

Networking for Environmental Sustainability in Arid Region Urban Communities
Final Report of a Workshop held at Texas Tech University August 14-16, 2019

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PROJECT OUTCOMES SUMMARY

Overview - A Workshop was held August 14-16, 2019 at Texas Tech University to conceptualize the sustainability challenges that face the small- to medium-sized urban centers that serve as the backbone of rural communities, particularly agricultural communities. The focus was on the arid and semi-arid regions in which water of adequate quality and quantity is a defining environmental need. Our conceptual framework was that of "One Health," which posits that environmental, human, and wildlife health are closely intertwined, and the path to a sustainable future requires meeting human, economic and environmental needs. The Workshop brought together a multidisciplinary team of academics, practitioners, and other stakeholders to identify challenges these communities face. This was an opportunity to engage researchers, including students and faculty, municipalities and other stakeholders in identifying the needs and a path for research to meet those needs. These challenges were evaluated in each of the four workshop themes: Environmental Sustainability, Urban Design, Water, and Public Health. Environmental sustainability was focused on the problems of urban development in sync with the natural environment and particularly wildlife. Urban design complements this theme but was more focused on how the design of the built environment respects the natural environment while meeting the needs for human habitat. Water focused on the common challenge that all arid regions face of meeting the water needs of the environment, human potable water needs, and water for the competing forces of agriculture, manufacturing and energy development. Public health recognized that the population in small cities and surrounding areas do not have easy access to health care that is common in large cities.

Intellectual Merit -We suggest that the challenges faced by small- to mid-size cities are fundamentally different than those faced by large urban centers and that research to address those challenges are also different. Appropriately addressing the challenges of these communities requires understanding those differences. The intellectual merit of the proposed work was to explore and expand on that understanding and develop a research agenda to develop evidence-based approaches to use that understanding to address the challenges.

Broader Impacts -The Workshop helped direct urban sustainability research in support of the communities in arid and semi-arid areas like the southern Great Plains. An example is the Thrive! Initiative of Texas Tech University. The Workshop helped a research community identify cross-cutting needs as well as build connections between the community and other stakeholders and the researchers. The Workshop helped raise the profile of the challenges faced by small- to medium-sized urban areas and directly impact the ability of those urban areas to address those challenges.

Because the focus was on small- to medium-sized urban areas, the Workshop was designed to attract participation from under-represented groups with the goal of more effective engagement with those groups in the definition and conduct of research directed toward addressing the challenges faced by their communities.

INTRODUCTION

With an ever-growing proportion of the human population now living in megacities, the environmental sustainability of small- to mid-sized cities is starting to receive much-needed attention. Small- to mid-sized urban centers (defined here as >50,000 and <500,000 residents) are much more common than the megacities that receive most consideration, and cumulatively serve as home for more people. In addition, they are more closely interdependent with surrounding rural and small communities than are megacities. Rural America depends upon the small urban center to meet important basic needs, such as health services and consumer goods, as well as the means to drive the rural economy—for example, with agricultural goods and equipment and oil field or other industrial services. In return, the economy of the urban areas depends upon the demand for goods and services from the surrounding rural community, but those goods and services do not always match the needs of the residents of the urban community. The overarching goal of the Workshop was to conceptualize the sustainability challenges that face the urban centers that serve as the backbone of rural communities, particularly agricultural communities. This was an opportunity to engage researchers, including students and faculty, municipalities and other stakeholders in identifying the needs and a path for research to meet those needs. We continue to see the conference participants as forming the nucleus of a Sustainable Urban Systems Research Network that can formulate a coordinated, convergent research agenda to address the needs of small- to mid-size urban communities. The workshop focused on the arid and semi-arid regions in which water of adequate quality and quantity is a defining environmental need. Our conceptual framework was that of “One Health,” which posits that environmental, human, and wildlife health are closely intertwined, and the path to a sustainable future requires meeting human, economic and environmental needs. Over the two and ½ day Workshop, talks that identify fundamental challenges to the environmental sustainability of small- to medium-sized urban centers in dry regions and their surrounding network of dependent rural communities were followed by discussions to design collaborative research that involves academia, industry, and civic leadership in devising lasting solutions.

The Workshop sought to address the questions

- How do small- to mid-sized urban centers serve as a force of conservation of the environment?
- What does green infrastructure (GI) look like in a brown landscape?
- How do communities in groundwater-reliant and agriculture dominated environments (GRADEs) sustain a water supply of adequate quality and quantity to sustain their population and grow their economy?
- How do we promote community health, well-being and environmental sustainability in the face of the challenges these communities face?

These questions were addressed by four workshop themes which are directed toward each of these questions: Environmental Sustainability, Urban Design, Water, and Public Health

The *environmental sustainability* of the natural environment including plant and animal life and the natural ecology is an often-ignored component of urban environments and an often-neglected contender in the water nexus. Urban environments provide habitat to many species, some of them of conservation concern. We suggest that wildlife is a critical component of the built environment and one that must be nurtured for a healthy and sustainable urban system. The Workshop sought to understand the range of wildlife in an urban environment, particularly one adjacent and interconnected with rural

communities, and their interactions with the human population. Elements of urban design make those settings more or less welcoming to species, some of which have important public health effects.

Urban design encompasses the interaction between the built and natural environments and must consider the anthropomorphic influences of human development and the availability of water. It is necessary for public life and natural systems to coexist, and urban design facilitates settings where people can experience social and ecological interactions fundamental to building sustainable communities, whether in urban, suburban or small town locations. For example, street trees, parks, squares, gardens, and other types of public open spaces provide a variety of environmental functions needed in urban areas, including stormwater management and mitigating the urban heat island effect. Nearly all endemic terrestrial and aquatic species, both flora and fauna, are adapted to the stable patterns of infiltration, evaporation, transpiration, groundwater discharge, consistent hydrology, and stable water chemistry that are a part of our natural systems[1]. These natural areas mimic sponges, receiving surface water, removing pollutants, trapping sediments, and facilitating groundwater recharge accomplished in a gradual, balanced manner. Contemporary land-use practices, including row-crop agriculture, however, have dramatically altered ecosystems through the widespread conversion of rural lands to developed areas. Rural lands typically provided an important buffer between urban land and water, but once lost to urbanization, they are gone forever.

No matter where one is situated, he/she is affected by the actions of those living and working upstream. Patterns of land use to accommodate population growth have changed significantly over the last several decades, thus altering upstream activities. Changing land cover and land use affects the physical, chemical, and biological conditions of downstream waterways; alters the makeup of flora and fauna; and fragments the landscape into smaller and more randomly scattered parcels[2]. The impervious landscapes in developed and urban areas made up of paved surfaces, storm sewer systems, and buildings don't allow runoff to percolate slowly into the ground. Instead, water accumulates and runs off rapidly in large amounts which increases stream bank erosion and sedimentation downstream, which then leads to flooding and negative effects on aquatic species. Along with increased water quantities and velocities, urban runoff becomes polluted when typical ground matter and other impurities picked up from a variety of sources are flushed into storm drains and carried into receiving water bodies, referred to as nonpoint source pollution. The combination of the loss of the buffering and filtration provided by rural landscapes and wetlands, a marked increase in the amount of land used per person, and the increase in urban runoff, dramatically affects the ability to maintain water quality within a watershed and thus compromises its ecologic and economic health.

Water is crucial for both urban and rural existence and economic prosperity. Farming and energy production compete with communities for good-quality water (the water-energy-food nexus). In arid areas the availability of good quality water is often limited and the technical, human, and financial resources to improve the quality of the available water may not exist. Problems of availability (e.g., shortage during drought) and quality (e.g., excessive salts or unacceptable levels of contaminants like arsenic) compound the challenge, with rural communities often having the least resources, the highest need, and the greatest lack of required expertise to utilize the financial resources and technical support available from organizations such as the Texas Water Development Board or the federal government. Increasingly, water availability may limit a community in their efforts to attract or fully develop industries including those in the food or energy sector which are among the most intensive water users. Many communities struggle to upgrade and/or maintain deteriorating infrastructure, an issue that particularly impacts small towns and cities. This is further complicated by the economic difficulties cities

of all sizes face in meeting the requirements of the Clean Water Act (CWA). Along with regulating municipal wastewater treatment facilities, the CWA governs surface water quality protection in the United States by regulating pollutant levels in discharges and runoff. The law was put into place to protect our water for safe drinking, recreation, and the health of fish, shellfish, and wildlife. Many communities in the rural southwest, however, face drinking water supplies that contain potentially unsafe levels of arsenic, salinity and radionuclides or constrained or dwindling water resources such as the Edwards Aquifer in central Texas and the Ogallala aquifer in the entire southern high plains of the United States. Current technologies to address these challenges are often too expensive, require unavailable technical sophistication or too much energy to pose satisfactory answers for these communities. The enactment of the new Water Infrastructure Improvement Act (HR 7279, <https://www.congress.gov/bill/115th-congress/house-bill/7279/text>) empowers communities to use green infrastructure (GI) to efficiently and economically meet critical water management goals, while protecting the health, safety, and well-being of their residents. Capturing rainwater where it falls is an important solution to urban runoff and water pollution, and a principle that guides GI and low-impact development (LID) practices. GI is a cost-effective, sustainable, and environmentally-friendly strategy that uses infiltration, evapotranspiration, and the capture and reuse of stormwater to maintain or restore natural hydrologies.

Public Health is focused on the health of the human population rather than individuals and has traditionally seen the environment as a determinant of human and animal health. Public Health focuses on the ecological model of health[3], which includes the individual and interactions between people, as well as the community, organizational, and social determinants of health. The core functions of public health are 1) assessment—discovering the threats to health, 2) assurance—ensuring conditions in which people can be healthy, and 3) policy—the development and implementation of public policies that influence health. Human health is connected to the built and natural environment, and studies show that the conditions of one’s neighborhood has an impact on health[4-6]. The environmental issues confronting public health include climate change, water pollution and decreasing water resources, air quality, and exposure to chemicals that are harmful to human health. Public health, particularly when defined broadly as both the pursuit of positive health outcomes and quality of life, is central to sustainable urban systems.

Human health can be affected by urban design, and funding agencies have become more interested in design and health as areas for intervention. In West Texas, small- to medium-sized urban areas are surrounded by rural counties. These “hub cities” are a source of medical and public health care for the rural communities. In the case of Lubbock, Texas, all of the surrounding counties in our Council of Governments area are considered medically underserved[7]. As small rural hospitals continue to close for lack of necessary funding, the urban centers are providing more and more care. The State Health Department Regional office in Lubbock serves 44 outlying rural counties, stretching their abilities to serve both the urban and rural communities. The urban centers often are the primary providers of health care services for the surrounding rural areas and are often a central foundation of the economy on which the small-to medium-sized urban centers are based. This is particularly true as the surrounding rural communities often face an aging population that needs those health care services. Attracting a new and younger population while maintaining services for the elderly population could be viewed as the central challenge to the sustainability of the small to mid-size cities and their environments. Moreover, the inability to meet these challenges means that a community would be

struggling for survival rather than being able to address quality of life and sustainability of those communities.

If maintaining medical health is a challenge to urban areas surrounded by aging rural populations, maintaining mental health and quality of life is an even more difficult challenge, especially during a health crisis like that posed by COVID-19. In addition, the “One Health” movement has increased the interest in health challenges for both humans and other animals, and how those health issues interact[8]. The West Texas economy depends upon farming and raising livestock, both of which challenge the environment and human and animal health in both the rural and urban areas.

Public health professionals are also invested in creating change and generally use theoretical models to develop intervention for transformation . The Diffusion of Innovations theory[9], which has been used both in public health and agriculture, allows us to understand both the attributes of changers and well as the attributes of the change, is a useful tool for making change in communities. The model helps us understand the readiness to adopt change, and the steps needed to move people in the direction of change. It also helps us to develop interventions for change that are appropriate for the audience.

Community Based Participatory Research (CBPR) is a skill that will be necessary for working with communities around issues of sustainability, health, and urban planning. CBPR is a method that involves communities in all aspects of research. Generally, CBPR begins with a research topic that the community chooses, and then works to involve the community through the research process, thus increasing community participation and capacity[10, 11]. Ideally, community members are involved in the development of research questions, collection of data, analysis of data and evaluation of research results. The Workshop seeks to build a foundation for CBPR through ensuring the participation of the stakeholder community in defining the research needs and the directions of subsequent research.

Beyond research, the methods of CBPR are also useful for working with communities to plan, implement and sustain projects. These methods of inclusion, joint decision-making, developing community partnerships, and implementing change together will be important for change agents that will attend this Workshop.

WORKSHOP PLANNING AND ORGANIZATION

Overview

In its 2018 report (<https://www.nsf.gov/ere/ereweb/ac-ere/sustainable-urban-systems.pdf>)[12], NSF viewed urban areas as social-ecological-technological systems with high degrees of internal integration and interdependence with surrounding rural regions. The report identified three primary “perspectives” or scales of study (single urban areas/metropolitan regions; multiple cities and communities; supra-aggregations of cities and urban areas) and six “key elements” (developing new data and methods; assessing sustainability outcomes; understanding “theories of change”; advancing comparative and scalability studies; modeling the future of SUS; and co-production of knowledge among researchers and practitioners). The Workshop attempted to address all of these, assessing sustainability outcomes and advancing comparative and scalability studies using the southern high plains and its surroundings (Fig. 1). By focusing on a specific region, it was possible to attract the participation not only of academics but representatives from the municipality and stakeholder communities. This region includes a number of urban centers of approximately 50,000-250,000 people each (Amarillo in the north, Lubbock in the

center, and Midland-Odessa/San Angelo in the south and Wichita Falls and Abilene to the east), interspersed with a variety of smaller towns and rural agriculturally-dominated communities. The semi-arid region shares a limited groundwater-dominated water supply and is historically dominated by agriculture. However, it is also heavily influenced by energy production and the resulting competition for water and environmental resources, as well as increasing urbanization in the larger communities. The region demonstrates the interconnected nature of small- to mid-size urban areas with the surrounding rural communities and is marked by the lack of a large urban center such as those that exist further to the west (Phoenix), north (Denver) and east (Dallas-Ft. Worth, Austin and San Antonio). We see the challenges of these mid-size communities as being every bit as serious as the larger urban areas, but these communities generally lack the financial, technical and human resources that the larger communities may exhibit. A further challenge is that whereas the mid-size urban centers in this area are generally showing population growth including some of the fastest growing cities in the U.S., many of the smaller towns are experiencing declining populations which increases the demands they may place on the urban areas. We believe the southern high plains and surrounding area provides a good model for the matrix of rural, small, and medium-sized towns that is common in many parts of America. Initially we expect to engage researchers and stakeholders in northern Mexico, Arizona, New Mexico, Oklahoma, Colorado, and Kansas but ultimately plan to engage other researchers and stakeholders facing similar challenges across the US.

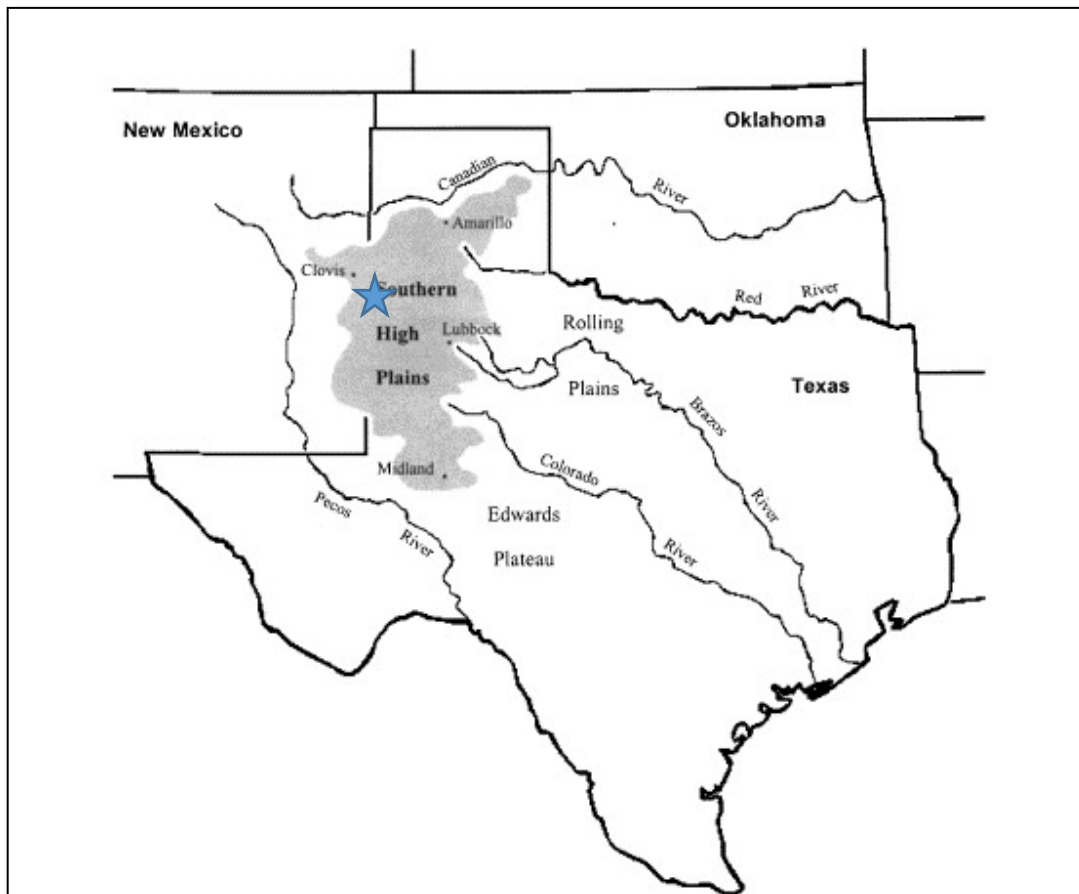


Figure 1a – The Southern High Plains Region of the U.S. with Lubbock, Texas indicated by a blue star[13]

The Workshop Organizing Committee (Table 1) included a core from Texas Tech University, which hosted the event, as well as other regional organizations and entities with strong relevant interdisciplinary and international networks. Committee membership was drawn from several academic disciplines and institutions and included representatives in each of the four foci for the Workshop, Environmental Sustainability, Urban Design, Water, and Public Health. The four foci are each important in and of itself but also interact in key ways that needed to be explored in the contexts of long-term environmental sustainability and integration with the surrounding rural matrix. We contend that the importance of these elements, and especially their interactions, are both more important and less appreciated in mid-sized urban areas and in dry landscapes (Figure 2).

Table 1: Organizing committee (in alphabetical order)

Name	Discipline	Organization	Unit
Molly Ballesteros	Public Outreach	City of Lubbock	Water Utilities
Theresa Byrd	Public Health	TTUHSC	Public Health
Melissa Currie	Urban Design	TTU	Landscape Architecture
Gad Perry	Conservation	TTU	Natural Resources Management Int'l Center for Arid and Semi-Arid Land Studies
Danny Reible	Engineering	TTU	Civil, Environmental Construction Engr Water Resources Center
Ashley Totrez	Public Outreach	City of Lubbock	Water Utilities

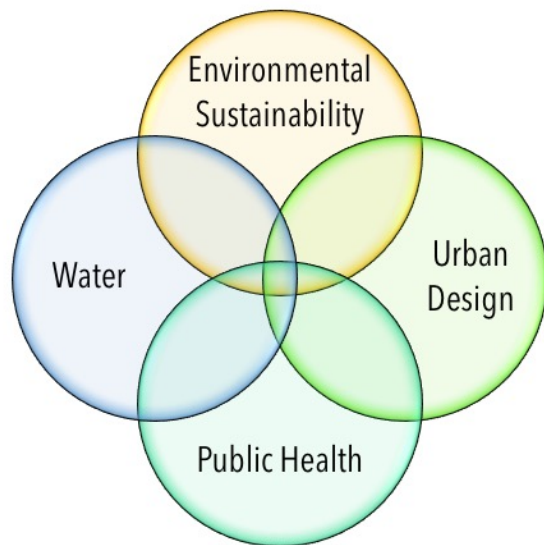


Figure 2. One Health Framework: Venn diagram of the primary foci and their interactions. The proposed Workshop briefly explored each in isolation before turning to their manifold interactions in the context of long-term regional sustainability.

Workshop Structure

Workshop participation was designed to maximize diversity in terms of discipline, institutional representation (academic vs. civic vs. government), and demographics. In addition to regional representation, we had participants representing US-based academic institutions with strong dryland ties who either are based in similar environments or study them. A list of participants is included in the Agenda (Appendix 1). Special efforts were made to encourage participation of students including opportunities for them to present their research in informal poster sessions. Special efforts were also made to ensure participation of key stakeholders including individuals from municipalities and the general public.

The workshop agenda is included as Appendix 1 and a summary schedule is included below. The schedule provided for both a combination of formal presentations and substantial time for discussion including breakout group discussions in each area.

Summary Schedule

Day 1: Wednesday August 14th, 2019

8- 9:00 AM Registration

9-10:15 AM Session 1: Plenary Session Moderator: Dr. Danny Reible

10:30 AM-12 N Session 2: International Perspectives Moderator: Dr. Gad Perry

1:30 – 3 PM Session 3: Public Health Session Moderator: Dr. Theresa Byrd

3:30- 5PM Session 4: Roundtable Discussion

Public Outreach

Public Health

Day 2: Thursday August 15th, 2019

8:30 – 10 AM Session 5: Water Theme Moderator: Dr. Danny Reible

10:30 AM -12:30 PM Session 6: Urban Design Theme Moderator: Dr. Melissa Currie

1:30 – 3 PM Session 7: Urban Conservation Session Moderator: Dr. Gad Perry

Session 8: Round table Discussion

Poster Session and Reception

Day 3: Friday August 16th ,2019

Session 9: Reports and Conclusion

Report out from each Moderator

Integration Session: Coming up with a Roadmap for a Sustainability Research Network

Session 10: Breakout and Closing Remarks

WORKSHOP SUMMARY AND OUTCOMES

Seventy five people registered for the workshop and approximately 50 were able to participate throughout the sessions. The workshop was well received by participants in that a post-workshop survey rated the overall workshop at 4.3 on a 5 point scale ranging from 1 (not useful) to 5 (very useful). The sessions on public health and urban conservation were found to be somewhat useful to useful (3.6 and 3.5, respectively) likely reflecting the diversity of the participants, many of whom work in neither area. The sessions on climate change, urban design, water and the breakout discussion sessions were all found to be useful to very useful by the participants (4-4.5 ratings). It is hoped that these positive perceptions will aid in future cooperation among the participants in pursuing a sustainability research network should opportunities arise.

The Workshop began with a welcome from Dr. Joseph Heppert, Vice President of Research at Texas Tech University, and Dr. Barron Orr from the United Nations Convention to Combat Desertification. These speakers charged the audience with the importance of addressing the problems that were the focus of the workshop deliberations. This was followed by a presentation by Dr. Katharine Hayhoe, Professor of Public Administration and Director of the Climate Science Center at Texas Tech University, part of the Department of the Interior's South-Central Climate Science Center, and a member of the Intergovernmental Panel on Climate Change. Dr. Hayhoe outlined the potential challenges associated with the increasing frequency of climate extremes for small and mid-sized communities in arid areas that already suffer from limited resilience.

The Workshop then turned to a series of presentations on international perspectives, recognizing that secondary cities in many other countries face similar problems. After presentations outlining the role of the State Department and USAID in managing the challenges of international cities, and the help they hope to receive in identifying and addressing future ones, a presentation from Dr. Amanda Shores of Colorado State University identified the usefulness of “mapping” in identifying and responding to sustainability challenges in secondary cities. Following these introductory talks, the Workshop ensued with featured sessions in each of the four key themes that challenge the “one health” of small cities in arid environments:

- **Public Health:** How do we promote community health and well-being in the face of the challenges these communities face?
- **Water:** How do secondary cities and their surrounding rural, often agricultural, communities in arid environments sustain a water supply of adequate quality and quantity?
- **Urban Design:** What does green infrastructure, particularly ecologically-informed infrastructure to conserve and maximize water, look like in a brown landscape?
- **Urban Biodiversity:** How can satisfying human needs in secondary cities harmonize with conservation of regional biodiversity?

Presentations were followed by interdisciplinary breakout sessions to allow discussions in smaller, more interactive, groups. The full presentations are included as Appendix 2. On the third day, these topics were addressed in a more integrated fashion by the group as a whole, in an effort to identify the primary conclusions and take-home lessons. We summarize the conclusions of the discussions below.

Key Lessons from the Workshop on Environmental Sustainability in Arid Region Urban Communities:

- *The critical nature of secondary cities*
 - These cities collectively have a majority of the world’s population and are closely connected to the economy and ecology of the surrounding rural, often agricultural, area, serving as regional “hub” cities.
 - They rarely have the resources to identify the fundamental knowledge necessary to guide actions toward sustainability and thus are heavily dependent upon external input
- *The interconnectedness and intersectionality of sustainability issues*
 - The four themes of our workshop (public health, water, urban design, and urban conservation) are all interconnected: one community means one health, one water, one air
 - Secondary cities should not be studied in isolation, but rather as part of a matrix that includes surrounding areas that are more rural, agricultural, or natural
- *The city- and area-specific nature of appropriate and acceptable actions to address sustainability*
 - “Sustainability” may mean different things in different locations. Different priorities and different challenges require different solutions
 - Fundamental knowledge and extensive data collection is required to provide the scientific understanding necessary to address sustainability issues in the different regions, environments, and communities in the nation and the world
 - International perspectives greatly extend the range of social, cultural, and physical settings that can be explored and provide insights not easily available in domestic settings
- *Rapidly growing secondary cities provide an opportunity for demonstration and testing of new paradigms* for addressing sustainability without trying to apply untested concepts to remake existing cities
- *The critical importance of the human dimension* in understanding and addressing the problems of secondary cities
 - This requires two-way community involvement to identify and shape the goals and objectives of any research or action, as well as education and outreach to disseminate research findings and products
 - The importance of effectively engaging all components of the community, including diverse cultures within that community, different socio-economic groups, as well as decision and policymakers
 - The importance of mapping to better understand the components of the community and their interactions, to visualize relationships, and to disseminate findings
- *The importance of having measurable outcomes of actions* toward sustainability
 - Appropriate metrics will have to be interactively defined by community-shaped goals and objectives and are part of the study
- *The need for development and training of a diverse, interdisciplinary student body* that will be the thought- and action-leaders of the communities of tomorrow.

The workshop also raised a number of questions that are related to the key findings above but will ultimately need to be answered by future research on urban sustainability.

- Urban sustainability is a multi-scale challenge. Primary cities talk to one another more than to smaller cities around them and this limits communication and effective response to joint problem. Secondary cities like Lubbock are much more interactive with their surroundings, and that perspective has mostly been missing from past urban sustainability research.

- Urban sustainability has not yet fully utilized emerging technology to meet future challenges. Cellular and internet communications are increasingly supplanting conventional phones and face to face interactions. 5G is emerging and promises dramatic increases in the internet of things. Smart cities may or may not be the future. Similar questions apply to self-driving cars, flying drones, etc. How will these change things? What infrastructure should be designed into future and renewing urban centers?
- Rural areas continue to dwindle. Their access to crucial services will keep getting worse. What infrastructure can help with that? How should cities plan for the resulting migrations?
- How will climate change exacerbate changes? The influence of climate change are likely to be most pronounced in the extremes, that is, in the in arid and semi-arid inland areas and the coast. Can cities be made more resilient? How does urban decarbonification look? Can we do that in a way that also supports wildlife, human health, and preparation for the next pandemic?

Although not discussed during the Workshop, the COVID-19 pandemic has served to sharpen the differences between large urban centers and the mid-sized cities and surrounding rural areas that were the focus of this workshop. Some of the reasons for these differences were explored by Perry and De Silva (2002) <https://www.newsecuritybeat.org/2020/05/urbanization-age-pandemic/> (and Appendix 2) in which it is argued that poverty and disparity are primary drivers of pandemic response and not just urban density. Small to mid-sized cities tend to lag the urban centers in feeling the effects of the pandemic but ultimately can be affected more deeply and without the resources to effectively respond.

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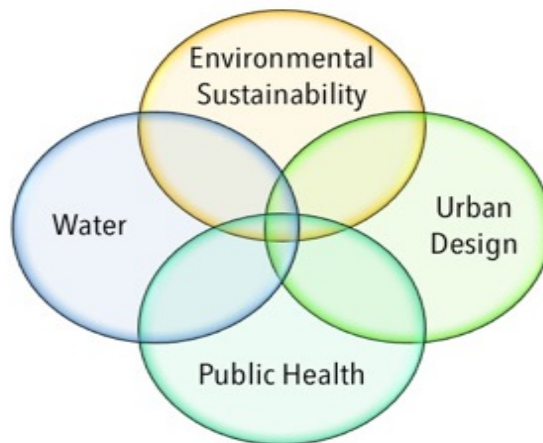
National Science Foundation Workshop:

Networking for Environmental Sustainability in Arid Region Urban Communities

August 14th - August 16th, 2019

International Cultural Center

Texas Tech University



Day 1: Wednesday August 14th, 2019

8:00AM - 9:00 AM Registration

Entrance Foyer ICC

Shuttles from Hyatt begin at 8 AM

9-10:15 AM Session 1: Plenary Session

Moderator: Dr. Danny Reible

10:30 AM-12 N Session 2: International Perspectives

Moderator: Dr. Gad Perry

1:30 – 3 PM Session 3: Public Health Session

Moderator: Dr. Theresa Byrd

How do we promote community health, well-being and environmental sustainability in the face of the challenges these communities face?

3:30- 5PM Session 4: Roundtable Discussion

Public Outreach

Public Health

Day 2: Thursday August 15th, 2019

8:30 – 10 AM Session 5: Water Theme

Moderator: Dr. Danny Reible

How do agricultural communities in arid environments sustain a water supply of adequate quality and quantity to grow their economy?

10:30 AM -12:30 PM Session 6: Urban Design Theme

Moderator: Dr. Melissa Currie

What does green infrastructure look like in a brown landscape?

1:30 – 3 PM Session 7: Urban Conservation Session

Moderator: Dr: Gad Perry

How do small- to mid-sized urban centers serve as a force of conservation of the environment?

Session 8: Round table Discussion

Water

Urban Design

Urban Conservation

Poster Session and Reception

Day 3: Friday August 16th, 2019

Session 9: Reports and Conclusion

Public Health

Water

Urban Design

Urban Conservation

Integration Session: Coming up with a Roadmap for a Sustainability Research Network

Session 10: Breakout and Closing Remarks

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APPENDIX 2 - URBANIZATION IN THE AGE OF PANDEMIC

May 20, 2020 By [Dr. Gad Perry](#) & [Dr. Gretchen De Silva](#)



Late last year, what is thought to be a bat-associated coronavirus infected humans in Wuhan, a city of 11 million in China, possibly after a stopover in illegally traded pangolins—setting off a global pandemic. [This kind of thing has happened before](#)—with AIDS, SARS, and MERS, for example. Much remains unknown about the biology of COVID-19, which is alarmingly [communicable by people with few or no symptoms](#). But an epidemic is only part biology. It is also driven by cultural factors, and urbanization is a crucial aspect. As sites of large gatherings and dense living conditions, cities offer the perfect settings for the spread of infection, yet their role seems to have often gone unremarked in discussions of the pandemic.

Cities are home to more than half of the world’s human population, and account for more than 70 percent of global GDP. They can generate an oversize impact on the environment, but also opportunities for enhanced well-being through access to healthcare, education, and social connections. At the same time, deep inequalities and poverty mark cities in both developed and developing countries, bringing [anger and resentment close to the surface](#). Especially relevant in the current pandemic, poor people the world over—including the [1.2 billion people living in slums](#) and over 70 million forcibly displaced people and refugees—lack safe, provisioned, low-density environments for sheltering in place.

Other recent disease outbreaks have also thrived in urban settings. Zika, a mosquito-spread viral disease originally isolated in Uganda, spread explosively in two Brazilian cities in 2015, ultimately affecting an estimated 1.5 million people and causing microcephaly in thousands of newborns. High human density and the presence of invasive species of mosquitos that arrived previously and were not considered a major threat but that can transmit the disease, unlike the native ones, allowed the disease to spread rapidly once it arrived in American cities, harming thousands.

After spreading in China, COVID-19 quickly emerged in urban centers around the world. [Genetic studies](#) suggest that the cases reported in Washington state in late February had their source in China, although community spread was apparently [already occurring in California at that point](#). By then the disease had also reached New York – via Europe. Soon it spread to other urban centers, with cases traced to both internal movement and new arrivals from around the world. U.S. residents were [reminded](#) that markets in faraway cities and students returning from study abroad can wallop health, [cripple economies](#), and hurt [national security](#).

The connectivity within and among cities is key to “superspreading events” that boost the speed of the virus’s infection rate. If COVID-19 had hit Wuhan a century ago, before the city became a hub for thousands of daily travelers heading near and far by train, bus, and air, COVID-19 would not have had such a rapid, global impact. [Where effective human mobility control measures were put in place, the spread was mitigated](#). In contrast, a mass celebration in Milan, after Italian Atalanta beat Spanish Valencia in the UEFA Champions League, contributed to the explosive spread of COVID-19 following the return of Italian and Spanish fans to their home cities. Despite relatively little testing, the [first US case in a rural county](#) was confirmed in late February. Today, the disease has been confirmed in nearly every county in the United States and virtually every nation on the planet. John Donne was mostly correct: no man is an island – especially if s/he lives in or near a city.

During the 2014 Ebola outbreak in West Africa, the United States devoted hundreds of millions of dollars to aid the fight. Billions of dollars are being allocated to COVID-19 and its near-future impacts, both domestically and globally. What of the long term? AIDS gave us Safe Sex domestically and the President’s Emergency Plan For AIDS Relief (PEPFAR) abroad. What will COVID-19 teach us? Will people [move away from big cities](#)? The answers may depend on whether this is the “once-a-century threat” that a recent [Wall Street Journal editorial](#) called it, or recurring, as the [World Economic Forum expects](#). A rare event might soon be disregarded, but cyclical pandemics will surely lead to long-lasting actions. We offer four policy recommendations for consideration:

1. **Prevention rather than response.** Expand studies to understand the biology and ecology of COVID-19 and other viruses and natural phenomena with the potential to infect humans. Early measures such as [disease surveillance](#) needs to begin before a disease crosses over. The [more we know in advance](#), the better we become at quickly developing tests, vaccines, and other remedies. The earlier we act, the less the impact.
2. **Invest in cities as critical drivers of sustainable and inclusive development.** Both challenges and opportunities abound in urban settings, yet [governments and aid organizations have not been sufficiently engaged](#). With projections that 68 percent of the

world's population will be living in urban areas by 2050, [a sustainable planet will depend on how cities grow, function and respond to stress](#). Better technology and urban policies can improve quality of life, reduce congestion, and decrease greenhouse gas emissions at home and in countries where U.S. foreign assistance is provided. The national security advantages of targeted urban investment can be broad and multilayered.

3. **Address Global Wildlife Trade.** About [70 percent of novel diseases start in animals](#), often via the illegal wildlife trade. [Eliminating wildlife trafficking](#) is a bipartisan priority for the United States. COVID-19 is a timely call to double down on efforts to enforce and expand existing international agreements on this topic.
4. **Adopt a “one health” approach.** More comprehensively, policy solutions must acknowledge that human health is tightly linked with that of other species and the environment. Not all novel diseases are coronaviruses. Many others are vector-borne, transmitted via mosquitos or ticks, many of them invasive. It is time to take [invasive species](#), which [cost the United States over 120 billion dollars every year](#), and other environmental challenges more seriously.

Whether COVID-19 does more damage in dense cities or in [rural areas that have fewer medical facilities, less financial resilience, and less stringent social distancing](#) remains to be seen. So far, the majority of cases and fatalities in this first wave of COVID-19 have been in cities. We must learn from this tragedy. There is little time to waste.

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