

Workshops June 2019

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Theme: Intelligent Border Mobility Systems

Smart Mobility



Border Solutions Alliance

Definition of Our Borders

Different type of flows

- People
- Produce
- Products
- Energy
- Health
- Illegal flows (trafficking, guns, etc.)

Need of data collection depends on the type of flow under consideration



Challenges in our border region

• Discrepancies on both sides

- Economy
- Data availability
- Infrastructure
- Policies and Goals

Data sharing

- Open format/source/frameworks for the different agencies
- Need for border-wide common data bank
- Build trust relations and data provenance



Solution Space

- Data as the enabling substrate
 - Blockchain
 - Artificial intelligence, data analytics
- System-of-Systems Approach
- Sustainability (Economic, Environmental, Social)
- Public Policy (Development and Adoption)
- Risk-based decision making models
- Commercialization pathways
 - Public-Private partnerships
 - Incentivization mechanisms
- Harmonizing Multi-stakeholders; finding common goals





Next Steps

- Identify expertise at the different entities
- Select area/sub-area leads
- Bring in industry partners and stakeholders to concretely articulate the challenges
- Settle on a timeline for meeting Feb
 6 presentation goals





Theme: Advanced Manufacturing and **Cross-Border Supply** Chains

Advanced Manufacturing and Digital Services

Breakout Session Ideas

June 7, 2019

Challenge

Creating a smart & connected cross-border supply system through the whole value chain

Sub-Challenges

- 1. Complexity of layers/actors and the adoption of new technologies system-wide
- 2. Collaboration among disciplines and between academics/industry/government
- 3. Generation of innovation IP, new firms, new kinds of jobs
- 4. Educating youth and the workforce for future economic activities
- 5. Inclusive growth minorities, small businesses, both countries
- 6. Global competition

Solutions

• Green Supply System: A Lean, No-Waste Paradigm for the U.S.-Mexico Border

• Resilient and Robust Global Supply System: Application to Sustainable Manufacturing for Better Security and Growth

• Application of Data Generated Optimization in Cross-Border Production Systems

Resilient and Robust Global Supply System; Application to Sustainable Manufacturing for Better Security and Growth

- Advanced manufacturing is innovative, intelligent, lean, green, non-conventional manufacturing.
- Why this community?
 - 1. Good cross-border relationship already exist.
 - 2. There is cultural integration across the border and acceptance of diversity.
 - 3. Number and type of industries such as microelectronics, automotive, medical, etc., exist.

4. Education institutions are engaged cross-border and already work on advanced manufacturing research with a manufacturing curriculum offering for students.

Resilient and Robust Global Supply System; Application to Sustainable Manufacturing for Better Security and Growth

Disruptive Events Supply Chain	Phenomenal Forces	Disruptive Technology Development	Market & Economic factors	Geopolitical forces & Policies	Organizational Structure & Culture	Labor
Raw						
Material						
Product						
Data						
Services						
R&D and						
Innovation						
Education and						
Training						

Resilient and Robust Global Supply System; Application to Sustainable Manufacturing for Better Security and Growth

Disruptive Events Supply Chain	Phenomenal Forces	Disruptive Technology Development	Market & Economic factors	Geopolitical forces & Policies	Organizational Structure & Culture	Labor
Raw Material	Μ	Н	L	Н	L	L
Product	Н	Н	Μ	Н	Μ	Μ
Data	Μ	L	L	Н	Μ	L
Services	M	Μ	M	L	Н	Μ
R&D and Innovation	L	Μ	Н	L	Μ	L
Education and Training	L	Η	Н	Μ	Μ	Н

Application of Data-Generated Optimization in Cross-Border Production Systems

Team

Academic Institutions

- University of Arizona; MIS dept and Arizona/Mexico Economic Indicators Project (US-sourced economic and social data for economic relations for all 4 border states)
- UCSD
- Columbia

<u>NGOs</u>

• Border Economics – San Antonio and Mexico City

Government

- Data Mexico, Ministry of Economy (coordination and presentation of data and information, datasets, economic relations on border, imports and exports
- Arizona/Mexico commission academics and govt people

<u>Industry</u>

- Cross-border business groups
- Samsung, Thermo Fisher
- Automotive parts, aerospace
- Medical devices
- A/V

Application of Data-Generated Optimization in Cross-Border Production Systems

Intellectual Merit

Using data throughout end-to-end production and supply chain to optimize, and applying data literacy across the enterprise.

- Have primary source for data, need to monitor at different levels
- Integration of data, transactional data, incorporate logistics data
- Automation across the supply system: Use ML so factory knows how to resupply itself automated lean manufacturing
- In manufacturing gathering data during production to streamline production ML to improve productivity use optimizing to create robust manufacturing network

Need case – Identify industries and companies that have most complex supply chain

Broader Impacts

What are the challenges for my company, my community, my family, that data can be used to address?

Workforce training esp. in underserved cross-border communities

Formal and informal education in primary and secondary plus for general public

Theme: Water Resources - Watersheds

MULTISCALE DRIVING FORCES SHAPING WATER RESOURCES IN A US-MEXICO TRANSBOUNDARY BASIN

A convergent research proposal on humannature interactions for a sustainable water future in a highly stressed and regulated inter-state & international basin

Hugo Gutierrez (hagutierrez@utep.edu), Brian Laub, Stacey Lyle, Anne Cross, Jesus Ochoa, Hector Rubio, Mario Olmos, Jorge Preciado

Background

nature geoscience ARTICLES https://doi.org/10.1038/s41561-019-0374-y

Human domination of the global water cycle absent from depictions and perceptions

Benjamin W. Abbott^{1*}, Kevin Bishop², Jay P. Zarnetske³, Camille Minaudo^{4,5}, F. S. Chapin III⁶, Stefan Krause⁷, David M. Hannah⁷, Lafe Conner⁸, David Ellison^{9,10}, Sarah E. Godsey¹¹, Stephen Plont^{3,12}, Jean Marçais^{13,14}, Tamara Kolbe^{2,15}, Amanda Huebner¹, Rebecca J. Frei¹, Tyler Hampton^{3,16}, Sen Gu¹⁴, Madeline Buhman¹, Sayedeh Sara Sayedi¹, Ovidiu Ursache¹⁷, Melissa Chapin⁶, Kathryn D. Henderson¹⁸ and Gilles Pinay¹⁹

Background



Fig. 3 | Diagram of the global hydrological cycle in the Anthropocene. a,b, Major water pools (expressed in 10³ km³) (**a**) and water fluxes (expressed in 10³ km³ yr⁻¹) (**b**). Uncertainty represents the range of recent estimates expressed in %. In **b**, we separate total human water use (~2410³ km³ yr⁻¹) into green (soil moisture used by human crops and rangelands, green arrows); blue (consumptive water use by agriculture, industry and domestic activity, blue arrows); and grey (water necessary to dilute human pollutants, which is represented with pink shading, pink arrows). This averaged depiction of the hydrological cycle does not represent important seasonal and interannual variation in many pools and fluxes.

Background



Fig. 4 | Some consequences of human interference with the water cycle. Although every aspect of the global hydrological cycle is influenced by a combination of climate change, land use and water use, we indicate a predominant cause by box color.

OVERARCHING GOAL: TO IDENTIFY (ACCURATELY) THE MAIN DRIVING FORCES AND MECHANISM AFFECTING WATER RESOURCES AT DIFFERENT TEMPORAL AND SPATIAL SCALES.

- To determine the extent of climate change effects on water resources (quantity and quality).
 - Effect of droughts and extreme climatic events and their intensities on water yields?
- To separate the conjunctive effects of human decisions on the use of water resources as affected by natural, social and economic constraints on both sides of the border.
 - How is water used differently under drought conditions by users and stakeholders at different temporal and spatial scales (water utilities, farmers, livestock producers, industry)?
 - How political and economic realities affect water management decisions on both countries and within each state within the basin?

COMPONENTS OF THE PROPOSAL

- Education.
- Socio-economic and anthropologic factors.
- Developing and transferring technology for data generation, processing and ingestion.
- Model validation & prediction at different scales.



OTHER COMPONENTS OF THE PROPOSAL

- Incremental engagement & agreements with stakeholders at different levels and times
- Reconciliation of human and natural dimensions of the work
- Implementation challenges clearly identified and addressed
- Flexibility (auto, revisit plan) feed back loops
- Project timeline 3 to 5 years
- Generation of a multiscale methodology

VALUES AND OUTCOMES

Stakeholders

- Better, more sustainable growth and human-ecosystems interactions.
- Balanced water budget outlooks.
- Higher value food production and improved environmental health.
- Characterization of long/short term economic outlooks as affected by both, climatic and human interactions.

CONVERGENT RESEARCH MULTI & TRANS- DISCIPLINARY TEAM

Political Scientists Economists Anthropologists Climatologist Hydrologists / Geoscientists Data and Computer scientists Agronomists Ecologists Chemists Communication / Education Scientists Artists



Source: https://www.nsf.gov/news/special_reports/big_ideas/convergent.jsp

Theme: Water Resources - Water Quality



WATER QUALITY

INTERDISCIPLINARY APPROACHES FOR

CHARACTERIZATION OF WATER QUALITY,

DEVELOPMENT OF TREATMENT TECHNOLOGIES, AND

ASSESSMENT OF HEALTH IMPACTS

30

BORDER REGION CONTEXT

- ARID AND SEMI-ARID CLIMATE: INCREASING TEMP & DECREASING PRECIP
- WATER RESOURCES: DECLINING SURFACE WATER SOURCES, LIMITED FRESH GROUNDWATER, UNKNOWN BUT PROBABLY LARGE BRACKISH GROUNDWATER
- HISTORIC USE: 70-80% BY AGRICULTURE, RELATIVELY LOW-VALUE CROPS (AND TYPICALLY NOT STAPLE CROPS)
- POPULATION: INCREASING, AND URBANIZING
- WATER TREATMENT TECHNOLOGIES: REVERSE OSMOSIS, AOPS, BIOREMEDIATION AVAILABLE BUT NOT
 WIDELY INCORPORATED
- CONVERSATIONS ABOUT WATER SCARCITY NEED TO EVOLVE TO RESILIENCE

WATER QUALITY CHALLENGES

- SALINITY
- HEAVY METALS, METALOIDS, RADIONUCLIDES
- PHARMACEUTICALS & PERSONAL CARE PRODUCTS
- INDUSTRIAL COMPOUNDS (E.G., PFOS)
- ANTI-BIOTIC RESISTANT GENES
- MICROBES

SOCIAL CHALLENGES

- DISPOSAL OF TREATMENT WASTE STREAMS TO SHARED WATER RESOURCES (E.G., EL PASO & JUAREZ TO RIO GRANDE, DIRECT EXPOSURE TO PORTS OF ENTRY), AFFECTS BOTH COUNTRIES
- AS WATER QUANTITY AND QUALITY AVAILABLE FOR AGRICULTURE DECREASE, THE AG SECTOR WILL NEED TO EVOLVE
- ADOPTION OF DIRECT POTABLE REUSE FOR URBAN DRINKING WATER SUPPLY

RESEARCH NEEDS

- CONTAMINATION SOURCE CHARACTERIZATION AROUND LARGE TWIN-CITIES (E.G, SAN DIEGO & TIJUANA, MEXICALI & CALEXICO, EL PASO & JUAREZ, DEL RIO & ACUNA, MACALLEN & REYNOSA)
- WATER RESOURCES PROTECTION STRATEGIES DEPEND ON CONTAMINATION SOURCE
- WATER TREATMENT TECHNOLOGY DECISION-SUPPORT TOOLBOX
- RISK-EXPOSURE, LONGITUDINAL HEALTH IMPACT STUDY

RESEARCH OBJECTIVES AND APPROACHES

- STUDY AREA RIO GRANDE FROM LAS CRUCES TO CHIHUAHUA
- OBJECTIVES
- 1. CHARACTERIZATION OF WATER QUALITY ANALYSIS, FATE AND TRANSPORT
 - SALINITY
 - HEAVY METALS, METALOIDS, RADIONUCLIDES
 - PESTICIDES
 - CONTAMINANTS OF EMERGING CONCERN
 - INDUSTRIAL COMPOUNDS (E.G., PFOS)
 - ANTI-BIOTIC RESISTANT GENES
 - MICROBES

RESEARCH OBJECTIVES AND APPROACHES

- 2. DEVELOPMENT OF TREATMENT TECHNOLOGIES EFFICIENCY AND FEASIBILITY
- 3. ASSESSMENT OF HEALTH IMPACTS SOCIOLOGICAL AND ECONOMICAL
- 4. OUTREACH AND EDUCATION
Theme: Water Resources - Transboundary Aquifers

Issues



SOLVE SOCIAL ISSUES DIRECTLY AFFECTING PEOPLE

HYDROLOGY ISSUES

WATER QUALITY ISSUES

Questions



What is a sustainable aquifer?



How is a sustainable aquifer defined by its actors?



What are the strategies for reaching sustainability?



How to integrate science and policy (methodology)?

Objectives



Source water protection and assessment of aquifer vulnerability



Aquifer sustainability



Watershed sustainability



Tool (Digital Twin)



Data policy problems



Approaches



Transboundary lense

Develop roadmaps TAAP – San Pedro

Digital Twin

Social science

Data Science

Sensors

Bridging narrative data with digital data

Citizen Science (data to app)

Informal



Conceptual Diagram



Data Sharing



Real Time



Informal



Mirror Sites



Long term project, expensive

Education



Change water habits



Inform and communicate water quality issues and risks

Theme: Water Resources - Urban Green Infrastructure Networks

<u>Group # 5: Transboundary urban green infrastructure networks</u> Transboundary governance for urban watershed function restoration with social-ecological impacts

<u>Goal:</u> Use the urban communities along the US-Mexico border as testbeds for evaluating the feasibility of creating connected networks of greenspace/restored ecosystems, which can provide ecosystem services and citizen engagement with nature.

<u>Governance</u>: constrains, institutions, stakeholders, decision process, funding, regulatory, hydro-diplomacy (formal & informal).

<u>Social:</u> citizen engagement, environmental education, provision of water and sanitation, recreation, non-motorized transportation (biking and walking), mental health benefits (contact with nature), reduced crime rates.

<u>Ecological:</u> ecosystem services including wildlife habitat, flood management, water quality, sediment control, groundwater recharge.

Some specific research questions

- 1. Using Rio Bosque Wetland as an existing baseline for wetland restoration along an international river, can this be replicated in Cd. Juarez and can the restoration be accelerated with more water provision?
- 2. Can restored urban wetland/riparian areas be used for recreation?
- 3. Can we restore a site via collaborations between academics, public, private, and NGO support (where NSF would not fund research/work on the Mexican side)?
- 4. Meeting SDG #6. How to achieve universal, sufficient, adequate, and full access to water?
- 5. Meeting SDG #6. How to achieve universal , sufficient, adequate, and full access to sanitation?
- 6. What are the economic, social, environmental costs of not having adequate and universal sanitation?

Some specific research questions (cont.)

- 7. In different communities along the border, analyze the feasibility of using rainwater for potable water use for underserved communities (volume, storage, and quality)
- 8. Does riparian/wetland vegetation improve water quality?
- 9. How much excess sediment that is regularly delivered to a water body from an unstable tributary can we reduce?
- 10. How to navigate the institutional landscape?
- 11. How to form partnership, collaborations, networks?
- 12. Hot to mobilize stakeholders?
- 13. Do greenspace networks in binational urban areas increase urban resilience?
- 14. <u>Environmental education question.</u> How can this project inform the public and the schools?

Some specific research questions (cont.)

- 15. <u>Modeling question.</u> In different border sister cities, what is the area extent (%, ratio) of the greenspace/built space to observe an actual impact/effect on: air quality, urban temperature, physical activity, flood/sediment control, wildlife habitat?
- 16. <u>Generalizability question:</u> Are there examples of successful transboundary urban ecological restoration zones elsewhere?

Theme: Urban and Rural Resilience

URBAN-RURAL LINKAGES AND BIOREGIONAL RESILIENCE

Measuring, Understanding and Improving Green Infrastructure and Natural Climate Solutions in the US-Mexico Border's City-Regions

• **PROBLEM**: Climate change and ecological degradation harm the cities, towns, natural and working lands of the US-Mexico Border's City-Regions. It is difficult to model prospects for resilience and sustainability at the city-region (bioregional) scale where urban-rural linkages have a vital role to play.

URBAN-RURAL LINKAGES AND BIOREGIONAL RESILIENCE

Measuring, Understanding and Improving Green Infrastructure and Natural Climate Solutions in the US-Mexico Border's City-Regions

SOLUTION (coupling fundamental and applied research):

(1) Invent, design and create a bioregional scale "Digital Twin" of a transborder City-Region. Feed this Digital Twin with input from distributed field sensors gathering data from a real-world counterpart; and

(2) Develop and continually improve/evolve this bioregionalscale Digital Twin as an interactive/ participatory resource for conducting sustainability science, planning and design through team-based civically engaged research and community science. Published at the Yale School of Forestry & Environmental Studies

The Trillion-Ton Cap: Allocating The World's Carbon Emissions

The U.N. climate panel concluded last month that carbon emissions should be capped at a trillion tons, a total the world is rapidly approaching. Now comes the hard part: How will we decide how the remaining emissions are apportioned?

BY FRED PEARCE · OCTOBER 24, 2013

More than half of the atmospheric safe space for carbon has been used up. The the trillionth ton of carbon will be emitted in Monday, May 7, 2035. http://www.trillionthtonne.org/

Explore



©2017 by National Academy of Sciences

Figure 20.3.1 Contribution of natural climate solutions (NCS) to stabilizing warming to below 2 °C. Reproduced from Bronson W. Griscom et al. PNAS 2017;114:44:11645-11650



Natural Assets and Green Infrastructure

Green Infrastructure Builds Resiliency Vegetation-based green **Build green infrastructure** infrastructure practices can like rain gardens and mitigate carbon pollution. permeable pavement to manage flooding. Reduce dependence on imported water and save money. E Let water soak into the ground to recharge local groundwater supplies. Keep water local. Capture runoff in cisterns and rain barrels to reduce municipal water use. Plant trees and green roofs to mitigate the urban heat island effect. -

5 Use living shorelines, buffers, dunes and marsh restoration to reduce the impact of storm surges.

For more information on green infrastructure, see: www.epa.gov/greeninfrastructure

Figure 20.2.1 Green Infrastructure Builds Resilience. Reproduced from EPA. 57

Environmental Protection

Agency



💛 Vacant lots 💻 Chollas Creek

Figure 20.2.2 OVGG Community Garden and Chollas Creek in the Pueblo Watershed, San Diego, CA Adapted from Google Earth, Inset Photo by Keith Pezzoli, used with permission



Ocean View Growing Grounds

Growing community through food

a neighborhood garden — www.OVGG.org — contact ovgrowinggrounds@gmail.com





Figure 20.3.2 Food Forest Planting, Ocean View Growing Grounds, Southeast San Diego. Photo by Keith Pezzoli, Used with Permission

ehp Environmental HEALTH PERSPECTIVES

November-December 2013 VOLUME 121 NUMBER11-12

Urban Gardening Managing the Risks of Contaminated Soil

FEBRUARY 2

CLIMATE CHANGE'S HOTTEST TOPIC

MATTERS

SOIL: ORGANISM HABITAT, ORGANIC WASTE RECYCLER, WATER QUALITY REGULATOR & CLIMATE CHANGE MITIGATOR

WITH PANELISTS:

RYLAND ENGELHART CAFE GRATITUDE CALLA ROSE OSTRANDER KISS THE GROUND SCOTT MURRAY ORGANIC FARMER & RESOURCE CONSERVATIONIST PABLO ROJAS RANCHER, EL MOGOR RANCH, VALLE DE GUADALUPE DR. KEITH PEZZOLI DIR., URBAN STUDIES & PLANNING, UC SAN DIEGO DAVID BRONNER C.E.O. DR. BRONNER'S DR. JUSTINE OWEN SOIL SCIENTIST, UC BERKELEY MICHELLE LERACH FOUNDER, BERRY GOOD FOOD FOUNDATION

FEBRUARY 2 | PRICE CENTER EAST, UC SAN DIEGO 5:30pm food and drinks in Foyer | 6-8pm Panel in Ballroom

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UC San Diego Center for Sustainability Science, Planning and Design (SSPAD) KISS GROUND

Commentary: How urban, rural link helps build San Diego's resilience

ut sandiegouniontribune.com/opinion/commentary/sd-utbg-farming-urban-resilience-20171026-story.html

San Diego Union-Tribune file photo

October 25, 2017



San Diego County, with thriving urban communities surrounded by long established agricultural areas, has the best of both worlds. In an expanding economy with a small town feel, San Diegans enjoy a high quality of life that includes the luxury of "getting out" of the urban bustle into the countryside, and access to locally grown farm products. We value a quality of life that requires limiting urban sprawl, recognizing what we stand to lose if we allow our farming and ranching areas to be swallowed up by urban growth.

Climate Change, population growth and the intensification of humanenvironment interactions, inequality, risks and disasters

Global & Regional Drivers

Culture change in universities increasing the value of civically engaged, placebased research

New modes of knowledge production, data science, communication and networking

Bioregional Transition Institutional, economic & societal stresses spurring "localization" as a countervailing response to globalization

Localization and the Bioregional Transition: UN, IPCC, New Urban Agenda







Figure 20.2.4 San Diego-Tijuana US-Mexico Border, Adapted from Google Earth



April 28, 2019

U.S.-Mexico Binational Border Solutions Alliance

Measuring, Understanding and Improving Natural Climate Solutions: Enabling Carbon Neutral Development through Transborder Urban-Rural Linkages and a Green Infrastructure Nexus











Category	Data	Solutions and tools
Water quality (physical, chemical, biological)	Sediment Nutrients Organics Agrochemicals	Improve health, quality of life, sanitation, habitat, green infrastructure
Water budget	Water level Discharge Evapotranspiration Soil moisture GroundwaterWater level Groundwater Water quality	Improve water management to provide for community and ecosystems needs
Landscape ecosystems	Soil moisture Carbon flux Salinity Organic matter Land use change	Implement natural climate solutions
Socio economics People moving across border (border human mobility) Economic activity (human activities)	Crossings Wait times Purchasing Agricultural production Economic output Exports and imports Water and product footprints	Provide community derived tools for border planning

Data management and improve solutions

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🔢 Apps 🖆 UCSD 🖆 Workgroups-Grants 🗁 E-books_Endnote 🗎 Courses 🗎 MySites 🗎 Images 🖆 Climate 🗎 YouTube 📄 PHOTOS 📀 Meeting re: Depar... 🗎 BtC 📄 STRAVA-FitBit 🚞 NSF BSA 🔹 🗎 Other Bookmarks





Home > Internet of Things

What is a digital twin? [And how it's changing loT, Al and more]

How does a digital twin work?

A digital twin begins its life being built by specialists, often experts in data science or applied mathematics. These developers research the physics that underlie the physical object or system being mimicked and use that data to develop a mathematical model that simulates the real-world original in digital space.

The twin is constructed so that it can receive input from sensors gathering data from a real-world counterpart. This allows the twin to simulate the physical object in real time, in the process offering insights into performance and potential problems.

https://www.networkworld.com/article/3280225/what-is-digital-twintechnology-and-why-it-matters.html

BIOREGIONAL GATEWAY

Creating a data science commons for convergence research and action aimed at making bioregions healthy, regenerative and just.



Tools for integrative mapping and geospatial analysis of the San Diego-Tijuana bioregion's built environment, working landscapes and microbiomes.

Enabling civically engaged research, citizen science and equitable participation in city and bioregional planning, policymaking and design.

Keith Pezzoli, kpezzoli@ucsd.edu April 2018



A Bioregional Center for Sustainability Science, Planning and Design S2Gateway Initiative

Asset Mapping of Vacant Land for Urban Agriculture and Green

Infrastructure

1. Site Suitability Analysis of 810 Vacant Lots for Urban Ag Use 2. Potential for Agricultural Incentive Zoning: San Diego County





← → C ☆ ③ https://bioregional.ucsd.edu/map/

🗰 Apps 📄 UCSD 📄 Workgroups-Grants 📄 E-books_Endnote 📄 Courses 🗎 MySites 📄 Images 🗁 Climate 📄 YouTube 📄 PHOTOS 🤣 Meeting re: Depar... 📄 BtC 🚔 STRAVA-FitBit 🚞 NSF BSA » 🎦 Other Bookmarks

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San Diego and Tijuana Land Use



Bioregional Science Gateway



Create "Civic Infrastructure" for bridging research and action. Thereby facilitate the "Rooted University Transition" (moving from a - c in the illustration). Integrate Civic, Green and Cyber Infrastructures as part of a 21st Century Bioregionalism

Theme: Emergency & Disaster Management



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Southwest Binational Workshop: El Paso, TX



SUSTAINED & RESILIENT BORDER MECHANISMS

Border Community Challenges to Research Questions to Research Goals





Border Community Challenges to Research Questions to Research Goals





Border Community Challenges to Research Questions to Research Goals

Challenge/s:

The central goal of this study is to identify significant barriers to binational collaboration between emergency management (EM) coordinators in El Paso and Juarez, and mechanisms for improving local to local coordination in this region. We need a deeper understanding of local-to-local EM collaboration, in order to limit the effects of a J disaster affecting city residents that could not be mitigated by authorities in the neighboring city. This collaboration is particularly important, given the unevenness and disparity of EM capabilities in C. Juarez compared to those in El Paso.

Research/Solution Goal/s:

To identify strategies to achieve a sustained and resilient mechanisms to foster stronger local-to-local binational cooperation, collaboration and operations.

- Potential data and technological solutions for improving situational awareness and coordination;
- Potential strategies for improving assessment and support for vulnerable populations.

roving situational awareness and coordination; support for vulnerable populations.

Context of the Challenge & Environment

Environmental & Variables:

- of their six capabilities for addressing them);
- Lack of shared communications and inter-operability;
- Limited collaboration agreements between municipal officials in either city;
- Lack of immediate shared resources;
- Lack of U.S. property insurance for equipment transported into Mexico; ullet
- Potential seizure of U.S. property in Mexico. \bullet

Approach/es:

Review the existing barriers to these efforts, including, information on existing geographical and weather-related vulnerabilities (insurance & NOA); perceptions of legal, institutional or cultural barriers; and documentation of existing agreements and binational protocols (EPA 2020, etc.).

Information asymmetries re: FEMA lifelines (we, in El Paso are not aware of the condition of each

Merit of the Pursuit

IM: Scholarship on disaster planning and disaster resilience has long recognized the challenges of coordinating the efforts of emergency responders, government officials, and nongovernmental humanitarian agencies in the immediate aftermath of a large-scale disaster (Birkland & DeYoungy, 2011; Burby, 2006; Koliba, Mills, & Zia, 2011).

- binational response.

Despite the extensive preparations of emergency management planners, the network of organizational actors involved in addressing a major catastrophic event are often challenged to work cooperatively with one another in the immediate days and weeks after the disaster (Comfort, 2007; Schneider, 2005).

among relevant community stakeholders, but among binational stakeholders in border communities.

Intellectual Merit

knowledge, policy and/or technology being advanced

An unstudied issue is the extent that disaster resilience in border communities depends not only on coordination with intergovernmental agencies, private stakeholders, and the public; but coordination that also involves binational agencies (local-to-local interaction). Given the urban density of this region, a large scale disaster is likely to affect communities on both sides of the border and require a

This research will provide a unique, evidence-based, community perspective on how to improve coordination in disaster planning not only





Merit of the Pursuit

Broader Impact society benefiting? How, who and in what numbers?



BI: The results from this research could reduce disaster impacts in the ELP-Juarez Region, and offer lessons for other areas of cross-border disaster planning.

Specifically, the findings from this research can improve the potentials for saving lives after a major disaster, by maximizing the mobilization of resources. This research could reduce property insurance claims in El Paso associated with a local disaster, by improving and expediting the mobilization of local response resources.



Team Science & Collaboration

This research will involve at three waves of data collection to explore the identified issues.

Firstly, data from the National Association of Insurance Commissioners (NAIC) will be examined to better articulate the threats associated with property-related disasters in this region. This data will be triangulated with NOA data to further articulate the results.

Secondly, text analysis will be performed on existing binational agreements that exist between local authorities, to identify existing capabilities and areas of potential improvement. Potential documents will include the EPA 2020 documentation, existing agreements identified by the Mayor's Office, and recommendations from interviewees.

Thirdly, qualitative, inductive research will be conducted with key El Paso-based stakeholders to further clarify potential barriers and potential solutions for local-to-local binational emergency management planning. This will involve at least 15-20 semi-structured interviews with local authorities in the borderlands. Potential respondents include respondents from the Mexican consulate, the TX Senator's office, persons doing trade work (from the El Paso Chamber of Commerce list), local EPA and FEMA officials, officials at Ft. Bliss, officials from the State public service commission, local law enforcement representatives, and representatives from the El Paso Emergency Management office.

Scope of the Work

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ANY QUESTIONS?





Theme: Health - Drug Resistance



Southwest Binational Workshop: El Paso, TX



SUPERBUGS AND DRUG RESISTANCE



Border Community Challenges to Research Questions to Research Goals



Antibiotic Resistance: A Global Threat

Antibiotic resistance requires a collaborative approach across countries to detect, prevent, and respond to these threats. Global leaders are joining CDC's AMR Challenge by committing to action across healthcare,



food, communities, and the environment (soil and water) to accelerate the fight.



Challenge

Reporting of Superbugs; Lack of Identification & Treatment Capacity-Clinician; Lack of Knowledge-Community; Origin of Infection; Cross Mobility; Unknown Pharmacy Dispensing Trends

Research/Solution Goal



Develop surveillance and implement global surveillance model for development of antibiotic resistance.





Border Community Challenges to Research Questions to Research Goals

Superbug Health Information Tracker©



ance Tracker	
a Sources	
Military Wells Waste Di	isposal
lethods les Social Media	
ariables	



Context of the Challenge & Environment

Qualitative		
	KII: Pharmac	cy, Public Health Agencies
Quantitative		
	Pharmacy data	
		What is being purchased/ how much Individual follow-up, surveys about antibio
	patterns – cross-sectional and possibly cohort	
	Environmen	tal sampling –
		Water sources (both sides of border)
		Sewage samples (both sides of border) Livestock (both sides of border)
	Medical data	
		Hospital discharge data
		Lab data
	Digital Data	
		Crowd-sourced data
		Facebook, twitter, etc. georeferenced data

Approach/es

Hospitaliclinic Waste Nospeomial dissemination otic use Servage/vater supply Vectors. Consumption? Contamination? Waste Contamination Contamination Consumption Waste_ Fight Intestion? **Contamination** Farming. Environment.



Merit of the Pursuit

Primary Research Question being addressed

- а. microbial resistance and trace the primary contributors of AMR emergence?
 - 1. Water, Livestock/ Agriculture, Humans (use patterns), Sewage

Advantages to comprehensive surveillance

- 1. Scalability to any class of drugs
- 2. Applicable to any global community
- 3. Applicable binationally and internationally

Secondary Research Questions

- How does availability of antibiotics influence the development of antibiotic resistance in a community? а.
- b. impact the quality and integrity?
- С. condition? How used? Prescription/non-prescription. Geography of where purchasers are from.
- d. crowded quarters. Healthy upon arrival but conditions facilitate transmission?

Intellectual Merit

knowledge, policy and/or technology being advanced

Can comprehensive One Health surveillance (of antibiotic use, and/or AMR bacteria) be used to identify emergent anti-

What is the lifecycle of antibiotics in the region, including disposal of unused antibiotics? How do the policies and process influence the quality and integrity of the antibiotics? (e.g. studies on prevalence of counterfeits, studies on real-world shelf-life (most lab studies show limited reduction in concentration even after a decade but are these conducted in climate controlled labs? How would our border heat

What are the antibiotic use patterns in the border communities? This would build on the birth cohort. Types of drugs purchased for what

Do the conditions in migrant housing facilities at the border facilitate AMR spread? Exchange of bacteria from many geographies. Close and



Merit of the Pursuit

Broader Impact society benefiting? How, who and in what numbers?





Overall Impact

National security and economic stability Clinical testing and treatment policy Clinical testing and treatment practice



Training opportunities

Pre-doctoral/ post-doctoral scholars Binational training opportunities



Community engagement

Binational education-clinician and community Stakeholder engagement workshops – directions forward



Team Science & Collaboration

Scope of the Work

Three main sites: California, Texas and Arizona (urban and rural) in each. Multiple community sites. Digital data, surveys, interviews and biological/environmental samples. Development of electronic framework and populate it with data. Analysis and present findings.



ANY QUESTIONS?



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Theme: Health - Chronic Disease in Border Regions



Southwest Binational Workshop: El Paso, TX



PREVENTING CHRONIC DISEASE IN BORDER CITIES AND REGIONS



Border Community Challenges to Research Questions to Research Goals

Challenge/s: High rates of chronic disease (obesity, diabetes, in border cities; access to health care; Issues of legal status; Premature death; Low-income populations have higher prevalence; Different systems and ways of accessing health care; Difficulty taking services to population; Cultural issues related to going to doctors and not using resources provided (local voucher example); crime/safety/fear keeping people from being physically active, Metabolic syndrome; Not enough focus on prevention

Research/Solution Goal/s:

- 1) regions.
 - a)
 - What causes/determinants of chronic disease are more common in border communities? b)
 - C)
 - d
 - e) What is the official approach versus what people actually do (e.g. accessing health services)

Understanding chronic disease prevalence and prevention in the unique context of U.S./Mexico border cities and

What is the profile of chronic disease (e.g. obesity, diabetes, asthma, cancer, heart disease) in border cities? What differences do we see in prevention strategies, including health education and messaging? How do differences in **urban planning and urban policy** influence chronic disease and prevention?

Context of the Challenge & Environment

Environmental & Variables:

- Chronic disease prevalence Residential profile (where you were born, how border).
 - Commuters
 - Recent arrivals
 - Mental Health
- Built environment as a key determinant (MX: IM Lara does GIS of green areas.
 - Use of automobiles
 - Physical activity
 - Safety
- Access to health services
- Health education/promotion strategies
- Individual

Residential profile (where you were born, how much time in the border, number of years established in the

Built environment as a key determinant (MX: IMIP data, Census) Commuting time, bus locations, Francisco

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Context of the Challenge & Environment

Environmental & Variables:

Prevention strategies: Amount of resources Access to prevention programs Initiatives promoted by community, impact Screenings of chronic disease and follow up questions

- Urban planning ullet
 - Incorporated health component has been done in the US •
 - Challenges in MX ●
- Official approach against what people do \bullet

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Merit of the Pursuit

IM: This work fills a critical gap in knowledge related to understanding chronic disease causes/determinants and prevention in the specific contexts of Mexico/U.S. border communities.

Intellectual Merit

knowledge, policy and/or technology being advanced

Merit of the Pursuit

Broader Impact society benefiting? How, who and in what numbers?



BI: This work should complement the work of U.S. Mexico Border Health Commission (Healthy Border 2020) and inform jurisdictions and public health agencies efforts to prevent chronic disease

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Team Science & Collaboration

Geographic scope: ideally this project would include multiple border regions such as San Diego/Tijuana, Nogales and Juarez/El Paso,
Scan of literature and secondary data
Survey of residents on both sides of border
Intercept survey of commuters to oversample this group
Description of systems, including: health care systems, prevention strategies, messaging, policies, infrastructure,
Possibly interviews or surveys of health professionals
Identify opportunities and strategies in health, education, planning, etc.

Scope of the Work

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ANY QUESTIONS?



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Theme: Health - Migration

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Southwest Binational Workshop: El Paso, TX



CROSS BORDER HEALTH MIGRATION

Problem Statement & Significance

Border Community Challenges to Research Questions to Research Goals

Challenge/s:

A broad research initiative aimed at examining cross border health utilization. Specifically focusing on: cross border pharmaceutical acquisition, cross border mobility to manage health care needs, and accessing dental hygiene services in border communities

Research/Solution Goal/s:

Strengthening and sustaining a cross border research network. Contacting health providers (dental, medical, other health providing offices) to connect directly with individuals accessing health in the U.S. and Mexico. Connecting with border populations that do not have the capability to go across the border to meet their health needs. Assuring that collaboration is binational, complimentary, and reciprocal in nature. Reconstructing border health creating infrastructure for a stronger, thriving border community.

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Context of the Challenge & Environment

Environmental & Variables:

Policies that influence health care access Socioeconomic status Administrative policies at Ports of Entry Migratory Status/ Citizenship Status Migratory Initiator/Experience

Approach/es:

Mixed methods (qualitative/quantitative), retrospectives to look at pre/post policies/ national events and their impact on health, migration patterns and how those influence health, mining existing administrative data sets



Merit of the Pursuit

cooperation as a foundation.

we can be a model for global health.

border community.

Develops a theoretical framework for examining cross border health issues.

Intellectual Merit

knowledge, policy and/or technology being advanced

- Expanding knowledge of team science and interdisciplinary work to include binational
- Offers an opportunity to better approach global health and by establishing a border initiative
- Generation of new data and data sources that speak to the unique health needs of the

Merit of the Pursuit

BI: Influential in sustaining national security

Reconstructs border health by creating infrastructure for a stronger, thriving border community.

Can foster interstate cooperation.

Reduce costs associated with chronic disease by increasing access to primary care services and medications.

Contribute to sustaining and strengthening a healthy labor force.

Improves the economies of both Mexico and US by sustaining and improving health outcomes.

Advocates for policies that are locally and stakeholder driven.

Reduces the effects of insurance coverage disparities by making health access the standard instead of the exception.

Broader Impact

knowledge, policy and/or technology being advanced

Team Science & Collaboration

Scope of the Work

Identify existing data sources that speak to health care utilization in border communities. Generate data sets from both sides of the border on health care utilization. Working with existing networks to identify directories of agencies and/or investigators who have or are currently conduction practice/research in this area.

ANY QUESTIONS?



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