

SAP Farm & Land Lab @ UMD

Innovation for a Regional 21st Century Land Grant Institution

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Overview

Founded in 2009, the 30 acre Sustainable Agriculture Project Land Lab (SAP) is a campus and community laboratory for solutions-oriented research, teaching and public engagement in regionally adaptive food, water, energy and biodiversity systems.

Utilizing land previously part of the closed Northeast Agricultural Experimental Station (1912-1976), SAP revitalizes abandoned assets of campus to create an innovative platform for addressing emerging regional issues of the 21st century while infusing sustainability concepts and actions into student learning and life at UMD.

Several large questions animate SAP: To what extent can we live on the annual ecological budget of this landscape and explore new modes of sustainable practices? How do we reduce the ecological footprint of campus by integrating academics and operations to create learning opportunities for campus and community in leading us toward more sustainable practices? How do we create a sustainability-literate student body that can both talk and walk the challenges we face going forward?

SAP collaborates with researchers from the humanities, social sciences, the natural sciences and engineering on solutions-oriented action research projects. An array of community organizations and governmental units also collaborate on diverse activities on site. More than a thousand students—nearly one tenth of the student body—annually participate in on site experiential learning activities. UMD's Dining Services supports the personnel needs associated with the farm and purchases the organically grown produce (more than 50,000 pounds projected in 2016) which is served on campus, creating a systems-change vehicle linking academics and operations for mutual benefit. Taken as a whole, SAP creates an integrative structure for social and institutional learning related to how to devise, model and disseminate ways that human systems can better interface with earth systems at a regional scale.

The SAP Land Lab has had remarkable success going from a one acre experimental teaching project in 2009 to the 30 acre campus, community, and state model that exists today. This

report lays out the background context of SAP in higher education generally and in the University of Minnesota system specifically. It lays out past and current successes, future vision, and next steps needed to achieve institutional stability and fulfill SAP's role in the mission of a 21st century land grant institution.

Higher Education Context of the SAP Farm & Land Lab

A central challenge for 21st century institutions of higher learning involves fostering the 'fused' knowledge necessary for the Anthropocene, the emergent geological age in which human activity has become the dominant influence on the biosphere. Indeed, as collective and cumulative human activities force increasing changes in planetary systems, 'nature' irrepressibly intertwines with human culture and social life: and as an object of study, this shifting 'social life of nature' is altering the terrain of the natural sciences, social sciences and humanities in new and complex ways.

To describe and engage these emergent planetary processes that manifest at local and regional scales, deeper integration of cross-disciplinary thinking, social ecological learning, new modes and sites of research, and innovative public engagement is vital, particularly for land grant institutions. Scholars have importantly focused on articulating emergent biophysical limits and social challenges related to the Anthropocene, but developing, evaluating, informing, and advising society on workable solutions relative to earth systems is increasingly urgent at all scales. Doing so calls upon the scholar's wit, the entrepreneur's innovation, and the practitioner's pragmatics, working in concert to create and refine models that speak to diverse communities.

The imperative to devise more fitting and flexible ways to service constituencies on our rapidly changing planet is not unique to higher education. Experts and institutions are vital for this challenge, but they must operate within a shifting social and organizational terrain in which relevant knowledge creation is happening beyond campus boundaries. Put different, solutions to the 'wicked problems' of the Anthropocene likely will not emerge from 'command and control' systems typical of the twentieth century.

The creation of "land labs" like SAP is one way in which institutions across the spectrum are inventing new ways to move away from top-down organization and augment expert-driven agendas with more interactive and embedded relationships. Witness the rise of integrative 'design' studios in professional contexts, workshop-style 'change and innovation' labs in business and social change sectors, and cross-cutting intergovernmental 'mind' labs at various levels.

SAP is best understood as part of the growth of regionally adaptive 'land labs' for landscape-scale action research in environmental, agricultural and conservation settings. In each of these cases, multilevel actors engage in co-creative social learning within a solutions oriented

framework to explore new ways of conceiving of and addressing emergent social, institutional and ecological challenges. Higher education has a special obligation and opportunity contribution to innovate solutions-oriented approaches given that we train many of the youth who will inherit a rapidly changing planet.

Theoretical Framework for SAP Farm Land Lab

Land grant institutions generally and the University of Minnesota Duluth specifically are well situated to respond to these emergent challenges that focus proactively on meeting human needs while enhancing natural systems within particular circumstances and places. Situated at the head of the largest freshwater lake in the world, the University of Minnesota Duluth is a regional land grant institution responding to the social and ecological changes pursuing through society and nature.

The Land Lab was founded to engage how global social and ecological changes are manifesting at a regional level. Northeast Minnesota has long been a site of resource extraction, a process that continues to unfold; but a new focus has emerged over the past several decades on social, economic and ecological sustainability within a bioregional context. Indeed, like regions across the US and the world, citizens and leaders in Northeast Minnesota are increasingly exploring ‘distributed systems’ in food, energy and water to both reduce the harmful ecological impacts of human infrastructure and more equitably share their benefits. The goal is to explore a mix of distributed and centralized/industrial systems that meet our needs while iterating a more just, equitable and sustainable future. The ‘face to face’ nature of smaller-scale distributed systems also often allows for bridging political and economic silos that create gridlock at larger scales.

Responding to this generational demand, SAP has evolved to support three related but distinct functions:

- a ‘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;
- a ‘community food systems incubator’, in which 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 area citizens alike;
- and a ‘land based research lab’, in which research opportunities focused on the nexus of food, water, energy and biodiversity meet for longitudinal action research projects.

University Farm

Research and demonstration farms associated with universities and colleges have long been important in the development of agriculture in the US, particularly with reference to ‘Land Grant’ activities. But over the past decade, several hundred smaller-scale college and university

farms have been founded that specifically seek to craft liberal arts undergraduate experiences with experiential learning for augmenting classroom learning, to influence life-long learning in helping students navigate an increasingly complex and harmful food environment, and to make sustainable interventions into the operational practices of their physical plants. Along those lines, the SAP Farm Land Lab has been inspired by these developments, inaugurating several activities that benefit the UMD campus community:

- SAP has crafted an innovative partnership with UMD Dining Services that links operations and academics for the mutual benefits of campus and community. UMD Dining Services supports SAP by hosting our Farm Manager and student-farmer employees and by purchasing the produce grown on site. Student-farmers enjoy season-long paid employment that allows them to dive deeply into sustainability learning in the nexus of sustainable food, water, energy and biodiversity enhancement. SAP collaborates with Dining Services to harmonize the agronomic and institutional needs, which can entail training personnel, acquiring relevant processing equipment, and expanding facilities that support the use of whole foods on campus for the first time in several decades. In 2016 SAP will deliver ca. 50,000 pounds of organic produce for consumption on campus.
- SAP uses agroecological practices to manage the field site, synergizing ecological components for productivity, stability, sustainability and equitability outcomes of the overall project for long term benefits. We mobilize crop rotations, green manures, integrated pest management, companion planting, biodiversity enhancement projects, and related activities. We intend to certify the field site formally as 'organic' in the 2016-17 academic year.
- Beyond the paid student employees, more than 1,000 additional students annually interact with the farm as student-farmers, interns, volunteers, as part of courses that use aspects of the farm for experiential learning, and as participants in other events held at the farm. The experiential dimension of the SAP Farm Land Lab builds upon classroom sustainability studies in ways that challenge students to engage the trade-offs around the multiple choices people, organizations and communities face in transitioning to more sustainable systems.

Community Food Systems Incubator

All across the United States communities are rebuilding food and agricultural systems at regional levels to garner the social, health, economic and ecological services that they provide. Our own Western Lake Superior region is also embracing this trend broadly. Institutions like the University of Minnesota play a potentially important 'anchor' role in fostering the transition to more sustainable systems across food, water, energy, and biodiversity. Along those lines, the SAP Farm Land Lab has engaged the 'community food systems incubator' role, fostering collaboration in on-site experiential opportunities for food and agricultural systems development and learning services for both campus and community. The following activities reflect these impulses:

- A Minnesota Department of Health/County Health Board funded Teacher Training Garden was built at SAP in 2012 to partner with the Duluth Public School Systems and the Duluth Community Garden Program in training teachers in siting, managing and integrating school gardens into curriculum and onto K-12 school yards. Many workshops have been held for regional K-12 teachers and school gardens have been sited at most public schools in Duluth and many across the region as well.
- SAP collaborates with 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.
- SAP collaborates (4 years running) with the 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.
- SAP hosts a western honeybee apiary in collaboration with the Northeast Beekeepers Association, which bring pollinator and educational services to the farm and its visitors.
- SAP 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.
- SAP hosts the 'Steve O'Neill Rhubarb Garden' in partnership with CHUM, which provides rhubarb for the O'Neill-founded 'Rhubarb Festival' held annually in June.
- SAP hosts multiple annual field days on site, inviting the public to engage the research and production. We also host an annual UMD Food and Farm Fest and 5K race that brings in diverse community and campus members to enjoy locally harvested food, a 5K run through the farm, a farmers market, live music, a petting zoo, and community group tabling; it also allows our students to showcase the learning they have acquired over the course of the season.
- SAP is exploring the launch of a citizen science approach to native pollinator initiative, working with campus and community to build habitat in urban and rural areas for native pollinators in conjunction with the White House/NSF initiative. We will be partnering with the Solar Commons and Rural Renewable Energy Alliance (RREAL) to install solar arrays that integrate human, ecological and technological infrastructures in exploring innovative design for the 21st century.

Research Farm

Our Western Lake Superior region faces near and long term challenges and opportunities related to our food and agricultural systems. From 1912 to 1976, our region enjoyed the services of the Northeast Agricultural Experiment Station, which helped build a food and agricultural system from scratch in the Great North Woods to the benefit of our citizens and communities. Since that station closed, those activities have been foreclosed from our region with all the attendant deficits it brings. From the point of view of food and

agricultural systems, projected future ecological and social changes will bring a climate more fitting, indeed demanding, of agricultural activities with an existing soil regime created by the ecological activities associated with the Great North Woods. How do we synergize research activities that can address these challenges, which include attention toward how human social and economic activities interface with changing ecological conditions through the interfaces of food, water, energy and biodiversity infrastructures. The Humanities and social sciences are key to navigating these issues alongside science and engineering. The SAP Farm Land Lab is pursuing those opportunities via the following activities:

- A farm scale wind turbine –conceived, evaluated, and installed with input from UMD’s Departments of Mechanical and Electrical Engineering, 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.
- 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 based researchers in regional climate change manifestations in building a ‘keyline’ terra-form system for ‘catch and release’ strategies appropriate 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 will install in Fall, 2016 a full spectrum weather station whose real-time data will be publicly available and also be used in on campus research and teaching weather and climate courses.
- Our future research projects respond to regional needs and interests (as determined by a survey with the Sustainable Farming Association) including season extension techniques and technologies, cultivar varietal development, and climate change issues as it relates to food and agriculture

SAP Land Lab: Development Timeline

The SAP Farm Land Lab has channeled ca. \$500,000 (as of 2016) to build the infrastructure and related activities since its inception in 2009. We have successfully built a

functioning farm and laboratory that provides social and ecological services to campus and community, and we look forward over the next period of “institutionalization” related to how we can more substantially leverage this unique asset for UMD to address the emerging issues of the Anthropocene as they take shape in the Western Lake Superior region. The following framework articulates the different phases of the SAP Farm Land Lab as it has developed and will continue to flourish:

Phase I (2009-2016) centered on building the infrastructure for a working farm-lab to support multiple projects simultaneously in harmonizing agricultural and energy production with biodiversity, carbon sequestration, and other ecosystem and human services.

Phase II (2016-2018) scales impact via sustainable institutionalization which includes securing recurring funds for an academic or administrative position for the SAP Land Lab Director, bringing internal and external funding to further develop projects based in the multiples values of SAP with stakeholders within the university, community and region.

Phase III (2018 forward) leverages the SAP platform in creating a hybrid university-community ‘Public Good Institute’ that, among other activities, will run a summer ‘Institutional Food Systems Seminar’ that will model-academic-operations-community collaborations for other institutions of higher learning; and create a summer ‘certificate program’ in sustainable agriculture and permaculture.