

BIOAg Final Grant Report: Agroecological Assessment of Farming in the Rural-Urban Interface: Building Resilient Regional Food Systems

Principal Investigator

- Marcia Ostrom, Associate Professor, WSU School of the Environment and CSANR

Co-Principal Investigators

- Lynne Carpenter-Boggs, Associate Professor, Dept. of Crop and Soil Sciences, WSU
- Jessica Goldberger, Associate Professor, Agricultural and Food Systems, Dept. of Crop and Soil Sciences, WSU
- Paul Thiers, Associate Professor, Political Science, WSU Vancouver
- M. Jahi Chappell, Ph.D., Adjunct Faculty, School of the Environment, WSU Vancouver
- Judith Wait, Doctoral student, Environmental & Natural Resource Science (ENRS)

Cooperators:

WSU Small Farms Team; WSU Clark County Extension; Clark County Food System Council; Denise Smee, Clark Conservation District Manager; Ann Foster, Salmon Creek Farmers' Market manager and Clark County Food System Council Secretary; Heather Tischbein; Northwest Cooperative Development Center; Farmer participants, including Jim and Diane Hunter; Valerie Alexander, Friends of Clark County board member; and others.

Key words:

Agroecology, farm assessment, innovation, local food, participatory research, regional food systems, resilience, rural-urban interface, sustainable agriculture, urbanization

Abstract

Farmland in urban-influenced regions produces the majority of vegetables and fruits grown in the U.S., yet rural-urban interface (RUI) farms are threatened by development pressure, climate change, economic conditions, and infrastructure loss (American Farmland Trust, 2007).

Developing innovative marketing relationships and strategic policy alliances with urban consumers can potentially enhance RUI farm viability. Community-led food system initiatives, including multi-stakeholder food policy councils and alternative food distribution networks, seek to strengthen such regional consumer-farmer linkages. Viable RUI farms can increase local food production and access, enhance long-term food security, contribute to local economic development, and provide a wide range of ecosystem services. Clark County, with the sprawling city of Vancouver, offers a unique opportunity to investigate RUI food system resilience at the farm level. This under-studied region hosts more than 60 direct market farms.

We proposed to develop and pilot an on-farm sustainability assessment tool that includes indicators for social, environmental, agronomic and economic sustainability through participatory field research with 20 direct market farms. By documenting the usage of BIOAg practices, we highlight areas of farm vulnerability, and identify areas for improvement. The tool will be evaluated and made available for use in other regions. Our project addresses BIOAg priority areas of “social and economic dimensions” as well as the eligible topic areas of “innovation and diversification to increase the resiliency and sustainability of farming and food systems” and “assessment of the environmental, economic, and/or social sustainability of agriculture and food systems that provide direction for needed improvements.”

Table of Contents:

Title:.....	Error! Bookmark not defined.
Principal Investigator.....	1
Co-Principal Investigators.....	1
Cooperators:.....	1
Key words:.....	1
Abstract.....	1
Grant Project Description.....	2
Outputs.....	3
• Work Completed:.....	3
○ Stage One: Establish research team, advisory group, project management.	3
○ Stage Two: Engage scientists and farmers in advising on development, implementation and evaluation of the assessment tool.....	4
○ Stage Three: Conduct on-farm assessments, process and analyze data, review results with farmer participants.	4
○ Stage Four: Report and Disseminate Findings.....	5
• Publications, Handouts, Other Text & Web Products:.....	5
• Outreach & Education Activities.....	5
Impacts.....	6
• Short-term Impacts (Knowledge gained and shared).....	6
• Intermediate-term impacts (current & expected change in behaviors).....	6
• Long-term (potential change in economic/environmental/social situations).....	7
Additional Funding Applied For / Secured.....	7
• Most Recent Grant Proposals.....	7
• Future Funding Possibilities.....	8
Graduate student funded.....	8
Recommendations for Future Research.....	8
References.....	10

Grant Project Description

To advance regional food system goals, this project investigated the challenges faced by rural-urban interface (RUI) farms as well as the contributions they make toward agroecological sustainability and food system resilience. The Clark County Food System Council endeavors to retain and increase local food production and sourcing in a region with significant food insecurity and development pressure (FSC, 2012, 2013). As such, research-based guidance for addressing the specific vulnerabilities of local agricultural production is needed. The

interdisciplinary research team and advisors helped develop, implement, and evaluate a user-friendly agroecological assessment. Our unique focus on conducting participatory research with direct market RUI farmers was designed to address critical gaps in knowledge and inform policy. In 2012, there were seven Farmers' Markets and 20 community supported agriculture (CSA) operations in Clark County.

This project had the following objectives:

Objective One: To develop an agroecological farm assessment tool for direct market farms that uses indicators of agronomic, social, environmental, and economic sustainability and resilience;

Objective Two: To pilot test the assessment tool with 20 rural-urban interface (RUI) direct market farms;

Objective Three: To analyze results to document the key contributions of these farms toward agroecological sustainability and regional food system resilience and identify areas for improvement;

Objective Four: To evaluate and share the tool and assessment results with other practitioners, partners, and stakeholders.

This project investigated the following **research questions:**

- What are the current and potential areas of vulnerability for RUI food producing farms?
- What will be needed to retain and enhance RUI food production capacity?
- What are useful indicators of environmental, economic, and social resilience for RUI food producing farms and how can these indicators be systematically assessed in Clark County and similar areas?

Resilience in this BIOAg project refers to the capacity to grow food for local consumption over the long-term, whereby farmers implement adaptive strategies to overcome challenges and complexity.

Outputs

- **Work Completed:**

All four Stages of the project are complete, as detailed below. Plans for continued data analysis and dissemination are also in place.

- **Stage One: Establish research team, advisory group, project management.**

We established a core group of stakeholder-advisors including farmers and representatives from conservation, marketing, retail, real estate, non-profits, and Extension. We also conferred with a multidisciplinary group of advisors including economists, environmental scientists, soil scientists, and entomologists. We collaborated with two emerging community organizations focused on food equity, and received support from the Northwest Cooperative Development Center (NWCDC).

Contextual data on food farming in Clark County was compiled from multiple sources, including agency farm lists, web-searches, and online County parcel information. Farm data was also collected through participant observation and networking at farmer-focused and food system events (farm tours, farmers' markets, community partners' meetings, and conferences). A farm

parcel list was compiled that includes 100 farms using one or more direct-to-consumer market channels (farmers' markets, farm stands, U-pick, CSA, and/or farm events). Based on farm characteristics identified in this master list, 23 farmer partners were selected to pilot the implementation of the Farm Resilience Assessment Tool (FRAT).

- **Stage Two: Engage scientists and farmers in advising on development, implementation and evaluation of the assessment tool.**

The resulting Farm Resilience Assessment Tool (FRAT) is comprised of a set of indicators of agronomic, social, environmental, and economic resilience. The process of FRAT development exemplifies an iterative process of adaptive project management.

Initial development of the FRAT was informed by other “tools” and models, as were the scoring criteria for resilience indicators. We compared the “public goods” assessment tool (Gerrard et al., 2012), the behavior-based resilience indicator framework (Cabell & Oelofse, 2012), and the characteristics of farm resilience (Milestad & Darnhofer, 2003), in order to correlate adaptive strategies hypothesized to be important to farm resilience. The agroecological scoring criteria chosen were additionally informed by Gliessman's agroecology textbook (Gliessman, 2015), Guthman's dissertation research methods (see the Appendix of Guthman, 2014), and other analyses of agroecological resilience (Altieri, Nicholls, Henao, & Lana, 2015; Nicholls et al., 2004).

Ongoing engagement with stakeholder-advisors for the FRAT helped prioritize the indicators to include on-farm trials, which took place at two urban agriculture sites over summer, 2014. We tested methods for assessing soil management strategies and biodiversity. A final draft of the semi-structured interview questions was tested with two advisors in December, 2014 and January 2015. Revisions were incorporated and the FRAT scoring framework was refined. Initial summary findings were shared with research participants and project advisors in order to solicit their feedback.

Data collection for the FRAT involved on-farm interviews, farm tours, and field observations. For the final sample of farms participating in the Farm Resilience Assessment, information that was compiled prior to interviews, from multiple sources, was cross checked with the farmers during interviews. After the in-depth semi-structured interviews were complete, and data compiled, the FRAT scoring system was refined based on preliminary analyses. Farmers who participated in the roundtable meeting provided additional information and contributed their evaluation.

- **Stage Three: Conduct on-farm assessments, process and analyze data, review results with farmer participants.**

On-farm assessments featuring semi-structured, in-depth interviews and site observations with farmers were conducted. The final sample of 23 farms was selected from an initial list of all direct market farms in the study region that raised vegetables and/or fruits, as part or all of their farm operations. FRAT farms varied on many other attributes—such as management practices, size in terms of land and gross sales, operator age, land tenure, time in farming, and the number and diversity of market outlets used. Data was compiled into the FRAT spreadsheets, helping to facilitate farm characterization, resilience indicator scoring, and analysis.

Initial results were shared at the monthly meeting of the multi-stakeholder Food System Council (including farmers), and with farmers and other advisors. The farmer roundtable was multi-

functional in that more information was gathered, some results were confirmed or expanded upon, and it led to some FRAT scoring criteria modifications.

The most notable finding that emerged from preliminary data analysis was the high level of commitment to the pursuit of *sustainability* practices such as water conservation, soil enhancement, and biologically-based pest management. The results also confirmed that farmers pursue a diverse range of economic strategies. Many farmers in the study were interested in more opportunities to aggregate their products to serve markets such as restaurants or institutions. Some were already engaged in informal cooperation and product aggregation. Most saw the need for greater farmer-to-farmer networking. These topics will be investigated in greater depth as we continue to analyze this data over the next year.

○ **Stage Four: Report and Disseminate Findings**

We completed the final research technical report, attached to this grant report.* Graduate student Judith Wait will be further analyzing and utilizing the data gathered in this project for her dissertation. As such, this report will be reviewed by co-PIs, commensurate with future dissemination plans to submit a summary article to the Journal of Agriculture, Food Systems, and Community Development (JAFSCD). In addition, we will produce a poster and presentation for future conferences.

● **Publications, Handouts, Other Text & Web Products:**

Over the course of the grant project, we periodically distributed research project summary updates via email, through individual communications, and at organizational forums (meetings where we were invited to give presentations). For each meeting, we produced a handout summarizing the research, the FRAT framework, and results pertinent to the timing and audience. A summary report from the farmer roundtable was produced, as well as a contact list they requested.

In addition, the following documents were distributed and referenced by stakeholders: 1) “Economic Significance of Food and Farming in Clark County,” a compilation of selected data on the agricultural sector, primarily from the 2012 Census of Agriculture; 2) “Food Production Agriculture & Farmland in Clark County: Notes on the Benefits of Farmland Protection.” The Clark County WSU Extension horticulturalist handed out both documents for a farm tour he co- led for policy-makers and agricultural-food system leaders.

● **Outreach & Education Activities**

Communicating with individual farmers and cooperators was ongoing throughout the project, including networking at Farmers’ Markets, farm visits, educational workshops, and conferences—such as Tilth Producers of Washington (2014) and Washington State Farmers Market Association (2013-14). Outreach led to meeting more farmers and expanding the farm parcel list. We talked with farmers about their local food system participation. During summer 2015, we coordinated five days of farm tours and interviews with diverse stakeholders. The sessions were video-recorded by two WSU communications undergraduates.

To address farmer identified needs, as opportunities arose, we worked with community partners to develop grant proposals for participatory research, including market risk assessment, community food system assessment, and outreach to include small socially disadvantaged producers (see also Funding, and Impacts).

Several outreach and education activities were co-organized with community partners. NWCDC's SSDP grant funding helped support the following activities:

1. Value Added Producer Grant (VAPG) workshop (presentation by Greg York, Rural Development, based on our invitation, February 18, 2015);
2. Matt LeRoux of Cornell Cooperative Extension visited Clark County (February 24-25, 2015). For the occasion, we organized an informal gathering for food system leaders, farm tours, and a workshop on the Market Channel Assessment Tool (MCAT).¹
3. A series of capacity-building sessions were co-facilitated with a subgroup of Southwest Washington's network of women farmers and supporters.
4. In order to test Market Channel Assessment Tool (MCAT) implementation, tracking forms and instructions were modified and then translated into Spanish. The pilot farm uses multiple types of market channels. Data was processed through the MCAT spreadsheet (M. LeRoux & Schmit, 2011), and preliminary results were presented to the farmer.
5. Project outreach was conducted at a harvest festival hosted by a participating farm. .
6. Outreach for scholarships for rural producers to attend the Cultivating Cooperative Roots Conference sponsored by NWCDC, scheduled right after the 2016 Spokane Ag Expo.

In addition, presentations on this BIOAg research, as well as on the MCAT, were delivered at the Small Farms Team retreat in March, 2015. Clark County Extension and several community partners co-hosted the VAPG and MCAT workshops at the Heritage Farm in Vancouver.

Impacts

- **Short-term Impacts (Knowledge gained and shared)**

This participatory research was initiated in response to Clark County food system stakeholder goals of preventing further loss of farms and food production infrastructure capacity. Co-PI Judith Wait has regularly attended monthly Clark County Food System Council meetings to keep cooperators and interested stakeholders mutually informed about the progress of the research; share initial findings from secondary data collection such as information from the Census of Agriculture; and communicate about relevant policy implications. She has also maintained ongoing communication with project advisors and farmer participants, and shared summary results to get their feedback.

Following our research on the irrigation water access problem, one cooperator helped find a favorable determination for small farm operations lacking a certified water right. The current Washington Department of Ecology (DOE) position is that farms using less than 5,000 gallons per day fall under the Exemption for industrial uses.

- **Intermediate-term impacts (current & expected change in behaviors)**

Some project impacts observed during the 2015 grant period followed producer workshops, educational farm tours for policy makers, and informational presentations to stakeholders.

For example, Clark County producers who attended a workshop on the Market Channel Assessment Tool (MCAT) became interested in conducting assessments on their farms. One farm piloted MCAT. Lessons learned include the challenge of tracking multiple tasks and laborers working to fulfil several market outlets and manage multiple crops in any given day during peak season amid a heat wave. Behavior changes for the next season might include focusing on the more profitable market outlets.

After the Value Added Producer Grants (VAPG) workshop in 2015, five producers initially intended to develop proposals for value-added projects. However, the application process is still too cumbersome for some producers. The Clark County Extension director, along with County economic development leaders, presented a proposal to the County Board of Commissioners to incorporate farm viability topics, such as MCAT and VAPG, into their work plan to promote economic development and job creation in the agriculture and food sectors.ⁱⁱ For 2016, the VAPG workshop will be sponsored by Clark County Extension and Rural Development. In addition, Extension has offered additional value added technical assistance in the interim.

FRAT research confirmed the need for more farmer networking opportunities, so the roundtable offered one venue. Farmers learned about other farmers' approaches to some common problems, and identified ways farmers could work together to overcome hurdles. They made future plans to learn more from one another. Examples include participating in soil management classes offered by a soil scientist farmer, and sharing Organic orchard management strategies. Farmers appreciated inclusion in farm resilience research, and that researchers are interested in helping to identify (and pursue) solutions.

- **Long-term (potential change in economic/environmental/social situations)**

The long-term goal of this project is to inform resource allocation and land use decisions that affect both immediate and long term farm viability. Our objectives are to document the problems facing small and mid-sized commercial food producers; to help ensure that farmer needs and aspirations are addressed in local food system development strategies; and to support farmland protection for the long-term. The research questions align with the Food System Council (2013) and Clark Conservation District (CCD) strategic planⁱⁱⁱ goals to enhance the sustainability and capacity of local food production agriculture. Initial data gathering and informational presentations were utilized by agricultural-food systems stakeholders for input to the County's 2016 Comprehensive Growth Plan update, which plans for 20 years into the future and is updated every 10 years. The Food System Council and associated leaders request our ongoing participation. Furthermore, this project identifies future research needed to inform the implementation of solutions and foster collaboration across technical, educational, economic, and policy sectors.

Additional Funding Applied For / Secured

- **Most Recent Grant Proposals**

Rejected

1. Ostrom, M. and J. Wait. *Participatory Evaluation and Education on the Risks and Benefits of Alternative Markets with Diversified Vegetable Producers*. Proposal submitted Nov. 17, 2014, to the Extension Risk Management Education's Western Center (WSU) \$49,962.

Secured by Graduate Student:

1. Wait, Judith. *Resilience of Small-Scale Food Farming in Urbanizing Regions*. Anne and Russ Fuller Fellowship for Interdisciplinary Research/Scholarship award of \$4,000 for 2015. Second year renewal application pending for 2016.
2. Northwest Cooperative Development Center (NWCDC) was awarded a 2015 grant to support outreach for "Cooperative Education And Business Basics For Small Socially Disadvantaged [rural] Producers." that included funding for collaborating with our community partners in SW Washington.

Secured by PI:

3. Peterson, H.; Feenstra, G; Hardesty, S; Ostrom, M; Tanaka, K, “Impacts of Values-Based Supply Chains on Small and Medium-Sized Farms,” proposal submitted to USDA AFRI NIFA through Kansas State University (2014-2016) \$500,000.
4. Moulton, C, Collins, D., Ostrom, M., and Jose Garcia-Pabon. “Farm Business Management Educational Program for Washington State,” USDA Risk Management Agency, RME Program (2013-2014), \$96,613, included funding, curriculum, and coordination for Cultivating Success farmer educational program in Clark County.

• **Future Funding Possibilities**

Program development with producers, community partners, advisors, economists, Clark County Extension agents, and the Conservation District continues to be a possibility, but requires a high capacity applicant.

1. USDA NIFA Community Food Projects Competitive Grants Program: Clark County collaborators identified the need for an overall agricultural-food system assessment and an inclusive process featuring community forums.
2. Western SARE: We have established partnerships with primary producer-cooperators and a professional agricultural advisor in order to consider a future project.
3. The Conservation Innovation Grants (CIG): Funded through Natural Resource Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP) is applicable to producer and agency biodiversity improvement goals and project effectiveness monitoring

Graduate student funded

The budget supported Judith Wait’s Research Assistant (RA) position, October 2013 through May, 2015, as well as hourly work in the summers of 2014 and 2015. Additional funding from other sources helped with farmer honoraria and expenses.

Recommendations for Future Research

This BIOAg project contributed to research recommended by Kate Clancy (2013) and the National Research Council (2010) in the following ways: We collected empirical data that will contribute to the national understanding of the requirements for viable local farming systems and we pioneered a model for place-based, participatory on-farm research that can be applied to other regions. This resilience-focused “transdisciplinary food systems research” (Clancy, 2013; National Research Council, 2010) similarly encountered the urgent need for better farmland preservation, a policy context considered adverse by farmers and their supporters, and calls for (re)building adequate processing and market infrastructure. More support is needed to meet multi-stakeholder goals to improve food security based on locally grown food. Across multiple disciplines, participatory research, in-depth agronomic technical assistance, and farmer support networks could be inter-linked to form a greatly needed social infrastructure model. In addition, guidance could be adopted from models in a watershed in Oregon (Flitcroft, Dedrick, Smith, Thieman, & Bolte, 2009), and a Virginia-based land grant university (Kimmel, Hull, Stephenson, Robertson, & Cowgill, 2012).

This project was a useful first step in our regional context and is expected to continue to help stimulate the pursuit of solutions by farmers, agencies, relevant stakeholders, and interested

citizens. However, based on the lack of reliable data on the agricultural sector, and food production in particular, more in-depth research recommended by economists would include a farm-by-farm “census” of all farming operations. Such research could tie in with the crop surveys done periodically by the Conservation District for the Washington Dept. of Agriculture.

In addition, future research and education funding is recommended to implement the Market Channel Assessment Tool (MCAT) in Clark County. MCAT is a risk management strategy for farms to evaluate the effectiveness of their market outlets in terms of labor, expenses, and income associated with activities from harvest to sales in order to optimize decision-making (M. N. LeRoux, Schmit, Roth, & Streeter, 2009).

The FRAT results add farmers’ recommendations and specificity to future project considerations. Recently, a list of thirteen project ideas from seven agri-food leaders was compiled by Leadership Clark County. A needs assessment, community forum, and planning report were on the list. Among the top challenges faced by farmers are access to affordable farmland, lack of public support, lack of market access. The FRAT results confirmed these findings. In the context of this BIOAg grant, we looked for funding to implement such recommendations for associated projects with community partners.

Research on former farms is an important area for future research on farm resilience. A greater understanding of why farms fail could allow more strategic prioritization of assistance. At least eight farms targeted for participation in this research ceased or greatly diminished operations in the last several years. New farm operations have started, but five retail-to-consumer marketing outlets that carried local produce are no longer operating, including the Uptown Urban Farmers’ Market. Eleven farms interviewed for this project have stopped participation in one or more Farmers’ Markets over their history.

With farms and farmers at the center of this research to identify farm vulnerabilities, we have documented strategies important for retention and enhancement of food production capacity. Ideally such strategies could be used to inform policy and incorporated into integrated education, Extension programs, and a long-term research agenda. Integrated programs could contribute to market strategy improvements for farmers and market channels. Results of this BIOAg grant could be included in a stakeholder-recommended comprehensive food system assessment and agricultural strategic plan.

*Please see also the attached Technical Report mentioned in Stage 4 above.

References

- Altieri, M. A., Nicholls, C. I., Henao, A., & Lana, M. A. (2015). Agroecology and the design of climate change-resilient farms. *Agron. Sustain. Dev.*
- American Farmland Trust. (2007). What's Happening to our Farmland? *National Resources Inventory report statistics*. <http://www.farmland.org/resources/fote/default.asp>
- Cabell, J. F., & Oelofse, M. (2012). An indicator framework for assessing agroecosystem resilience. *Ecology and Society*, 17((1): 18).
- Clancy, K. (2013). Digging Deeper: Bringing a Systems Approach to Food Systems High-priority Research Approaches for Transforming U.S. Food Systems. 3(4), 5-7.
- Clark County Food System Council. (2012). Policy Roadmap for Clark County's Food System: Strategies for Change.
- Clark County Food System Council. (2013). Promoting Agricultural Food Production in Clark County.
- Flitcroft, R. L., Dedrick, D. C., Smith, C. L., Thieman, C. A., & Bolte, J. P. (2009). Social infrastructure to integrate science and practice: the experience of the Long Tom Watershed Council. *Ecology and Society*, 14(2), 36.
- Gerrard, C. L., Smith, L. G., Pearce, B., Padel, S., Hitchings, R., Measures, M., & Cooper, N. (2012). Public Goods and Farming. In E. Lichtfouse, Editor. (Ed.), *IN: Farming for food and water security* Dordrecht; New York: Springer.
- Gliessman, S. R. (2015). *Agroecology: the ecology of sustainable food systems*: CRC Press.
- Guthman, J. (2014). *Agrarian Dreams: The Paradox of Organic Farming in California* (Second ed.): Berkeley: University of California Press; ISBN 9780520959132.
- Kimmel, C. E., Hull, R. B., Stephenson, M. O., Robertson, D. P., & Cowgill, K. H. (2012). Building community capacity and social infrastructure through landcare: a case study of land grant engagement. *Higher Education*, 64(2), 223-235. doi: 10.1007/s10734-011-9489-9
- LeRoux, M., & Schmit, T. M. (2011). Marketing Channel Assessment Tool (MCAT) Version 2.0.2 Summary Description & Instructions for Use: Cornell University.
- LeRoux, M. N., Schmit, T. M., Roth, M., & Streeter, D. H. (2009). Evaluating Marketing Channel Options for Small-Scale Fruit and Vegetable Producers: Case Study Evidence from Central New York *Dept. of Applied Economics and Management, College of Agriculture and Life Sciences*: Cornell University.
- Milestad, R., & Darnhofer, I. (2003). Building Farm Resilience: The Prospects and Challenges of Organic Farming. *Journal of Sustainable Agriculture*, 22(3), 81-97.
- National Research Council. (2010). *Toward Sustainable Agricultural Systems in the 21st Century* T. N. Academies (Ed.)
- Nicholls, C. I., Altieri, M. A., Dezanet, A., Lana, M., Feistauer, D., & Ouriques, M. (2004). A rapid, farmer-friendly agroecological method to estimate soil quality and crop health in vineyard systems. *Biodynamics*, 33-39.

ⁱ LeRoux, Matthew; unpublished reports; personal communications in person and emails, Nov. 2014-Feb. 2015

ⁱⁱ The slides for the presentation are available at <http://www.clark.wa.gov/thegrid/documents/WSUeditedver3.pdf> and the recorded session is found at <http://clark.wa.gov/thegrid/052715CMB.MP3>

ⁱⁱⁱ <http://www.clarkcd.org/publication/>