Building Collaborative Research and Extension Networks to Advance the Conduct and Application of Science with Urban Communities

Non-Technical Summary

The land-grant university (LGU) system was developed when most U.S. residents lived in rural areas. Since the passage of the 1887 Hatch and 1914 Smith Lever Acts, an overwhelming majority of our population has relocated to metropolitan centers. While the mission of the LGU system has not changed, the system must update the methods, topics and questions of our research and Extension units to deliver on that mission in the 21st century

To support urban research and implementation, this project will:

1. Build and facilitate 3 urban research and extension communities of practice in:
    1. Urban Agriculture and Food Systems
    2. Nutrition, Health, and Wellness
    3. Built Environment
2. Develop and maintain an Urban Data Hub that a) includes a map room with thousands of mappable data layers and the capacity for uploading local data sets, allowing researchers to explore and visualize data to support research teams, and b) assembles, stores, and distributes materials, resources, and information related to urban research activities and priorities.
3. Provide professional development training for LGU professionals in collaborative, basic, applied and community-based research with urban communities.

This project will support researchers, Extension professionals, community practitioners, and metropolitan leaders by reinforcing productive connections between public, land-grant universities and urban communities. Housed within the National Urban Research and Extension Center (NUREC), this project will leverage NUREC's local and multistate connections to Extension to advance the discovery, co-creation and application of knowledge.

Statement of Issues and Justification

This NRSP supports best practices for conducting research in urban communities. It is rooted in the fundamental mission of the LGU system and the integration of research and Extension to advance science and support diverse communities. A defining characteristic of urban communities is density. Systems related to food production, safety and consumption; human physical, emotional, and mental health; the natural environment and the ecosystems services it provides; and the built environment exist in close proximity resulting in a multitude of complex, social and ecological relationships over space and time.

Designing and conducting effective research programs in these complex urban environments requires an ecological systems perspective that is informed by mutually beneficial collaborations with urban communities. These concepts have only recently become part of the preparation and training of

university researchers and their students. As increasing numbers of students and scientists desire to work in urban settings and with urban audiences, they may encounter significant barriers and may require new insights and skills to engage in this work with maximum effectiveness

This NRSP supports high quality, sustained programs of urban-based research and Extension where it is important to understand and address the following regardless of discipline or research question:

- The complex political and jurisdictional boundaries of urban areas.
- Racial, ethnic and cultural diversity and associated language, social, political, cultural and economic factors must be considered in all research projects if we expect adoption of findings.
- The accurate characterization of when research is "extractive", in which communities have participated in investigations that advance institutional or individual academic goals but do little to support or enrich their communities.
- The expectation among communities (individuals and governments) that they are collaborators in the research process, not just research subjects or recipients of results.

The National Institutes of Health understand the importance and complexity of this work with their emphasis on community-based participatory research (CBPR). The National Science Foundation contracts with the Toolbox Dialogue Initiative to provide training and support in team-based, translational research. The USDA is just beginning to provide some training on these issues.

This NRSP will facilitate high quality urban research by supporting and better preparing researchers to understand and navigate the complexities of conducting research in urban areas. We will do this by:

1. Supporting the development of research and Extension communities of practice, in which scientists; Extension professionals; federal, state, local and tribal government agencies; urban institutes; non-governmental organizations; non-profit organizations; and community. organizations co-develop research and related Extension programs across the urban landscape. As of September 2024, 21 SAES and other researchers, Extension professionals from 9 LGU representing Northeast, North Central, Southern, and Western regions have indicated their interest in one or more of the community of practice areas.
2. Developing and maintaining an Urban Data Hub, consisting of an urban mapping database and interface as well as a research description repository, that will support urban researchers by providing a point of entry to geo-spatial data layers that enhance community understanding and inform development of research questions.
3. Providing professional development training for LGU faculty and professionals in how to conduct team-based, mutually beneficial, research and Extension initiatives with urban communities.

Prerequisite Criteria

How is the NRSP consistent with the mission

While the mission of the LGU has not changed since its founding, the 21st century nation we serve has. The LGU system was developed when an overwhelming majority of residents resided in rural communities. Currently over 80% of the nation's population live in urban areas and tend to be older [1] and with a higher degree of ethnic and racial diversity [2] [3] [4].

The complexity of urban processes and interactions over space and time make it difficult for communities to understand and predict future outcomes and adapt. This is particularly true for urban systems, because they represent a multitude of complex social and ecological relationships. "However,

the science is yet nascent on how to guide … emerging social, technological, and infrastructural innovations occurring in urban areas" [5, p. 5]. In social-ecological systems (SES) such as these, it is often difficult to determine how a change, or shock (e.g., policy change, earthquake, etc.), will impact different processes within, or components of, the system. The inability to identify obvious relationships between cause and effect makes it difficult to determine when changes may lead to unintended or undesirable consequences. Systems Thinking (ST) and Resilience Thinking (RT) approaches offer intuitive, structured frameworks for conceptualizing the complex behavior of a system to help people visualize and understand how environmental processes, human decisions, and other urban functions interact to create change. ST and RT are incorporated in several system-based frameworks: social-ecological systems - systems in which the social and natural elements interact [6]; sustainability transitions research - focused on the challenge of promoting and governing transitions towards sustainability, primarily in socio-technical systems [7]; and social, ecological, and technological systems - focusing on the complex SES processes that interact with infrastructure [7].

Systems Thinking (ST) Approach

ST approaches can easily be employed with community members to identify and integrate individuals' understanding of the system in the form of conceptual maps. These maps can begin as sets of simple, causal relationships but can then be nested to represent more complex system behavior, allowing teams to integrate many different perspectives, knowledges, and understandings of the system into a holistic model.

Resilience Thinking (RT) Approach

RT approaches represent a broader body of knowledge on how complex SES persist, adapt, or transform in the face of disturbances. SES represent a multitude of social, economic, cultural, political, ecological, and biophysical processes and relationships. Interactions between these different system components can be direct or indirect and often manifest as non-linear, cross-scalar changes to the system, making these systems difficult to predict and manage. As such, system shocks can have significant, negative, unanticipated impacts. RT seeks to steer us away from assuming that complex systems can be broken into linear, predictable components, and instead focuses on understanding system feedbacks and patterns that better account for the complex relationships that make up SES. Through RT, communities are better able to identify barriers and leverage points at the system scale and explore how changes to system dynamics redirect future outcomes. In doing so, communities develop a better understanding of what factors contribute to system (in)stability and how through their goals or choices they can navigate their system toward more resilient futures.

Given these complex urban systems, researchers need: a) access to underlying data sets that allow them to understand (and visualize) the current system; b) awareness of past and current research efforts and data; c) the skills, confidence, and support to participate in CBPR including pragmatic, quasi-experimental, and mixed methods studies along with team and translational science; and d) access to a research and extension community of practice. Therefore, NRSP-12 will focus on three core activities:

1. Build and facilitate research and Extension **communities of practice** to galvanize interest, facilitate communication, disseminate successful models and support collaborative multi-site, regional or national programs across 3 interrelated urban issue areas:
    a. Urban Agriculture and Food Systems
    b. Nutrition, Health, and Wellness
    c. Built Environment

2. Develop and maintain an **Urban Data Hub,** consisting of an urban mapping database and interface as well as an urban research repository, to support urban researchers.
3. Provide **professional development** training for scientists, graduate students, post-docs, Extension professionals and community members in ST, RT, and how to conduct collaborative, community-based participatory research.

Building Research and Extension Communities of Practice

This NRSP will fund a Program Leader for each of the 3 issue areas identified above who will be responsible for creating and cultivating:

- A **collaborative framework** for scientists; Extension professionals; federal, state, local and tribal government agencies; urban institutes; non-governmental organizations; non-profit organizations; and community organizations to co-develop research and related Extension programs across the urban landscape.
- **Research and Extension Communities of Practice** that will support the development, implementation and evaluation of a research and Extension initiatives; support teams in identifying, applying, and securing funding from various sources, including state Experiment Station and Extension Directors, Hatch and Hatch multi-state Research Project (RAs,) competitive grants, philanthropic foundations, and private industry; and engage with stakeholders to ensure alignment between research programs, community needs, and extension efforts.
- A **sustainability plan** to support ongoing collaboration and mutual benefit for all stakeholders and participants

Urban Data Hub

We will develop an Urban Data Hub, consisting of an urban mapping database and interface (UMDI) as well as an urban research repository (URR), to support urban research teams. The mapping component will be based on established University of Missouri tools and practices and will leverage an existing repository of thousands of mappable data layers (https://careshq.org/map-room/). Users will be able to define customized geographic boundaries for urban areas, create custom reports and data visualizations, and integrate local data sets into the mapping database. The research description repository will support the collection, storage, and distribution of information and empirical data related to research results, needs assessment and impact. A secure portal will be developed allowing LGU researchers to submit standardized information regarding their research and related extension activities. This data will support a search and visualization interface allowing the identification of existing partnerships and potential research and extension connections between faculty and institutions. Online support materials as well as training opportunities will be provided to users of the system.

Professional Development Training

We will provide support for multidisciplinary teams of experts to conduct basic, complex, transdisciplinary, applied and community-engaged research. Approaching professional development in this context requires sensitivity to collaboration dynamics and team norms [7] [8]. It is also critical to think *holistically* about urban systems and to understand the history, culture and prior experiences urban audiences have had with university researchers. Therefore, our approach to professional development emphasizes team science and community engagement to leverage differences and create research-based collaborations that address complex problems that are more than the sum of their parts.

Our initial menu of professional development activities includes capacity-building workshops, wayfinder workshops, early-career development resources, webinar series, office hours, community of practice roundtables, collaboration agreement development workshops, and train-the-trainer workshops (details provided in Table 1, attached). We will offer the capacity-building workshops and monthly office hours annually and will annually offer two to three additional activities (e.g., the wayfinder workshop) depending on community needs. We will evaluate the activities and products we deliver and assess the needs of our stakeholders on a regular basis using quantitative and qualitative measures and will coordinate with the project evaluator to maximize collaboration and engagement with the stakeholder community.

Table 1. Initial menu of professional development activities to be offered by NRSP-12.

Activity	**Description**	**Duration**	**Targeted stakeholders**
Capacity-building workshops	Designed to increase shared understanding in heterogeneous teams and make it easier to establish collaborations among groups with different experiences, goals, cultures and values.	2-3 hours, offered monthly	Teams of stakeholders
Wayfinder workshops	Designed to build skills for collaboration between researchers and community partners in ST and RT.	3 days	Researchers, community members
Early-career development	Resources to help early-career researchers and practitioners learn about career paths, share experiences, and build social networks.	1-2 days	Early career researchers and practitioners
Webinar series	A nationally offered webinar series supporting research related to the themes of this NRSP. We would invite suggestions of topics and presenters from the stakeholder community. Webinar recordings would be made available for viewing by the community.	60-90 min, 3 or 4 annually	All
Office hours	The professional development team would organize a monthly office hour to which all stakeholders would be invited. We would schedule this hour in two 30-minute blocks and invite individuals and teams to sign up with a description of the issue they would like to discuss. This could lead to additional support meetings on an as-needed basis.	One hour per month	All
Community of practice roundtables	Roundtables would emerge from and be built into the NRSP research and extension communities of practice — learning from each other in ways that leverage experience within different urban contexts.	60-90 min, 3 or 4 annually	All
Collaboration agreement	Create templates to help stakeholders develop collaboration agreements. These formal	2-3 hours	Stakeholder teams

development workshops	agreements specify the vision, norms, expectations and responsibilities among collaborators.		
Train-the-trainer workshops	All activities described above will be facilitated by the core professional development team. As needed, we may expand capacity for delivering these activities to include additional project leaders and team members. We will conduct train-the-trainer workshops and design these on an ad hoc basis to meet project needs.	Variable	Project leadership

How does the NRSP pertain to a national issue?

The USDA Economic Research Service's Rural-Urban Continuum Codes (RUCC) classify U.S. metropolitan counties by the population size of their metropolitan area and rural counties by their degree of urbanization and adjacency to a metropolitan area. Between Code 1 (most urban) to Code 9 (most rural) communities gradually transition across the two extremes. Data from the RUCC codes help illustrate that while highly urban and highly rural areas are distinct, there are strong connections and interdependence across the entire urban-rural continuum, however urban areas exert an outsized influence on the entire continuum. U.S. urban centers account for nearly 80% of the nation's population and generate nearly 85% of the national Gross Domestic Product [8], yet only occupy approximately 5% of the land surface [9]. Additionally, urban issues can soon become rural issues. The world's 50 largest cities draw water from watersheds that cover over 40% of the world's land surface [10]. These "large transboundary flows of people, natural resources, goods and services (including multiple essential infrastructures and food supply), information, innovation, waste, and population … yield a new conceptualization of urban systems as multiscale, interdependent social, natural and engineered systems that impact human and planetary well-being across spatial (local to global) and temporal scales." [5, p. 4].

The scale, diversity, and complexity of urban areas require different approaches to problem solving to a degree that makes urban-based research a distinct area of scientific enquiry [11] [12]. For example, one's lifestyle, environment, and genetics [13] are established primary determinants of health, but one's zip code is the most significant predictor of overall health outcomes and life expectancy [14]. BIPOC and chronically under-resourced urban communities reside within many of the most impacted zip codes.

While urban and rural areas may share challenges, and potentially root causes, of issues related to food security, production and distribution, they often do not share solutions. The Extension Committee on Organization and Policy (ECOP) recognized this issue and recently established an Urban Agriculture and Food Systems Program Action Team to focus system wide investments and opportunities related to all aspects of food in our metropolitan regions, including food waste management. The National Urban Research and Extension Center (NUREC; http://nurec.extension.org), original formed in 2015 as the Western Center for Metropolitan Extension and Research (WCMER; http://metroextension.wsu.edu), was established to support developing the research base for urban Extension programs and provide a new model for the role of the land-grant university in urban communities [11].

In July 2024, NUREC convened 43 individuals (9 representing federal agencies, 4 from local governments, 15 from non-profits/membership organizations, 14 from 6 land-grant universities, and 1

from a non-land-grant urban serving university) over 1.5 days to address research needs and aspirations across the issue areas of: 1) urban agriculture and food systems, 2) health and wellness, and 3) the built environment. Participants self-selected into one of the issue areas groups and developed short-, medium, and long-term outcomes that were further classified based on importance, feasibility, impact and potential for successful program development. Outcomes from this workshop included (see attachment *NUREC co-convening summary* for more details):

- Urban agriculture and food systems: Recognized that food systems are part of a community and are inherently place based; therefore, solutions and production must focus on local needs and downscale from large/rural agriculture to small/urban production systems. Opportunities exist to reimagine the built environment by repurposing buildings for Controlled Environment Agriculture (CEA). They recognized that land access and the ability to measure factors such as increased food access are issues to overcome. The team identified 21 research priorities and 9 educational/Extension programs. They enumerated 28 short-, medium-, and long-term outcomes distributed across moon shots (9), best bets (8), low-hanging fruit (9), and low priority (2).

- Health and wellness: Recognized the need to create and strengthen systems, networks, and policies that improve the health, wellness, and economic opportunities of individuals and families living in urban spaces. They identified several connections among health and wellness, the built environment and agriculture and food system sectors. The team identified 8 research priorities and 6 educational/Extension programs. They enumerated 31 short-, medium-, and long-term outcomes distributed across moon shots (10), best bets (10) low-hanging fruit (8) and low priority (3).

- Built environment: Identified a core issue of balancing land access with gentrification anxiety. The team identified 30 research priorities and 35 educational/Extension programs. They enumerated 90 short-, medium-, and long-term outcomes distributed across moon shots (30), best bets (39), and low-hanging fruit (21). This group saw a near-term value in building a database of best practices with partners (APLU, NLC, NUREC, ITGA, ICMA) and to curate existing examples and shared metrics.

- Additional cross-cutting observations included: Issues related to economic and workforce development; impacts of climate change; equal access to resources (health, jobs, green space, etc.); the need to identify and curate existing resources (e.g. strategic plans and best practices for urban communities and research based priorities including return on investments and benefits to people, health, economy, environment); development of metrics; and aggregation of data across cities; and the need for programs and policies to be both place-based and support the local context.

This convening built on several previous activities NUREC has undertaken to document and initiate the establishment of a national urban research agenda, including:

Urban Green Infrastructure (GI): In early 2018, WCMER hosted a summit to connect scientists, Extension professionals, practitioners, and community leaders (https://metroextension.wsu.edu/gisummit/). Key findings included an identified lack of communication and coordination across academic disciplines and agency departments that

oversee siting and installation; viewing GI as an acceptable alternative to more traditional approaches; taking a landscape scale perspective versus project-by-project; and the externalization of environmental costs [14].

Sustainable Urban Systems: In 2019, funded by a National Science Foundation (NSF) grant, NUREC convened a select group of 40 scientists and practitioners across an array of disciplines, sectors, and locations to:

- identify the key challenges megapolitan regions (regions comprised of several large cities and their outer-lying areas) and their adjacent communities and natural spaces face as urbanization continues,
- explore approaches used in megapolitan regions to address these challenges, and
- synthesize this information to identify priority research areas that a network or team could promote for improving urban systems sustainability.

(https://metroextension.wsu.edu/sustainable-urban-systems/)

Urban, Indoor, and Emerging Agriculture: During May 2020, WCMER, in conjunction with National Urban Extension Leaders (NUEL) and several urban Farm Bureau county organizations, conducted 4 on-line listening sessions. The goal was to solicit, collect and organize input from a broad group of stakeholders in response to a request from the National Institute of Food and Agriculture (NIFA) about the Urban, Indoor and other Emerging Agricultural Production Research, Education and Extension Initiative (see https://metroextension.wsu.edu/urban-agriculture-listening-sessions/ for input received).

Across these engagement activities, local decision makers and community members made key contributions that illustrated the critical importance of place-based knowledge and the role it plays in addressing urban challenges. Local participants also expressed a desire to be active members in the development of research questions, the conduct of research, and understanding the results and how to apply them to improve the wellbeing of their communities. These activities illustrate that co-creation with communities from the initial stages of a project, including grant writing, are essential to success and that Extension is well positioned to support these efforts in collaboration with researchers.

Rationale

Priority Established by ESCOP/ESS

NRSP-12 will support research, connect research to Extension, and collaborate with community stakeholders to address priorities articulated by ESCOP. Below we articulate research issues informed by stakeholder engagement activities NUREC has led or co-led, including:

- Promoting Urban Food, Energy and Water Resource Resilience via the Regional Food System (https://metrocenter.wsu.edu/metrofew/). This summit convened a cross section of stakeholders including researchers, Extension professionals, urban food producers and policy makers to understand how food, energy, and water are interdependent in the context of changing environmental pressures and policies, using the Seattle metropolitan area as a case study. Issues addressed at the summit were based on information learned from 27 key-informant interviews [15].

- The July 2024 convening (described in How does the NRSP pertain to a national issue). In addition to the convening, NUREC solicited prospectuses from LGU research and Extension professionals on key research questions within their domains and the 3 issue areas. Sixteen LGU research and Extension faculty contributed individually or as a team to 5 prospectuses [16] [17] [18] [19] [20].

- During May 2020, WCMER, in conjunction with NUEL and several urban Farm Bureau county organizations, conducted 4 on-line listening sessions (see How does the NRSP pertain to a national issue?).

NRSP-12 will support research programs to advance knowledge and solutions aligned with four of the Grand Challenges (GC) listed in "*A Science Roadmap for Food and Agriculture"* [13]:

GC1 We must enhance the sustainability, competitiveness, and profitability of U.S. food and agricultural systems.

- How can Controlled Environment Agriculture (CEA) become economically profitable, environmentally sustainable and support social outcomes like improved access to quality food?
- How can we expand local food production in urban areas and extend the seasonal availability of fresh, local produce?
- How do we optimize urban agricultural land use, selection, protection and conservation (including soil health)?
- What are, and how do we overcome, the barriers of entry for new urban farmers (many who are younger, more likely to be female, and come from BIPOC communities?
- How can urban agriculture be integrated with urban development?
- How do we develop urban animal production systems that are economically viable, environmentally sustainable, and socially and culturally appropriate?

GC2 We must adapt to and mitigate the impacts of climate change on food, feed, fiber, and fuel systems in the United States.

- What role does urban agriculture play in mitigating impacts of climate change such as heat islands and air quality?
- How can agriculture systems be integrated with urban construction and retrofitting to facilitate food production and conserve resources?
- How can we increase our understanding of urban ecology and ecosystems, urban food production and climate adaptation?

GC5 We must improve human health, nutrition, and wellness of the U.S. population. Research programs aligned with this challenge would advance knowledge and solutions related to the following

- What are potential unintentional negative effects of urban agriculture on the environment, animals, and human health?
- What are the risks associated with large concentrations of urban air pollutants and / or urban soil contaminants on human health exposure through urban food production?
- What are the underlying conditions and health impacts of synanthropic and invasive pests in urban centers?
- What are the specific mental health risks associated with urban environments and populations?
- What is the relationship between food insecurity and mental health?

- What are the collective features and impacts of dietary patterns along with food access and physiological factors in urban environments?
- What are the impacts of successful produce prescription programs on chronic disease-related outcomes and are these programs cost-effective?
- What are the impacts of free school meals on urban communities across varying SES dimensions? Do supplemental interventions (e.g., school gardens, school wellness policies) differentially impact health-related outcomes among youth?
- How do nature-based (e.g., park prescription, built environment change) programs influence mental and physical health outcomes? What are the gaps and innovations?
- What are the challenges and solutions for addressing food and nutrition security, particularly those at greatest risk such as low-income families and seniors [20]?
- How can digital health technologies be leveraged in urban settings to reduce health disparities?
- What are successful approaches for facilitating nature access for marginalized communities in urban areas. Can outdoor recreation promote resiliency to chronic stress in marginalized communities in urban areas?
- What are and how do you measure the social benefits (e.g. fostering a sense of belonging for community members) associated with urban agriculture programs?

GC6 We must heighten environmental stewardship through the development of sustainable management practices.

- What are the water and energy sector implications of increasing the amount of food that is sourced in urban areas versus importing food to meet urban demand?
- What is the impact of expanding water access and usage for urban food production on municipal use, hydropower generation, and in-stream ecosystem flows? How would a model of FEW resource interdependencies support decision-makers in crafting scientifically informed policies to incentivize local versus imported food, energy and water production and use?

In addition to addressing grand challenges, NRSP-12 activities support core elements and strategies of "*Healthy Food Systems, Healthy People"* [21]:

- Systems Thinking: Realign the research, [extension], and education approaches using a "systems thinking" model to remove barriers, incentivize the formation of interdisciplinary partnerships among various entities (i.e., academia, industry, federal and state governments and health care).
- Policy, Systems, and Environment (PSE): Identify the main policy, systems, and environmental drivers of consumer behavior in relation to chronic diseases; and understand the drivers' inter-connectedness in terms of food consumption decisions and how that information can be used to influence better decisions.
- Chronic Disease: There is a somewhat recent shift from acute and infectious disease to chronic and non-communicable diseases. …. Individuals, families and communities that have systematically experienced social and economic disadvantages face greater obstacles to optimal health.
- Underserved Communities: matters of food, nutrition and diet-related chronic disease are an extremely high priority for many minority and high-risk populations…; unfortunately, dietetics programs on university campuses usually have very little representation from within these communities.

along with guiding principles identified in the *National Climate Change Roadmap* [22]

- Systems-based innovations**:** Cultivate and advance systems-based innovations and approaches that bridge biophysical and socioeconomic disciplines to build system resiliency to climate change.
- Participatory research processes: Co-create a science continuum that bridges fundamental research to producer knowledge, practice, and experience and incorporates principles of environmental and social justice.
- Socioeconomic and policy research: Develop and evaluate models that assess impacts of markets, consumption patterns, socioeconomic conditions, and food systems on human well-being under a changing climate.
- Equity and justice: Ensure that climate actions do not unfairly burden marginalized communities and rectify historical environmental injustices by fairly distributing both benefits and burdens.
- Policy relevance: Align climate initiatives and policy objectives to maximize resources and outcomes.
- Contextual considerations: Recognize diverse social and economic factors that affect communities and emphasize tailored solutions that consider cultural practices, socioeconomic conditions, and values.
- Co-production with end-users: Involve end-users in decision-making processes to ensure that climate actions meet their needs and preferences.
- Systems-thinking: Study climate change comprehensively by examining interconnected systems (e.g., ecosystems, economies, societies) to identify
- User-centered: Design user-friendly, accessible policies, technologies, and interventions that prioritize human needs, values, and behaviors in addressing climate change.

Relevance to Stakeholders

This NRSP will be housed within the National Urban Research and Extension Center (NUREC), which evolved from the Western Center for Metropolitan Extension and Research (WCMER) formed in 2015. NUREC is a nationwide, collaborative membership-based organization for land-grant universities that facilitates the co-creation and application of knowledge; enabling urban communities to improve their health and wellbeing, achieve equitable economic growth, and steward their natural environments – delivering on the land-grant mission for urban residents, communities and the organizations that support them.

To address our nation's urban challenges, NUREC bridges the gap between researchers and communities by applying the unparalleled power and reach of the land-grant university system, rooted in Extension's community-centered approach (see Figure 1 in attachments). NUREC is an issue and innovation leader for both the LGU system and external stakeholders – a place where new knowledge is generated; existing knowledge is applied to novel or place-based issues; and policies and programs are developed, piloted, refined, expanded, evaluated, and updated for local to national impact. NUREC accomplishes this in collaboration with external stakeholders and by leveraging strong partnerships with existing Extension organizations (e.g. National Urban Extension Leaders and the Extension Foundation).

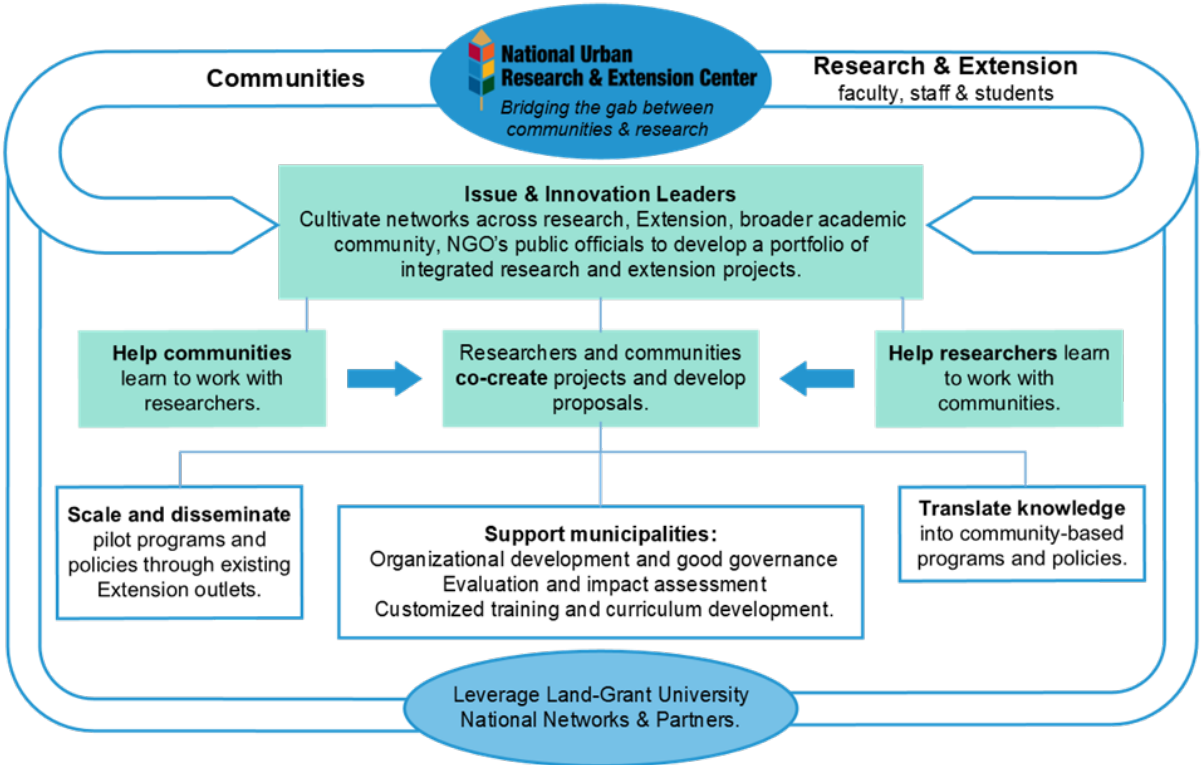

Figure 1. Visual representation of the National Urban Research and Extension Center's mission and unique value.

Utilizing this established framework and model, stakeholders who will both help develop and benefit from this NRSP include:

- Scientists at LGU and Urban Serving Universities.
- Leaders in the nation's urban communities, including national organizations such as:
    - National League of Cities (NLC), including the Large Cities Caucus, the 1st-tier Suburbs Caucus and NLC's Director of Research.
    - Large Urban County Caucus (LUCC) of the National Association of Counties (NACo).
- Extension Leadership nationwide – including existing Program Action Teams of Climate Mitigation, Resiliency, and Adaption; Economic and Workforce Development; Health Equity & Well-Being; and providing leadership for the Urban Agriculture and Food Systems.
- Urban Extension professionals directly and networks of Extension professionals including:
    - The National Urban Extension Leaders (NUEL) network.
    - The Joint Council of Extension Professional (JCEP) Associations: ANREP - Assoc of Natural Resource Extension Professionals; NACAA - National Assoc of County Agricultural Agents; NACDEP - National Assoc of Community Development Extension Professionals; NAE4-HYDP - National Assoc of Extension 4-H Youth Development Professionals; and NEAFCS - National Extension Assoc of Family & Consumer Sciences and Extension Committee on Organization and Policy (ECOP) Program Action Teams (PATs).
    - Cross-disciplinary organizations, e.g., NECI (National Extension Climate Initiative) and EDEN (Extension Disaster Education Network).
- The Transformation Network, an NSF funded Sustainable Regional Systems Research Network, a partnership between eight Western U.S. universities with over 50 partner organizations representing Tribal partners, governmental and non-governmental organizations, public utilities, conservation districts, irrigation districts, and municipalities.

In 2024 NUREC engaged its network of research and Extension faculty to gauge interest in on-going participation across the three issue areas (urban agriculture and food systems, health and wellness, built environment). As of September 2024, 27 SAES and other researchers, Extension professionals, and other stakeholders have indicated their interest in one or more of the issue areas, serving as either:

- *Team Leader / Co-Leader.* These persons will serve in a leadership role for the team and will work collaboratively across teams to build synergies, shape, and sharpen research agendas, and share opportunities that advance the overall mission.
- *Core Members.* These persons will be the owners of the purposes, goals, and actions of the team, demonstrate its core values, fulfill its roles and responsibilities, and operate the team effectively in order to serve the team's clients and stakeholders.
- *Affiliate Members.* These persons are team members who have a particular interest in participating in one or more of the working groups to identify priorities, set specific team goals, and address opportunities or issues related to the working group's funding, research, communications, and development.
- *Information Members.* These persons are team members who want to receive and contribute information but are not active in the on-going workings of the team.

These teams will serve as the foundation of NRSP-12s research and extension communities of practice for each issue area. As part of NUREC's overall mission, these communities of practice will connect communities and researchers to identify and prioritize emerging issues and research efforts for collaborative problem solving and dissemination of results and products.

Implementation

Objectives

1. Create Integrated Research and Extension Communities of Practice - connecting scientists with urban stakeholders and constituents for the design and implementation of methods, procedures and practices that result in more successful research programs and more effective applications of research findings.
    a. Comment:
2. Develop and maintain an Urban Data Hub that will a) include a mapping function with thousands of data layers and the capacity for uploading local data sets, allowing researchers to explore and visualize data to support research teams, and b) assemble, store, and distribute results, methods, outcomes/indicators materials, resources, and information related to urban research activities and priorities.
    a. Comment: Training will be provided on how to use the mapping function along with development of customized tools for program leaders and scientists, including custom geographical boundaries for urban areas
    b. Comment:
3. Support the academic, professional and workforce development of scientists, graduate students, post-docs, and Extension professionals to conduct transformational, community-driven research in urban communities, including BIPOC and chronically under-resourced communities.
    a. Comment:

Projected Outcomes

A. A structured framework based on systems thinking and interdisciplinary team building for scientists; Extension professionals; federal, state, local and tribal government agencies; urban institutes; non-governmental organizations; non-profit organizations; and community organizations to co-create urban research and extension programs.
    a. Comment: This will include the development and updating of systems maps related to each of the issue areas.
    b. Using the Toolbox Dialogues and Wayfinding workshops we will provide a tailored framework that guides researchers in the process of conducting interdisciplinary research with community partners. Those participating in these activities will leave with a clear understanding of how to better identify complex urban challenges and integrate community needs into on-going research.

B. Researchers who are able to adeptly apply and train others in using the framework in different locations and for different research challenges.
    a. Comment: Through our broad set of professional development activities and our Train the Trainer workshops, we anticipate creating a national cohort of researchers who have participated in our research framework workshops to be able to instruct others in their research networks in how to help others use this framework.

C. Improved ability of professionals to conduct team science and community based, participatory research. Current and future scientific and Extension workforce will develop skills to conduct transdisciplinary research, authentically engage w/ BIPOC and marginalized communities, and the use of data in the co-creation, dissemination, and application of knowledge through applied research.
    a. Comment: Will provide professional development opportunities related to a continuum of team science from basic disciplinary based teams to translation / convergent research teams.
    b. Comment: This team has been supporting other funded projects for over five years to explore, identify, and develop conceptual and practical knowledge for guiding faculty and student researchers through the process of community-engaged research. This work has included a deep review of current best practices and recent insights from academic and grey literature, has supported workshops designed to share community engaged research experiences and glean lessons learned, and has worked with research teams to craft unique Community Engagement Plans to ensure research with communities has had adequate forethought given, and provides transparency for the communities engaged.
    c. Comment: **Tracking Tools:** Evaluations will be conducted following each training session to assess effectiveness and areas for improvement. We will design a strategy that is sensitive to the needs of the stakeholders and based on continuous improvement. We will begin with a menu of professional development options that will evolve over time in response to the needs of the stakeholders. The external evaluation conducted in year 3 will also evaluate outputs and outcomes related to this objective.

D. Generate integrated research and extension projects (including Hatch multi-state RA and ERAs; federal proposals; and privately supported.
    a. Comment: Will build off the Generating Research Opportunities Workshop (GROW) for Urban Agriculture Conference and offer these within each issue area.

E. Applied research projects and results will be shared with decision-makers at the local, county, state, and national levels.

    a. COMMENT: Tracking Tools: Output data such as scholarly products, policy documents, and presentations will be collected as part of the Data Hub for public access. The NRSP Advisory Committee will support assessing utilization and impact of materials within their networks. NUREC leadership will maintain close communication with stakeholders to evaluate the effectiveness of NRSP products. These data will be reviewed by NUREC leadership and project leads to access performance and develop plans to address any gaps. The external evaluation conducted in year 3 will also evaluate outputs and outcomes related to this objective

F. Applied research projects will be connected to urban Extension professionals (e.g. through the National Urban Extension Leaders (NUEL) network and ECOP PATs) to support adoption and implementation of research, including the development of programs, curricula, and scholarly products that state Extension programs can implement in their urban areas.
    a. COMMENT: **Tracking Tools** This type of data is already collected by NUREC. The NUREC director is an ex-officio member of the NUEL Steering Committee, and these data will be shared with NUEL to evaluate effectiveness of NUREC and how to address gaps in performance. The external evaluation conducted in year 3 will also evaluate outputs and outcomes related to this objective.
G. Urban Map Room: Develop and curate digital map room with thousands of mappable data layers and the capacity for uploading of local data sets.
    a. Comment: Training will be provided on how to use the tools along with development of customized tools for issue leaders and scientists, including custom geographical boundaries for urban areas, and custom indicator taxonomy along with 100 existing indicators.
    b. Comment: The web platform will track use of the map room for project evaluation.
H. Urban Research Repository: an easily accessible database that assembles, stores, and distributes materials, methods, resources, and information related to urban research activities and priorities.
    a. Tracking Tools: users of the repository will register (free of charge) to access the repository, allowing for tracking of users and the ability to measure use and impact.
I. A Web page and digital communications: We will develop a web presence for the NRSP within the existing NUREC web site (http://nurec.extension.org) for a single point of entry for the NRSP to access all training and products.
    a. Comment: Tracking Tools – A Customer Relationship Management (CRM) platform will be leveraged to track, display through dashboards, and advance stakeholder engagement.

Management, Budget, and Business Plan:

Management plan

This NRSP will be administered within the National Urban Research and Extension Center (NUREC), which was established (as the Western Center for Metropolitan Extension and Research) in 2015 by the Western Extension Directors Association and has been hosted by Washington State University since inception. This will allow integration with and leveraging of NURECs established research, Extension, and stakeholder connections. WSU currently provides fiscal administration of NUREC as well as overall organizational support for the Director (Brad Gaolach), operational management (Martha Aitken), an urban extension specialist and a project specialist. NRSP-12 will have access to WSU's resources such as communications hosting and document repositories.

NRSP-12's specific management plan will include:

Project Director (PD) is responsible for overseeing all aspects of the NRSP and its interface with NUREC, with a focus on developing the larger network of project partners (e.g. state, federal, and tribal government agencies, non-profit organizations, non-governmental organizations, community organizations, business, and trade groups). They will play a catalytic role in building interdisciplinary collaborations and networks and supporting program leaders. They will support the Advisory Committee in its evaluation and advisory functions for the NRSP. Dr. Brad Gaolach from Washington State University (WSU) and director of NUREC will serve as the PD for the NRSP.

Associate Director (AD) will work in close collaboration with the PD, providing oversight of the project, including network partnership development and advising across the project subgroups. Dr. Seguin-Fowler, whose expertise spans food, nutrition, and food environments as well as health, wellness, physical activity and built environments, will serve in this role. She has twenty-five years of experience working with federal, state, and local agencies as well as community-based organization partners and Extension educators from across the US. She is Director of the Healthy Living program within the Texas A&M Institute for Advancing Health through Agriculture, based at the Dallas AgriLife Research and Extension Center.

Project Operations Director (POD) will report directly to the PD and work to ensure successful operational and administrative collaboration amongst all project partners and subcontractors, including primary oversight over fiscal and contract matters related to the NRSP. They will work with the PD to help manage the projects, support evaluation plans, reports, and reporting timelines and address project needs as necessary. Martha Aitken from WSU will serve as the POD and serves in a similar role for NUREC.

Project Manager (PM) will support the PD and AD and urban program leaders in an administrative role. They will help plan meetings, project related travel, and scheduling of training and workshops. The person filling this role is TBD.

Operations Assistant (OA) will support the POD in an administrative role and will help interface with WSU process requirements. This position will be hired as needed to accommodate NRSP's growth. The person filling this role is TBD.

Program Leader (PL) Each program leader (3) will provide leadership within their issue area to support development of research projects consistent with the role of the NRSP. They will cultivate a research and extension community of practice and support the development of project teams through trainings and programs as part of the NRSP. They will help project teams connect to established or develop new Extension programming and workforce development opportunities.

Professional Development Team (PD) will be led by Michigan State University's Toolbox Dialogue Initiative (TDI) Center (https://tdi.msu.edu/) along with representatives from WSU's Center for Environmental Research, Education, and Outreach (CEREO; https://cereo.wsu.edu/). This team will be led by Dr. Edgar Cardenas, Associate Director of TDI Center, Dr. Michael O'Rourke, Executive Director of TDI Center, and Dr. Julie Padowski, Director of CEREO. TDI Center is a service center based at Michigan State University that facilitates and studies capacity building activities for heterogeneous teams of collaborators. They partner with programs at NSF, NASA, DOE, and multiple universities around the US.

Urban Data Hub (DH) will be developed by the University of Missouri (MU) Center for Applied Research and Engagement Systems (CARES) and led by CARES Director, Chris Barnett.

Communications & Marketing will support customer relationship management (CRM), provide communications externally about the NRSP as well as updates about progress, learnings, outputs, and outcomes from the projects. Internally, the communications work will connect the projects and the project leaders in Connect Extension or other national platforms to support collaboration and help setup and support a CRM for NUREC. They will determine what information is shared on websites and will take an active role in marketing the NRSP including the development of any print and social media materials as well NRSP communication pieces detailed below. This role will be provided by staff (TBD) from the Extension Foundation.

Advisory Committee (AC) will provide strategic guidance for the NRSP and be a bridge between national-scale insights Program Leader and their development of research projects and teams. The AC will meet annually with NRSP leadership and identify further action and /or communication needed to be shared with constituents and stakeholders. They will also provide a feedback loop to ESCOP, ECOP, and USDA. In addition to the AAs and NIFA representative, it will include representatives from research (Bret Hess, Executive Director AgInnovations – West); Extension (designee of the National Urban Extension Leaders); Extension Foundation (TBN); National League of Cities (Chistine Baker-Smith, Director of Research); National Association of Counties Large Urban County Caucus (TBN); and a representative from a non LGU urban serving university (Gregory Kienzel, Director, Data and Impact Measurement, University of Pittsburgh).

External Evaluation: We will employ an external evaluator (Dr. Teresa McCoy) throughout the project to measure the overall outcomes, successes, and challenges of the NRSP and identify areas for improvement. The approach for this project is developmental evaluation as defined by Patton [23] because this project involves a complex and emergent environment where variables “interact within a network of feedback loops that behave in non-linear ways” [24]. The development evaluation approach uses a learning framework along with the evaluation framework that “maps the key challenges and opportunities” and “sets direction for learning and project development” [24]

Both qualitative and quantitative data will be collected from primary and secondary sources using appropriate methods. The overall evaluation objectives for each year of the grant and some of the evaluation strategies that will be used are detailed in Table 2. Formative evaluation will be used to assess how activities are implemented and the achievement of outputs on a monthly basis. Data will be analyzed by a research assistant and findings will be shared with the project team to incorporate in process improvement. A dashboard will be created that will share project metrics in years one and two and the summative reviews in years three through five.

Table 2. Evaluation objectives, data sources, and collection strategies for each year of the project.

Year One: Develop Core teams, trainings, and data hub set up		
Broad Objectives:	**Data Source:**	**Data Collection Strategies:**
Identify and onboard initial core team members	Team members	Project team feedback surveys
Review and revise DC meeting outputs	Team Members	Secondary data—project artifacts

Attend NRSP trainings	Team Members	Pre- and post-testing of knowledge gain
Build team cohesion	Team Members	Project team feedback surveys Team member interviews
Establish Urban Data Hub	Content Area Leads	Project Records
Year Two: Recruit the research community		
Broad Objectives:	**Data Source:**	**Data Collection Strategies:**
Expand and onboard additional core team members	Team Members	Project team feedback surveys
Provide trainings to the research and practitioner communities	Researchers & Practitioners	Pre- and post-testing of knowledge gain
Develop content area specific and NRSP wide data standards	Content Area Leads	Project Records Expert Review
Develop enhanced data hub for each content area	Content Area Leads	Project Records Expert Review
Years Three-Five: Maintenance mode		
Broad Objectives:	**Data Source:**	**Data Collection Strategies:**
NRSP wide evaluation to document success and areas for improvement	Team Members Major Stakeholders	Survey Key Informant Interviews

The executive team, composed of the project director, operations director and assistant, will meet weekly as part of NUREC's standing operations meeting to ensure smooth operation of the NRSP, that all milestones are being met, and support to all aspects of the NRSP are being provided.

The project team, composed of the executive team, associate director, professional development lead, data hub lead, program leaders, and communications lead, will meet monthly for the first six months of the project, every other month for the balance of year 1, and then quarterly during years 2-5 of the project.

The project team, external evaluator, and advisory committee will meet annually throughout the project.

Business plan

NRSP-12 will be housed within NUREC. Therefore, the business plan for this NRSP is closely associated with NUREC's overall business plan (attached *NUREC-who we are)* and its resources will be used to support the objectives and activities of the NRSP. This association allows for development of resources to support complementary activities and provide a structure to sustain NRSP activities even when OTT funding is no longer available.

Additional funding that supports NUREC and the broader goal of advancing the conduct and application of science in urban communities include

Contributions from NRSP funded universities:

- Washington State University is requesting 0.19 FTE in year 1 and 0.216 FTE (average) in years 2-5 funding for Dr. Brad Gaolach to serve as PD with an additional 0.20 FTE committed to the project (0.42 FTE annually). WSU has provided 0.50 FTE of Dr Gaolach in support of NUREC since inception in 2015 and plans to continue this level of support for his NUREC and NRSP activities throughout NRSP funding (estimated value of $687,200 ($523,661 in salary and $163,539 in fringe (average rate of 31.23%)). WSU also has provided 0.10 FTE of the Project Operations Director to support NUREC since its inception and plans to continue this level of support for NUREC and NRSP activities throughout NRSP funding. All combined, WSU has 0.60 FTE annually in support of NUREC in addition to contract and fiscal oversight associated with hosting a national center and managing extramural grants and contracts. As fiscal and administrative host of NUREC, WSU will provide the necessary infrastructure to support current and ongoing contracts and multi-institution extramural funding.

- Texas A&M is allocating 0.05 FTE annually for Dr Seguin-Fowler to serve as the AD for NRSP-12.

NUREC Membership: NUREC will continue its institutional membership model to provide additional funding for research, graduate student, and sabbatical fellowships with NUREC and pilot or seed funding to develop projects and services that would not be allowable with NRSP funds but support the broader vision and mission of NUREC (e.g. professional certification courses, mentoring, exchange programs, and Extension curriculum, and fee-for-service opportunities). Additionally, NUREC members will continue to provide in-kind support for their representatives on the advisory board, which meets 6 times a year.

Currently, there are 13 platinum-level institutional members ($5,000 annual membership), generating $65,000 in revenue. Our goal is to grow this membership to 20 by the end of the first cycle of NRSP funding, generating $100,000 annually to support NUREC operations and activities that are not allowable with NRSP guidelines and OTT funds.

Since its inception, member Extension programs have contributed over $300,000 in direct funding to NUREC in addition to staff time associated with their participation in the advisory board and other project-related activities.

National Urban Extension Leaders (NUEL): NUEL provides leadership for traditional Extension programming in urban communities and provides a direct advisory role to the Extension Committee on Organization and Policy (ECOP) Program Planning Committee. NUEL and NUREC are two of the core agencies that develop and support the Urban Extension Framework, which provides the high-level strategic framework for urban Extension and is currently undergoing an update. The director of NUREC has an ex-officio position on NUEL's Steering Committee.

NUEL has a 17-member Steering Committee that meets monthly, plus twice a year for 1.5 day in-person meetings along with committees for professional development, DEIJ, regional networks and supporting the biannual National Urban Extension Conference. All staff time and direct costs associated with the steering committee are provided in-kind by the member's institutions. NUEL estimates annual in-kind contributions to include $39,250 salary for steering committee participation, $58,7000 for travel to in-person meetings and $401,880 in salary for regional and national conference professional development.

Extension Foundation: The Extension Foundation (EXF), through their membership dues and extramural funding having provided direct support to NUEL, ECOP Program Action Teams, including the Sustainable Urban Food Systems (a merger of the Urban Agriculture and Food Systems and Food Waste) PAT that is led by NUEL and NUREC leadership. Additionally, EXF has provided $40,000 in funding and an additional $40,000 of in-kind services to NUREC to support its evolution from WCMER to a national center, which include the funding for the July 2024 convening.

The National League of Cities: NLC hosted the July 2024 convening at their Washington D.C. offices, providing all the meeting space, technology, operational staff time, and facilitated securing discounted hotel and catering prices. They also are committing staff time to serve on the NRSP-12 Advisory Committee

Our long-term plan is to build funding relationships with city, county, state, federal, and tribal agencies and their associations (e.g. NLC, LUCC, Council of State Governments); national non-profit organizations; philanthropic organizations; and national industry organizations that will directly fund the current and additional program leaders along with support for the professional development and urban data hub activities. This would be in addition to funding specific research projects and Extension activities. With this as the long-term vision, we see OTT funds as seed funding to develop proof-of-concept and minimal viable products and building these funding streams during the availability of NRSP funding to support a seamless transition from NRSP funding. Creating a framework for how the three program leaders develop their respective issue areas will allow NUREC to develop additional issue areas and secure funding for program leaders during OTT funding. We are working with the EXF to provide their development expertise and connections in support of the overall mission of NUREC and the broader goal of advancing the conduct and application of science in urban communities.

Budget (attach separately)

Integration

The goals, objectives, and activities of this NRSP will be integrated with Extension through its housing within NUREC. NUREC is an issue and innovation leader for both the LGU system and external stakeholders (see [25], attached, for more on NUREC's mission, activities, and outcomes). NUREC accomplishes its mission by:

Engaging

…cultivating a nationwide network of urban land-grant professionals to develop innovative research and Extension programming and share best practices to benefit metropolitan regions across the country.

… collaborating with communities to identify projects, co-create outcomes, and achieve those outcomes.

Innovating

…establishing ourselves as a leader in innovative approaches to emerging urban issues for external stakeholders and the land-grant university system.

…conducting, interpreting, and disseminating leading edge research that builds the capacity of communities, organizations, or government agencies to address emerging challenges.

Advancing

… leveraging the unprecedented reach of Extension through subject-matter based professional societies, cross-disciplinary organizations, the National Urban Extension Leaders, and the Extension Foundation.
…disseminating research results through direct service and educational activities such as Extension's legacy programs including 4-H Youth Development, Master Gardeners and more recent programs.

Foundational collaborations already exist within Extension leadership and county-based programing, including several of the ECOP Program Action Teams (https://pats.extension.org/) and with the National Urban Extension Leaders (NUEL) network. These collaborations will facilitate engagement with scientists and dissemination of research results across all Extension disciplines.

This NRSP would add value to several multi-state research and extension projects that members of NUREC leadership have established or participated in:

- NE2401 Urban Agriculture: Equity, Sustainability, and Community Development
- NE2206 Green Stormwater Infrastructure and Agriculture multi-state project
- WERA 1053: Urban Agriculture and Food Systems multi-state project, which will support the Agriculture and Food Systems topic area.
- Transformation Network (TN) **-** an NSF Sustainable Regional Systems Research Network. The TN is a transdisciplinary research effort, focused on the intermountain West, aiming to build community capacity for innovative and equitable adaptations across urban-rural systems to create a sustainable future. NRSP-12 members have contributed to developing training and tools to improve scientists' skills and abilities in conducting co-created research with communities.

Other multi-state and SAES Hatch or McIntire–Stennis projects that could benefit from this NRSP include:

- NC1193: Promotion of Health and Nutrition in Diverse Communities of Emerging Adults
- NE1962: Outdoor Recreation, Parks and Other Green Environments: Understanding Human and Community Benefits and Mechanisms
- W2023: Understanding Recruitment and Retention in the 4H Club Program
- NE1962: Outdoor Recreation, Parks and Other Green Environments: Understanding Human and Community Benefits and Mechanisms
- NE2439: Improving the health span of aging adults through diet and physical activity
- NC2172: Household financial and health decision-making under economic uncertainties
- MAS 00554 Rebirth and Resilience: Building Social, Cultural, and Green Infrastructure to Revitalize Legacy Cities and Make Them More Resilient to the Effects of Climate Change
- SAES – Decoding urban soil landscapes – A framework for improving ecosystem services and lifescape quality
- SAES – Improving pest management in urban ecosystems through comprehensive integrated pest management plans
- SAES – Urban tree ecosystem services, disservices, and net benefits.
- FRST – St. Univ. of New York - Increasing Community Resilience and Reducing Disaster Risk through Equitable Urban Forest Planning

- FRST – Univ. of Washington - Translating Urban and Community Forestry Human Health Evidence to Integrated Urban Planning and Policy
- WDC55: Western Regional Mental Health Network, which explores intersections between nutrition and mental health (https://www.wrmhnn.org/).

The goal of this NRSP and NUREC is to both strengthen and expand our relationships with non-academic partners to benefit the scientists conducting research, external stakeholders, and the residents, communities, and environments they serve. Relationships already exist with the National League of Cities, the Large Urban County Caucus of the National Association of Counties, USDA, EPA, NOAA, and HUD. Through our UIIAs, we will build on these and develop new partnerships with other federal agencies (e.g. NASA, Commerce, Energy, Homeland Security, Interior, Education, Health and Human Services, Defense, and Transportation). We also plan to develop relationships with other important entities such as the Council of State Governments, National Governors Association, and appropriate national NGO and non-profit organizations such as The Nature Conservancy, American Farmland Trust, Farm Bureau, American Planning Association, ICLEI, and others.

Outreach, Communications and Assessment

Intended Audiences

In addition to fostering high quality urban research, this NRSP complements the mission of NUREC to bridge the gap between community and research and support the translation and application of that research by Extension. Therefore, our target audiences include:

- The scientific community at land-grant universities; urban serving universities; local, state, federal, and tribal governmental agencies. This would include graduate students and postdoctoral researchers and fellows.
- Policy makers at local, state, federal, and tribal governmental agencies.
- Extension and other practitioners at local, state, and national levels and their associated organizations such as the National League of Cities as a conduit to their members nationally as well as local non-governmental organizations who may access or benefit from the research through their local Extension offices.

Stakeholder Engagement

Primary stakeholder engagement will be through participation in the NRSP-12 support activities (e.g. professional development activities, communities of practice, and the data hub) in addition to member attendance at professional society meetings (both research and Extension). A primary activity of the program leaders is to grow their specific community of practice through existing and professional networks. These communities of practice will connect communities and researchers to identify and prioritize research that is important to both, and then elevate those issues for collaborative problem solving, program development and dissemination of results and products. This approach will ensure an on-going feedback loop of evaluating NRSP activities, how they are being used by stakeholders, and how they are supporting researchers' needs.

We have begun building our issue area teams following our June convening in D.C. (see Relevance to Stakeholders). Our budget includes travel and registration funds for the project director, program leaders, and the lead for the urban data hub to attend the National League of Cities and the National Association of Counties Large Urban County Caucuses national meetings to build engagement with these

national organizations, their leadership on NRSP-12 issue areas, and their urban membership. Additionally, our Advisory Committee is composed of members of our core stakeholders and will help us engage with their networks.

Dr. Gaolach, project director and director of NUREC, helped establish and serves as is an ex-officio member of the National Urban Extension Leaders (NUEL). He will ensure that engagement with NUEL, and their 1,300+ members. We are integrating a research track into the National Urban Extension Conference to directly connect NRSP-12 to urban Extension faculty, staff, and leaders.

NUREC is finishing the development of their new website (http://nurec.extension.org) and will incorporate NRSP-12 into their site that will include the Data Hub elements as well as showcasing NRSP activities, products, and accomplishments. We have requested funding to purchase a customer relationship management (CRM) platform (Hubspot) that will be integrated into our digital communications and events (e.g. webinars) to track stakeholder engagement and drive enhanced engagement in NRSP-12 from the website.

The need for, and the elements of, this NRSP have developed over several years as NUREC engaged with internal and external stakeholders, including:

Generating Research Opportunities Workshop (GROW) for Urban Agriculture. This workshop was a virtual event designed to engage potential research, extension, education, industry, and community collaborators from across the nation in integrated urban agriculture proposal development. During this conference, interdisciplinary teams collaborated to develop creative and effective proposals rather than spend resources competing against one another. (https://sites.google.com/msu.edu/grow-uaconf/home).

Leading Edge Dialogues: In 2019 the WCMER hosted the National Urban Extension Conference (NUEC) and launched the Leading Edge Dialogues, a series of 90-minute interactive workshops which explored critical issues facing our cities and our universities. Recommendations and opportunities for collaboration emerging from the LED's are detailed in papers which can be viewed at: https://metroextension.wsu.edu/led.

Urban, Indoor, and Emerging Agriculture: During May 2020, NUREC, in conjunction with NUEL and several urban Farm Bureau county organizations, conducted 4 on-line listening sessions (see How does the NRSP pertain to a national issue?)

Following these listening sessions, NUREC led the development of WERA1053: Urban Agriculture and Food Systems.

Sustainable Urban Systems: NUREC brought together a select group of 40 scientists and practitioners across an array of disciplines, sectors, and locations as part of the National Science Foundation's development of their Sustainable Regional Systems program (see How does the NRSP pertain to a national issue?). Following the workshop, NUREC joined the Transformation Network, an NSF Sustainable Regional Systems Research Network (https://resilience.unm.edu/).

Urban Green Infrastructure: In early 2018, NUREC hosted a summit to connect scientists, Extension professionals, practitioners, and community leaders to share existing resources;

inform education and research priorities; and build new collaborative, problem-solving networks program (see How does the NRSP pertain to a national issue?).

Promoting Urban Food, Energy and Water Resource Resilience via the Regional Food System. This summit built on 27 key-informant interviews and convened researchers, Extension professionals, urban food producers and policy makers to understand how food, energy, and water are interdependent in the context of changing environmental pressures and policies.

Measuring Accomplishments and Impacts

We have several mechanisms to measure impacts of NRSP-12 direct activities and research related outputs:

- Web site engagement – As our primary source of engagement and dissemination of products, we will use web site metrics to track and analyze engagement. Surveys can be incorporated for user feedback.
- Customer relationship management (CRM) platform – we will use this to build and track our engagement with individuals and by stakeholder type (e.g. researchers, policy makers, Extension professionals)., The CRM provides digital communication interaction data and engagement metrics for participation in online training events (e.g zoom-based webinars).
- Urban Data Hub – both components of our data hub (map room and research repository) will also track engagement data; we will require basic information during registration to access both elements (free of charge). Data collected will include scholarly products (e.g. peer-reviewed publications, policy documents, scholarly presentations) and external funds developed and leveraged

We will track the impacts and effectiveness of NRSP-12 directly through:

- Surveys after all our professional development trainings for near-term outcomes (awareness and knowledge gain) as well as periodic follow-ups (using our CRM platform and data) to measure medium-term outcomes (application of new knowledge and behavior change).
- User-participation in our Urban Research Repository – the repository will require individuals to actively participate in and add their repository materials to the database. We will encourage everyone who participates in NRSP-12 activities to do so for tracking and as part of our overall marketing and engagement plan for NRSP-12. Additionally, on an annual basis, we will survey NRSP-12 participants to provide us with associated scholarly products (e.g publications, presentations, etc) and will analyze reference data (e.g citation indices) to measure secondary impacts.

We will employ a third-party evaluator who will engage throughout the project. In year 1 they will help establish metrics for overall project evaluation and the process for collecting, understanding, and utilizing the data. They will collect and analyze data at least annually for supporting continual assessment and refinement by the project leadership, along with more thorough evaluations and formal reports in years 3 and 5.

Communication Pieces

We will produce an annual NRSP report that provides a comprehensive accounting of NRSP-12 activities, accomplishments, outcomes, and impacts. Additionally, we will provide 1-page overviews for each of the issue areas and data hub elements to support communication with SAES and ARD directors, other

stakeholders, and to use a recruitment and engagement mechanism for new participants. These will be shared through the NIMSS system, with the advisory committee, all members of the NRSP, on the NRSP webpage and with regional executive directors for both AgInnovations and Extension.

Following the development of network maps for each issue area (to be completed in year 1) we will also publish updates to the current working network map.

Data Management Plan

The Urban Data Hub will be developed and housed on University of Missouri (MU) Center for Applied Research and Engagement Systems (CARES) supported systems. The Urban Data Hub will consist of an Urban Mapping Database and Interface (UMDI) and an Urban Research Repository (URR).

UMDI: The UMDI will leverage existing national data repositories at CARES consisting of thousands of mappable data layers. The data layers comprise geographic information stored in ESRI geodatabases, SQL Server, and MySQL databases or accessed via standard data sharing protocols (open map services, APIs, etc.). These data are based on common data resources, such the American Community Survey, and include current and (limited) historical data. A complete listing of data layers can be found at https://allthingsmissouri.org/atm-map-data-list/.

The data will be maintained by CARES staff, who will integrate updated information on a regular basis, including acquisition and integration of new data, preparation of map symbolization, documentation of new data, and development of map services. CARES will be responsible for ensuring data security and backup and will collaborate to identify and integrate information directly supporting urban research. No personally identifiable information (PII), including data subject to HIPAA or FERPA regulation, will be housed in the UMDI.

The UMDI will also support integration of local data developed by researchers. The supported formats for this information include standard geographic data formats (shapefiles, KML/KMZ files, or geojson data), spreadsheet data that can be associated with common geographic features (e.g. counties) based on a standard geographic identification code, and geocodable address data. Researchers submitting data will be required to participate in a short training event, certify that the information they are providing does not include PII, enter basic metadata for each dataset uploaded, provide citation and sharing permissions, and develop mapping symbology for their data set. Tools and assistance for the latter will be provided. All data submissions will be conducted using a secure, permissions-based interface and will be reviewed for content before being made publicly accessible in the UMDI.

All mapping data will be publicly accessible through a mapping interface that allows for discovery, display, and interaction with available map layers. The interface will include tools for overlay of multiple data layers, data query and selection, discovery of metadata, generation of map outputs (JPG, GIF, PNG, and PDF formats), and map sharing (via email or social media). Logged in users will be able to save maps and retrieve maps previously constructed within the UMDI.

A chief component of the UMDI will be the reporting tools, which will provide indicator-based reports for an identified geographic area. A list of supported indicators will be developed for UMDI users to select and build custom reports and logged in users will be able to generate and save reports on the system. All users will be able to download reports in PDF or Microsoft Word formats.

URR: The Urban Research Repository (URR) will be designed to include systems for submitting and documenting urban research, storing and cataloging submitted research, and allowing user discovery and retrieval of research documentation.

Research descriptions will be collected through a standardized, login only, WordPress-based interface and stored in a MySQL database. Researchers will be asked to provide standard information about their research, including (but not limited to) information on subject, sponsors, methods, findings and publications. A standard taxonomy related to research description will be developed to aid data entry and facilitate data query. Researchers will also supply citation information and use permissions and will be able to update the information submitted. Researchers will have the ability to provide links to research websites and online publications related to their projects. Optionally, researchers can submit a photograph related to their research for inclusion in search results. The information submitted to the URR will be immediately available for user discovery, but CARES staff will exercise the ability to remove or block public access to submitted data as warranted.

User discovery tools will consist of an interface allowing users to search, filter, and sort information within the URR. Information will be displayed as an array of tiles with basic information that can be selected by the user for display of the complete information related to the urban research project. The user will have the option to mark a particular project as research of interest. It is anticipated that users will select multiple research projects of interest, or even all results of their query, for further action. The user will then be able to generate and download a formatted report (PDF or similar) of all projects of interest with basic research information included.

An optional login for the user discovery tools will be designed and implemented. Logged in users will be able to save and return to their queries, so that as more research is added to the URR over time, their results will automatically update. In addition, these logged in users will be able to save their search results reports and use them in the future to link directly to the full research project description stored in URR.

User support and training materials will be developed and made available within the URR. Regular backup of the systems and data will be supported, and systems security scans and compliance will be provided in collaboration with the University of Missouri Division of Information Technology.

Distribution of Results

The primary mechanism for distributing results will be through the NRSP-12, which will include access to the URR. Outreach and engagement efforts will drive traffic to the website so it will be seen as the primary portal to engage with and from which to access results. We will also present the results at scientific discipline related professional meetings and annual meetings of stakeholders. We are intentionally choosing not to host our own NRSP-12 related annual meetings of stakeholders as we feel there are enough existing venues. Instead of competing for participation, we think that resources could be better, and more effectively, spent by engaging stakeholders at their respective meetings and demonstrating how we support their work and missions (e.g. the National League of Cities annual City Summit and the National Urban Extension Conference).

We will engage with and distribute materials to appropriate organizations and committees within the land-grant system, to include the Executive Director for each of the regional AgInnovations and

Extension Directors associations, for dissemination across the research and Extension networks; appropriate APLU committees; Extension Committee on Organization and Policy (ECOP); and the National Urban Extension Leaders.

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