garden demonstration area and continue projects.

Projected Budget for Project:

Budget Items	LSSI Grant	School Match (listed on the school's MoP)	Brief Description of Expenses
Staff Time	xxxxxxxxxxx		
Student Activities and Field Trips	$500	School provides a substitute for classroom teacher for two separate days. PPD	Integrated Science Class attends a field trip to the KBIC Department of Natural Resources Greenhouse at $5.17 per mile. Biology classes attend field trip to local CSA and farmers market at $5.17 per mile.
Sub Costs- for project planning	200	School provides a substitute for classroom teacher for two separate days. PPD	Project planning includes Professional Development training at Michigan Tech and CCISD.
Professional Learning Community Activities	200	Permission to use school classroom and garden area for PLC discussions.	One film (get one from Joan). Purchase reading books for each PLC member at $20.00 per book X 10 = $200. Purchase food for (3) PLC discussion groups.
Supplies	$2000	Use of school greenhouse and grounds.	See detail below
Community Event	$300		Contribute food for a community dinner.
TOTAL COSTS	$3200		For < 150 students

Serving between 150-250 students	Up to $3200

Supply Breakdown:

(10) 1” x 10” x 8’ Cedar boards - $20.00 each - $200.00
(1) Elite Heavy-Duty Aluminum Greenhouse Kit-$779.26-$779.26
(1) The Rocket Mass Heater Builder's Guide: Complete Step-by-Step Construction, Maintenance and Troubleshooting-$28.74-$28.74
Estimated materials for the rocket mass heater (see below)-$200
(26) gauge sheet metal: 48” x 18", 16” x 109”, 20” x 89”, 41’ X 36”
(16) gauge sheet metal: 31” x 14”, 32” x 40”, 33 ½” x 43", 34” x 34”
(20) ft. of 1” square tubing
6” well casing pipe, ¼” thick
Stovepipe and elbow
Perlite
Sand
½” sheet metal screws
Fire bricks (high heat cement if you wish to use mortar)
Some CEB or regular bricks
High temp silicon
High temp paint
(6) 1” x 2” x 10’ Furring Strips - $2.00 each - $12.00
Box (1 lb) 2 ½” Galvanized Wood Screws – $10.00
Roll of Landscaping Fabric - $20.00
12 Cubic Feet of Peat Moss - $50.00
12 Cubic Feet of Vermiculite - $50.00
12 Cubic Feet of Compost - $50.00
(2) Rain barrels - $100.00 each - $200.00
(4) Dwarf fruit tree - $240.00
Compost bin lumber and material - $30.00
Seeds - $50.00
LSSI Project Sign and Material - $80.00

Total: $2000