



The UMD Land Lab: Place-Based Education for the 21st Century



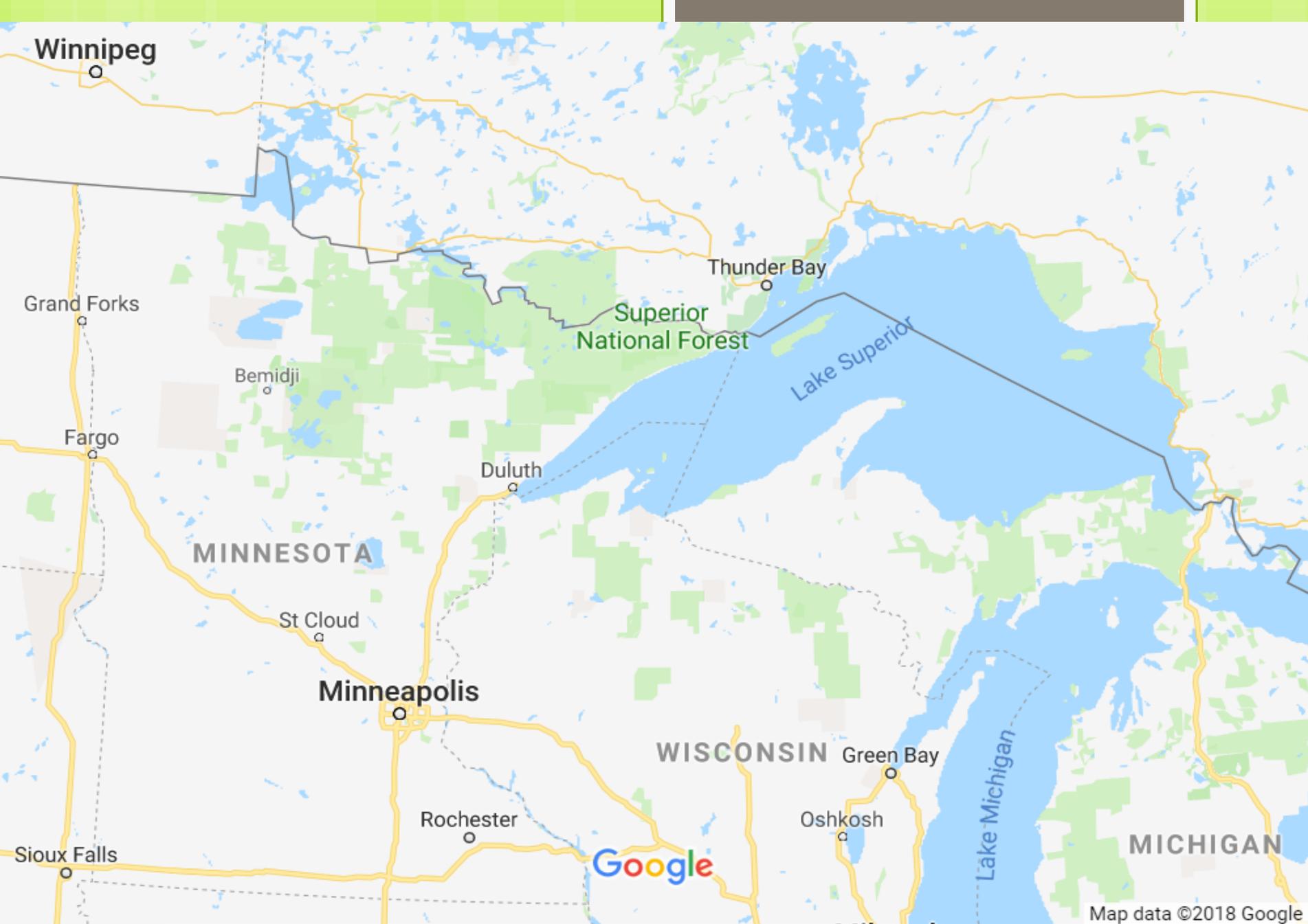
UNIVERSITY OF MINNESOTA DULUTH
Driven to Discover™

Crookston **Duluth** Morris Rochester Twin Cities

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Situating the Place: Western Lake Superior Region



**Extractions in NE MN:
displacements**



Extraction & Phenomenal Rate of Growth of Duluth, 1880s-1920s

Systems Approaches to Building Agro-Food Systems in Western Lake Superior region, 1.0, Early 1900s

Agriculture/Production	Marketing/Distribution	Education/Consumption
Seeding Farms along RR	Market Farmers – for Restaurants and Grocers via Greysolon Farms	Northeast Experimental Station
Greysolon Farm Company	Farmers Market	YMCA - Education
Northeast Experimental Station	Farmers Cooperative	Homecrofting Committee – Community Gardening
		Fair Competitions – Raising Awareness
		Home Products Dinner – Building Knowledge and Buy-in
		Northeast Experimental Station

Cross Sector Collaboration: Businesses, Non Profits, Manufacturers, Booster Clubs, Churches, University, Schools, etc.

Northeast Agricultural Experimental Station, 1912



FIG. 2. FIRST BREAKING OF "NORTH EIGHTY" VIRGIN SWAMP

The Unique Role NEAES Played In Western Lake Superior Region



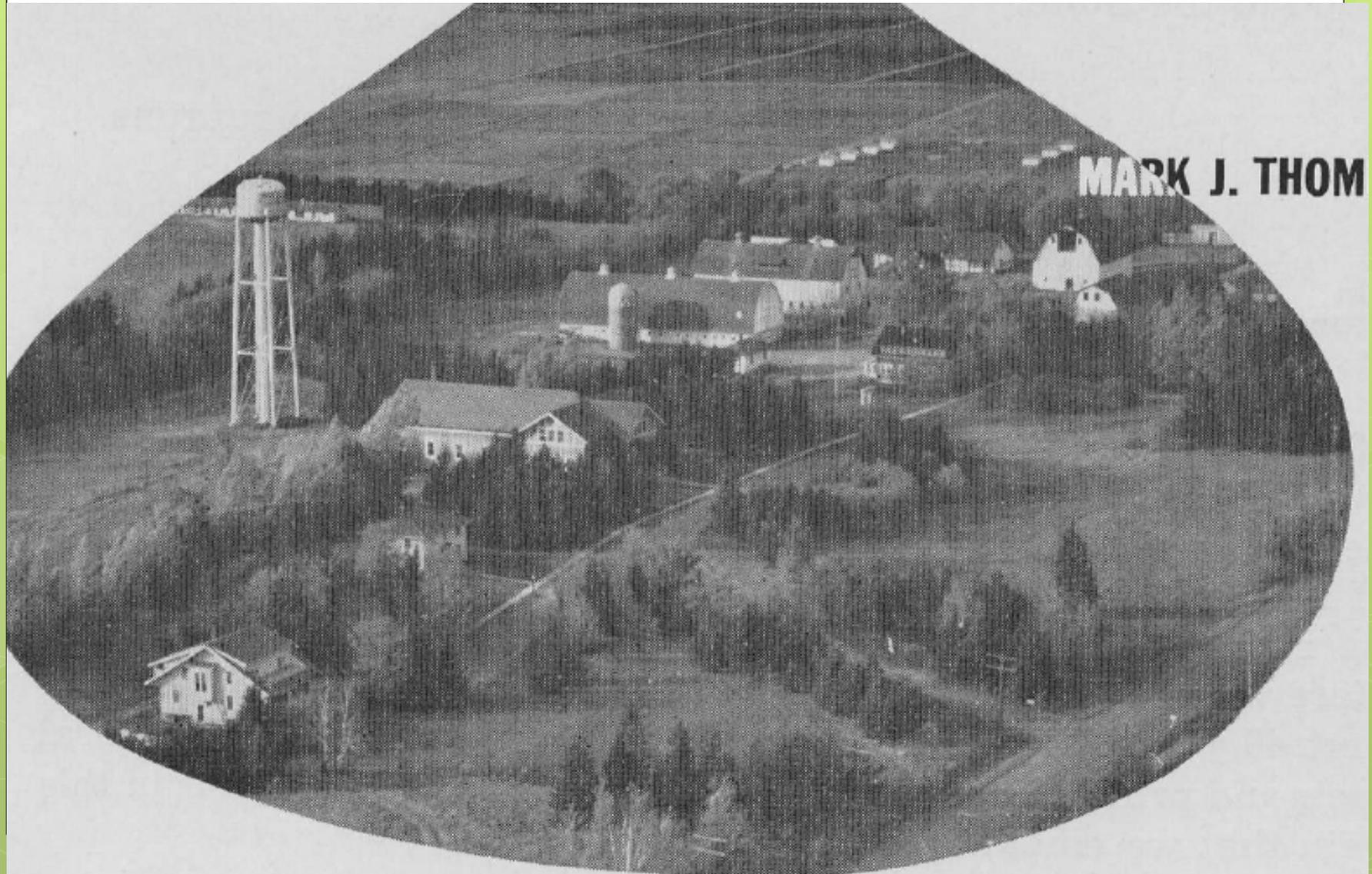
FIG. 9. ATTENDANTS AT THE FIRST INSTITUTE, 1914

Northeast Experimental Station, 1930s



Northeast Station Campus

NE Experimental Station, 1950s





NE Experimental Station, 1976

Connecting social & ecological systems as social ecological system

- **Infrastructure** (food, energy, transportation, housing/buildings, water) **as interface between social and ecological realities and as interface between the individual and social body**
- **Industrial infrastructure as control and command** of Nature and the dangerous failure of this orientation
- How (and how fast) to revolutionize our infrastructure to become **more elegantly interactive with how Earth systems reproduce the conditions for life**
- **The place based nature of this challenge**
- **To what extent can institutions be leveraged to create this pathway?**

Shifting Roles of Agricultural Research Stations

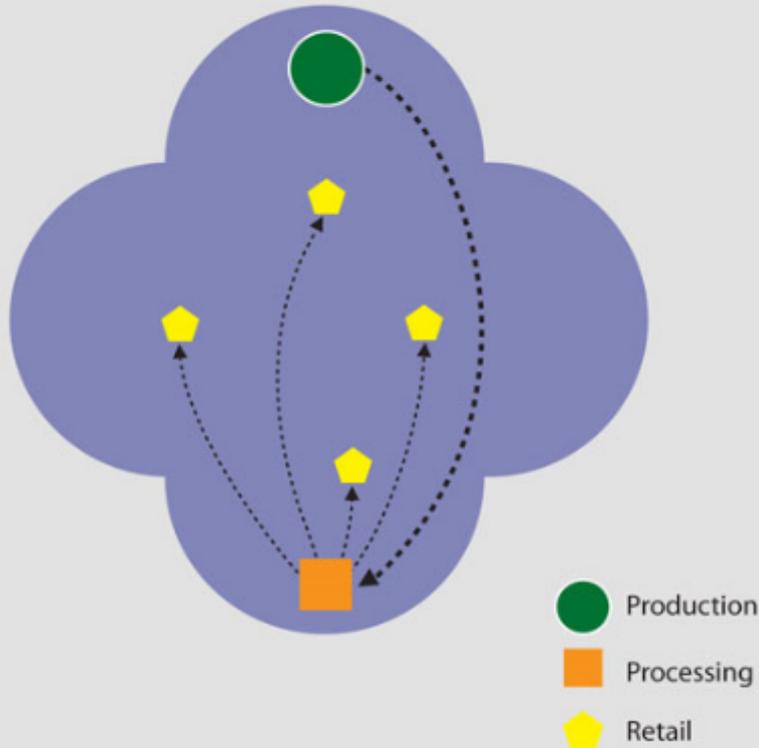
Vantage Point	Frame	Time Period
Seeing like an industrial state	20 th century high modernism	1880s (1912)-1950s
Seeing like a corporation (market)	late 20 th century neo liberalism	1950s-2000s
Seeing like a community/region?	21 st century bioregionalism	Present - ?

Systems Patterns of 'Critical Materials and Services': The Confusion of Centuries

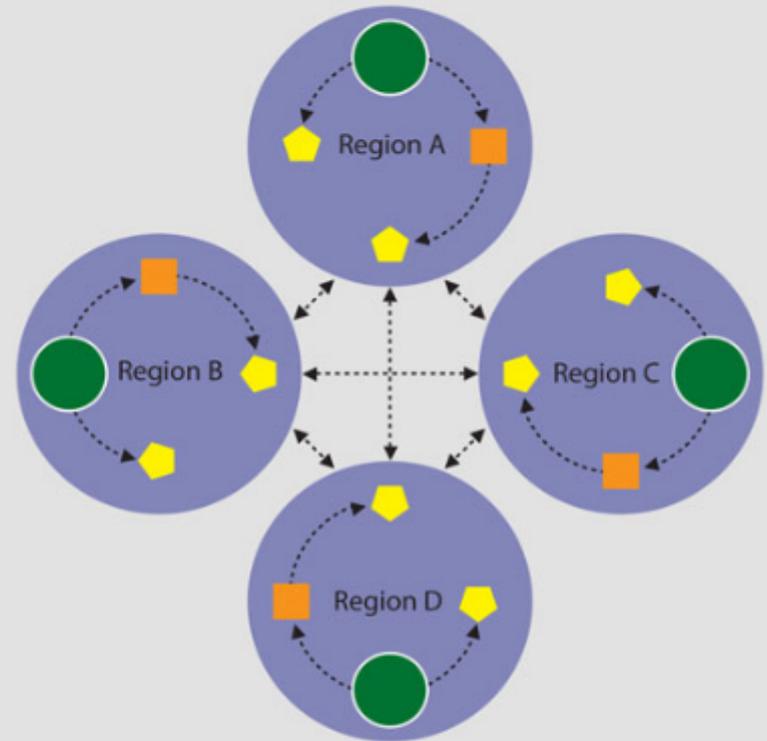
- If the 20th century played out the 'ur-pattern' of centralized systems...
- The 21st century will iterate forward 'ur-patterns' of distributed systems...
- Various referred to as (new) regionalism, bioregionalism, food/water/energy-shed, etc.
- Agrifood context: place based agriculture within a community food systems paradigm

REFOCUSING THE FOOD SYSTEM - CONCEPTUAL MODEL

CURRENT MODEL



INTEGRATED REGIONAL FOODSHEDS MODEL



of regions is arbitrary for illustrative purposes - actual distribution and definition of U.S. foodsheds to be determined

Increase Healthy Food Production
Localize Processing Capacity
Decrease Transportation Costs
Increase Healthy Food Retail
Maximize Local Resources



Increase Access
Increase Affordability
Increase Quality

New Roles for Higher Education

- **Pure Research** remains important
- Yet we know the basic outlines of both problems and possible solutions relative to the biospheric crisis
- **Social Action Research** increasingly important
- How do we create the change necessary to respond to these challenges?
- Previously, the university has been seen as a provider of skills needed in society.
- Today's universities need to increasingly be seen as a driver of societal change

The Lab Model: Refiguring *Learning by Doing* (de-silo'ing)

- **Design Studios**
 - Architecture. Landscape, Design
- **Change & Innovation Labs**
 - Corporate and Social Change Sectors
- **'Mind' Labs**
 - Intergovernmental
- **Land Labs**
 - Agro-Food Systems, Sustainability, Community

UMD Land Lab

- An innovation-oriented *Land Lab* founded in 2009
- Field Site and Faculty Collaborative
- *Focus on distributed systems in food, water, energy*
- Series of Partnerships within the University and across community
- Creating social learning around sustainability by setting in motion projects on field site

Levels of UMD Land Lab

- **University Farm**

- exposing students (1,000 annually) to experiential education that supplements their theoretical understanding of the complex issues of global ecology within a regional landscape-scale context

- **Community Food Systems Incubator**

- Institutional partnerships and community collaborations create on-site projects that advance sustainability goals on and off campus while providing cross generational and cross sector learning opportunities for students and general citizens alike

- **Land-based Research Lab**

- Landscape scale space where research opportunities focused on the nexus of food, water, energy and biodiversity meet for longitudinal action research projects

University Farm

- **Intrapreneurial partnership with UMD Dining Services** linking operations and academics for the mutual benefits of campus and community.
- DS uses a tiny percentage of their \$2.7 million revenue to host Farm Manager and student-farmer employees and purchases produce.
- They have been able to leverage this partnership for their own broader benefit, i.e. as justification for remodeling, connecting with community as leader, and protection against privatization
- Personnel development & training, equipment purchase, and facilities redesign that support campus use of whole foods for the first time in decades
- Deliver ~25 tons of organic produce annually
- Land Lab uses agroecological practices at the field site, managing according to organic standards since its inception.
- **Ca. 1,000 students annually** interact with the farm as student-farmers, interns, volunteers, as part of courses for experiential learning

Community Food Systems Incubator

- **Teacher Training Garden** in partnership with Minnesota Department of Health/County Health Board, the Duluth Public School Systems and the Duluth Community Garden Program in training teachers in sifting, managing and integrating school gardens into curriculum and onto K-12 school yards.
- Healthy Northland Farm to School, **hosting all Duluth-area 7th graders** (550 over two days in 2015) for experiential learning about healthy food and sustainable agriculture; we work with area farmers to host learning stations to provide the educational services for this event who also visit classrooms in the weeks prior to the site visit to introduce students to concepts surrounding healthy food and sustainable agriculture.
- Intertribal Agriculture Council, growing several varieties of flint corn to adapt it to this region. We host field days around planting and harvesting the corn for tribal communities and people and others interested in issues of tribally held seeds and related food and health concerns.
- Northeast Beekeepers Association, which bring pollinator and educational services to the farm and its visitors.
- Community Orchard, won via crowd-sourcing a 50 tree heirloom apple orchard in 2012, which is used for regional research and whose produce is donated to the area food shelf.
- 'UMD Food and Farm Fest and 5K race that brings in diverse community and campus members to enjoy this social and institutional farm and land lab

Research Lab

- **Farm scale wind turbine** –UMD's Department of Mechanical Engineering, UMD Office of Sustainability, Facilities Management and other partners-- provides renewable energy for SAP as well as research and learning for engineering faculty and students. In addition to modeling farm-scale renewable energy systems, the turbine also models a process for evaluating appropriate technology for the region; for example, biologists from the UMD campus and local EPA scientists have worked extensively on this project, gaining important baseline data over two years on potential impacts on birds, bats and other wildlife at the SAP landscape.
- **Dry bean trial research** - SAP is in the second year of a research collaboration with agronomists at the University of Minnesota Twin Cities over the past two years on evaluating field scale performance of organic heirloom dry beans.
- SAP hosts **hydrological research** with University of Minnesota Twin Cities researchers in regional climate change manifestations in building a 'keyline' terra-form system for 'catch and release' strategies for both drought and flood conditions.
- SAP has partnered with the Natural Resources Research Institute on a pending **biochar** research program that would explore options for amending boreal soils for agricultural production against the backdrop of regional climate change.
- SAP hosted **native pollinator habitat research** in collaboration with the Xerces Society in evaluating methods of prepping land for planting varieties of plants and plant communities.
- SAP installed a full spectrum **weather station** whose real-time data is publicly available and also be used in on campus research and teaching weather and climate courses.
- **Regeneration Garden**, which brings together 'stacked' educational, technological and ecological infrastructure around native pollinators, renewable energy, and public art

UMD Land Lab





UMD Land Lab Fields







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Upward Bound Group from TC, 7-12



UMD Land Lab Farmers at Harvestfest Farmers Market, 9-14





7th Graders, Ordean Middle School, 9-30-15



Photographs from Jamie Zak related to Teacher Training Garden Workshops



UMD Dining Services (first ever) Executive Chef Tom Linderholm Inspecting Produce

Harmonizing academic and agronomic needs

- Academic and agronomic calendars are opposite by historical design
- To accommodate, we delay produce maturity via varietal and crop selection, begin our planting later than we could, and assist in storage and processing options
- Organic agriculture relies on diversity of plant families, so a variety of produce needs to be considered by the UMD Dining Services

- Tomato
- Pepper
- Onion
- Broccoli
- Summer Squash
- Winter Squash

- Cabbage
- Basil
- Beans
- Carrots
- Cucumbers
- Melons



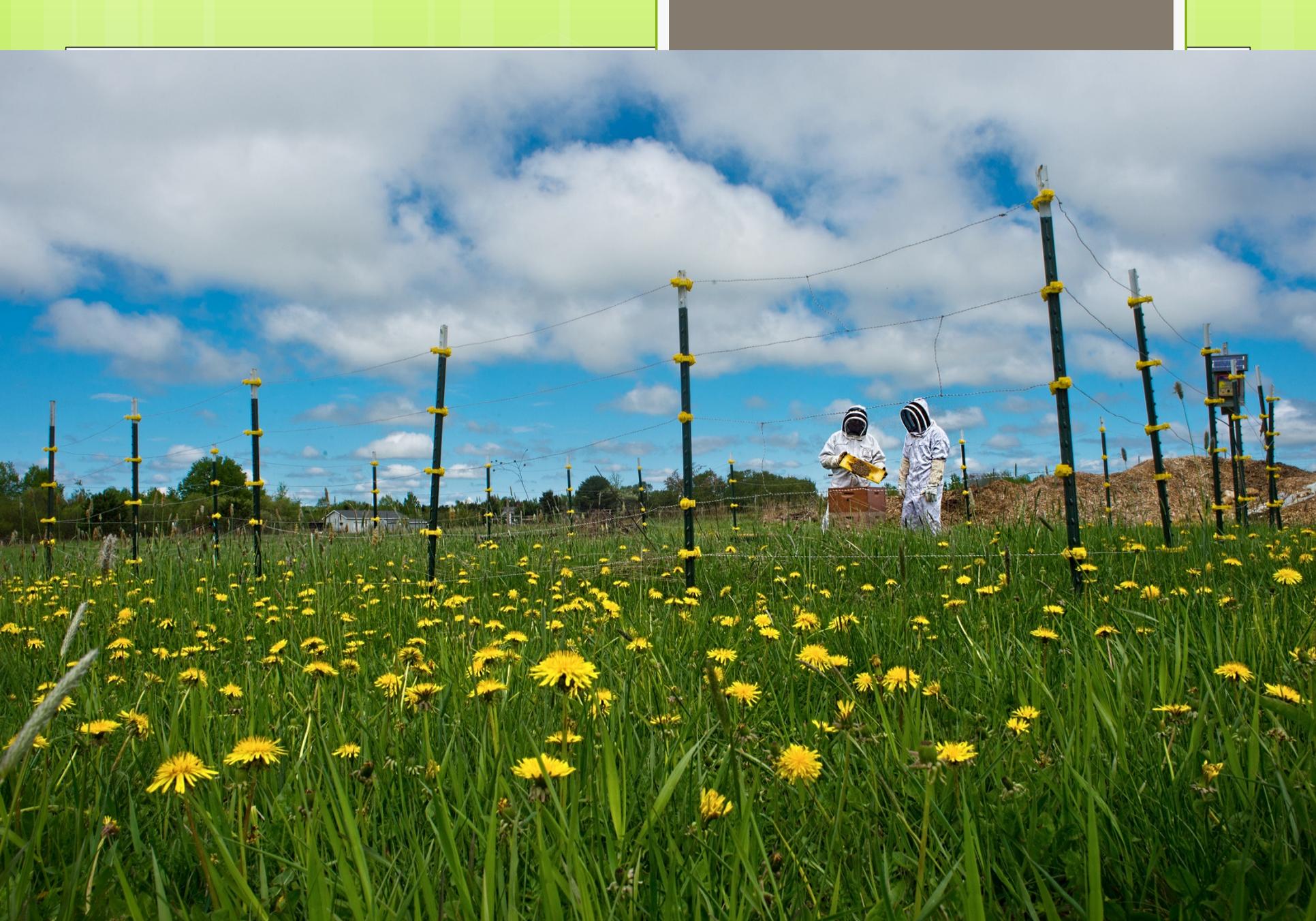
Refurbished 1920s era Root Cellar



UMD Director of Dining Services Inspecting SAP Farm Deliveries

New UMD
Dining
Services
Equipment
to support
processing
of locally
sourced
whole
foods:
**Flash
Freezing
System**







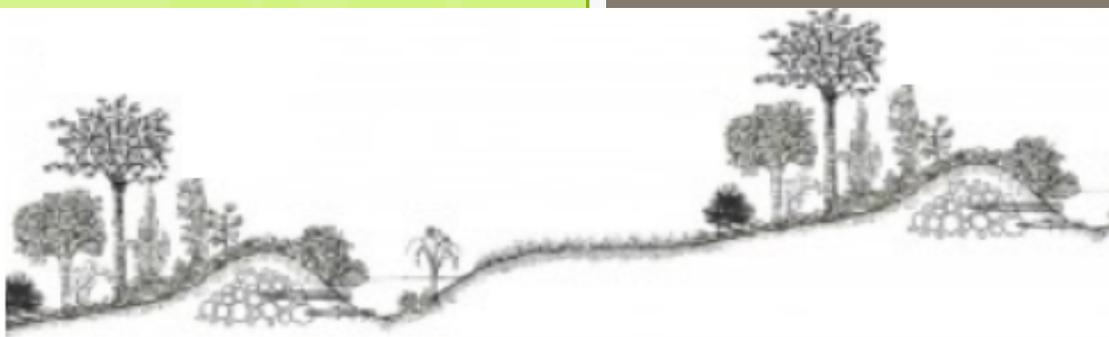
Controlled Environmental Agriculture



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Research Project with UMD Mechanical Engineering, NRRI, & EPA



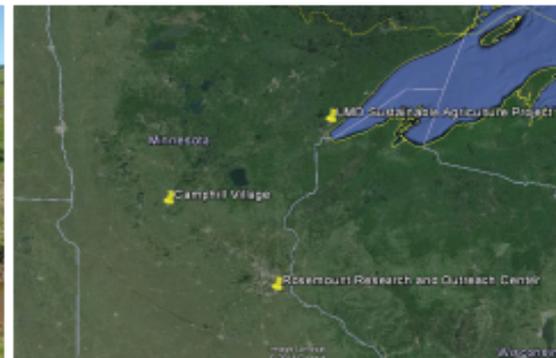
Woody perennials (hazelnuts) located below the modified terrace.



Established modified terrace with mature hazelnut bushes and growing native pasture.



Newly constructed modified terrace holding water from recent storm that will percolate into the soil profile instead of running off site.



Locations of test sites in Minnesota

Research Project:
Keyline Water System for flood and drought conditions

BIOCHAR Farms have a lot of leftovers: corn stalks, wood chips, animal manure, rice hulls, tree bark, grasses, and more. One way to put these leftovers, or biomass, to good use is to transform them. They can be burned without oxygen to form biochar, a type of charcoal that farmers can use for fuel or mix into the soil.

ATMOSPHERIC BENEFITS

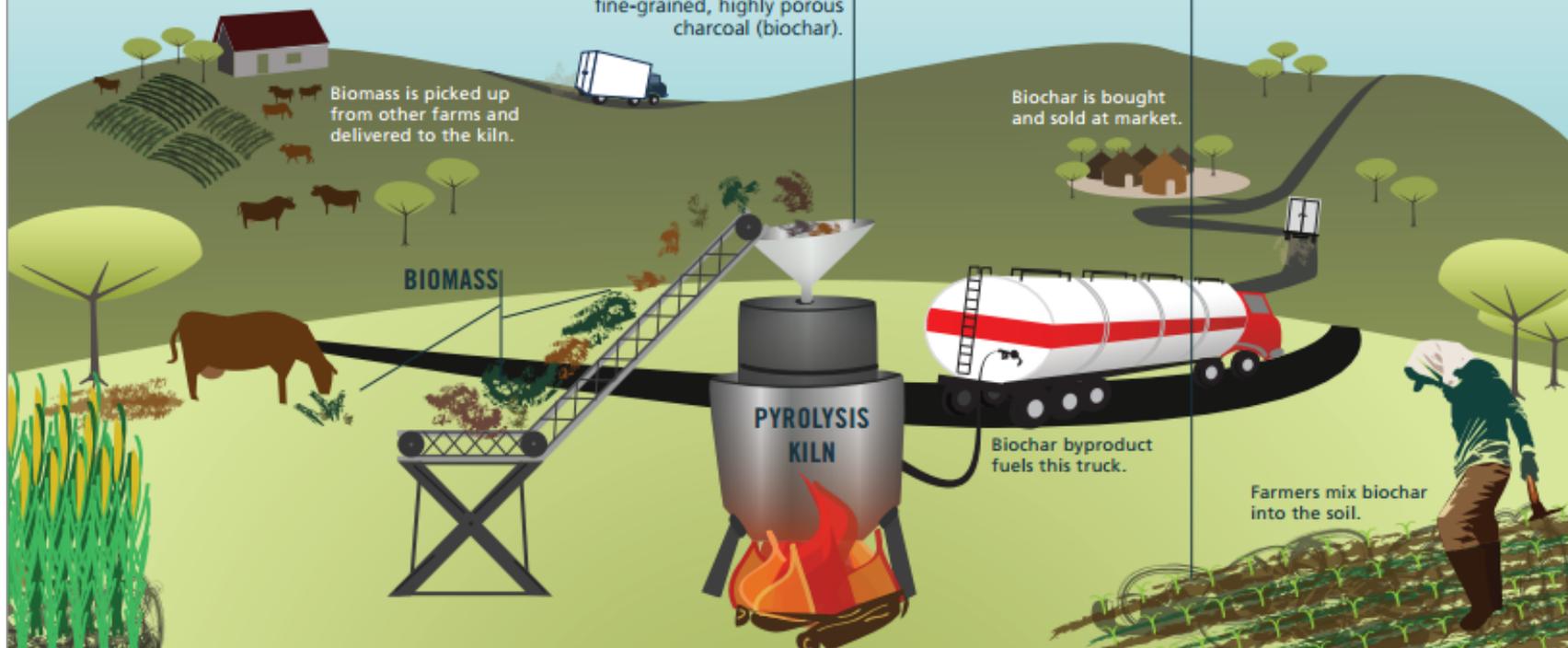
- Stores carbon
- Reduces methane and nitrogen dioxide soil emissions
- Reduces odor (by not leaving biomass to rot)

PYROLYSIS

Intense heat (sometimes more than 1,000° F) with no oxygen creates a fine-grained, highly porous charcoal (biochar).

SOIL BENEFITS

- Improves fertility
- Decreases nutrient runoff
- Improves water retention





Milkweed Seed Finder



**Pollinator Conservation Resource
Center**



Bumble Bee Conservation



Monarch Conservation

Lake Superior Living Laboratories for Higher Education

- Collaboration with Lakehead University, Thunder Bay, and Algoma University, Sault St. Marie
- How do we recognize that we now live in the laboratory of the Anthropocene?

(In)Conclusions

- The 'good food movement' is a social movement that needs institutional support and leverage
- What role can universities play in transitioning to a more sustainable society?
- To play a useful role in building distributed systems in the 21st century, universities must reflect upon and transform their own centralizing ethos and practices