Urban Water Innovations Network (UWIN) Summary of Results from the Social Equity and Environmental Justice (SEEJ) Survey of UWIN Co-investigators

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BACKGROUND

Objective: The purpose of the *Social Equity and Environmental Justice (SEEJ) Survey* was to collect ideas from co-investigators about how these two themes could be fully integrated into the Urban Water Research Network's (UWIN) research, education, and outreach activities.

Social equity refers to an equitable (fair) distribution of environmental resources among social groups that differ in socioeconomic status, such as income, occupation, education, race/ethnicity, age, gender, citizenship, and urban/peri-urban residence. *Environmental Justice (EJ)* is similarly concerned with the disparate impacts of environmental burdens and benefits that affect communities marginalized by poverty and racial prejudices (Hood 2015). The meaning of EJ extends further to recognition of the broader historical and cultural contexts that support and allow inequalities to continue to exist (Taylor 2009). The definition of environmental justice, according to the U.S. Environmental Protection Agency (2015), "is the fair treatment and *meaningful involvement of all people* regardless of race, color, culture, national origin, income and educational levels with respect to the development, implementation, and enforcement of protective environmental laws, regulations, and policies." In UWIN we are dealing with the social equity and environmental justice implications of water in urban areas.

Results from the SEEJ Survey were used to help frame a successful UWIN supplement proposal submitted to the National Science Foundation in October 2015 and approved in March 2016. Two new research activities are funded by the supplement grant. 1) We proposed to administer and analyze a household survey to address questions about the socio-spatial distribution of consumer behaviors, how water pricing policies affect people over the entire socio-economic spectrum, and how people perceive water-related pressure points and risks with respect to their health, safety, and livelihoods in urban, suburban, and peri-urban households. 2) We proposed to assemble and analyze a searchable database that will enumerate, describe, and map EJ water problems and vulnerable water constituencies in the regional UWIN hubs. The database will be built from quantitative and qualitative information (e.g., documents, surveys, maps, spreadsheets, interviews, photos, etc.) gathered from other UWIN projects and field work funded by the supplement. We also committed to create viable opportunities for meaningful engagement of EJ constituencies in the development of Blueprint indicators and solutions and to develop an EJ module for the urban water sustainability massive open online course (MOOC).

SOCIAL EQUITY AND ENVIRONMENTAL JUSTICE (SEEJ) SURVEY

Survey Administration: The SEEJ survey was conducted shortly after the August 2015 Kick Off Meeting of UWIN at Colorado State University. It consisted of 16 questions and was sent to 43 UWIN co-investigators via email with a link to Survey Monkey. Responses were collected from August 28 to September 4, 2015.

Respondents:

- Representation of all (22) UWIN projects.
- 64% response rate (n=29/43 investigators invited).
- At least two people working on each project responded; most people were working on two projects; four people were working on seven to nine projects.
- Number of respondents by region: Phoenix-Tucson-Sun Corridor (9); Baltimore-Mid-Atlantic (6); Colorado-Front Range (4); Miami-Southeast Florida (4); Los Angeles-Southern California (3); Portland-Cascadia (3).
- Field/discipline of respondents (21 identified): Civil/environmental engineers (5); Hydrology (3); Ecology (2); Environmental sciences (2); Architecture (2); Atmospheric science (2); Applied Mathematics (1); Anthropology (1); Economics (1); Geography (1); Urban Planning (1).

Data Coding: Respondents replied in their own words to questions about water hazards and water amenities that are social equity and environmental justice concerns (Q1, Q2, and Q3). These answers were coded by Harlan, who developed a set of categories for the responses. The answers were coded independently by Clark-Reyna, using the same codes. There was nearly perfect agreement between the two coders. Clark-Reyna coded the open-ended responses for Q7 and Q9 and developed the set of response categories.

Summary of Results: The results of the SEEJ survey will be used in conjunction with additional input from the whole UWIN team to help shape social equity and environmental justice activities as the project moves forward.

The SEEJ survey questions and graphic representations of complete responses from UWIN investigators are reported below in four sections: Water Hazards; Water Amenities; Household Survey of Indicators, Pressures and Solutions; and Your Team's Contributions to Research, Education and Outreach on Social Equity/Environmental Justice.

Because the research teams in each regional hub are different sizes, and different numbers of investigators responded from each region, it is more important to note the whole scope of the answers than the number of respondents in each category. We believe that every topic mentioned by respondents is something important that we should investigate as sustainable water systems are developed. Nevertheless, the larger numbers of responses in some categories probably indicate the topics that coinvestigators are better prepared to address (or have said they would address) in UWIN. The highlights below give some sense of the survey results but there is much to be discussed in follow-up conversations.

- The most commonly mentioned hazard for low-income communities was flooding because those communities are more likely to be located in floodplains. Respondents believe that urban development patterns and climate change will increase flood hazards.
- Hazards from water pollution, toxins, and water-borne diseases were also concerns that can be partially related to failures of storm water and flood management and aging infrastructure.
- The affordability of water for lower-income groups, sometimes due to the diminishing supply of clean water, was a concern. There was high awareness that water affordability and physical access to surface water are key equity variables in mediating the effects of urban heat islands and regional climate change (rising temperatures, rising sea levels, and storms). Respondents believed that affordability and access are unequally distributed across high and low income strata at city, neighborhood and household scales.
- Inequities in amenities from urban green, blue, and gray water infrastructure were explicitly recognized: lower income communities have less green space/ vegetation and less blue space/surface water to deliver the ecosystem services of cooling residential areas and for providing water recreation and aesthetics.
- The high price of real estate in locations that protect people from water hazards and provide access to water amenities were widely shared concerns. In particular, there is disproportionate location of community water recycling and storm water management in wealthy neighborhoods.
- Low-income and various minority groups were most often mentioned as environmental justice communities. Others were farmers, immigrants, lowincome cities, and people living "downstream."
- Over three-quarters of respondents said they would use information about water from a household survey. Decision-making, affordability, perceptions of risk, and consumption habits were most often mentioned. Primary reasons for selecting

survey regions should be the ability to compare and contrast diversity in geography, climate, and social characteristics.

- Approximately 80% of respondents said they were very or somewhat likely to include social equity or environmental justice concerns in their UWIN research. Between 40%-50% were very or somewhat likely to fund students to work on such problems.
- Similarly, a majority of respondents had connections to grassroots community organizations and were likely to involve them in UWIN activities.

WATER HAZARDS

Q1a. What water *hazards within the whole UWIN scope* do you think would be strategic candidates for research on social equity and/or Environmental Justice concerns? (27 respondents named 43 hazards – open-ended responses)



Figure 1. Hazard Types Identified for All of UWIN (Percent of Total EJ Hazards)

Why do you think this hazard is a priority? (examples of statements)

Floods

... "their recurrence and important role as ecosystem disturbances"

... "longstanding and well-recognized issue because of economically disadvantaged ... communities are often subject to greater health and safety risks resulting from the economic forces that drive land use patterns"

... "likely to increase due to climate change and development patterns in the target regions" (floods and water shortages)

Thermal Stress

... "hottest areas in a city are usually far away from water bodies and parks"

Supply and Cost

... "affordability because very low income people may be required to forego other essential needs"

... "cheap water for landscaping or food production would benefit low income residents"

... "in a warmer world shortage will be rampant and poor people will be less and less able to afford it"

Pollution and Disease

... "human health implications of toxins, especially for children"

... "water-borne diseases"

Q2. Can you identify *in your study region any water hazards* in communities that are particular social equity or Environmental Justice concerns? In this question, *"communities"* refers to places of various socio-spatial scales, such as neighborhoods in cities of any size or entire small cities and towns. (17 respondents named 24 hazards – open-ended responses).



Figure 2a. Hazard Types Identified by Respondents' in Own Regions (Percent of Total EJ Hazards)

Figure 2b. Number of EJ Hazard Types Reported in Respondents' Own Regions by Region



Q2. Environmental Justice *Communities* Affected by Water Hazards in Respondents' Own Regions (10 respondents named 16 specific groups – open-ended responses)



Figure 2c. Number of EJ Communities Identified

WATER AMENITIES

Q1b. What water *amenities within the whole UWIN scope* do you think would be strategic candidates for research on social equity and/or Environmental Justice concerns? Why do you think so? (17 respondents named 32 amenities – open-ended responses)



Figure 1b. Amenity Types Identified for All of UWIN (Percent of Total EJ Amenities)

Detailed Amenity Codes (some codes could fall into > 1 category)

Green Infrastructure

Cooling Parks Vegetation Storm water management Trees

Blue Infrastructure

Recreation (fishing, swimming, boating) Surface water Water amenities (misc.) Water fronts (rivers, coasts)

Safe (Clean) Drinking Water

Gray (engineered) Infrastructure Rainwater harvesting On-site recycling Resorts Real estate value Sanitation Storm water management Irrigation/misters Why do you think this amenity is a priority? (examples of statements)

Green Infrastructure

... "large-scale centralized solutions impact only certain parts of the city compared to how distributed solutions like green roofs and green infill can help reduce storm water flows . . . and simultaneously increase green space and blue space for more equity"

Blue Infrastructure

... "access to clean fresh water for fishing and swimming"

... "living near the foothills is a privilege of the wealthier class where water provides aesthetics"

... access to "waterfronts/parks because of their emerging role in a healthy microbiome"

... "an abundance of irrigated parks/swimming pools are and will continue to be located near higher-priced real estate"

Safe Drinking Water

... "downstream plains communities have greater challenge with drinking water treatment and meeting standards"

... "safe water and sanitation"

Gray Infrastructure

... on-site water recycling systems increase property values and command higher rent but I've heard that only higher-income groups receive the benefits (reliability, cooling, etc.)

... "restaurant misters are typically located in middle class neighborhoods"

Q3 Can you identify *in your study area any water amenities* in communities that are particular social equity or Environmental Justice concerns? In this question, "communities" refers to places of various socio-spatial scales, such as neighborhoods in cities of any size or entire small cities and towns. (19 respondents named 27 amenities – open-ended responses)



Figure 3a. Amenity Types Identified by Respondents in Own Regions (Percent of Total EJ Amenities)

Figure 3b. Number of EJ Amenity Types Reported in Respondents' Own Regions by Region



Q3. Environmental Justice *Communities* with Amenity Concerns in Respondents' Own Regions (15 respondents named 27 specific groups – open-ended responses)



Figure 3c. Number of EJ Communities Identified

HOUSEHOLD SURVEY OF PRESSURES, INDICATORS, AND SOLUTIONS (HPIS)

Q6 Do you anticipate that your research project(s) will want information from the cross-site household survey that we are planning to do?



Q7. If you want household survey information, what are the most important things you want to know? (Not the actual questions you would ask in the survey questions but the data you would like that help answer your research questions.) You can list between 0 and 3 topics. (17 respondents named 37 items – open-ended)



Figure 7. Type of Information Wanted from HPIS

Q7 List of Specific Responses by General Topic

Decision-making/sustainable use (10)

What is the willingness to adopt building scale reuse systems?

Likelihood of applying a GI/LID practice

What determines participation at the household level in rainwater harvesting

Are homeowners willing to increase maintenance activities (5 hours per year) to be able to use graywater for irrigation?

Resources you need to apply a GI/LID practices

Are renters or homeowners willing to pay more to have the benefit of neighborhood or building scale water recycling systems?

Willingness to pay for hazard mitigation

Willingness to invest in water and energy saving technologies and what incentives would help

Importance of water systems in decision making

Adaption decision making

Price/affordability (7)

Prices for irrigation water How affordable are water services in the city How does the price of water influence their use of water for outdoor amenities Household water bill: the socioeconomic aspect is not my bread and butter but it is necessary to quantify how much people are willing to spend on water for certain amenities Forecasts of impact on household of price increases in water Perception of water availability and cost Access to air conditioning and reduced use of air conditioning during hot periods to save money

Perceptions of risk (5)

Perceptions of waterways and risks Perceptions of risk in terms of timeframes Perception of risk (due to sea level rise) Perceptions of hazard risks Flood risk perceptions and decision thresholds

Consumption/water use (5)

Household water consumption Household water use (i.e. amount of water): the idea would be to quantify irrigation water + pool water (available for ET) Source of drinking water (tap, bottle, neighborhood fill station, etc.) Household electricity consumption Uses of water

Accessibility/distribution of amenities (4)

Water and energy supply amenities Do you have access to a natural water body for recreational use? How equitable is the distribution of use in the city? Outdoor comfort condition

Distribution of hazards (2)

Location within a 100-year or 500-year floodplain How equitable is the distribution of risk in the city?

Water as a cooling resource (2)

Ways in which water is used as a cooling resource Type and use of home cooling resources

Neighborhood green (2)

Type of green infrastructure How green is your neighborhood?

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Health (1) Experiences of people related to their health

Q8 If resources permit us to survey only 3 of the UWIN hub regions, what would be your nominations? (23 respondents named 70 choices)





Q9 Why are these regions your top priorities for a UWIN household survey?



Figure 9. Reasons for Picks

Q8 List of Specific Reasons by General Topic

Compare/contrast sites (5)

I think these provide good contrasts and climate variation.

They are arid or semi-arid. You should do at least one of these areas. Each has its fascinating characteristics. The mid-Atlantic has enormous built infrastructure problems. Miami is threatened by SLR, tropical storms, and a degrading Everglades. The Sun Corridor offers a view how a desert city(s) will cope with climate change.

Major coastal cities might make for good comparative study They are prototypes for a large number of other cities and they have diverse climates,

More social inequality (4)

Coordination with other projects/initiatives related to social dimensions of heat vulnerability and water.

I would pick areas with most socioeconomically vulnerable populations.

I'm in Colorado I think the Baltimore and Miami cases would provide more examples of issues than the others

These areas have larger inequity issues (my perception only - I am not a social scientist). I would have included Miami, but had to pick 3.

Diversity (climate, geographic) (3)

Geographic distribution, existing foundation

Large populations; varied climates; varied racial/ethnic composition Significant geographic/climatic/political/socioeconomic diversity. For example, including LA/SoCAl with the Sun Corridor may not be as palatable due to greater similarities.

Diversity (social, cultural) (3)

Diverse set of culture, climate and policy

Without looking at census data it seems that these areas have larger diversity among the populations.

Most water and economic diversity

Geography/climate (3)

Semiarid

Because our model (CSU MMF) is likely to be especially relevant to changing balance or precipitation and evaporative demand in these regions

Coastal regions affected by sea-level rise impacts

YOUR TEAM'S CONTRIBUTIONS TO RESEARCH, EDUCATION, AND OUTREACH ON SOCIAL EQUITY/ENVIRONMENTAL JUSTICE

Q5 How likely are you to include social equity or Environmental Justice research in your UWIN project(s)?



Q10 Support graduate student(s) or postdoc(s) who would contribute some of their time to SE&EJ topics within the scope of your UWIN project





Q12 Contribute to developing social equity or Environmental Justice lesson modules for an urban water MOOC or other educational outlets?



Q13 Do you have any ties with grassroots community organizations in your study area?



Q14 How likely is that you would try to involve them with your UWIN project in some way?





Q16 Are you interested in having a followup phone or email conversation with us to discuss your ideas about social equity and Environmental Justice in UWIN?



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