Poster Presentation Abstracts

*Presenters and their associations are highlighted.

❖ **Jennifer Blanks**, Andrea Roberts

Department of Landscape Architecture & Urban Planning, TAMU

A Cyber GIS-enabled Spatial Decision Support System: A Case Study on Flood Emergency Management

Abstract:

This research serves as a pilot study for beginning to locate and identify lost burial grounds of Texas Freedom Colonies. In disaster management for burial grounds, Freedom Colony graves are overlooked, despite their historical and cultural significance. The Sweet Rest Cemetery in the neighborhood of Tamina, Texas is prone to flooding due to lack of street infrastructure, lack of routine maintenance, and being located in a low, laying flood plain area. This research applies tasseled cap transformation to measure the change in land brightness, vegetation, and wetness of The Sweet Rest Cemetery using Landsat 7 ETM+ raster data files dated October 1999 and October 2017.

❖ **Natalie Coleman, Department of Civil & Environmental Engineering Department, TAMU**

Societal Impacts of Hurricane Harvey Measured through Risk Inequalities from Infrastructure Service Disruptions

Abstract:

Natural disasters place tremendous pressure on critical infrastructure systems by testing their service reliability under extreme conditions. System failures are inevitable during harsh events, and prolonged disruptions pose serious risk to the well-being of communities. However, infrastructure service disruptions will not be experienced the same way by different sub-populations, and socially vulnerable groups tend to suffer more from such disruptions. The objective of the research paper is to investigate which sociodemographic characteristics are most influential to the differences in hardship of the households due to the service losses. The temporal and physical context of this study were the transportation, communication, water, and power outages during and in the immediate aftermath of Hurricane Harvey (2017) in Harris County. The findings demonstrate the need

to integrate the social dimensions in disaster mitigation practices to make improvements on the current condition of the infrastructure systems and to address risk inequalities experienced from natural disasters.

❖ **Nicholas Diaz**, Brent Fortenberry, Wesley Highfield, Sam Brody
Department of Marine Sciences, TAMUG

Deriving First Floor Elevations within Residential Communities Located in Galveston Using UAS-based Data

Abstract:
Flood damages occur when just one inch of water enters a residential household and models of flood damage estimation are sensitive to first floor elevation (FFE). The current sources for FFEs consist of costly survey-based elevation certificates or assumptions based on the year built and foundation type. We sought to address these limitations by establishing the role of a UAS platform in deriving FFEs. A UAS was used to obtain georeferenced aerial imagery to create detailed 3D models accurate within +/- 2 cm. From these models, ground and FFE measurements can be obtained to better assess the risk and potential flood damage. Three residential communities within Galveston Island were chosen based on location, elevation differences, and structure types. Our findings show that the UAS approach is an efficient, cost-effective method establishing FFEs in residential communities to further understand flood risks at the household level.

❖ **Daniella Edey**, Courtney Thompson, Tracy Hammond, Josh Cherian
Department of Geography, TAMU

Online Local Environment Hazards Education for Young Adults Using a Social Media Platform

Abstract:
Effective natural hazards education has been found by numerous studies to reduce disaster impacts at individual and community scales. Most secondary school curricula does not cover local natural hazards or their impacts in depth. Content was developed to investigate the cognitive and emotional impacts of a natural disaster on local college students through an online education program. The resulting educational program utilized an online learning and social media platform, and the content produced focused on local hazards of Texas and used Hurricane Harvey as a case study. Each module contains a pre and post-test to assess the efficacy of the module with a risk perception survey before and after the program. Changes in their risk perceptions and content knowledge were identified after exposure to the program. The program is able to be modified for use in local high schools and elementary schools in the future.

- **Amir Esmalian**, Maitreyi Ramaswamy, Kambiz Rasoulkhani, Ali Mostafavi
Department of Civil Engineering, TAMU
Agent-based Modeling Framework for Simulating Societal Impacts of Infrastructure Service Disruptions during Disasters

Abstract:

The objective of this paper is to model and examine the impacts of different levels of infrastructure service losses caused by disasters on the households' well-being residing in a community. An agent-based simulation model was developed to capture complex mechanisms underlying households' tolerance for the service outages, including household characteristics (e.g., sociodemographic, social capital, resources, and previous disaster experience), physical infrastructure attributes, and extreme disruptive events. The rules governing these mechanisms were determined using empirical survey data collected from the residents of Harris County affected by Hurricane Harvey as well as the existing models for power outages and service restoration times. The analysis results highlighted the spatial diffusion of service risks among households living in affected areas in disasters. The proposed simulation model will provide utility agencies with an analytical tool for prioritization of infrastructure service restoration actions to effectively mitigate the societal impacts of service losses.

- **Nasir Gharaibeh,** Issac C. Oti, Cheng-Chun Lee, Marccus Hendricks, Michelle A. Meyer, Shannon Van Zandt, Jaimie Masterson, Jennifer A. Horney, Philip Berke
Department of Civil & Environmental Engineering, TAMU
Assessing the Validity and Reliability of Drainage Infrastructure Monitoring Data Obtained from Citizen Scientists

Abstract:

Data on the quality of stormwater infrastructure assets at the neighborhood level tend to be scarce or even non-existent, limiting the ability of local communities to manage these assets effectively. Participatory methods provide an opportunity for collecting these data by volunteer members of the public. However, very little is known about the validity and reliability of infrastructure data collected using participatory methods. In this presentation, we examine the validity and reliability of stormwater infrastructure monitoring data obtained from citizen scientists. The volunteer citizen scientists were high school students collecting data from their local community. The study took place in an environmental justice neighborhood in Houston with a long history of flooding. The results suggest that with adequate planning, training, and organized community engagement efforts, the validity and

reliability of data collected by citizen scientists can be comparable to data obtained from sensing instruments and trained inspectors.

❖ **Donghwan Gu**, Walter Gillis Peacock, Nathanael Rosenheim
Department of Landscape Architecture & Urban Planning, TAMU

Post-disaster Household Dislocation after Hurricane Andrew, Ike, and Matthew

Abstract:

This research explores household residential dislocation after three hurricanes: Andrew in August 1992, Ike in September 2008, and Matthew in October 2016. The decision to dislocation may be driven not only by damage to structures, but also by social factors related to vulnerability, such as ethnicity, income, and tenure. Surveys, including structural damage inspections, face-to-face interviews with residents where possible, and interviews with neighbors or residential managers where necessary, were conducted with randomly sampled housing units after each hurricane. The responses from three surveys are pooled into a single dataset to allow for analysis and comparison of factors influencing the probability of dislocation. While each hazard event was a "hurricane" the actual hazard driving damage was quite different. Hurricane Andrew, a category 5 hurricane, was primarily a wind event, Hurricane Ike, was primarily a surge event, while Hurricane Mathew, for the community of Lumberton, North Carolina was a riverine flooding event. The analyses attempt to capture the major factors shaping household dislocation: damage from wind, flooding, or both and socio-economic factors. While structural damage may be a primary factor of dislocation, other factors appear to have consequences as well. Damage type, flood depth, building type, race-ethnicity, income, and tenure were the significant factors affecting the probability of dislocation. The development of this dislocation model will help identify vulnerable residential areas in a community that have a higher probability of population loss due to household dislocation.

❖ **Christena Hoelscher,** Timothy Dellapenna, James Churchill, Zhaohui Aleck Wang, Eyal Wurgaft
Department of Oceanography, TAMU

Mapping the Migration Pattern of the Hurricane Harvey Flood Deposit on the Brazos Subaqueous Delta

Abstract:

Hurricane Harvey brought over 100 cm of rain to the lower drainage basin of the Brazos River, resulting in the highest discharge event in the river's recorded history. The purpose of this project is to delineate the Brazos subaqueous delta

flood deposit from Hurricane Harvey, and track its migration pattern. On September 10th, 2017, during the waning phase of the flood, a cruise was scheduled to collect a series of box cores across the nearshore subaqueous Brazos River Delta. Follow up cruises were scheduled to help track the migration of the flood layer. Subsequent mapping of the flood layer indicates that after initial deposition, the flood layer has migrated offshore and to the west of its original deposition site. This layer will potentially be available for re-mobilization due to active shelf processes, which will introduce nutrients and contaminates that are stored in the storm layer to the water column.

❖ **Mirsalar Kamari,** Youngjib Ham
Department of Construction Science, TAMU
Construction Site Hurricane Preparedness using Large-scale Aerial Visual Data
Abstract:

It is no wonder that construction sites, consisting of incomplete structures and unsecured resources, are recognized as one of the most vulnerable environments to severe windrelated events such as hurricanes. To better secure unstructured construction sites, this research aims at proposing a new computer vision-based method to analyze potential risk of wind-induced damages occurred in construction sites. By leveraging large-scale visual data collected from drones, potential wind-borne debris in construction sites are automatically identified, and their volume is obtained to assess the associated threat level in the context of their kinetic energy in extreme wind conditions. The proposed Imagingto-Simulation framework enables practitioners to automatically flag vulnerable objects/areas in construction sites with respect to the severity of wind events, which helps to better secure their jobsites before potential extreme events in order to minimize the associated damage in a timely manner.

❖ **Asim Bashir Khajwal,** Arash Noshadravan
Department of Civil Engineering, TAMU
A Probabilistic Hurricane Loss Model for Risk Assessment at Regional Scale
Abstract:

Hurricanes have been the most predominant cause for the loss of life and property in coastal regions of United States. The existing hurricane wind damage models often assume a prescribed mathematical structure to describe the dependency between aggregated loss and the hazard intensity in an average sense. The effect of uncertainty is introduced by treating model parameters as random variables. In our present study, a new approach is introduced, which relies on a more rigorous and reliable quantification of the involved uncertainties. In particular, the wind-

induced damage is modeled as a nonstationary stochastic process for which a probabilistic representation is constructed using polynomial expansion. The economic damage data collected by an insurance company is used to calibrate and test the predictive capability of the proposed stochastic hurricane loss model. This representation has the advantage of being based on minimal prior assumptions and constraints, in addition to being computationally less demanding.

❖ **Jessica Lee,** Shannon Van Zandt

Department of Landscape Architecture & Urban Planning, TAMU

Inequity in Stormwater Infrastructure: Findings from Houston

Abstract:

Stormwater infrastructure mitigates flooding by managing stormwater runoff and streamflow. A growing number of studies revealed the unfair distribution of stormwater infrastructure across neighborhoods. However, current research is limited by the types of infrastructure considered. To fill the gap, this study examines the distribution and network of stormwater infrastructure across diverse neighborhoods in the City of Houston, Texas with an environmental justice framework. Specifically, we analyze the distribution of open ditches and gravity main across census block groups with bivariate correlations. We compare the network of stormwater infrastructure among two underserved and two affluent neighborhoods. We hypothesize that socially vulnerable neighborhoods have more outdated open ditches and less grey infrastructure. Preliminary results support the unequal distribution of stormwater infrastructure. This study provides empirical evidence in environmental justice research to describe stormwater infrastructure as an environmental good to reduce the risk of flooding that is potentially distributed unequally across neighborhoods.

❖ Tiffany A. Radcliff, Jennifer A. Horney, Aram Dobalian, **Blanca Olivia Macareno**, Umar Y. Kabir, Cody Price, Colten Strickland

Department of Health Policy and Management, TAMU

Disaster Planning, Preparedness, & Response for Rural Long-Term Care Providers

Abstract:

The growing proportion of older adults in the United States population is a well-documented concern, with implications in health and healthcare. There is a gap in understanding how rural long-term care providers plan for and respond to disasters. This project utilized information from public sources for contextual understanding of the community, long-term care providers, and recent disaster

events and interviewed key informants around three recent disasters (i.e., Hurricane Harvey in Texas, Mendocino and

The Redwood Valley Complex Fires in California, and Coal Ash Waterway Contamination in North Carolina). Researchers analyzed interview data to describe overarching themes and lessons learned around coordination planning, staffing, infrastructure, and alternative communication methods during and after disasters. Results from this analysis will be used to guide policy and planning discussions around resource needs, preparation, response processes, and quality of care impacts of disasters in rural areas.

❖ **Robert Martin**, Mindy E. Bergman
Department of Psychological and Brain Sciences, TAMU
Hurricane Harvey, Distress, and Academic Success

Abstract:

Hurricane Harvey struck at the beginning of the academic year at TAMU. The first semester--even the first few weeks of college--are vital to college students' adjustment and success (Bowman, Jarrat, Jang, & Bono, 2018). Whereas research on natural disasters is abundant, there is limited research on natural disasters and higher education (Doyle, Lockwood, & Comiskey, 2017; Pietro, 2018). This study focuses on factors that may influence academic success of a college student population following a natural disaster. This study draws on conservation of resources theory (i.e., people act to maintain and regain economic and psychological resources; Hobfoll, 1989) and transactional stress model (i.e., when situations requiring adjustment exceed coping ability, stress increases and resources diminish; Lazarus & Folkman, 1984). Undergraduates (N = 355) completed a survey that included demographics, academic performance, personality, psychological distress, and socioeconomic status. Analyses will examine factors that influence academic performance and psychological distress.

❖ Coby Turman, Renzhe Chen, Negar Kalantar, Maria Koliou, **Anastasia Muliana**
Department of Mechanical Engineering, TAMU
Complex Freeform Shapes with Potential Hazard Mitigation Strategy

Abstract:

Contemporary architecture prominently features complex surfaces, as a means to provide aesthetically pleasing structures and to make efficient use of space. With the currently available construction materials, i.e. steel, concrete, wood, aluminum, and glass, it is challenging and costly to form complex freeform shapes. One pressing issue in architectural buildings is the ability to mitigate the impact of hazards from natural disasters. A solution that simultaneously addresses

all the above issues requires new approaches in construction material design. We consider an approach to create flexible freeform surfaces, for facades, from relatively stiff and thick panels through relief cutting, or kerfing. Because of their architected nature, kerf surfaces are expected to display a
wide range of wave propagation and energy dissipation mechanisms. Thus, the kerf surfaces offer not only the ability to generate freeform complex structures but also can incorporate intelligent hazard mitigation strategy that minimizes forces impacted on the buildings.

❖ **Trent Parker**, Ruiqing Shen, Michael O'Connor, Qingsheng Wang
McFerrin Department of Chemical Engineering, TAMU

Application of Safety Triad in Preparation for Climate Extremes Affecting the Process Industries

Abstract:

A number of incidents within the process industries have been attributed to climate extremes. The late Dr. Mannan proposed the concept of a "safety triad," which represents the three layers of an effective safety system, with deficiencies in any of the layers leading to possible incidents. Using this safety triad, past incidents in the process industries resulting from climate extremes can be investigated. From these investigations, appropriate systems and strategies can be implemented to address deficiencies in any of the layers to reduce the likelihood of similar incidents occurring in the future. This work presents a case study involving the DuPont La Porte facility toxic chemical release to demonstrate the use of the safety triad to identify deficiencies of the layers that led to the incident and propose strategies to address them.

❖ **Daniel Pilgreen**, Gerard Kyle, Ashley Moss, Richard Woodward
Department of Recreation, Parks, & Tourism Sciences. TAMU

Adapting to Climate Change: The Influence of Community Attachment on Migration Intention

Abstract:

With increasing climate instability, individuals within vulnerable communities are required to adapt to this changing environment. One adaptive response for individuals concerned about environmental threats is to migrate from the vulnerable community. This research examines the role of community attachment in the relationship between environmental concern and intent to migrate in the greater Houston, Texas area. The present study analyzed survey data from Texas Gulf Coast residents regarding concern about environmental threats, community attachment, and willingness to relocate. Findings indicate that as concern

increases, residents' intent to move from their community increases. The nature of community attachment's influence on the association between concern and displacement was more complex. Where community identification decreased the likelihood of displacement, emotional and functional bases of attachment increased respondents' propensity to move elsewhere. Although place attachment is often considered a positive aspect of a community's resilience, these suggest the possibility of it contributing to vulnerability.

❖ **Joy Semien**, Andrea Roberts
Hazard Reduction & Recovery Center, TAMU

Voiceless and Invisible: From the Mouth of Babes

Abstract:

Communities of color are often overlooked or exploited by media after disasters. Further, due to their socioeconomic conditions, a history of disinvestment, declining population, or unincorporated status, members of these communities lack the resources needed to develop sophisticated messaging to make their voices heard by media and during planning processes. As a result, communities of colors may find that their concerns and experiences during disasters have been marginalized not only in media coverage but during recovery planning and funding allocation. Some may characterize these often historic, African American communities as voiceless or invisible to the media. The paper uses the theory of communicative and advocacy planning as theoretical principles to argue the importance of giving these communities a voice in a world that continues to silence them.

This project conducted by the Texas Freedom Colonies Project and their collaborators highlights one method used to provide a voice to these voiceless communities. Sunnyside, a freedom colony, located in Houston, TX served as the case study community for this project. Within this community is a small high school named Jones Future Academy which served as the site for the study. The researchers interviewed 200 high school students (9th to 12th Graders) asking questions related to their experiences with Hurricane Harvey. The results indicated that from a child's perspective marginalized communities are not equally represented across media streams and that there is a need to address this issue. Essentially the lesson learned here is that silence is deadly.

❖ **Kijin Seong**, Clare Losey, Shannon Van Zandt
Department of Landscape Architecture & Urban Planning, TAMU

Homeowners' Long-term Residential Mobility Decisions following Recurrent Hurricanes

Limited funds and growing demand for disaster assistance dictate a broader understanding of homeowners' preferences to either rebuild or relocate from their disaster-affected homes. This study explores long-term mobility decisions of homeowners in Lumberton, North Carolina who received Hazard Mitigation Grant Program (HMGP) assistance for property acquisition, elevation, or reconstruction following Hurricane Matthew (2016). A subsequent disaster, Hurricane Florence (2018), devastated the city less than two years later, providing a unique opportunity to position mobility decisions in the context of repetitive hurricanes. The authors conducted semi-structured interviews with 15 HMGP recipients to understand their mobility decisions following Hurricane Matthew and perceptions of those decisions following Hurricane Florence. More socially vulnerable homeowners expressed concerns about the affordability of relocation. In addition, the risk of subsequent disasters, willingness to accept that risk, and a desire to remain in one's current home and/or neighborhood played a significant role in the homeowner's decision-making process.

❖ **Brianne Taylor,** M.Keith Chaffin, Aline Rodrigues Hoffmann, John F. Edwards, Angela M. Arenas-Gamboa
Department of Veterinary Pathobiology, TAMU

Immersion Foot Syndrome in Six Equids Exposed to Hurricane Floodwaters
Abstract:

Prolonged exposure to water, known as immersion foot syndrome in humans, is a phenomenon first described in soldiers during World War I and characterized by dermal ischemic necrosis. In this report, we describe the pathologic findings of a condition resembling immersion foot syndrome in five horses and one donkey with prolonged floodwater exposure during Hurricane Harvey. At necropsy, all animals had dermal defects ventral to a sharply-demarcated "water line" along the lateral trunk. In the first five animals, histologic examination revealed moderate to severe perivascular dermatitis with vasculitis and coagulative necrosis consistent with ischemia. The severity of the lesions progressed from ventral trunk to distal limbs and became more pronounced in the chronic cases. The pathophysiology of immersion foot syndrome is multifactorial and results from changes in the dermal microvasculature leading to thrombosis and ischemia. This is the first veterinary report to characterize a condition similar to immersion foot syndrome.

❖ **Jordan Walker**, Jessica Labonté
Department of Marine Biology, TAMUG

Microbial Communities and Ecosystem Recovery of Galveston Bay Post-Hurricane Harvey

Abstract:

On August 25, 2017, Hurricane Harvey made landfall then stalled over Houston, setting the record for the highest rainfall in the United States. The waters brought terrestrial, freshwater, and anthropogenic chemicals and microbes into Galveston Bay. Since microbial communities are constantly adapting to the ecosystem around them, this study aimed to characterize the impact of Hurricane Harvey on the microbial communities in the Galveston Bay using 16S rRNA genes and metagenomic data. Heterotrophs were most prevalent directly following the storm and the autotrophs rebounded to preHurricane Harvey levels over a 5-week period. Preliminary data analysis has shown that metagenomic data can provide a glimpse into the metabolism of prevalent groups. Further metagenomic analysis will provide insight into the specific metabolic pathways underpinning the recovery process of the microbial community. Understanding the effects of storms, like Harvey, and how microbial communities respond to them will help inform management and recovery efforts.

❖ **Meichen Wang**, Sara Hearon and Timothy Phillips
Department of Veterinary Integrative Biosciences, TAMU

Broad-acting Enterosorbents for Mitigation of Toxin Mixtures during Emergencies and Natural Disasters

Abstract:

Following disasters, the mobilization and redistribution of contaminants can increase the risk of exposures to mixtures of hazardous substances and impact the safety of water and food being consumed. This study is to use developed sorbents in the diet to reduce human and animal exposures to contaminants at the site of disasters. We have characterized the sorption of multiple environmental toxins including different pesticides, plasticizers and polycyclic aromatic hydrocarbons, and investigated chemical and structural mechanisms of sorption. Equilibrium isothermal analyses and dosimetry studies were conducted to derive surface capacities, affinities and enthalies, and predicted therapeutic dose for each toxin exposure. Additionally, we used a toxin-sensitive living organism (Hydra vulgaris) to confirm the safety of developed clays and their efficacy in reducing toxicities. We anticipate that a mixture of optimal sorbents developed from this study can be delivered during disasters to reduce human and animal exposure to mixtures of toxins.

❖ **Chandler Wilkins, Department of Landscape Architecture & Urban Planning, TAMU**

A Cyber GIS-enabled Spatial Decision Support System: A Case Study on Flood Emergency Management

Abstract:

This study examines the neighborhood outcome and quality of Housing Choice Voucher (HCV) recipients in Houston, Texas before and after Hurricane Harvey. The purpose of this thesis is to discover if neighborhood quality improved for HCV recipients in after Hurricane Harvey. The study revealed where HCV recipients found residence after navigating the housing market, characteristics of the new neighborhoods, amenities and services within proximity, and how those results compare to their previous residence. Neighborhood quality was distinguished by the overall culmination of factors including poverty rate, educational attainment, resources and amenities, floodplain, and social vulnerability. Resources and amenities used in this study include libraries, schools, hospitals, parks, and community centers. The results show that in comparison to original residences, HCV recipients are accessing areas of low poverty and high education attainment, however, resources and amenities are further away. Ultimately, HCV recipients were accessing higher quality neighborhoods, but distance and accessibility to resources and amenities was a tradeoff.

❖ **Abrina Williams**, Judanne Lennox-Morrison, Joy Semien, Haley Yelle, Michelle Meyer, Shannon Van Zandt, Joseph D'Angelis, Shannon Burke

Hazard Reduction & Recovery Center, TAMU

Are You Ready for Recovery? An Evidence-Based Disaster Recovery Handbook for Planners

Abstract:

Abstract: Planners and allied professionals like floodplain managers can be valuable during disaster recover using their different expertise, but there is a need for planners to understand disaster recovery processes to effectively support their communities with rebuilding and resilience. The American Planning Association (APA) and the Hazard Reduction and Recovery Center (HRRC) at Texas A&M University are collaborating to develop a recovery handbook. Together the team will develop the evidence-based handbook using qualitative and quantitative research about planners and allied professionals' experiences and educational needs related to disaster recovery. quality neighborhoods, but distance and accessibility to resources and amenities was a tradeoff.

❖ **Siyu Yu**, Matthew Malecha, Philip Berke

Department of Landscape Architecture & Urban Planning, TAMU

Examining Factors Influencing Plan Integration for Community Resilience at the District Scale in Six US Coastal Cities Using Hierarchical Linear Modeling
Abstract:

Vulnerability is growing as a result of continued development in flood-prone areas and a lack of coordinated hazard mitigation planning. The resilience of the built and natural environments is strongly influenced by the development and growth management guidance provided by a community's 'network of plans', which often includes land use, hazard mitigation, among others. The ways these multiple and independent plans interact can significantly impact community vulnerability. This study investigates the influence of a series of factors on plan integration for resilience at the district scale in six US coastal cities using Hierarchical Linear Modeling. The research questions that are examined are: What is the level of plan integration? What factors influence plan integration for resilience in six US coastal cities? Findings show that communities with a larger "temporary" population and a lower socio-economic status are less likely to incorporate hazard mitigation in local plans, controlling for community planning capacity.

❖ **Zhe Zhang**, Hao Hu, Dandong Yin, Shakil Kashem, Ruopu Li, Heng Cai, Dylan Perkins and Shaowen Wang
Department of Geography, TAMU

A Cyber GIS-enabled Spatial Decision Support System: A Case Study on Flood Emergency Management
Abstract:

With the increased frequency of natural hazards and disasters and consequent losses, it is imperative to develop efficient and timely strategies for emergency response and relief operations. A cyberGIS-enabled multi-criteria spatial decision support system is developed for supporting rapid decision-making during emergency management. It combines a high-performance computing environment (cyberGIS-Jupyter) and multicriteria decision analysis models with various types of social vulnerability indicators to solve decision problems that contain conflicting evaluation criteria in a flood emergency situation. Social media data (e.g. Twitter data) was used as an additional tool to support the decision-making process. Our case study involves two decision goals generated based on a past flood event in the city of Austin, Texas, U.S.A. As our result shows, WSM produces more diverse values and higher output category estimations than the TOPSIS model. Finally, the model was validated using an innovative questionnaire. This cyberGIS- enabled spatial decision support system allows collaborative problem solving and efficient knowledge transformation between

decision makers, where different emergency responders can formulate their decision objectives, select relevant evaluation criteria, and perform interactive weighting and sensitivity analyses.