

The 33rd Applied Geography Conference

Program and Proceedings

October 20-23, 2010

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The 33rd Applied Geography Conference

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CONFERENCE AT A GLANCE

Wednesday, 10/20/2010

2:30 pm – 5:00 pm: Downtown Fort Worth Walking Tour

5:00 pm – 7:30 pm: Registration

6:00 pm – 7:30 pm: [Keynote Session] Practicing Geography

7:30 pm – 9:30 pm: Opening Reception (Driftwood)

Thursday, 10/21/2010

7:30 am – 3:00 pm: Registration

7:30 am – 3:00 pm: Poster Presentations

8:30 am – 10:00 am: Session T11 [Retail Power Day] Map
Communication and Technology Issues

8:00 am – 10:00 am: Session T12 Education

8:30 am – 10:00 am: Session T13 Applied GIS 1

8:30 am – 10:00 am: Session T14 Physical Geography

8:30 am – 10:00 am: Session T15 Impacts of Climate Variability and
Change

10:00 am – 10:30 am: Session Break

10:00 am – 3:30 pm: Exhibition and Poster Session Open

10:30 am – 12:00 pm: Session T21 [Retail Power Day] Site Modeling

10:30 am – 12:00 pm: Session T22 Urban/Ethical Patterns in America

10:30 am – 12:00 pm: Session T23 Applied GIS 2

10:30 am – 12:00 pm: Session T24 Hazards 1: Vulnerability and Risk

10:30 am – 12:00 pm: Session T25 Severe and Extreme Weather

12:00 pm – 1:30 pm: Lunch Break

1:30 pm – 3:00 pm: Session T31 [Retail Power Day] Retail Careers and
Lessons Learned

1:30 pm – 3:00 pm: Session T32 Urban Transportation

1:30 pm – 3:00 pm: Session T33 Remote Sensing 1

1:30 pm – 3:00 pm: Session T34 Hazards2: Warning and Preparedness

1:30 pm – 3:00 pm: Session T35 Surface-Atmosphere Interaction

3:00 pm – 3:30 pm: Session Break

3:30 pm – 5:00 pm: Session T41 [Retail Power Day] Census Changes
and Issues for Applied Geography

3:30 pm – 5:00 pm: Session T42 [Retail Power Day] Ethical Issues in
Applied Geography

3:30 pm – 5:00 pm: Session T43 Remote Sensing 2

3:30 pm – 5:00 pm: Session T44 Hazards3: Perception and Impacts

3:30 pm – 5:00 pm: Session T45 Forest/Biogeography

5:00 pm – 7:00 pm: Dinner Break

7:00 pm – 9:00 pm: Conference Reception (Driftwood)

Friday, 10/22/2010

7:30 am – 12:00 pm: Registration

8:00 am – 10:00 am: Session F11 [Retail Power Day] Retail Research

8:30 am – 10:00 am: Session F12 Development and Sustainability

8:30 am – 10:00 am: Session F13 Tools for Research in Geography

8:30 am – 10:00 am: Session F14 Geography and HIV/AIDS

8:30 am – 10:00 am: Session F15 River, Aquifer, and Seawater

10:00 am – 10:30 am: Session Break

10:30 am – 12:00 pm: Session F21 [Retail Power Day] Retail Business
Education

10:30 am – 12:00 pm: Session F22 Wastes, Scrap, and Recycling Issues

10:30 am – 12:00 pm: Session F23 Emerging Innovations in
Geoinformatics

10:30 am – 12:00 pm: Session F24 Medical Geography

10:30 am – 12:00 pm: Session F25 Water and Watershed

12:00 pm – 1:30 pm: Luncheon with Keynote Speaker, Mr. Andy Taft,
President, Downtown Fort Worth, Inc.

1:30 pm – 3:00 pm: Session F31 Geographic Areas for the 2010 Census
and the American Community Survey

1:30 pm – 3:00 pm: Session F32 Urban Geography

1:30 pm – 3:00 pm: Session F33 Geographically Weighted Regression

1:30 pm – 3:00 pm: Session F34 Geographical Analysis of Crime

1:30 pm – 3:00 pm: Session F35 Resource Geography

3:00 pm – 3:30 pm: Session Break

3:30 pm – 5:00 pm: Session F41 Census Research

3:30 pm – 5:00 pm: Session F42 Urban-Rural Interface

3:30 pm – 5:00 pm: Session F43 Economic Geography

3:30 pm – 5:00 pm: Session F44 Place and Ethnicity

3:30 pm – 5:00 pm: Session F45 Water Resources

5:30 pm – 6:00 pm: Pre-Field Trip Briefing

6:30 pm – 7:30 pm: Board Meeting

Saturday, 10/23/2010

8:00 am – 2:00 pm: Field Trip (Sheraton Fort Worth Hotel Lobby)

WEDNESDAY, October 20, 2010

2:30 pm – 5:00 pm

Downtown Fort Worth Walking Tour

(Free to attend)

Donald I. Lyons and Jeff Roet, *University of North Texas*

5:00 pm – 7:30 pm

Registration

Lightcatcher Foyer

6:00 pm – 7:30 pm

Keynote Session

Practicing Geography: Careers for Enhancing Society and the Environment

Room: *Driftwood*

Organizers and Chairs:

Michael Solem, *Association of American Geographers* and

Janice Monk, *University of Arizona*

Panelists:

Richard Boehm, *Texas State University – San Marcos*

Larry Carlson, *Carlson & Associates*

Robert Czerniak, *New Mexico State University*

Kate Edwards, *Englobe Inc.*

John H. Haake, *J.H. Haake Market Research LLC*

Kingsley Haynes, *George Mason University*

Ted Payne, *USDA*

Linda Peters, *ESRI, Inc.*

Fred Shelley, *University of Oklahoma*

The AAG's Enhancing Departments and Graduate Education in Geography (EDGE) project is sponsoring a keynote session for the 2010 Applied Geography Conference in Fort Worth, Texas. The session will feature academic geographers and other professionals with experience in public and private sector employment who will discuss key issues affecting career opportunities for geographers in business, government, and non-profit (BGN) organizations.

Session chairs Michael Solem and Janice Monk will lead the panelists in a structured discussion exploring the following questions:

- 1) What are some of the important trends in labor markets, the economy, and public policy that are likely to have an impact on the careers of geographers in BGN organizations?
 - 2) How can academic departments improve the preparation of geography students with the knowledge, skills, and perspectives they will need for a successful career in BGN organizations?
 - 3) In what ways have geography departments successfully implemented internships, certificate programs, professional master's degrees, and adjunct instructors from BGN organizations to enhance career preparation and professional development?
 - 4) In what ways are BGN organizations not fully tapping the potential of geography for enhancing the work they perform? What can be done to improve awareness and appreciation among employers of what geography offers and, in turn, why they should hire geography graduates?
- The session will also explore cross-sector professional development issues and ideas for strengthening links between employers and academic geography programs.

7:30 pm – 9:30 pm

Opening Reception

Room: *Driftwood*

THURSDAY, October 21, 2010

7:30 am – 8:30 am

Map/Poster Setup

Room: *Driftwood Hallway*

Organizers: Chetan Tiwari and Pinliang Dong, *University of North Texas*; Mark Kalmbacher, *J C Penney*

8:30 am – 10:00 am

Session T1

Map Communication and Technology Issues [Retail Power Day]

Room: *Spicewood*

Panelists:

Chetan Tiwari, *University of North Texas*

Pinliang Dong, *University of North Texas*;

Mark Kalmbacher and Betty Picard, *J C Penney*

Education (8:00 am – 10:00 am)

Room: *Cap Rock*

Chair: Richard G. Boehm, *Texas State University-San Marcos*

EXAMINING CAREER PREPARATION FOR GEOGRAPHY MAJORS: A POST-GRADUATE SKILLS SURVEY

Judy Behrens, Richard Boehm, and Michael Scholz

Texas State University-San Marcos

The health of an academic discipline can, in part, be measured by its ability to attract students to undergraduate and graduate degree programs. The general effectiveness of an individual academic program can be ascertained by examining the extent to which program graduates are prepared for effective job performance and career progression. As one of the largest undergraduate geography programs in the country, with corresponding vigorous graduate and Ph.D. programs, the Department of Geography at Texas State University offers a variety of academic pathways for students to acquire the skills and competencies that are needed for successful integration into the discipline-related workforce. A post-graduate skills survey of department alumni was conducted (1) to identify valuable knowledge, skills, and training that were developed while attending Texas State, (2) to identify skills and competencies that could be added to the curricula in geography programs to enhance program

effectiveness, and (3) to gain insight into alumni employability, job satisfaction, and career progression.

USING GEOGRAPHY TO HELP TEACH HISTORY: DUAL-ENCODING HISTORY LESSON PLANS

Lisa Tabor and John Harrington, Jr., *Kansas State University*

It is startling how little most Americans know about the world. Geography education is the key to improving geographic literacy and current geography education programs are growing in number and strength. How do we teach more and better geography? Use of the psychological theory of dual-encoding to integrate geography and history lesson planning is one method to bring more geography into the classroom, given the dominant role of history in the K-12 social studies curriculum. As part of the Kansas Geographic Alliance programmatic activity, Kansas history and geography standards were assessed to identify candidate themes for development of dual-encoded lesson plans. Five workshops were delivered to share these dual-encoded lesson plans during in-service for K-12 teachers. Teachers at the workshops provided assessment and feedback of the material. We conclude that considerable progress can be made in geography education. Not only will the knowledge provided demonstrate the impact and significance of geography to history teachers but it will also advance teacher content and pedagogical knowledge, and most importantly students will learn both geography and history better.

"DEAD ENDS": RECONSIDERING THE INFLUENCE OF PLACE TO IMPROVE STUDENT LEARNING

Jennifer Speights-Binet, *Samford University*; Christa Boske, *Kent State University*; and Lillian McEnery, *University of Houston, Clear Lake*

This study explores the influence of *place* on student learning by examining the spatiality of children's lives within deep-rooted community boundaries near Martin Luther King Boulevard in a large southern metropolitan city. The analysis of data, gathered through semistructured interviews, student community map-making, field notes, and written narratives reveal that despite efforts made by school administrators to change the climate and culture of the middle school, the influence of *place* was embedded in how students understood themselves and personal aspirations. The implications suggest school leaders deepen their empathic responses and understanding regarding the significance of *place* in schooling children. This paper illustrates how a simple mental mapping exercise has the potential to affect school leadership initiatives and guide curricular and school policy decisions.

REFLECTIONS ON THE ART OF TEACHING LANDSCAPE EXPLORATION

Jeffrey William Lash, *University of Houston-Clear Lake*

How do you teach the art of landscape exploration? What's the best pedagogy for guiding a student's experience of a place? How do you help students connect myriad place-based experiences in order to synthesize geography? This paper draws on the author's reflection on these questions in the context of a ten-day geography of Texas field trip. A model linking learning theories to field-based geography education is presented and used to evaluate the effectiveness of various learning activities. The model provides geography educators with the means to assess whether or not their pedagogy will foster significant learning. Keywords: Geography, fieldwork, pedagogy, experiential education.

EDUCATION AND THE APPLIED GEOGRAPHY OF WATERSHED MANAGEMENT

Richard G. Boehm, Carmen Brysch, and Judy Behrens, *Texas State University-San Marcos*

Watershed management is an essential component of sustainability, requiring cooperative understanding and actions from a variety of citizens in vastly different geographical areas that comprise the drainage basin of a river. One of the best ways to encourage the cooperative actions necessary for quality watershed management is through education. "Geography: Teaching with the Stars," a 22-program, Internet-based professional development series for geography and environmental science educators, includes a video unit on watershed management. This program includes a classroom demonstration, print support materials, and a facilitator's guide. The program DVD will be shown and the program will be discussed. Preliminary research findings will be available and print materials will be distributed. "Geography: Teaching with the Stars" is designed to supplement the face-to-face professional development procedures of the National Geographic Society's state Alliance network. The production of the watershed management program was funded by the United States Department of Agriculture.

Applied GIS 1

Room: *Llano*

Chair: Stephanie Renee Long, *Tarrant County Community College and HDR Engineering, Inc.*

THE APPLICATION OF GIS IN THE ENVIRONMENTAL IMPACT ANALYSIS OF TRANSMISSION LINE ROUTING

Stephanie Renee Long, *Tarrant County Community College and HDR Engineering, Inc.*

In 2005, Senate Bill 20 (SB 20) required 5,880 additional megawatts by January 1, 2015 and directed the designation of Competitive Renewable Energy Zones (CREZ). This bill also ordered the Public Utility Commission of Texas (PUCT) to devise a transmission plan with enough capacity to supply customers with the additional electricity from renewable resources. Once the PUCT chose the companies to implement this plan, those companies were then able to choose consulting firms capable of delineating and evaluating possible routes for the transmission lines and preparing an Environmental Assessment (EA) and Alternative Routing Analysis for their proposed 345kv transmission line projects.

The methods used by GIS staff members from one of these consulting firms will be thoroughly discussed and will include project tasks such as GIS data collection, reconnaissance surveys, environmental constraints mapping, determination of possible route alternatives, proposed study area boundary creation, preparation for public meetings, extensive custom geoprocessing models, and development of figures to support expert testimony and document submittal.

The main goal is to demonstrate the technical ability of GIS professionals in the execution of an environmental impact analysis in regards to transmission line routing.

CAPACITY BUILDING FOR COLLABORATIVE GEOSPATIAL DATA DEVELOPMENT

Matthew J. Gerike, *University of Missouri*

Few argue the importance of having accurate, detailed, and up-to-date spatial data available for emergency response applications. However, emergency responders are only one of many users of local level spatial data. It is also costly in time and money to develop and maintain comprehensive data sets.

The Missouri GIS community developed and tested a process to overcome this problem by fostering federal, state, university, regional, and local partnerships. Working together, we built capacity for mutually beneficial spatial data development. These data development projects include creating new data, reviewing existing data, enhancing location accuracy or attribute data, maintaining the now-current data sets, and sharing these data across multiple applications.

Missouri continues to apply, develop, and amend this process. The lessons learned through implementing this process are helpful for other

states, regions, and entities looking to reconcile demands for the best possible spatial data while making do with sparse or volunteered resources.

INVESTIGATING THE GEOGRAPHICAL ACCESSIBILITY OF COMMUNITY HEALTH SERVICES IN JINAN CITY CHINA

Yu Wang and Robert Haining, *University of Cambridge*

Access to healthcare has become an important issue for worldwide medical geographers. Since the late 1990s, the Chinese government has started to develop a community health service (CHS) system with the aim of providing primary healthcare for all urban population. As part of an ongoing joint project, which studies China's CHS system from a geographical perspective, this research investigates the accessibility of community healthcare in Jinan, one of the first cities to launch a CHS in China. Firstly, a CHS-GIS platform is constructed for collecting and managing the location and service information of community health institutions across Jinan. By applying a gravity model and kernel density method, the study then measures, maps and evaluates the spatial accessibility and geographical coverage of CHS in the City. In addition, suggestions based on the findings are put forward in this study for the local health bureau to implement improvements in access to CHS.

THE ESTIMATION OF PRIMARY HEALTH CARE ACCESSIBILITY FOR ABORIGINAL RESERVES IN ALBERTA

Olesya Elikan, *University of Calgary*

The role of accessibility to primary health care and its utilization is highly dependent on characteristics of population as people have different abilities in terms of overcoming a distance. Certain demographic and socioeconomic characteristics of population such as income, age, gender and ethnicity have a strong affect on personal mobility. Presence of accessible sources affects individual decision making of utilizing health care. Aboriginal population in Alberta is known to have limited access to health care which becomes a dominating factor of chronic diseases increase. The purpose of this study is to evaluate accessibility to primary health care in the province of Alberta with focus on Aboriginal reserves. Spatial accessibility is represented by geographical distance and travel time to the health provider. In this study accessibility is measured by travel time from patients' locations to nearest primary health care provider using GIS techniques. Two models of accessibility were built based on different datasets of health providers that were available: physicians of Alberta database and health care facilities dataset that includes hospitals, long-term care centers, nursing stations, outpatient clinics and community health centers. Each of this models indicated reserves that have limited or

no access to primary care. Comparison of two models revealed differences in accessibility depending on type of provider used in the analysis and helped locating reserves that have no physicians on site and primary health care is only presented by other non-doctor professionals.

Results provide a better understanding of weaknesses within health delivery system in Aboriginal communities and allow indicating communities that require immediate attention because of their lack of access to health care and provide an effective decision support tool that can be used in regional health planning.

Physical Geography

Room: *Pheasant Ridge*

Chair: William C. Wright, *United States Military Academy*

HURRICANE IKE STORM SURGE SEDIMENTATION IN TEXAS AND LOUISIANA

Harry F. Williams, *University of North Texas*

Hurricane Ike made landfall at Galveston Texas on September 13th, 2008. A storm surge in excess of 3 m struck the upper Texas coast and part of southwest Louisiana's Chenier Plain, situated in the northeast quadrant of the landfalling hurricane. The storm surge caused widespread flooding many tens of km inland and transported large amounts of offshore and littoral sediments into nearshore subaerial environments. This study documents the character of storm surge sedimentation in southeast Texas and southwest Louisiana, based on field surveys made in January 2009. The storm surge deposit exhibits two distinct styles of deposition: thick, sandy washover fans, typically extending about 150 m inland, deposited as traction load; and a thinner, finer, more organic-rich, blanket of sediments, extending, in places, at least 2700 m inland, deposited from suspension. Preservation of the storm surge deposit was assessed by a repeat survey made in January 2010. The study findings show that storm surge sedimentation can extend a considerable distance inland and that hurricane-derived sedimentation can be a significant contributor to long-term sedimentation in nearshore environments along the Gulf Coast.

GIS-BASED ANALYSIS AND MODELLING OF COASTLINE POSITIONAL CHANGES

Sajid Rashid Ahmad and V. Chris Lakhan, *University of Windsor*

This research focussed on the utilization of geographical information systems (GIS) analysis and modelling approaches to assess, visualize and predict the positional changes in width and configuration of a dynamic coastline. Historical coastline advance and retreat data (1941-1987) from

the coast of Guyana, supplemented with Landsat TM and ETM+ data (1992 and 2006) were analyzed with the ArcGIS v. 9.2 software. With the assumption that the historical rate of coastline change provided the best estimate for predicting future changes, long-term rates of coastline change were generated with version 4.1 of the Digital Shoreline Analysis System (DSAS). The GIS results permitted visualization of sections of the coastline where temporal phase shifts could be related to spatial changes caused by either the advance or retreat of the coast. The coastline for the year 2016 was predicted with the DSAS, an extension to ArcGIS v. 9.2, thereby highlighting spatial positions along the coast where there could be occurrences of either accretion or erosion.

DEVELOPMENT AND EVALUATION OF ELEVATION PROFILES AND SLOPE MAPPING METHODS

William C. Wright and Michael D. Hendricks, *United States Military Academy*

Determining accurate slope and terrain elevation profiles are extensively used in today's society for numerous reasons. GPS and GIS provide numerous different data sources for the creation and representation of these values. Here we present two case studies where we created map products using two different techniques to represent slope and elevation profiles. The methods used are based off the availability of different data sources and availability of the information. The first site was at West Point, NY, where we used DEM data sets to generate our values. The other site was just outside Fort Greely, AK, where we used GPS to generate data. We evaluated the accuracy of different resolution DEMs, as well as, corrected versus uncorrected GPS. Here we provide our findings in the form of RMSE slope values for each dataset as compared to a survey conducted with traditional total station equipment as ground truth.

REPEAT PHOTOGRAPHY DOCUMENTS SHORT-TERM LANDSCAPE CHANGES IN GEOTHERMAL FEATURES IN YELLOWSTONE NATIONAL PARK, WYOMING

William D. Butler, *Kansas State University* and David R. Butler, *Texas State University-San Marcos*

The U.S. National Park Service (NPS) provides no information in tourist literature on the changing nature of geothermal features that visitors will see during visits to Yellowstone National Park, Wyoming. Repeat photographs were taken in 2005 and 2009 of geothermal features in the Artists Paint Pots and Mammoth Hot Springs basins, located in northern Yellowstone. Features examined include hot springs, travertine and sinter

deposits, and general basin morphology. Loci of flow at Mammoth Hot Springs shifted dramatically over the four-year period. Travertine coloration resulting from cyanobacteria colonization fluctuated with shifting hydrothermal flows. Water levels in hot springs rose and fell dramatically in both basins. Park visitors returning to a site after several years may unexpectedly see a substantially altered landscape as a result of these processes. The NPS should offer literature that prepares visitors for the likelihood of pronounced visual changes in geothermal features.

Impacts of Climate Variability and Change

Room: *Driftwood*

Chair: Kent McGregor, *University of North Texas*

ANALYSIS OF ATMOSPHERIC ANOMALIES DURING THE 2009-10 EL NIÑO EVENT AND IMPACT ON WATER RESOURCES IN THE SOUTHWEST

Kent McGregor, *University of North Texas*

In the fall of 2009, the 5th strongest El Niño event on record developed in the tropical Pacific and had a pronounced effect on weather in the U.S. during the winter and following spring. The changes in sea surface temperatures caused profound changes in atmospheric circulation patterns and produced a number of unusually strong winter storms tracking across the country. The related atmospheric anomaly patterns were reconstructed using data from the NOAA Reanalysis Model. These variables included, pressure, temperature, precipitation, vertical velocity, humidity and winds among others. The analysis produced a surprisingly complex pattern in which some parameters revealed interpretable results while some did not. One important impact was an increase winter precipitation across the southwest U.S. This is consistent with previous events and is an important input to the water resources of the region.

PREPARING FOR THE POTENTIAL EFFECTS OF CLIMATE CHANGE ON AGRICULTURAL SYSTEMS: IMPROVING RESILIENCE AND REDUCING VULNERABILITY

Desserae K. Shepston, *Texas State University-San Marcos*

Globalization has impacted the production and consumption patterns of food such that the places of production are frequently disconnected from the places of consumption, both spatially and temporally. Changes in climate will mean that global food security will depend upon the increased resilience and reduced vulnerability of agriculture social-ecological systems at local scales. Accurate assessment of agricultural systems' resilience and vulnerability will require examination of cross-scale linkages. Such assessments will be increasingly necessary to mitigate the potential

detrimental effects of climate change. I will present a framework that can be used in determining current levels of resilience and aspects of agriculture that are vulnerable to climate change. This framework will provide stakeholders with considerations for addressing the future affects of climate change on local food security. From the results of the assessments, stakeholders can then establish an action plan for increasing local food security in the face of climate change.

CLIMATE CHANGE KNOWLEDGE AND PERCEPTIONS OF TEXAS STATE UNIVERSITY GEOGRAPHY ALUMNI

Elizabeth G. Ray, *Texas State University-San Marcos*

To examine knowledge and perceptions of climate change, this study undertakes a survey of alumni of the largest academic geography program in the United States in the highest carbon dioxide emitting state in the nation. Texas State geography alumni were chosen because the programs within the Department of Geography prepare students to work in many fields expected to be impacted by climate change ranging from biogeography to urban planning. This study intends to gauge the levels of accurate knowledge and perceptions of personal and global risks from climate change to learn what perspectives they will bring to their roles as professional geographers. The state of Texas presents a relevant study area for the perceptions of climate change due to its overall contributions to global climate change and its population's vulnerability to the effects.

A college degree in geography does not presuppose either accurate knowledge of the causes and effects of climate change or the personal will to take action. This study will examine the accuracy of the graduates' knowledge and attempt to gauge their levels of concern for climate change at local and global scales. The supposition that Americans consider climate change to be a greater problem for other people and for geographically distant places than for themselves will also be investigated.

10:00 am – 10:30 am
Session Break

10:30 am – 12:00 pm

Session T2

Site Modeling [Retail Power Day]

Room: *Spicewood*

Chair: Tony Hernandez, Ryerson University

Panelists:

Larry Carlson, *Carlson & Associates*

David Huff, *University of Texas at Austin*

Tony Lea, *Environics Analytics*

Bill Black, *Louisiana State University*

Contemporary Urban and Ethical Patterns in America

Room: *Cap Rock*

Chair: Milton E. Harvey, Kent State University

Organizers: Norah Henry and John Frazier, Binghamton University

A SPATIAL DYNAMIC EXAMINATION OF ASIAN INDIANS IN AMERICAN GATEWAYS, 1980-2008

Milton E. Harvey, Kent State University, Kevin Butler, University of Akron, Norah Henry and John Frazier, Binghamton University

ASIAN INDIANS IN AMERICAN GATEWAYS: A MICRO-SCALE ASSESSMENT OF METROPOLITAN STRUCTURES

Norah Henry and John Frazier, Binghamton University, Kevin Butler, University of Akron, and Milton E. Harvey, Kent State University

SPATIO-TEMPORAL VARIATIONS OF AIR CONDITIONS AND ASTHMA HOSPITAL VISITS AMONG ETHNIC GROUPS IN MISSISSIPPI, 2003-2005

Jay Lee and Saad Algharib, Kent State University, Fazlay Faruque, University of Mississippi Medical Center, Lin J. Lee, Urban Operations Research, Inc., and John Barr, Kent State University

Applied GIS 2

Room: *Llano*

Chair: Timothy Dolney, *Pennsylvania State University, Altoona*

POLICY DRIVEN GIS - UNITING COMPLIANCE WITH MUNICIPAL INFRASTRUCTURE NEEDS

Rick Zarate, Megan Andring, and Mark Valentino, *Freese and Nichols, Inc.*; Charlotte Baldwin, *Fort Hood DPW*

Under Phase II storm water regulations, small municipal separate storm sewer system (MS4) operators, including municipalities, counties, and military installations are required to map their storm sewer systems to aid in the detection of illicit discharges. This task can be daunting for small MS4 operators that currently do not have a geographic information system (GIS) to manage their storm sewer systems. As a result, some small MS4 operators have expanded their municipal GIS to include their storm sewer systems.

Here we present information on the development of a storm sewer system GIS for the Fort Hood Military Installation in Central, Texas for compliance with Phase II storm water regulations. Mapping the storm sewer system at a military installation presents unique challenges because system design and the location of individual components vary with regard to specific military activities. Furthermore, access restrictions and training areas limit the connectivity of the overall system. For this project, the storm sewer system was mapped using a combination of high sensitivity GPS, GIS, and custom databases. The scope of mapping activities at Fort Hood was expanded to include aspects of asset management, such as conditional evaluation of storm sewer system features and collection of high precision data for future modeling and storm water master planning.

This project provides an example of how environmental policy can provide the impetus for improving municipal GIS capabilities for better planning, operations, and maintenance of public infrastructure. Viewed in this manner, compliance with Phase II storm water regulations presents an opportunity for small MS4 operators to develop a GIS assessment management system to coordinate their ongoing storm water infrastructure needs.

DRIVING DOWN CORPORATE CARBON EMISSION THROUGH ALTERNATIVE TRANSPORTATION METHODS: A GIS APPROACH

Shunfu Hu, *Southern Illinois University, Edwardsville*

In the United States, the transportation sector accounts for approximately one-third of greenhouse gas emissions and is the fastest-growing major source of greenhouse gases. Meaningful action to reduce greenhouse gas emissions requires organizations/corporations to adopt appropriate alternative transportation methods. For example, fast food restaurants such as Kentucky Fried Chicken (KFC), McDonald, and Wendy's utilize materials that need to be transported from places hundreds of miles away. This research project estimated and compared the **carbon emission (CO₂)**

for a KFC restaurant located in Glen Carbon, Illinois with three transportation methods: trucks, truck flaps, and trains. **It was found that using truck flaps could reduce CO₂ by 6% and using trains could reduce CO₂ by almost 50%.**

URBAN CARBON COUNTING

Sean Tierney, *University of North Texas*

In an effort to meet the Kyoto targets, and in accordance with the US conference of mayors climate protection agreement, cities are enacting policies aimed at carbon reduction for municipal government operations, but also private industries and residents. To baseline their emissions levels, cities are taking greenhouse gas inventory reports and the methods used to calculate emissions are varied. Comparing the divergent accounting methods used by some of the largest cities reveals the potential problems in tabulating emissions.

USING NEIGHBORHOOD STATISTICS AND HILLSHADING WITHIN GIS TO IDENTIFY POTENTIAL LOCATIONS FOR THE SEASONAL STORAGE OF SOLAR HEATING (S³H)

Timothy Dolney, *Pennsylvania State University, Altoona*

This research presents the use of GIS to identify potential locations of the Seasonal Storage of Solar Heating (S³H) within the state of Pennsylvania. The S3H utilizes a large pit to store thermal energy collected during the warm months for later use in the cold months. To maximize its overall efficiency, S3H must be built where several locational parameters occur in unison: abandoned mine lands (AMLs), institutions, soil type, and land use. These parameters were mapped using GIS with potential locations identified through the applications of neighborhood statistics. These locations were further defined using hillshades. In the end, site visitations were performed to ultimately identify potential locations.

Hazard 1: Vulnerability and Risk

Room: *Pheasant Ridge*

Organizer: Burrell Montz, *East Carolina University* and Graham A. Tobin, *University of South Florida*

Chair: Burrell Montz, *East Carolina University*

USING VULNERABILITY AND PLANNING TO MEASURE SUSTAINABILITY IN COASTAL NORTH CAROLINA

Gary Ian Monitz, *East Carolina University*

Along the coast of North Carolina, development has put tremendous stress on already delicate natural systems. Consisting almost entirely of barrier islands, this region is highly dynamic and subject to a variety of acute and chronic natural hazards. In order to continue to enjoy these areas for recreation and reap the economic benefits that they bring, it will be essential to strike a balance between human activity and nature. This can only be accomplished through effective planning and coastal management. It is argued here that sustainable coastal communities result from the combination of relatively low natural vulnerability as well as planning and management strategies aimed at effectively adapting to different types of hazards. Taking both vulnerability and planning into account, a preliminary sustainability index has been devised and is used to compare three different communities along the North Carolina coast. The results suggest that traditional mitigation strategies are insufficient and that more adaptive approaches will be necessary to sustain these communities.

EXAMINING GEOGRAPHIC VISUALIZATION AS A TECHNIQUE FOR INDIVIDUAL RISK ASSESSMENT

William M. Bass, and R. Denise Blanchard, *Texas State University-San Marcos*

This research examined the extent to which geographic visualization might serve as a technique for assessing and understanding levels of personal risk. An exercise was created, consisting of a series of five animations, representing five historical flood events in flood-prone central Texas and displayed on an Internet site along with a survey questionnaire. Three questions guided this research: 1) To what extent can individuals correctly rank levels of intensities among five historical rainfall events, and, therefore levels of risk after viewing visualizations; 2) Does professional training and experience in a hazards-related field prove to be an advantage for correctly identifying and ranking levels of risk among the rainfall events after viewing visualizations; 3) Is prior experience with a flood, or any other hazard occurrence a factor in whether individuals can correctly assess levels of risk in visualizations depicting rainfall events? Our study demonstrated that computer-interested individuals are willing and able to access website information related to historical flood events, and interact with that website in viewing, interpreting and ranking computer animations of featured events; and, for the most part, regardless of prior experience, or workplace training, can, more or less, distinguish between levels of intensity of events. However, due to the fairly recent introduction of geographic visualization in hazards research, we call for more work in this area, and have offered an extensive list of research questions for

assessing the viability of this technique for more accurate risk assessment and management at the individual level.

AN EXAMINATION OF DIFFERENTIAL VULNERABILITY TO HURRICANES AMONG COLLEGE STUDENTS

Graham A. Tobin, Jason L. Simms, and Margarethe Kusenbach,
University of South Florida

Research into the vulnerability of college students to hurricanes throughout the Southeast and Gulf regions of the USA are scarce, which is surprising given the large number at risk. An important question is whether students can be treated as a homogeneous group relative to hurricane vulnerability, or whether subgroups, based on such variables as gender, ethnicity, and socio-demographic traits play a role as established in the general population. Variation within student population vulnerabilities may necessitate different approaches to hurricane mitigation. The few studies that have been done show some variability amongst students with potential sub-grouping. Our study of 500 students uses multivariate statistical methods to examine this issue, including discriminant function analysis to determine whether or not it is possible to identify discrete subgroups within the student population. Results indicate that while some minor differences are present among certain groups, in general well-defined subgroups do not exist. These findings support the hypothesis of a “leveling effect” of higher education that creates a degree of homogeneity among students related to hurricane vulnerability.

Severe and Extreme Weather

Room: *Driftwood*

Chair: Richard W. Dixon, *Texas State University-San Marcos*

CLIMATOLOGICAL DESCRIPTION OF TORNADOES ASSOCIATED WITH GULF COAST-LANDFALLING HURRICANES (1950-2005)

Todd W. Moore and Richard W. Dixon, *Texas State University-San Marcos*

This study provides climatological descriptions of tornadoes associated with Gulf Coast-landfalling hurricanes during the period 1950 to 2005 using GIS and statistical methods. Specific climatological descriptions provided are hurricane-tornado activity per hurricane, hurricane-tornado physical characteristics, and temporal and spatial characteristics. Our analysis indicates that, while hurricane-tornadoes are a common phenomenon associated with hurricane landfalls along the Gulf coastline, their frequency is variable. Some hurricanes produce no tornadoes while others produce more than 100. Relatively weak hurricane-tornadoes and those with relatively short path-lengths and narrow path-widths are most

common. Hurricane-tornadoes occur most often in August and September, during afternoon hours, and after their associated hurricane landfall. Hurricane-tornadoes have occurred throughout the Gulf Coast region, but most are located within 200 km of the coastline. Lastly, hurricane-tornadoes are most often located to the right of their associated hurricane center, relative to directional heading.

WEEKLY VARIATION IN SEVERE THUNDERSTORM WARNINGS AND SEVERE THUNDERSTORM REPORTS

Kevin M. Barrett, and Richard W. Dixon, *Texas State University-San Marcos*

Severe thunderstorm warnings issued by the National Weather Service and severe thunderstorm reports obtained from the National Climatic Data Center were analyzed to ascertain potential bias in the issuance of warnings favoring certain days of the week. Eight National Weather Service Warning Forecast Office County Warning Areas (CWA) representing regions of Texas and Oklahoma were studied. Seven of the eight CWA show no significant trend that favors specific days of the week. The Amarillo Warning Forecast Office CWA exhibited a statistically significant trend for warnings favoring the middle part of the traditional workweek. Spatial analysis of the Amarillo CWA indicated that rural counties are less likely to receive warnings during the weekend. Results indicate that daily variations in the number of warnings have been lessened by technology through the modernization of the National Weather Service during the middle part of the 1990s.

HISTORICAL CLIMATOLOGY OF EXTREME WINTER WEATHER EVENTS IN TEXAS

Susan L. Peters, and Richard W. Dixon, *Texas State University-San Marcos*

Texas weather exhibits wide seasonal variability. Within the same year the state can be struck by a major hurricane along the coast during summer and a blizzard in the Panhandle during the winter. A typical Texas winter begins in late October and ends in early April. However, isolated events have been reported well into May. Texas experiences four different forms of extreme winter weather; blizzards, snow events, ice events and winter or "mixed" events. Winter weather is more common in the northern/northeastern regions but does every so often occur in the most southern regions of the state. The purpose of this research was to determine if there are any trends or spatial patterns to the extreme winter

weather events that have occurred over the last 50 years between 1959 and 2009.

12:00 pm – 1:30 pm
Lunch Break

1:30 pm – 3:00 pm

Session T3

Retail Careers and Lessons Learned [Retail Power Day]

Room: *Spicewood*

Chairs: Eugene Tettey-Fio, *Binghamton University* and Ken Smith, *J C Penney*

Panelists:

Eugene Tettey-Fio, *Binghamton University*

Ken Smith, *J C Penney*

John Frazier, *Binghamton University*

Larry Carlson, *Carlson & Associates*

Doug Schnell, *Panera Bread*

Clay Hallman, *Simon Property Group*

Brett Bayduss, *Site Selection Group*

Tom Dwyer, *Dutch Hill Consulting*

Matt Panfel, *International Council of Shopping Centers*

Matt Ryan, *Rockland County Planning*

While business and retail geography professionals have relied on integrating both business and geographic skills to help corporations with location strategy, real estate market analysis, and marketing, academic institutions have focused on a compartmentalized approach to training students for the field. In most cases, turf wars between various schools within the university prevent students from taking all the relevant courses to prepare them for business geography careers. In other cases courses are structured in ways that disconnect geography from business or business from geography. That geographic skills are critical to corporations has become evident as premier business schools have started incorporating geo-technology (GIS) in their curriculums and business graduates are competing with geography graduates for the same jobs. To make our graduates more competitive, they would need an expanded inventory of skills and this leads to some questions involving Business Geography Education:

- 1) How do we best prepare geography graduates for a more competitive business world?
- 2) What should we be doing besides site and real estate location analysis to level the playing field against business school graduates with geo-technology skills?
- 3) How has the field evolved over the years and in what ways?

- 4) What specific skills should recent graduates bring to the entry level job?
- 5) What should be added or taken away from the curriculum to streamline training for a more competitive market?

This panel brings together a) expert business professionals with many years of experience, b) people in academia interested in improving the chances of their graduates in business and retail geography careers and c) recent graduates to share experiences and propose ways to make academic training more relevant.

Urban Transportation

Room: *Cap Rock*

Chair: David Wong, *George Mason University*

WHY TAKING THE METRO FOR COMMUTING IN WASHINGTON, DC AREA?

Min Sun, and David Wong, *George Mason University*

The Metro system in Washington, DC is the second busiest rapid transit system in the U.S., but is also among the ones with highest fares after several fare hikes in recent years. While the public has been encouraged to take public transportation, taking the Metro with the ever increasing fares and associated costs may not seem logical. Nevertheless, the ridership has not declined with the increasing fares. In this paper, we compare the costs of commuting taking the Metro/public transportation with driving in the Fairfax County region, a suburb outside of Washington, DC. Taking the Metro/public transportation involves many possible combined modes. We identify factors determining the costs of all combined modes and develop cost surfaces. We found that without subsidies from employers, driving is the logical choice under most scenarios. If subsidies were moved, taking Metro/public transportation does not make economically sense in most cases.

GIS ANALYSIS OF THE DCTA A-TRAIN PASSENGER RAIL IN DENTON COUNTY, TEXAS

Clint C. Petty, *University of North Texas*

With increasing population in Denton County, traffic congestion is an ever worsening problem. The college campuses of the University of North Texas (UNT) and Texas Women's University in the city of Denton draw a substantial number of commuters throughout the year. The Denton County Transportation Authority's (DCTA) currently under construction A-train passenger rail, located parallel to I 35 E from Carrollton to Denton, will serve to alleviate traffic congestion in the area. In this paper, a geographic information system (GIS) will be utilized to compare current drive times to UNT with estimated travel times via the DCTA A-train. The

service area of each A-train station will also be examined in conjunction with census block data to estimate the potential rider population for which the rail service will be available. Under normal traffic conditions, it is much quicker to drive from the northwest Dallas study area to Denton. However, with certain realistically modeled traffic congestion problems, the A-train actually becomes the faster commute. Well over 500,000 people lived within a fifteen minute drive of a rail station, making the A-train a viable and accessible alternative to driving.

ASSESSING URBAN WALKABILITY: A SUITABILITY MODEL RATING EASE OF TRAVEL WITH LIMITED RELIANCE UPON PERSONAL AUTOMOBILE TRAVEL IN AUSTIN, TEXAS

David Thomas Hickman, *Texas State University-San Marcos*

Research in environmental justice and urban planning suggests that communities could benefit from increased access to safe, walkable streets. A tenant of new urbanism, walkability measures characteristics of the built environment that promote active methods of transportation. Despite a growing body of literature, the lack of a universal formula for walkability scoring creates difficulty comparing diverse regions.

This research suggests a general paradigm and exemplary application by which communities may be compared using GIS. A model of the Austin, Texas region was created that rates walkability on three major criteria: access to amenities, ease of travel, and barriers to walkability. Within this application, shortest network path to nearest city park represents the first factor; ease of travel is determined by intersection density and shortest network path to bike routes; while local crime and extreme slope variations in the topography of Austin model barriers to walkability.

THE ACCOUNT OF SPATIAL PRIVILEGES BY WORKING OUT OF TRANSPORT STRATEGIES OF REGIONS IN RUSSIA AND THE CIS

Vladimir Bugromenko, *R&C "Geogracom", Moscow, Russia*

The fresh wording of a subject of geography of transport is used: an estimation of consequences (economic, social, ecological, geopolitical, demographic, on safety) developments of territory by means of the spatial privileges created by a transport network. The modern tool for realization of such approach is the model of Integrated Transport Accessibility (ITA) which includes an assessment of two kinds of reliability – technical and topological.

On an example more, than 30 regions of Russia and the CIS where long-term transport strategy are developed, is defined that the share of topological reliability in the general reliability of transport systems

increases from 1-5 % in the developed regions to 15-18 % - in developing. It means that by means of management of spatial patterns in transport networks it is possible to get 15-18 % of effects (financial, ecological, on safety, etc.). Thus, it is answered in the affirmative on a question, whether the geometry and space topology has any cost?

The system of support of decision-making on strategic transport planning «Geogacom 6» which is introduced in many regional authorities is created. The basic sections in regional transport strategy in which spatial privileges for the population and the economy are estimated is following: the minimum transport standard, a perspective transport skeleton of territory, financial scenarios of spatial development.

Remote Sensing 1

Room: *Llano*

Chair: Mandy Munro-Stasiuk, *Kent State University*

COUNTY-LEVEL POPULATION ESTIMATION USING KNOWLEDGE-BASED CLASSIFICATION OF LANDSAT TM IMAGES AND REGRESSION MODELS

Pinliang Dong, and Anjeev Nepali, *University of North Texas*

This paper presents a knowledge-based model for classification of Landsat TM images, and linear regression and geographically weighted regression (GWR) models for county-level population estimation using classified images and 2000 census data. For efficient and effective extraction of residential areas, the knowledge-based model was built using spectral responses of Landsat TM band 4 (near infrared), band 7 (mid-infrared) and five spectral indices, namely Normalized Difference Vegetation Index (NDVI), Modified Normalized Difference Water Index (MNDVI), Normalized Difference Built-up Index (NDBI), Normalized Difference Blue Band Built-up Index (NDBBBI), and Wetness Index (WI). Results from Denton County and Collin County in Texas show that the overall image classification accuracy is over 90%, and that total population estimation errors are less than 5%.

MAPPING CAROLINA BAYS OF THE RAEFORD QUADRANGLE, HOKE COUNTY, NORTH CAROLINA

Lee Stocks, Jr., *University of North Carolina at Pembroke*

Carolina Bays are geomorphic surface features which are largely elliptical with long axes trending in a general northwest-southeast direction, found in the Atlantic Coastal Plains from Florida to New Jersey. They are generally depressed several feet with raised sand rims found on the southeast side. The vast number found in the Carolinas has led to the popularization of the name. At present, multiple genesis hypotheses attempt to explain the origin of these odd, sinkhole-like features. These range from

extraterrestrial meteor collisions, to wind and wave action forming erosive currents that create their distinctive elliptical shapes. Theories attempt to account for this uniform orientation, as well as varying sizes, distribution, ages, soils, vegetation and geology. Sizes range from a few thousand square meters to several square kilometers and can cover 50-60% of the land surface area in some quadrangles, with overlapping and truncation being common.

Missing from the literature is a concise method for mapping these features using modern high-resolution datasets in a spatial framework. In this study a geographic and spatial analysis is performed using multiple layers to explore the best data and method for mapping Carolina Bays within the USGS 1:24,000 Raeford, North Carolina Quadrangle. Derived from this case study are quantity, distribution, area, length, width, ellipticity, and orientation of mapped Carolina Bays for future spatial and morphometric exploration.

USING LANDSAT DATA TO TRACK MILPA CYCLES, YUCATAN MEXICO

David Korte, and Mandy Munro-Stasiuk, *Kent State University*

Milpa agriculture is a type of swidden agriculture practiced by the past and present day Maya. Small fields, traditionally no more than 2-5 acres, are cultivated for 2-3 years. The fields are then left fallow for 7-20 years to allow the forest to regrow. A new field is cultivated for 2-3 years and the cycle repeats itself. Ideally a field should be left fallow for at least 10 years to regenerate soil fertility and prevent soil erosion.

The economy for the modern day Maya has been migrating from sustainability to money. The goals of this project are to determine if Milpa cycles can be observed using Landsat data and how they might be changing as a result of the pressures of a money based economy.

Fields were randomly selected and tracked during a time period between 1984 and 2009. A simple Normalized Digital Vegetation Index (NDVI) was used to determine healthy vegetation and fallow fields. Preliminary results indicate that Milpa cycles are detectable using Landsat data, although based on available imagery, there is no evidence that the length of time fields are fallow is changing.

Hazard 2: Warning and Preparedness

Room: *Pheasant Ridge*

Organizers: Burrell Montz, *East Carolina University* and Graham A. Tobin, *University of South Florida*

Chair: Phil Chaney, *Auburn University*

RESPONSE TO SHORT-FUSE WARNINGS: WHAT WE KNOW AND DON'T KNOW

Burrell Montz, *East Carolina University*

Although advances in meteorological and hydrological sciences lead to more accurate and timely warnings, losses are not decreasing. We know that vulnerable populations may be unable to take appropriate action, but others simply make the wrong decision, sometimes for what are good reasons. How people make decisions under conditions of uncertainty and how and why these decisions differ among various groups, based on such factors as local circumstances, location, age, gender, and culture are important considerations. Part of one's response relates to people's perceptions, but it also involves how uncertainty is communicated. Critical to this is how various actors in the process recognize this and incorporate it into what they do (with respect to forecasts and warnings, for example). An overview of what we know can begin to move us toward focusing on those aspects of warning and warning response that are most salient to both forecasters and emergency managers.

DECISIONS TO INCLUDE HOUSEHOLD PETS IN THE EVACUATION PROCESS: A CASE STUDY OF HURRICANE GUSTAV

Courtney N. Thompson, *University of Alabama*

In this study, evacuees from the path of Hurricane Gustav were surveyed concerning their decision to include their household pets in their evacuation plans. Data were collected along two major evacuation routes within the 48-hour window prior to landfall in the southern and coastal regions of Louisiana (generally south of Interstate 10). The regions of New Orleans, Houma, and Lafayette were represented most frequently, as determined by zip code data collected from the surveys. Results revealed a majority of evacuees with pets chose to include them in their evacuation plans, highlighting the significance that household pets play in making timely evacuation decisions. Since the devastating hurricanes of 2005, changes have been made to create more friendly pet policies. This change has pointed out that we now need to research not only how to get people out of danger but also how to include their pets.

WILDFIRE HAZARD AND EGRESS POTENTIAL IN CENTRAL TEXAS NEIGHBORHOODS

Jordan Stewart, and Ron Hagelman, *Texas State University-San Marcos*

Wildfire is a common hazard in areas where urbanization encroaches on undeveloped landscapes. Populations at risk in these environments may face the need to evacuate quickly, especially if their homes are not suitable

for shelter in a fire event. Traditional suburban design, often meant to generate a sense of seclusion via non-linear street design and ubiquitous landscaping, can further complicate egress. Traffic bottlenecks during last-minute evacuations have proven deadly in both urban and suburban landscapes. This can be especially true in suburban neighborhoods embedded in the wildland-urban interface (WUI), or on the urban periphery (UP). This study analyzes the conditions of place, morphologies, and traffic bottleneck potential of suburban neighborhoods in the WUI of Austin, Texas. The purpose of this analysis is to develop a relative ranking of selected WUI neighborhoods based on their hazardousness in relation to wildfire, to investigate the influence of age/morphology on the rank of any one neighborhood, and to illustrate the potential of GIS-based traffic bottleneck analysis on the most and least hazardous neighborhoods. All neighborhoods in the study area exhibited landscape characteristics (based on the seven-point scale utilized) that could serve to thwart efficient evacuation, although many of the smaller developments proved less hazardous than the larger ones. Size of the development was a more important determinant of relative hazardousness than was age or morphology. Bottleneck analysis illuminated the evacuation inefficiencies endemic to most suburban designs as well as the utility of providing one or more exits with neighborhood-wide evacuation in mind.

Surface-Atmosphere Interactions

Room: *Driftwood*

Chair: Robert V. Rohli, *Louisiana State University*

PREDICTING FRACTIONAL SNOW COVER

Clayton J. Whitesides, Matthew H. Connolly, and Jason D. Arbogast,
Texas State University-San Marcos

Global climate change, precipitation variability, and the importance of runoff in mountainous watersheds have highlighted the importance of reliable estimations of available snow pack in recent years. Although several studies have addressed this issue, nearly all of the previous research efforts were heavily dependent on costly in-situ data collected from field surveys. In response to these data collection costs, this study employed Landsat ETM+ imagery, a USGS 30 meter DEM, fuzzy classification, and [statistical](#) techniques, to predict fractional snow covered area in Durango, Colorado. Slope, aspect, elevation, solar radiation, derived fractional snow cover, and derived LAI were processed through classification and regression tree (CART) analysis and an expert knowledge classifier. Study results suggested that LAI and elevation were the primary and secondary predictors of fractional snow covered area. Visual

comparisons of the study area and final output maps suggested that model outputs offered a reasonable approximation of ground conditions.

AN INVESTIGATION OF URBAN INFLUENCE ON PRECIPITATION IN THE SOUTHEASTERN UNITED STATES: ENHANCEMENT, BIFURCATION, AND SYNOPTIC CHARACTERISTICS

Anna Trevino, *Louisiana State University*

Urban areas have been shown to influence the amount and distribution of local and regional precipitation. This is exhibited spatially and temporally through varied precipitation amounts in and around urban regions. This study presents a framework for the analysis of precipitation anomalies due to growth in urban land cover. The first objective is dedicated to determining which cities southeast exhibit enhanced precipitation. The second objective consists of a series of spatio-temporal analyses of select cities for evidence of storm bifurcation. The movement of each event will be analyzed for evidence of urban influence using radar-derived precipitation data. If potential storm bifurcation is found, rainfall distribution will be used as a basis for a bifurcation signal. The final objective is to identify synoptic-scale circulation conditions associated with storm bifurcation. It is expected that precipitation enhancement and bifurcation may occur in large cities and may be attributable to frontal or convective systems.

CORRELATING CLIMATE WITH LATE-WINTER WETLAND HABITAT IN THE RAINWATER BASIN, SOUTH-CENTRAL NEBRASKA

Rex Michael Robichaux, and John Harrington, Jr., *Kansas State University*

The Rainwater Basin Wetland Complex of south-central Nebraska is a region of great climatic variability and tremendous ecological importance. The Rainwater Basin Wetland Complex is located at the focal point of the Central North American migratory bird flyway, and supports in excess of twelve million birds during the spring migration period. The physical landscape has been significantly altered from its pre-settlement state by agricultural conversion via the draining of over ninety percent of the native wetlands. Due to the region's highly variable continental climate, interannual wetland water levels are also highly variable and currently unpredictable. Multi-year analysis was used, including the construction of a regional water budget, to study which climatic variables play the most crucial role in the late-winter filling of wetlands. Research objectives were met by analyzing ten cold season climatic variables and an annual measure of wetland area for five years, in order to better understand possible

climatic drivers of wetland hydrologic functioning levels in March. Longer time series of winter season climatic information were also assessed to help place the recent and more detailed analysis into a longer climatic context. Research results will aid local management agencies in the future through enhanced knowledge of how climatic variation impacts wetland function. Seasonal precipitation (a positive relationship) and temperature (a negative relationship) were favored by the linear regression analysis. Annual snow storage from the hydrologic water budget analysis was highly correlated basin-wide flooded hectares.

AERODYNAMIC RESISTANCE OVER SHORT BERMUDA GRASS IN NORTHERN LOUISIANA AT THE BEGINNING OF THE GROWING SEASON

Robert V. Rohli, Yin-Lin Chiu, Vipin Kumar, Steven L., Luigi Romolo, and Theophilus K. Udeiwigwe, *Louisiana State University*

Aerodynamic resistance is an important biophysical property because it governs the rate of water loss from a vegetated surface to the atmosphere. A three-week experiment in March/April 2010 at St. Joseph Research Station in Tensas Parish, Louisiana involved the calculation of numerous micrometeorological measurements at 60-second temporal resolution. Aerodynamic resistance was computed as a function of roughness length, wind speed, and atmospheric stability. The stability estimates were based on profile measurements of wind speed and temperature within the surface boundary layer to calculate gradient Richardson number, which was then used to adjust for departures from neutral atmospheric stability using the KEYPS profile estimation. Results indicate that possible difficulties in measuring vertical wind shear may skew extreme event estimates, but that other values are within the range calculated in previous studies for similar environments. These results can assist environmental modelers in determining vulnerability to drought impacts under a variety of conditions.

3:00 pm – 3:30 pm
Session Break

3:30 pm – 5:00 pm

Session T4

Census Changes and Issues for Applied Geography [Retail Power Day]

Room: *Spicewood*

Chair: Linda Peters, *ESRI, Inc.*

Panelists:

Linda Peters, *ESRI, Inc.*

Raydele Klostermeier, *J C Penney*

Clay Hallman, *Simon Properties*

Jillian Elder, *Walgreens*

Lynn Wombold, *ESRI, Inc.*

Ethical Issues in Applied Geography [Retail Power Day]

Room: *Cap Rock*

Chair: David Daleiden, *Daleiden & Associates*

Panelists:

David Daleiden, *Daleiden & Associates*

Larry Carlson, *Carlson & Associates*

John H. Haake, *J. H. Haake Market Research*

Tom Dwyer, *Dutch Hill Consulting*

Applied Geography is a powerful resource for the retail and real estate industry. Credible geographic analytical work can make the difference between success and failure for retailers and developers alike. Millions of dollars are involved in location decisions that are permanent in nature and are investments that last for decades. With this power, the geographer is faced with ethical concerns on many occasions. The geographic analytical work is all too often, a dynamic that can be abused to sway multi-million dollar decisions. As a professional, the applied geographer's future depends on the credibility and honesty of his evaluation. Attention paid to the ethnics of our profession is critical to the future of geographers in business. Nothing exposes the business geography profession to vulnerability more than unethical analysis and conduct.

This panel will attempt to identify what is meant by ethics in applied geography – how ethnics in geographic research can be compromised and the damaging results – and how the field of

geography is perceived when unethical behavior is exhibited. We will also indicate methods to circumvent ethical pitfalls through real world examples from our experienced panel of professionals. We hope illicit reactions and have opinions discussed by all attending.

Remote Sensing 2

Room: *Llano*

Chair: Michael C. Slattery, *Texas Christian University*

USING NOAA'S HYSPLIT (HYBRID SINGLE-PARTICLE LAGRANGIAN INTEGRATED TRAJECTORY) MODEL TO PREDICT MERCURY DEPOSITION FROM COAL-FIRED POWER PLANTS IN TEXAS

Michael C. Slattery, *Texas Christian University*

This paper focuses on the atmospheric deposition of mercury (Hg) and its impact on aquatic ecosystems. First, a brief overview of studies of Hg in the environment and contamination of fishes in Texas reservoirs is given, and shows that there should be concern over current Hg levels in fish in Texas water bodies. Atmospheric modeling is then used to show that deposition of Hg from coal-fired Electricity Generating Units (EGUs), widely recognized as the largest single anthropogenic source of environmental Hg, is of widespread regional significance, even in areas where non-US sources are assumed to dominate. The dominant transport direction of the wind over Texas, coupled with the location of most of the EGUs, contributes to widespread deposition of Hg in the region, and will continue to do so if Hg emissions are not adequately controlled.

SPATIAL APPLICATION OF WEPS FOR ESTIMATING WIND EROSION IN THE PACIFIC NORTHWEST

Jincheng Gao, *Kansas State University*; Larry Wagner, *USDA-ARS*; Fred Fox, *USDA-ARS*; Serena Chung, *Washington State University*

A REMOTE SENSING ANALYSIS OF FINGER LAKES REGION VINEYARDS

Adam James Mathews, *Texas State University-San Marcos*

The use of geographic techniques like remote sensing in identifying, and inventorying and assessing agriculture is becoming more and more important to farmers and land-owners around the globe. The Finger Lakes Region of New York State is well-known for its grape cultivation and the production of fine wines. This study uses the spectral characteristics of the vineyard areas in New York State using 2-foot resolution aerial imagery to differentiate them from surrounding land uses via band calculations, layer stacking, and supervised classification. Consequently, where vineyards are

found they can be inventoried and their characteristics summarized. This study also addresses temporal change in the grape crop via Landsat 30-meter resolution satellite imagery and ground-based photographs. The Normalized Difference Vegetation Index (NDVI) is used to monitor leaf-area changes in the vineyard to coincide (ground-truth) with the photographs taken in the field.

MAPPING SALT AND SODIUM-AFFECTED SOILS IN THE SENEGAL RIVER DELTA USING LANDSAT TM DATA: A COMPARISON OF UNSUPERVISED AND SUPERVISED APPROACHES

Ramatoulaye Ndiaye, and John Harrington, Jr., *Kansas State University*

Soil salinization is an increasing problem in the deltaic region of the Senegal River in West Africa. Flows within the river fluctuate seasonally in response to warm season precipitation in the headwater area. Late 20th Century human modifications (e.g., dams to help control flooding and diversions to improve year-round water supply) have been linked to an increase in sodic soils in the delta region.

Efforts to mediate the salinization problem will benefit from accurate maps of where salt and sodium-affected soils are located. Since field work in support of supervised classification involves a time and dollar investment, this study compares supervised and unsupervised approaches to classify Landsat TM data from the dry season of 2001 and 2003. Results document an expanding salinization problem and the importance of field data collection in support of detailed analysis and mapping of digital satellite data for land resource management.

Hazard 3: Perception and Impacts

Organizers: Burrell Montz, *East Carolina University* and Graham A. Tobin, *University of South Florida*

Chair: Graham A. Tobin, *University of South Florida*

NATURAL HAZARD PERCEPTION AMONG TEXAS HILL COUNTRY VITICULTURALISTS

Christic G. Townsend, *Texas State University-San Marcos*

The State of Texas is the fifth largest wine producing state in the United States. The wine economy in Texas is largely dependent on the success of crops grown in the Texas Hill Country viticultural region, which is, territorially, the largest appellation in Texas and the second largest in the United States.

Multiple natural hazards have the potential to impact grape production in the Texas Hill Country. Occasionally one or a combination of natural hazards, including disease, hail, frost, drought, and flooding, has

been responsible for the loss of entire vintages. Here I present research findings on how grape growers perceive and prepare for natural hazards in their vineyard operations, based on interviews with eighteen vineyard operators in the Texas Hill Country. Interview information combined with an examination of local climate data provides a broad geographic picture of natural hazard perception and preparedness among viticulturalists in the Texas Hill Country.

HURRICANE AND TORNADO HAZARD COMPETENCY IN ALABAMA

Jason C. Senkbeil, *and* Diane Schneider, *University of Alabama*

The state of Alabama experiences a variety of severe weather events in all seasons. While most Alabamians have experienced or been impacted by hurricanes, tornadoes, or both, this experience may not necessarily translate into accurate hurricane and tornado hazard competency. In this research, questions about general hurricane and tornado characteristics, frequency, and hazards were administered through surveys conducted on University of Alabama students and a small population of Monroeville, AL residents. The results of both surveys suggest that student and public weather hazard competency is below average to average on a number of issues. TV meteorologists should adjust broadcasting styles and switch emphasis to a more hazard oriented and less technical theme. Emergency managers should rethink communication strategies and work to develop new messages, graphics, and methods to facilitate better warning communication and explanation.

PREVIOUS EXPERIENCE AND PREPAREDNESS DURING THE 2008 SUPER TUESDAY TORNADO DISASTER AT MACON COUNTY, TN

Phil Chaney, *and* Greg S. Weaver, *Auburn University*

This paper evaluates the preparedness and response of local residents who had previous experience with being in a tornado disaster. The study site is Macon County, Tennessee, which was hit by an EF3 tornado on 5 February 2008. The tornado's path across the county was approximately 10 miles long and 800 yards wide. Thirteen deaths were reported in the county. One hundred and twenty-seven local residents participated in a post-disaster survey that was conducted within days of the disaster. Thirty-seven of the survey participants (29%) indicated that they had previous experience. For those with previous experience, 57% did not have an emergency response plan for seeking shelter, 95% did not own an emergency weather radio, and 49% lived in a mobile home. Although 42% rated their perception of danger as high when they became aware of the tornado warning, 30% indicated that they did not believe they were in any danger.

Forest/Biogeography

Room: *Driftwood*

Chair: Richard Earl, *Texas State University-San Marcos*

GEOGRAPHIC INFORMATION SYSTEMS TO JUSTIFY CONSERVATION OF BIODIVERSITY IN COSTA RICA: METHODS OF APPROPRIATE MEASURES FOR TROPICAL CONSERVATION APPLICATIONS

Kim Ozenick, and Michael C. Slattery, *Texas Christian University*

Costa Rica has long been known as one of the pioneers in conservation. The implementation of the Payments for Ecosystem Service (PES) program in the late 1990's has been largely successful in fulfilling the country's conservation initiative, but error still arises when quantify and valuing the actual worth of ecosystems. The study focused on evaluating whether Geographic Information Systems (GIS) could prove to be an efficient tool in quantifying and evaluating biodiversity in a forest with three succession stages (primary, secondary, and unknown). While common statistical analysis did not display significance in different between biodiversity and forest structure of the 3 sites, GIS was used to examine the spatial relationships within the 3 sites. When considering succession stages, it was found that spatial analysis yielded a more holistic view of the area than traditional statistical analysis techniques. This paper discusses the methods used in mapping and spatially analyzing multiple forestry and botanical data to assess overall diversity. This assessment will ultimately aid in determine and actual monetary worth to better conservation management and policy formation in the tropics.

GRASSLAND FRAGMENTATION EFFECTS ON BURROWING OWL PRODUCTIVITY

Monique De Vries, *New Mexico State University*

Western burrowing owl (*Athene cunicularia*) population declines are primarily linked to habitat fragmentation. To study how habitat fragmentation affects sensitive species, a comparison was made between burrowing owl productivity and grassland fragmentation on the Pawnee National Grassland. Thirteen prairie dog colonies were systematically searched for burrowing owl nests and nest productivity was monitored from May to August of 2009. Aerial photographs of the area were classified and analyzed for landscape characteristics at both 600 meters and 3 kilometers around randomly selected nest sites. Landscape metrics, such as Edge Density, Variability of Patch Size, Interspersion/Juxtaposition Index, Mean Patch Size, Mean Shape Index, and Fractal Dimension, as well as vegetation composition, were used to explore burrowing owl productivity.

Grassland fragmentation and burrowing owl productivity were not strongly correlated when comparing percentage of land cover. Landscape metrics did not clearly explain productivity difference between colonies.

HOW CULTURAL AWARENESS AND INGENUITY BENEFITS FOREST STEWARDSHIP COUNCIL CERTIFICATION IN THE DEVELOPING WORLD: CASE STUDY IN ZIMBABWE, AFRICA

Maria Grace Fadiman, *Florida Atlantic University*

The movement among consumers to purchase items that are certified for social integrity and environmental sustainability is growing. Thus, it is becoming increasingly necessary for companies to earn ecocertification labels. This project analyzes an endeavor certified by the Forest Stewardship Council (FSC). Focusing on the social and environmental criteria, the research investigates a complete chain of production from trees to final products in Zimbabwe, Africa. Through understanding local cultures and ecosystems, the company has found creative methods to comply with certification standards. Examples for social integrity include: community ownership, payment in non-devaluing commodities, traditional and modern health maintenance, safety precautions and gender inclusion. In terms of the environment, this group practices: rotational felling, replanting and waste minimization through utilizing scrap wood and producing sawdust pellets. This study serves as model which companies can apply to their own production criteria in order to sustainably achieve and maintain ecocertification labeling.

WOOD RESOURCES OF THE EASTERN TEXAS HILL COUNTRY

Richard Earl, William G. Adams, and Ashley N. Naber, *Texas State University-San Marcos*

Rural landholders in the eastern Texas Hill Country are faced with the “spillover” effects of population growth in the Austin-San Antonio Corridor that increased over 30 percent between 1990 and 2010 and is expected to increase another 60 percent by 2050. More than 150 years of livestock overgrazing and fire suppression has led to massive increases in Ashe juniper, decreases in livestock carrying capacity, and reduced ground-water recharge. The decrease in livestock carrying capacity has contributed to reduced profitability of ranching that has fueled land fractionalization for exurban ranchettes and loss of wildlife habitat. “Brush management” programs increase carrying capacity and recharge but are expensive for the landowner.

This paper analyzes the potential for selling woody vegetation for charcoal (mesquite), firewood (Oak), fence posts (juniper) and powerplant

fuelwood (mesquite, oak, and juniper). Vegetation sampling at the 4,000 acre Texas State Freeman Ranch employing the point-centered quarter method and measurements of tree diameter, height, and mass provided resources per unit area for the three taxa. Using market prices provides a value of greater than \$1,000 per acre. When these values were extended to the 1.2 million acre “eastern Texas Hill Country” region, the annual supply is worth over \$1 billion and would sustain a 100 MW wood burning powerplant. Additional revenues would be provided by the additional $\frac{1}{4}$ to $\frac{1}{8}$ acre foot of useable water supply per acre and the nearly double livestock carrying capacity.

7:00 – 9:00 PM

Conference Reception

(Driftwood)

Sponsored by

Texas Christian University

FRIDAY, October 22, 2010

8:30 am – 10:00 am

Session F1

Retail Research [Retail Power Day] (8:00 am – 10:00 am)

Room: *Spicewood*

Organizer: Murray Rice, *University of North Texas*

Chair: Murray Rice, *University of North Texas*

RETAIL DEVELOPMENT AND DOWNTOWN CHANGE: SHOPPING MALL IMPACTS ON PORT HURON, MICHIGAN

Amie Dickinson, *Advance Auto Parts*; Murray Rice, *University of North Texas*

Mall openings initiate a period of tremendous change in local and regional retail landscapes. What is not necessarily obvious in such situations is the particular types of retail and service activities that were most affected by new mall introduction. In small cities in particular, the introduction of a new regional mall can have important impacts.

To study these impacts, we focus on Port Huron, Michigan and the changes associated with the 1987 opening of Birchwood Mall. Our analysis specifies the details of the mall's 20-year impact on the local retail community using relative entropy and chi-square analyses.

Our study identifies the business types most affected by the new mall development, both in the area of the mall and in downtown Port Huron. The study results provide a profile of mall development impacts, and suggest several business types best suited to revitalization programs for downtowns facing new mall competition.

NATIONAL LEVEL ANALYSIS OF 50 MAJOR U.S. DOMESTIC RETAILERS

Lawrence Joseph, *Arizona State University*

The structure of retail competition is complex. Although regionalism is widely recognized as being an important factor affecting retail trade, few studies have focused on location patterns of competitors at the US national scale. This paper analyzes the domestic spatial patterns of retail stores and competitors at the national scale to demonstrate what major domestic retailers have regional bias, as compared to their competitors. GIS tools such as spatial mean center, standard distance, and standard distance ellipse are used to analyze the locations of 50 major US retailers. Spearman's rank correlation coefficients are used to test whether the standard distance of the chains can be explained by factors such as chain

age and the total number of stores in the chain. Analyzing national spatial patterns provides insight into which chains may seek growth or retrenchment strategies. This analysis can serve as a benchmark for future trends in US domestic retailing.

INNER CITY MARKET NICHE FOR WAL-MART STORES IN METROPOLITAN LOCATIONS

Brian Ceh, and Tony Hernandez, *Ryerson University*

Our study examines the impact of a Wal-Mart store on its surrounding retail environment in an inner city neighborhood of Toronto, Canada from 1994 to 2008. Wal-Mart inherited a Woolco store location in Toronto's Dufferin Mall in 1994 as part of its entry into the Canadian market. Though suburban and exurban Wal-Marts can adversely impact main street retailing, inner city Wal-Marts may have better outcomes. For example, they might help stabilize inner city neighborhoods, limit the extent of inner city "food deserts" and potentially act as a catalyst for redevelopment. Our study found that within a few years of Wal-Mart locating a store in Dufferin Mall that taxable property revenues more than tripled and mall vacancies decreased. The mall has been gentrified and upscale stores are now being attracted. These outcomes are highly relevant to the commercial districts of struggling inner city neighborhoods across North America.

A GENERAL MODEL OF MORTGAGE FAILURE TIPPING POINT WITH AN EXAMPLE FROM SOUTHERN CALIFORNIA, 2006-2007

Guoping Huang, *Harvard University*; Stephanie Yates Rauterkus, *University of Alabama at Birmingham*; Rihcard Peiser, *Harvard University*; Grant Thrall, *University of Florida*

One of the most important problems of the mortgage crisis and the 2008 economic collapse is the contagion impact of properties in foreclosure on other neighboring properties. Mortgage default often leads to property disinvestment, vacancy, and abandonment. While one foreclosed property within a neighborhood may not endanger neighboring properties, several homes in a neighborhood may tip the scales whereby a vicious cycle of disinvestment and deterioration begins. The present paper investigates whether or not this vicious cycle is manifest where mortgage failures multiply, and if so, to determine if there is a point at which the downward cycle accelerates – in other words, is there a tipping point related to mortgage default?

We investigate the impact that mortgage default has on properties in the same zipcode and neighboring zipcodes using data for the Los Angeles

metropolitan area for the period 2003-2008. We hypothesize that neighborhoods' susceptibility to cascade failure can be measured by the rate of acceleration of mortgage failures within the neighborhood. First we present a model of change and the rate of change of mortgage failure for a small geographic area. Second, we present a model of change and the rate of change of mortgage failure for a surrounding geographic area. Third, we examine the different socio-economic compositions of different neighborhoods on the resiliency or susceptibility to mortgage failure. Finally, we interpret how the implications of our model can guide private investment decisions and public policy analysis.

RETAIL LOCATION AND RESIDENTIAL GENTRIFICATION

John H. Haake, *J. H. Haake Market Research*

Residential gentrification refers to the revitalization of the housing stock of previously neglected, low-cost housing in urban neighborhoods. Neighborhoods experiencing gentrification exhibit changing demographics characteristics and an increasing demand for retail goods and services. This paper develops a methodology for defining and analyzing the residential gentrification process in the US and its implications for retailing. A generalized model that defines and identifies the developmental stages and spatial pattern of gentrification is discussed. The demographic characteristics and retail location opportunities for each of the stages of gentrification are also examined. Finally, the methodology is illustrated by applying it to a specific metropolitan area.

Development and Sustainability

Room: *Cap Rock*

Chair: Lisa M. B. Harrington, *Kansas State University*

GREENING SMALL BUSINESS IN SPOKANE, WA: A CASE STUDY IN UNIVERSITY-COMMUNITY ENGAGEMENT IN SUSTAINABILITY

William J. Kelley, *Eastern Washington University*

Several cities in the U.S. have recently developed programs to encourage and recognize "green business practice" among their commercial and industrial sectors. Typically, the programs focus on business practices that reduce energy, waste, and pollution along with encouraging alternative travel modes. This case examines such an initiative in Spokane, WA and the collaborative partnership the program has with a research and service center at Eastern Washington University.

The case describes assessment and recognition approaches, business receptivity, benefits and levels of effort in service learning, and ongoing

challenges in measuring long term sustainability outcomes. The case also explores the role “trust” plays in the interaction of participants.

SUSTAINABLE DEVELOPMENT: THE OPPORTUNITIES AND CHALLENGES IN REBUILDING TORNADO-IMPACTED GREENSBURG, KS AS "STRONGER, BETTER, AND GREENER"

Bimal K. Paul, *Kansas State University*

After an EF-5 tornado destroyed 95% of aging, declining Greensburg, Kansas on May 4, 2007, the city officials took the opportunity to rebuild this community by encouraging alternative practices and recommending energy-efficiency housing in a new Sustainable Comprehensive Plan. Using information collected from both primary and secondary sources for nearly three years, this paper outlines the lessons learned in Greensburg regarding the necessary processes that must take place in order to rebuild in a sustainable way. Specifically, it provides valuable insights regarding the opportunities and challenges Greensburg city officials have been confronting in rebuilding this community as “stronger, better, and greener.” Whether or not impacted by an extreme natural event, these lessons will provide helpful guide for small communities looking to be sustainable in some form or another.

LOCAL LAND USE DEVELOPMENT AGREEMENTS IN CALIFORNIA

Betty Elaine Smith, *Eastern Illinois University*

A California development agreement is a negotiated contract between a city or county and developer applicant that assures for a specified time period the developer’s land use entitlements in exchange for various city or county benefits provided by the developer. Over the years, city and county governments met with mixed degrees of success for a number of reasons including 1) level of sophistication in the use of development agreements, 2) value of local resources and markets (housing, commercial, and industrial), 3) regional economic conditions, 4) local growth philosophy, and 5) financial stability of involved parties. This paper summarizes responses to mailed surveys and interprets on-site interviews to conclude whether or not the agreements worked as they were intended.

DECISIONMAKERS' VIEWS OF SUSTAINABILITY IN RURAL COASTAL WASHINGTON AND OREGON

Lisa M. B. Harrington, *Kansas State University*

Although sustainability and sustainable development often are used to describe planning and action goals, understanding of the meanings of these terms can be variable. In order to gain information about the

understandings of key individuals in a rural region with a variety of key economic activities (timber production, fisheries, tourism, and agriculture), interviews were conducted in Clatsop County, Oregon, and Pacific County, Washington, in Fall 2008. These consisted of 10 key informant interviews with a variety of decision makers and information providers, including elected public representatives, public planners and administrators, and individuals strongly involved in resource-based enterprises. Concerns included both economic and environmental aspects of local to regional (and global) sustainability concerns; responses also reflected variable perceptions of local control (or power) over important aspects of change, and the clarity of the sustainability concept. Such concerns and perceptions should be considered as local decisions are made in regard to sustainability issues.

Tools for Research in Geography

Room: *Llano*

Chair: Yu Zhou, *Bowling Green State University*

ESTIMATION OF FARMLAND SOIL WIND EROSION MAKING USE OF GPS RTK MEASUREMENT AND ¹³⁷Cs TRACING TECHNIQUE

Chunlai Zhang, *Beijing Normal University*; Jiaqiong Zhang, *Beijing Normal University*

Serious wind erosion in northern China has been being a big environmental problem especially on cultivated soil. This paper estimated soil erosion rates during the past decades making use of differential GPS technology and ¹³⁷Cs tracing technique in Kangbao County, a representative area undergoing serious wind erosion both on farmland and on grassland in northern China. Banks that maintained between farmland plots when the original grassland had been cultivated into stripped farmland have experienced little erosion or deposition, so these banks offered a useful reference for GPS measurement to estimate soil loss by wind in adjacent farmland plots. Differential GPS and real time kinematic (RTK) measurement shows that almost half centimeters surface soils have been blown away from farmland in this area since the soil had been cultivated in the early twentieth century. Average depth of soil loss by wind erosion in the measured two farmland sites is 0.54 cm per year (88.34 t hm⁻² a⁻¹). Soil wind erosion rates derived from ¹³⁷Cs method present a very close result that the average wind erosion rate in 30 farmland plots is 0.55 cm per year (89.53 t hm⁻² a⁻¹) since 1963. Intense wind erosion not only caused serious local land degradation, but makes this area an important source of blown sand and dusts that threaten downwind Beijing and Tianjin metropolitan area, China.

GEOGRAPHIC FIELDWORK: COMPARING GPS CAPABILITIES BETWEEN SMARTPHONES AND DEDICATED GPS

Anna Klimaszewski-Patterson, *New Mexico State University*

Since Apple iPhone's 2007 debut, the availability of GPS-enabled smartphones has grown. The effectiveness of GPS-enabled smartphones for basic geographic fieldwork has been unexplored. This article compares a GPS-enabled smartphone, the HTC G1 Dream (G1), against a dedicated GPS device, the Trimble Juno ST (Juno), with respect to ease-of-use and accuracy of GPS readings. Ease-of-use tests involved (1) locating polylines/boundaries, (2) recording polylines/tracks, (3) recording points/waypoints, and (4) navigating to specific geographic coordinates. GPS accuracy tests were done at previously recorded survey markers. In ease-of-use tests, G1 applications proved much simpler for test subjects to operate and extract data from than Juno applications. Regarding GPS accuracy, G1 exhibited lower residual error, and thus more truthfulness, in its reported accuracy. Both devices had an actual accuracy range between 1-6 meters. G1 demonstrated that a GPS-enabled smartphone can be a viable alternative for geographic fieldwork where enterprise-level software is not needed.

A TECHNIQUE FOR CREATING ANIMATED MAPS OF URBANIZED AREAS USING LANDSAT IMAGERY

Charles Roberts, *Florida Atlantic University*, J. L. Delahunty, *Texas Tech University*, and Gillian Breary, *Florida Atlantic University*

USING CLICKERS IN LARGE GEOGRAPHY CLASSROOM: PRACTICE, PROMISES, AND PROBLEMS

Yu Zhou, *Bowling Green State University*

A clicker, or classroom response system (CRS), is an electronic device to poll an audience and get immediate feedback to questions posed by presenters. Because of its ability to collect audience responses in real-time, the use of clicker is growing quickly in large lecture rooms of many higher education institutions. To test the effectiveness of clickers in a large geography class, the author used the technology in Weather and Climate, a selective general natural science required course at Bowling Green State University, in both Fall 2009 and Spring 2010 semesters. The experience indicates that while clickers are very effective in managing large-size classes, understanding students by gathering valuable information, and engaging students in active learning, there are still many problems need to be solved to utilize its full potentials in large classroom teaching.

Geography and HIV/AIDS

Room: *Pheasant Ridge*

Chair: Joseph R. Oppong, *University of North Texas*

FIGHTING HIV/AIDS IN WEST AFRICA - IS THERE ROOM FOR GEOGRAPHERS?

Joseph R. Oppong, *University of North Texas*

Compared to Southern Africa, HIV/AIDS is less severe in West Africa. Yet this generalization conceals important spatial differences in severity, dynamics and drivers of the very serious epidemic facing West African countries. Understanding the spatial patterns and the associated drivers including globalization pressures, gender imbalance and the impact of economic changes is critical for effective control of HIV/AIDS.

This paper examines and attempts to explain the changing spatial patterns of HIV/AIDS in West Africa (Benin, Burkina Faso, Côte d'Ivoire, Cape Verde, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo). Focusing on gender, religion, economic, political and other influences, it argues that place specific interventions are critically needed in the effort to control HIV/AIDS. Consequently, geographers have a crucial role to play in the fight against HIV/AIDS.

HIV/AIDS LATE TESTERS IN TEXAS

Jody S. Huddleston, and Joseph R. Oppong, *University of North Texas*

HIV positive people who are unaware of their status are unable to take advantage of current treatments, may continue to participate in high-risk behaviors, and are thus more likely to transmit the disease. Consequently, early diagnosis is critical for both the health of the individual and the prevention of further spread. This study examines the geography and neighborhood characteristics of HIV/AIDS late testers in Texas. Zip code level HIV/AIDS data from Texas DSHS was analyzed using statistical and spatial analytic tools. After examining Texas as a whole, Dallas and Harris Counties are examined as case studies. In general zip codes with high rates of late testers have high percentages of unmarried couples, low median incomes, and are more likely to be occupied by minority populations. Knowing the spatial distribution and neighborhood characteristics of areas with high late tester rates may allow for more effective targeting of prevention and control efforts.

NEIGHBORHOOD CHARACTERISTICS AND HIV/AIDS IN TEXAS

Joseph R. Oppong, and Chetan Tiwari, *University of North Texas*

This study examines the pattern of HIV/AIDS cases diagnosed in Texas at the zip code level from 1999-2008. It interrogates the neighborhood characteristics associated with the areas with high rates. The results confirm that neighborhood characteristics such as race-ethnic makeup, socioeconomic characteristics, crime rates, school dropout rates, recreation facilities and other indicators of neighborhood health are important determinants. Moreover, mode of exposure to HIV varies significantly between and within neighborhoods. The research explores these using WebDMAP and statistical analysis. It concludes that neighborhood specific interventions are needed to tackle America's multiple HIV/AIDS epidemics in the South.

THE IMPACT OF TEXAS DEPARTMENT OF CRIMINAL JUSTICE PRISON FACILITIES ON THE HIV/AIDS RATES OF THE GENERAL COMMUNITY IN TEXAS COUNTIES

Libbey C. Kutch, Joseph R. Oppong, and Chetan Tiwari, *University of North Texas*

Previous research suggests that prisons may be fueling HIV/AIDS spread in the general population. Thus the location of prisons and characteristics of the surrounding communities may influence the geography of HIV/AIDS.

This paper investigates the relationship between the spatial distribution of HIV/AIDS and the location and size of Texas Department of Criminal Justice (TDCJ) prison facilities in Texas communities. It addresses two major questions: 1. does the location of prison facilities affect the HIV/AIDS rate of non-incarcerated residents? 2. Is there evidence to suggest that the prison system is fueling the spread of HIV/AIDS in the general population? In other words, is living within communities closest to prison units a risk marker for HIV/AIDS?

This study suggests that populations living in close proximity to prisons are more vulnerable to coming in contact with HIV/AIDS, and therefore more likely to contract the disease.

MODELING PLACE VULNERABILITY

Adam Harold, *University of North Texas*

Much research has been done on studying and identifying vulnerable people and populations with respect to disease, including HIV/AIDS. However little has been done to identify 'vulnerable places' with respect to these diseases, including HIV/AIDS, beyond a model that mirrors the composition of a population. While individual risk factors such as behaviors are crucial in understanding HIV/AIDS, the outcome of certain risky behaviors can vary by place. This makes the study and identification

of vulnerable places necessary. The objective of this study conceptualizes and operationalizes a model for place vulnerability. This study shows that areas within the state of Texas vary with respect to HIV/AIDS, and that these differences are in part due to neighborhood characteristics. The main outcome of this study is the use of the methodology in order to target vulnerable places, and identify those factors that contribute to making an area vulnerable to HIV/AIDS.

River, Aquifer, and Seawater

Room: *Driftwood*

Chair: Robert D. Larsen, *Texas State University-San Marcos*

TEXAS FRESHWATER INFLOWS

Shae R. Luther, and Laura J. Stroup, *Texas State University-San Marcos*

More than twenty natural and engineered inlets are found along the Texas coastline. They provide corridors between the Gulf of Mexico and the estuaries and bays lying behind barrier islands. Estuarine habitats are essential for coastal ecology and for effectively managing concomitant resource values. Central Texas, particularly the Austin-San Antonio corridor, contains several of the nation's fastest growing counties. Therefore, upstream water use has increased, and this trend is expected to continue. Municipal growth and altered flow regimes have degraded receiving bays and estuaries by reducing freshwater inflows. Scientists and decision-makers are expanding research regarding the impact of low flows on the physical and chemical makeup of bays and estuaries, as well as the effects those changes have on the ecosystem as a whole. This research investigates documented effects of reduced freshwater inflows on the Texas coastline as well as evolving state policy to address this novel conservation challenge.

MODELING KUWAIT SEAWATER CLARITY: A SPATIAL-TEMPORAL STUDY USING REMOTE SENSING AND GIS

Mohammad M. M. Alsahli, *Kuwait University and University of Kansas*;

Kevin P. Price, *University of Kansas*; Robert Buddemeier, *Kuwait*

University and University of Kansas; Daphne G. Fautin, *Kuwait University and University of Kansas*; Stephen Egbert, *Kuwait University and*

University of Kansas

Kuwait water clarity is an important water quality indicator that influences the entire Kuwait coastal ecosystem. The spatial and temporal distributions of this important water characteristic should be well understood to obtain a better knowledge about this productive coastal

environment. The aim of this project was to study the spatial and temporal distributions of Kuwait Secchi Disk Depth (SDD), a water clarity measure, using Sea-viewing Wide Field-of-view Sensor (SeaWiFS) and MODIS data collected from November 1998 to October 2004 and January 2003 to June 2007, respectively. SeaWiFS and Moderate Resolution Imaging Spectroradiometer (MODIS) data showed a significant relationship with *in situ* SDD data ($r^2 = 0.67$ and $r^2 = 0.68$, respectively). Kuwait SDD derived from SeaWiFS and MODIS images showed that Kuwait water clarity increased from north to south and from inshore to offshore, whereas the temporal variations of Kuwait water clarity were influenced by the Shatt Al-Arab discharge variation.

A FEASIBILITY STUDY OF THE DESALINATION OF BRACKISH EDWARDS AQUIFER WATER IN CENTRAL TEX POWERED BY REFUSE DERIVED FUELS AND RECOVERED LANDFILL GAS

Robert D. Larsen, *Texas State University-San Marcos*

This paper addresses several factors which play significant roles in the maintenance and sustainability of quality of life. There is an increasing demand for new sources of potable water and renewable energy. The freshwater of the Edwards Aquifer is oversubscribed. In central Texas a major cooperative effort is underway to tap into the brackish water body within the Edwards Aquifer to provide between 5 and 10 MGD in additional water for human consumption. Desalination requires reliable sources of energy. A partnership consisting of a privately owned landfill (Texas Disposal Systems Landfill, Inc.), the Barton Springs/Edwards Aquifer Conservation District, and the Government Partnership Program at Texas State University-San Marcos are working on the project. Energy for the demonstration project will be provided by methane gas from the landfill and/or Refuse Derived Fuels (RDFs). Excess energy produced by the project will be fed into the City of Austin grid as "Green" energy.

10:00 am – 10:30 am
Session Break

10:30 am – 12:00 pm

Session F2

Retail Business Education

Room: *Spicewood*

Organizer and Chair: Eugene Tettey-Fio, Binghamton University

Panelists:

Brett Bayduss, *Site Selection Group*

Tom Dwyer, *Dutch Hill Consulting, Inc.*

Lawrence Estaville, *Texas State University-San Marcos*

Matt Panfel, *International Council for Shopping Centers*

Matt Ryner, *Rockland County Planning*

Eugene Tettey-Fio, *Binghamton University*

Wastes, Scrap and Recycling Issues

Room: Cap Rock

Organizer and Chair: Donald I. Lyons, *University of North Texas*

RECYCLING STEEL, HIDDEN FLOWS AND THE INTERNATIONAL TRADE OF SCRAP IRON AND STEEL

Amanda Caldwell, *University of North Texas*

Steel is one of the most highly utilized metals in industrialized economies. When iron- and steel-containing products become obsolete, they are easily separated from the solid waste stream and recycled. Iron and steel can be infinitely recycled, making it a semi-closed material cycle that prevents some virgin extraction. The elimination of a portion of virgin extraction reduces hidden flows of wastes and energy use, which is highly lauded by a greening steel industry. However, few consider the hidden flows of extracting ferrous scrap from the infrastructure of industrialized societies. The transport, manipulation by heavy machinery, and overseas shipment of ferrous scrap creates hidden flows of air emissions that detract from the perceived environmental benefits of steel recycling. The purpose of this study is to estimate the hidden flows of trans-pacific shipment of ferrous scrap from the U.S. to China by utilizing an emissions model for ocean-going vessels. The results of this analysis are a first step to a life cycle assessment of internationalized ferrous scrap flows that should be compared to the extraction of iron ores.

RECYCLING EFFICIENCY AND NEIGHBORHOOD AFFECTS: A CASE STUDY OF THE CITY OF FORTH WORTH'S RECYCLING PROGRAM

Robert Wachal, *University of North Texas*

In 2003, the City of Fort Worth adopted a new recycling program to increase recycling rates. While this change did increase recycling rates, it also resulted in an increased number of rejected recycling loads, costing the City of Fort Worth over two million dollars in lost revenue.

GIS, socio-economic and demographic census data, neighborhood characteristics (general ordinance violations) and recycling records were integrated in order to determine which recycling routes the city should concentrate their education and advertising efforts to reduce the number of recycled loads. Recycling records and the number of rejected loads ($n = 238$) were geocoded by route. Recycling routes were then overlaid onto the census blocks to extract racial, economic and demographic information extract income information. These demographic variables were standardized based on the population of each route. To investigate any potential relationships between recycling behavior and demographics, the number of rejected loads was compared to the race, age, and income for each route. Modest R-square values were recorded for recycling efficiency and socio-economic and demographic characteristics of the neighborhoods. Recycling efficiency rates were also compared to the overall numbers of ordinance violations ($n = 19,433$) for each neighborhood in order to increase the explanatory power of the regression equation.

LAND USE LAND COVER AND TRACE METAL RUNOFF FROM CHICKEN LITTER APPLICATION

Jessica E. Pack, Shea Tuberty, and Christopher A. Badurek, *Appalachian State University*

Impacts of elevated concentrations of toxic trace elements present in poultry litter are a recent environmental concern, especially for plant and aquatic toxicity. Trace elements present in chicken litter are both naturally occurring and the result of anti-coccidial treatments and growth supplements. Specifically, arsenic, copper, manganese, and zinc are added to the feed. This study examines soil, sediment, water, and fish tissues analyzed for As, Cu, Mn, and Zn. While elevated arsenic concentrations were not found, copper and zinc concentrations were found at levels known to induce phytotoxicity and to be of concern to aquatic organisms. GIS analysis was also used to assess impacts of land use on sample sites and potential relationships between land cover, proximity to chicken farms, and location on stream network. Results from this study are discussed in terms of potentially more environmentally sustainable chicken feed and litter management practices.

CIRCUITS OF SCRAP: CLOSED LOOP INDUSTRIAL ECOSYSTEMS AND THE GEOGRAPHY OF U.S. INTERNATIONAL RECYCLABLE MATERIALS FLOWS, 1995-2009

Donald I. Lyons, *University of North Texas*

Industrial ecology argues that the traditional model of industrial activity needs to be transformed into a 'closed loop' industrial ecosystem where used materials (scrap) and by-products would substitute for virgin materials during production processes. The recycling of scrap material forms part of this larger effort to reduce the overall environmental impact of production and consumption. A key, but as yet, unresolved question in this process is the geographic scale (local, regional, national, global) at which loop closing should take place.

This preliminary empirical research examines the export and import geography of seven largest (by weight) U.S. scrap commodities (iron & steel, paper, plastics, aluminum, copper, nickel and zinc) between 1995 and 2005 to ascertain the extent to which U.S. scrap flows overseas and how that might affect our understanding of how material loops can close. The results suggest that there are two distinct circuits of scrap flows in the U.S. With the exception of Canada, the U.S. exports a substantial portion of the recyclable scrap generated each year to rapidly developing countries, while importing smaller quantities of scrap from the E.U. With the major exception of higher value iron & steel scrap to China, the U.S. tends to export lower value scrap and import higher value scrap. In part this reflects imbalances in the supply and demand for scrap in the U.S. and the developing world and the lack of potentially available scrap and the absence of a robust recycling infrastructure in the developing world.

Emerging Innovations in GeoInformatics

Room: *Llano*

Organizer and Chair: James K. Lein, *Ohio University*

APPLYING 3D MODELING AND GEOSPATIAL TECHNOLOGY TO UNIVERSITY CAMPUS VISUALIZATIONS

Bradley A. Shellito, *Youngstown State University*,

This project examines the application of Geospatial Technology for the creation and utilization of a three-dimensional interactive model of the campus of Youngstown State University. The use of Google SketchUp in designing 3D models is examined, along with the methodology of creating properly georeferenced 3D data, as well as the level of detail achieved from the modeling, including textures, unique features, and other 3D objects. The use of Google Earth as a delivery platform for the model is

examined, as well as the web interface for model access. Lastly, applications of the model for campus marketing, promotion, and planning purposes are examined.

END-TO-END WORKING PROTOTYPES FOR STANDARDIZED OPERATIONAL ENVIRONMENTAL GEOGRAPHIC INFORMATION NETWORKS: EXAMPLES FROM THE GREAT LAKES AND ARCTIC FOR INVASIVE SPECIES AND CLIMATE MONITORING

Richard A. Beck, *University of Cincinnati*; James K. Lein, *Ohio University*; Robert C. Frohn, K. Hinkel, W. Wisner, B. Jones, C. Arp, C. Lambert, D. Miller, K. Kreigel, *Ohio University*

Cost-effective implementation of geographic information networks (GINs) is greatly enhanced by the adoption of geo-informatics standards. The utility of GINs is enhanced still further by the implementation of those standards from end-to-end. In the case of environmental monitoring, end-to-end equals from sensor-to-public. Here we describe two specific implementations of Open Geospatial Consortium (OGC) standards. The first example was constructed for invasive species monitoring on the Linux platform and the second example for climate monitoring on the Windows platform. The invasive species example is for western Lake Erie and the climate monitoring example is from Arctic Alaska. We use TCP/IP as the standard for the sensor and network communications, ASCII for encoding and specific XML refinements of the general OGC standards for data encoding for search, retrieval, visualization and analysis with a variety of OGC-compliant clients. Use of the OGC standards multiplies the return on investment in GINs by decreasing the amount of middleware and reformatting usually associated with proprietary data formats and accelerates the pace of research that leverages GINs. The value of GINs would increase yet again if sensor manufacturers would adopt a specific implementation of the OGC metadata and data standards such as those prototyped here.

A CRITICAL COMPARISON OF CONCEPTUAL AND MEASUREMENT MODELS OF URBAN FORESTS

Mike Battaglia, *Ohio University*; Gaurav Sinha, *Ohio University*

Defining and measuring vegetation cover in urban areas is becoming an important aspect of urban infrastructure planning. The concept of an urban forest is often invoked to give meaning to measured urban vegetative land cover. Researchers have shown that diverse and often incompatible concepts seem to be nested within the umbrella term "urban forest". The heterogeneity in urban forest semantics needs to be explored

and formalized so that the varied concepts and epistemological foundations of different measurement frameworks can be shared amongst researchers and planners. In this paper, we share initial insights from our exploration of urban forest semantics and their spatial characterization. We analyze multiple definitions and measurement frameworks that have been used to map and characterize urban forests. We also discuss how pragmatic measurement models driven by available data and technology may seriously undermine the conceptual validity of the measurements. For instance, using the traditional approach of satellite imagery classification to map land cover is problematic because different urban settings require different operational definitions of the urban forest. Moreover, extremely high resolution imagery coverage is needed to distinguish between vegetation types in a small area. Ground surveys may provide detailed coverage but apart from being time-intensive, often limit measurement of upper foliage, and practically measure a different type of urban forest than that measured by satellites. Exploring such unintended ontological and epistemological shifts in urban forest representation and measurement exercises is the focus of this paper. We use East Baltimore as an example to represent such problems, especially in the context of small-scale studies.

SPATIAL MULTICRITERIA DECISION ANALYSIS: PRESCRIPTIVE MODELING FOR SUSTAINABLE DEVELOPMENT

Walter Kropp, *Ohio University*; James Lein, *Ohio University*

The modern understanding of sustainability is characterized by imprecision and uncertainty. Although the term sustainability has its roots in long-held “sustainable” beliefs and principles, the term has changed significantly as the concept of sustainable development and modern day reinterpretations have emerged. This project focuses on the creation of a spatial multi-criteria decision analysis (SMCDA) approach for modeling the spatial pattern of sustainable development.

Spatial MCDM analyses differ from traditional MCDM approaches in that the criteria and state of the environment are exclusively spatial in nature. The model developed in this study incorporates spatial criteria from the LEED and SSI rating systems to examine the spatial pattern of sustainable development in 3 municipalities of Massachusetts under contrasting development scenarios. With the addition of alternate scenarios, the model is used to explore plausible future environments in order to address the imprecision and lack of definition inherent to the concept of sustainability.

Through Spatial MCDA a structure is provided to deal with complex, interconnected factors simultaneously through a weighting and ranking system inside a geographic information system (GIS). By observing how

the spatial pattern of sustainability changes between study areas and preference weighting systems this study demonstrates the value of Spatial MCDA in community visioning and the role of GIS in prescriptive environmental planning.

Medical Geography

Room: Pheasant Ridge

Chair: Chetan Tiwari, *University of North Texas*

A METHOD FOR PRODUCING DISEASE MAPS WITH HIGH LEVELS OF GEOGRAPHIC DETAIL

Chetan Tiwari, *University of North Texas*

Although the level of geographic detail is an important property of all disease maps, it is rarely the property that maps are designed to optimize. Instead most disease maps continue to be designed to show adjusted rates for geographic areas such as counties, census tracts, or other administrative areas for which health and population data have been tabulated. However, as health and population data become increasingly available in registries and population archives, such spatial data can potentially be manipulated to control the geography for which disease rates can be computed and displayed. In this paper, we propose a method for determining optimal sample locations for estimating disease rates using kernel density estimation methods. We show that the use of the optimal sample location method leads to improved and more accurate geographic detail in the disease maps produced using kernel density estimating methods.

A SPATIO-TEMPORAL ANALYSIS OF LASSA FEVER AND CEREBRAL SPINAL MENINGITIS IN WEST AFRICA

Richard Ohwofasah Djukpen, *University of Illinois, Urbana-Champaign*

Understanding the spatial-temporal patterns of endemic disease is a key element in finding lasting solutions. In West African nations of Nigeria, Chad, Liberia, Sierra Leone, Guinea, Niger, Lassa Fever (LF) and Cerebral Spinal Meningitis (CSM) are endemic diseases. The virulence of these diseases and other infectious diseases are not debatable. Every year people get infected, sick (Morbidity) and die (Mortality) of these diseases. These diseases were discovered many years ago. Therefore, why are the diseases still plaguing the West African region to this day? This paper examines the underlying factors that make Lassa fever and CSM endemic in our region. A number of factors such as environmental, culture, lack of political will and expenditure of governments, poverty, urbanization,

migration and transportation pattern significantly influence the endemicity of these diseases. The use of spatial analysis techniques indicates that spatial clusters of these diseases occur in West Africa.

DENTON DRUG DISPOSAL DAY

George Maxey, Duane B. Huggett, and Kati Stoddard, *University of North Texas*

Pharmaceuticals are being widely detected in water, sediment and aquatic biota in the United States. The primary route of entry into the aquatic environment for many pharmaceuticals is considered to be post-consumer fate (e.g. humans excreting some small fraction of un-metabolized drug product). Secondary to post-consumer fate is the entry of drugs into the aquatic environment via the disposal of unused medicines. While at the present time it is difficult to control exposure in the aquatic environment relating to post-consumer pharmaceuticals, exposure to unused medicines represents the one exposure route that can be controlled and lessened.

The goal of this project is to develop a pilot demonstration program for the “take-back” of unused medicines in Denton, TX, ultimately determining the applicability of such a program in reducing the pharmaceutical load to the environment.

HIERARCHICAL ORDERS OF TRIBAL HEALTH SERVICE CENTRES IN DHADGAON TAHSIL OF NANDURBAR DISTRICT (M.S.)

Dynaneshwar Shivaji Suryawanshi, *VWS College, Dhule*

Water and Watersheds

Room: *Driftwood*

Chair: Feifei Pan, *University of North Texas*

SUSTAINABILITY OF THE CARRIZO-WILCOX AQUIFER IN CENTRAL TEXAS USING INDICATORS

Dana Denice Squires, *Texas State University-San Marcos*

The Carrizo-Wilcox aquifer in Central Texas is a sandstone aquifer that may also contain gravels and clays of Eocene age. The aquifer is adjacent to one of the fastest growing areas in the state: the Interstate Highway 35 corridor between San Antonio and Waco. This area is expected to experience substantial population growth by 2050. With the surface water resources in the area previously allocated and the Edward’s Aquifer being tightly managed due to the Endangered Species Act, the Carrizo-Wilcox Aquifer has become a significant candidate for development for fresh water supplies in Central Texas.

The United Nations Educational Scientific and Cultural Organization has developed indicators of groundwater sustainability. Three of their seven indicators will be discussed as a means of determining the sustainability of the Carrizo-Wilcox aquifer: the amount of renewable resources per inhabitant, total abstraction per groundwater recharge, and total abstraction per exploitable groundwater resource.

The indicators isolated and analyzed here can provide assistance in achieving this sustainability. Recharge rates for the aquifer is 1.8 inches per year, the surface area of the outcrop is 2,469 square miles, and the total abstraction is 193,718 acre-feet per year and population for 2000 is 1061454. Preliminary results for Central Texas for the indicator of groundwater renewable resources per inhabitant is 0.24 acre feet per year per person and total abstraction divided by the groundwater recharge is 3.96 percent.

GEODATABASES OF BASIN CHARACTERISTICS FOR WATERSHEDS THROUGHOUT TEXAS, 2010

Sophia Gonzales, *US Geological Survey*

The U.S. Geological Survey (USGS), in cooperation with Texas Commission on Environmental Quality (TCEQ), is currently (2010) developing geodatabases that will contain basin characteristics for more than 3,000 water quality monitoring stations in Texas. TCEQ collects and analyzes water-quality data at surface-water monitoring stations throughout Texas to ensure compliance with applicable State Standards. When the water quality at any given station does not meet State standards, a plan for remediation is developed. Such plans require detailed basin characterization information including average rainfall, elevation, slope, land use or land cover statistics, and total drainage area. The geodatabases will be organized by hydrologic unit code and will be used to store geographic information and basin characteristics for each monitoring station. The databases will facilitate displays of geographic information and data analysis, which will help TCEQ make remediation, policy, and resource allotment decisions.

USING GIS TO DELINEATE SEWER BASINS TO THE HIGHEST LEVEL OF DETAIL

Jennifer Moore, *Freese and Nichols, Inc.*

Basins for a wastewater system can be viewed at three levels of increasing detail: major basins, subbasins, and subareas. For the City of Fort Worth Wastewater Master Plan, the boundaries for these elements were derived from two different sources – North Central

Texas Council of Governments (NCTCOG) and the City's Field Operations department. These two sources do not necessarily share the same boundaries although they reference similar geographical areas. In order to establish better basin delineations, the basins were recreated from the highest level of detail available – the subareas. Multiple subareas constitute a subbasin and multiple subbasins constitute a major basin. Numerous factors were taken into consideration for determining the criteria upon which the new subareas, subbasins, and major basins were delineated using GIS. Once the subareas were delineated, found to be topologically correct, and verified to meet the established criteria, the subbasins and major basins were created.

THE EFFECT OF THE UNCERTAINTIES IN SOIL HYDRAULIC FUNCTIONS AND PARAMETERS ON SOIL MOISTURE PREDICTIONS

Feifei Pan, *University of North Texas*

The effects of the soil hydraulic functions and hydraulic parameters on soil moisture simulations are studied by comparing the observed and simulated soil moisture using six combined methods, which are formed by three commonly used soil hydraulic functions, i.e., Brook and Corey [1964] (BC), Campbell [1974] (CA), and van Genuchten [1980] (vG), and two methods to determine soil hydraulic parameters, i.e., soil hydraulic parameter look-up table given in Rawls et al. [1982] (RA), and empirical relationships between soil hydraulic parameters and soil particle size distribution (PSD) developed by Cosby et al. [1984] (CO). Hourly soil moisture measurements collected at six soil moisture sampling sites of Soil Climate Analysis Network (SCAN) are tested. At each site the Richards equation is solved between 10cm and 50cm. The observed soil moisture at 10cm and 50cm are used as the upper and lower boundary conditions. The root mean square error (RMSE) and correlation coefficient between the simulated and observed soil moisture at 20cm are computed and compared. We found that residual soil moisture in the hydraulic functions plays a negligible role in affecting soil moisture simulation. Rawls et al.'s soil hydraulic property lookup table is slightly better than the Cosby et al.'s empirical relationships in terms of accuracy of the simulated soil moisture. The van Genuchten functions always produce a lower correlation coefficient and filter the high frequency variations in soil moisture stronger than BC or CA does. The uncertainties due to the rock contents and macropores in soils are also studied. It was found that applying a rock content correction term to soil saturated hydraulic conductivity K_s and soil

porosity could increase the correlation coefficient, but for some cases the RMSEs became worse. It was also found that only applying a macropore factor to soil K_s could not improve the accuracy of the simulated soil moisture significantly, because the pore size distribution index b is more influential than K_s .

12:00 pm – 1:30 pm

LUNCHEON

Room: *Brushy Creek & Dry Comal Creek*

Keynote Speaker:

Andy Taft, President

Downtown Fort Worth, Inc.

**DOWNTOWN FORT WORTH: THE GEOGRAPHY OF
SOMEWHERE – HOW THE PUBLIC AND PRIVATE SECTORS CAME
TOGETHER TO RENEW A CITY CENTER**

1:30 pm – 3:00 pm

Session F3

Geographic Areas for the 2010 Census and the American Community Survey

Panelists:

Michael Ratcliffe, *Division of Geography, US Census Bureau*

Vincent Osier, *Division of Geography, US Census Bureau*

April Avnayim, *Division of Geography, US Census Bureau*

Urban Geography

Room: *Cap Rock*

Chair: Christopher A. Badurek, *Appalachian State University*

DIVERGENT SENIOR HOUSING IN AUSTIN, TEXAS

Kevin Romig, Kathleen Seal, and Virginia Shewmake, *Texas State University-San Marcos*

While retirement is a fairly new concept in the American social economy, traditional housing designs based on consumer preferences of the “Greatest Generation” may be losing their market share. The market for retirement housing is changing due to the coming onslaught of baby-boomer retirees and their divergent preferences than those of previous generations. What will these new communities look like, and how can urban and cultural geographers better theorize and understand these trends? This research examines two examples of the divergent senior housing paradigms in metropolitan Austin, Texas in an attempt to illuminate the shift at its onset. We use both social theory as well as grounded, interpretive research to elicit this narrative discovering that the future demand for age-restricted single-family housing may be quite limited.

HEADING EAST: REDEFINING GROWTH FORCES IN THE I-35 CORRIDOR

James Vaughan, *Texas State University-San Marcos*

Land is perhaps the greatest natural resource we have, but poorly managed urban development can have deleterious environmental consequences for rapidly growing urban regions. The environmentally fragile western portion of the I-35 Corridor in central Texas has been the favored location for urban development in spite of planning efforts to encourage growth to the east in the Blackland Prairie, which is more suitable for development. The recent construction of Highway 130 between Austin and San Antonio is pulling growth away from the hilly

terrain and Edwards aquifer recharge area of the region. This new highway was “sold” to the public as an alternative to the congested I-35 freeway, but in reality illustrates how economic forces, rather than planning, open up more suitable areas for development. An understanding of the driving forces of secondary circuits of capital as well as planners’ land management efforts sheds light on how this resource is used and developed in the Texas political and economic climate.

STILL LEFT BEHIND: ESTIMATING THE UNINSURED POPULATION IN TEXAS

Michael E. Cline, Rice University

The recently passed health care legislation will expand health care access by providing a variety of incentives and penalties that encourage businesses to offer and individuals to acquire health insurance. While the intent of the legislation is to expand health insurance coverage to all individuals, some people will remain uninsured either due to legislative restrictions or as a result of individuals and businesses choosing to forgo health insurance coverage. Understanding who those individuals are and where they are likely to live will play a critical role in planning for services provided by agencies serving these populations. This paper will present preliminary results of an effort to quantify and map these uninsured populations.

RELATION OF HOUSING DENSITY GROWTH TO LAND USE AND LAND COVER CHANGE ALONG THE S. FORK NEW RIVER

Christopher A. Badurek, *Appalachian State University*

Increasing population growth and resulting changes in land use drive by amenity-based migration to rural areas are recognized as issues of significant importance to residents of western North Carolina. Previous studies have shown rapid growth in rural areas has been associated with decline in quality of scenic amenities and water quality in particular. This study provides a GIS analysis of spatial density surfaces demonstrating land use change and density surface analysis over a sixty year time period within a one mile buffer area of the South Fork New River in Watauga County, NC. This housing density surface analysis is supplemented with additional land use land cover change analysis spanning the last ten years. Results are discussed in relation to the environmental planning issues of mitigating potential water quality and flood hazards issues, farmland preservation, and public involvement decision-making in relation to the economic benefits generated from the local housing market.

GeoSpatial Analysis

Room: *Llano*

Chair: Timothy H. Brown, *National Institute of Justice*

TRANSPORTATION INVESTMENT AS ECONOMIC STIMULUS: EVIDENCE FROM THE SOUTH-CENTRAL U.S.

Jonathan C. Comer, Amy K. Graham, and Stacey R. Brown, *Oklahoma State University*

The public and elected officials view investment in transportation infrastructure as a catalyst for economic growth. Past research at various scales, however, has been inconsistent if not contradictory on the topic, leading some to believe that quality transportation networks are necessary but insufficient conditions for expanding the regional economy. If research can show that transportation spending, as evinced by better quality highways and bridges, correlates with indicators of economic growth, then such investments are a good use of public monies and can form the basis of a comprehensive regional economic plan. We address the problem using a different approach than past research, using spatial regression (GWR) to model the relationship between transportation quality and regional economic growth. Examining this relationship in the South-Central U.S. at the county level, we uncover modest supporting evidence but find that notable spatial variations in this relationship exist in a study area centered on Oklahoma.

INVESTIGATING LAND COVER AND URBAN PATTERN IMPACTS ON WATERSHED INTEGRITY: A GWR AND ANN APPROACH

Richard Ross Shaker, *University of Wisconsin-Milwaukee*

The current integrity of the planet is being stressed beyond its biological capacity, and understanding human created landscapes is more important now than ever. Changes to native landscapes to provide for human needs have been found to be one of the most pervasive alterations to native ecosystems resulting from human activity. Albeit, terrestrial waters often being found the ecosystems most affected by stressors associated with landscape change. The Fish Index of Biotic Integrity (F-IBI) has been welcomed as a robust method for investigating landscape – aquatic interaction, and was averaged by basin to create an overall rating of Watershed Biotic Integrity (WBI). In this paper, Exploratory Spatial Data Analysis (ESDA), Geographically Weighted Regression (GWR), and Artificial Neural Networks (ANN) were used to examine relationships between- landscape composition and urban land configuration and- WBI as an indicator of watershed ecological condition. In all, by combining GWR and

ANN an improved methodology for investigating non-linear relationships between landscape predictors and ecological condition was revealed.

GEOGRAPHICALLY WEIGHTED NEURAL NETWORKS FOR ASSESSING THE EFFECT OF SUBMERGED AQUATIC VEGETATION ON BLUE CRAB DENSITY IN THE CHESAPEAKE BAY

Kangshou Lu, and Paporn Thebpanya, *Towson University*; Jeffery White, *Maryland Department of Environment*

A dramatic decline of submerged aquatic vegetation (SAV), which resulted in the habitat loss for blue crabs (*Callinectes sapidus*), has caused a great public concern in the Chesapeake Bay region. Its effect on blue crab population and fishery is difficult to assess because of the complex bay ecosystems. Although both SAV and blue crab stock have been monitored through annual mapping and winter dredge survey, their relationship and spatial disparity have not been fully explored at the bay-wide scale. Lack of such understanding certainly affects the decision and effectiveness of restoration effort. This paper proposes an innovative geographically weighted neural network (GWNN) to examine the complex relationship between SAV and blue crabs, assess spatial heterogeneity of SAV on crab density, and identify potential areas for future SAV restoration. Unlike the global approach, a separate network was developed for each site, with local inputs geographically weighted, based on distance and bandwidth. The result illustrated that the GWNN model outperformed the geographically weighted regression model. It also suggested that SAV density and adjacency had a stronger effect on the density of immature crabs rather than on the juveniles. While the effect of SAV varied substantially across different sex and age groups, and spatially across the entire bay area, sites in the lower and central bay segments appeared to have maximum marginal effects if targeted for future SAV restoration effort.

IDENTIFYING APPROPRIATE GRID CELL SIZE FOR THE ANALYSIS OF CRIME

Ronald E. Wilson, *National Institute of Justice*; Joel Hunt, *American University*, and Timothy H. Brown, *National Institute of Justice*

Grid systems are still a common analytical geographic information system (GIS) layer used by crime analysts. Grids provide a uniform framework for analyzing crime incidents and allocating resources that can resolve the problems of variation in the sizes and shapes of administrative units such as Census tracts or police beats. That is, grids minimize the Modifiable Areal Unit Problem (MAUP). Determining the most appropriate grid cell size for the system remains a persistent problem. Traditional approaches

use the number of observations as part of the formula to determine the appropriate cell size. This is problematic for crime analysis because the grid system must remain constant over time for comparative purposes. Incident counts change over time and using them as part of the equation rescales the cell sizes each time a new time frame of data is used. This makes comparisons of change from one time frame to another impossible. To solve this problem, this research examines seven different grid cell sizes created from the characteristics of administrative areal units in combination with characteristics of the shape and size of the jurisdiction as a proxy for the internal and external geography of the jurisdiction. We employ sensitivity analysis to identify the cell size that best retains the spatial structure from the original areal units of analysis of the jurisdiction to reduce arbitrarily altering the analysis results from a change in areal unit. Using crime data from two different U.S. cities, we compare several global spatial autocorrelation statistics across six different time frames to account for differences in measurement approaches by each of the techniques. Finally, working from the assumption that crime correlates with populations (positively and negatively) we test these grid systems using the same global spatial autocorrelation techniques with local level parcel data to compare the spatial structure of the population with that of the crime data. This verifies whether the grid system preserved the original spatial structure of the crime or not, thus lessening negative impacts of the MAUP due to changing areal units. The results of this research are intended to guide crime analysts in identifying grid cell sizes base on the geography and spatial structure of their jurisdiction for analysis.

Geographical Analysis of Crime

Room: *Pheasant Ridge*

Chair: Fahui Wang, Louisiana State University

MAPPING NIGHTTIME LIGHTING CONDITIONS FOR WALKING SAFETY: AN EXPLORATORY CASE STUDY FROM DULUTH, MINNESOTA

Olaf Kuhlke, and Samantha T. Olson, *University of Minnesota - Duluth*;

Trey T. Schiefelbein, *Miami University of Ohio*

This paper provides an exploratory case study addressing the need to monitor and map the nighttime street lighting conditions in American cities, and utilizes the case study of Duluth, MN. Recent work in criminology and geography has pointed to the strong correlation between crime hotspots, dark, unlit city spaces and walking routes. This research provides a first comprehensive methodological approach and exploratory analysis of urban nighttime lighting conditions, and provides a clear procedure for mapping and monitoring such

conditions. Utilizing existing engineering standards and lighting levels recommended by law enforcement, the study identified that a high-crime neighborhood in Duluth, MN has insufficient street lighting, as over 80% of sidewalks have lighting conditions below recommended levels.

MODELING CRIME PATTERNS USING GEOGRAPHICALLY WEIGHTED REGRESSION

Qiang Xu, *Indiana University South Bend*; Yu Zhou, *Bowling Green State University*

Geographically Weighted Regression (GWR) is a method of spatial statistical analysis used to explore geographic differences in the effect of one or more predictor variables upon a response variable. In the past, GWR has been used in analyzing spatial patterns of socio-economic as well as natural phenomena. In this paper, GWR is used to study violent crime in South Bend, Indiana, a city with a significantly higher crime rate than nearby similar-sized Midwestern cities. Previous researches on violent crime indicate that socio-demographic factors create variations of crime concentration. Neighborhoods with great poverty rates, high population density, and inadequate informal social networks, for example, generate a consistent concentration of violent crime over time. It is very important, therefore, to identify the characteristics of neighborhoods in order to have an effective control of violent crime. With GWR, the crime data collected from South Bend is spatially related to neighborhood socio-demographic characteristics.

SPATIO-TEMPORAL DIMENSIONS OF RURAL FAMILY VIOLENCE: INITIAL OBSERVATIONS FROM DOÑA ANA COUNTY, NEW MEXICO

Michael N. DeMers, Martha Roditti, Madeline Gillette, and Zach Edwards, *New Mexico State University*

Crime mapping, increasingly successful for finding criminals through analysis of activity space, has not been extensively applied to family violence where victims and perpetrators typically share activity space. Using GIS and related spatio-temporal statistical techniques to evaluate family violence requires that one concentrate not on how activity spaces intersect, but rather on where and when events occur and the degree to which demographic, socio-economic, and lifestyle factors might contribute to regional concentrations of family violence. In urban areas US Census data are adequate for such analysis. There is little information regarding the utility of this approach for rural areas where the degree of aggregation is expected to place limitations on their use. One expects that limited population density in these areas will limit access to both statistically

meaningful crime statistics and the socio-economic variables that might predict them. This paper presents preliminary results of hot spot mapping, correlation and *Ordinary Least Squares* spatial regression, and temporal analysis of family violence in Doña Ana County, New Mexico to characterize family violence patterns and to determine the degree to which Census Block Group level data can be used for predictive analysis. Several locations demonstrated significantly elevated incidents of family violence. Using Census 2000 SF1 data, preliminary correlates to these elevated family violence rates (per 1000 population) seem to be *number of households with a woman and children but no husband* (FHH_CHILD 53.7%), *number of households with a married couple and related children* (MARHH_CHD -51.4%), *number of households with a man and children but no wife* (MHH_CHILD 51.9%), *number of one person male households* (HSEHLD_1_M 46.1%), and *number of housing units that are occupied by renters* (RENTER_OCC 50.1%). An Ordinary Least Squares Spatial Regression Model (OLS) model resulted in an r^2 of 0.49 based on the best three of the variables (HSEHLD_1_M, MARHH_CHD, and FHH_CHILD). Temporal results for 2007 indicate seasonal increases in family violence incidents during summer, with higher concentrations during weekends. Quarterly peaks in family violence seem to occur with no regularity from community to community, and expected increases in family violence during selected holidays were not observed in our data.. Conclusions from our research suggest that the large size of the Census Block Group sample unit, the unavailability of timely Census economic data limit the strength of our prediction. More importantly, there are many recognized socio-economic and lifestyle variables that, if they become available, are expected to greatly strengthen our model results.

GIS-BASED ANALYSIS OF JOB ACCESSIBILITY AND CRIME PATTERNS: MEASUREMENT, OPTIMIZATION AND IMPACTS

Fahui Wang, *Louisiana State University*

Various accessibility indices have been developed in the literature to assess the relative ease by which the locations of jobs (supply) can be reached from a residential (demand) location. These measures need to be refined and integrated into one framework to capture actual supply-demand interactions, and to be automated in a users-friendly GIS environment for wide adoption. Optimization methods are called for to identify adjustments needed for maximizing job access equality, and thus provide valuable guidance for public policy towards a job market of more equitable access. Several case studies are used to illustrate the impacts of inequality in unequal access to job market and crime patterns. The

emphasis of the talk will be placed on methodological advancements and implications in public policy.

Resource Geography

Room: *Driftwood*

Organizer and Chair: Bradley Cullen, *University of New Mexico*

BOUNDING A SACRED SPACE: MAPPING THE MT. TAYLOR TRADITIONAL CULTURAL PROPERTY

Peggy Allison, *University of New Mexico*

In June of 2008, the region known as Mt. Taylor in northwest New Mexico was designated by the U.S. Forest Service as a traditional cultural property (TCP). The TCP designation came about as the result of public meetings the USFS held with representatives from eight Native American tribes to discuss growing interest in Mt. Taylor as a potential site for uranium mining. To earn the TCP designation, tribes were asked to draw a cartographic boundary around a region collectively held to be a living spiritual landscape. Despite ambiguous and overlapping claims from the tribes, the USFS produced and distributed a map used to distinguish areas requiring tribal consultation before ground disturbance can take place. This paper investigates and explains the processes leading to the Mt. Taylor TCP map and analyzes some of the cartographic issues inherent in counter-mapping or participatory GIS projects within the regulatory frameworks of the United States.

WILDLIFE AND LIVESTOCK: A CONFLICT ON THE ARAPAHO RANCH, WY

William J. Gribb, *University of Wyoming*

The Arapaho Ranch is a Wind River Reservation operation run by the Arapaho Tribal Council. The ranch is an organically-certified cattle operation in the northeastern portion of the reservation that has a diverse landscape from mountain tops (Owl Creek Mtns.) to river valley floor (Wind River). This diverse landscape is the natural habitat for a wide range of mammals, grizzly bears to prairie dogs. The conflict is between managing a profit-oriented cattle operation and accommodating the natural wildlife of the area. Using a GIS, it was possible to identify and analyze the movement of livestock and the habitat for select species. The grazing patterns of the semi-free range cattle overlap the natural habitat of elk, deer and antelope. At the same, the cattle are at times a prey animal for the different predator animals in this environment, bear, mountain lion, and wolves. The analysis of the grazing patterns and habitats of the major ungulates revealed four major types of relationships on the ranch. In addition, the probable ranges of predator species were

identified to assist in delineating avoidance areas on the ranch. The different goals and objectives of the Arapaho Tribal Council and the ranch were analyzed using a conflict matrix to identify policies and strategies that encouraged collaboration. Thus, alternative strategies for controlling the livestock grazing patterns and providing management options for protecting the wildlife can reduce the conflict between livestock and wildlife.

RIVER PROTECTION IN THE TWIN CITIES METROPOLITAN AREA

Rod Squires, *University of Minnesota, Minneapolis*

In 1972 the lower 52 miles of the St. Croix River was designated part of the national Wild and Scenic River system. Four years later, the Minnesota Valley National Wildlife Refuge, stretching for 50 miles either side of the Minnesota River, was established. In 1988 the Mississippi River that flowed through Minneapolis and St. Paul was designated as a National River and Recreation Area. Despite the protections afforded by federal statutory designations all three rivers continue to face developmental pressures.

SHAREHOLDER-OWNED ELECTRICITY COMPANIES: FACTORS INFLUENCING PROFITABILITY

Bradley Cullen, *University of New Mexico*

The electric utility industry is undergoing a period of uncertainty. For decades, utilities were accepted as 'natural' monopolies. Things began to change, however, in the 1970s. Faced with sharp increases in fuel costs, utilities were increasingly requesting rate increases. Their status as almost risk free investments was shattered, when their stock prices began to decline and a couple of companies even sought bankruptcy protection. It is now necessary to analyze the profitability of individual electricity companies, rather than assuming that all utilities are profitable. This study found that the profitability of electricity companies is related to their nuclear capacity and size (number of customers). But these relationships were weak, which means that variables not included in this study are affecting profitability. What we do know is that the era of 'natural' monopolies is over, and that more changes to the structure of the electricity industry are in the offing.

3:00 pm – 3:30 pm
Session Break

3:30 pm – 5:00 pm

Session F4

Census Research

Room: *Spicewood*

Organizer and Chair: Michael Ratcliffe, *Geography Division, US Census Bureau*

ZIP CODE TABULATION AREAS FOR 2010 AND BEYOND

Vincent Osier, *Geography Division, US Census Bureau*

ZIP Code tabulation areas (ZCTAs) are the Census Bureau's census block-based representations of the US Postal Service's ZIP Codes. In response to comments from data users regarding the relationship between ZIP Codes and ZCTAs, the Geography Division, US Census Bureau, used a model-based approach to improve the delineation of ZCTAs based on ZIP Code information in its master address file. For those current census blocks that contain multiple ZIP Codes, Thiessen polygons were defined, and the resultant polygon boundaries were used to identify potential 2010 census block boundaries. This methodology will provide for a closer relationship between block-based ZCTA definitions and ZIP Codes, resulting in statistical data tabulations by ZCTA that more closely represent ZIP Code-based data.

CENSUS TRACT AND SPATIAL ANALYSIS

Gang Gong, and John B. Strait, *Sam Houston State University*

Census tracts are small, relatively permanent geographic entities within counties (or the statistical equivalents of counties) delineated for data collection and presentation purposes. The Census Bureau uses census tracts to collect, organize, tabulate, and present the results of its decennial censuses. Due to the wide application of census data, census tracts have become the basic units of analysis in a great variety of studies such as those in the fields of geography, sociology, criminal justice, epidemiology, and business, etc. While prevalent in academic research, some of the characteristics of census tracts are not well-known to many researchers and a number of common errors could be avoided if a better understanding can be achieved. This paper intends to outline the prospects and potential pitfalls in utilizing census tract data for various analyses, especially those with a spatial nature. Issues related to the formation, delineation, and evolution of census tracts are discussed.

USING AMERICAN COMMUNITY SURVEY (ACS) DATA IN GEOGRAPHICAL RESEARCH

Min Sun, and David Wong, *George Mason University*

In 1996, the U.S. Census Bureau launched the American Community Survey (ACS) program, a continuous measurement program that was designed to replace the long form in the decennial census. The first ACS dataset became available to the public in 2006, but 2010 marks the first year that the census long form is replaced by ACS. ACS data have not been widely used in geographical research so far. Because ACS data capture socioeconomic characteristics of population and housing information, they will be indispensable for social and geographical research. However, due to the survey nature of the ACS data, using them even in the simplest ways require special attention. In this paper, we will review the characteristics of ACS data pertinent to geographic research, discuss the caveats of interpreting and mapping ACS data, and suggest some principles in dealing ACS data from a geographical perspective.

UNDERSTANDING "PLACE" IN CENSUS BUREAU DATA PRODUCT

Michael Ratcliffe, *Geography Division, US Census Bureau*

The concept of "place" is both understood and misunderstood. To some extent, we all identify and live in some "place," but likely would define "place" in different ways. The Census Bureau collects boundaries and presents data for incorporated places and unincorporated census designated places, but these two entity types do not necessarily encompass all data users' conceptions of place, nor do they encompass all of the places that exist in the United States. This presentation will focus on the Census Bureau's place concept and definitions; discuss other kinds of census geographic entities that, while not specifically defined as places, can be used to supplement place-level data; and will discuss the availability of data for places across Census Bureau data tabulation programs.

Urban-Rural Interface

Room: *Cap Rock*

Chair: Gang Gong, and Joe Hallonquist, *Sam Houston State University*

THE IMPACT OF GENTRIFICATION ON URBAN DEVELOPMENT

Mohammad Hadi Kaboli, *Universite de Strasbourg*; Leila Zare, *Islamic Azad University*

The aim of this study is to investigate urban development by considering gentrification. The gentrification is a spontaneous process of revitalization and redevelopment of a central neighborhood in a city, which provokes a rise in residential property price and hence a population turn-over in favor of middle class.

As the actors begin the renovation of some units in a neighborhood, a new procedure begins; with the renovation of first unit there will be a cycle of interrelated changing in the whole neighborhood.

The new approach in this research is the combination of urban development with gentrification as complex system. Two essential components of gentrification are the mobility and renovation and those are taken to account for acquiring a realistic model.

The algorithm based on the cycle of interrelated changes proposes a cellular automata (CA) simulation. The CA system is composed of four components: cells (pixels in the GIS discrete grid artificial world), state (land use classes in classified images), neighborhood (Moore, circle... etc) and transition rules.

In this study, Anderson classification system has been exploited in urban development algorithm.

Defined by Anderson classification system (1976), seven classes make the limits of city development and thus orient it; the seven classes are: water, road, commercial, forest area, residential area, pasture, row crop. The cellular automata system in this study, finds relation between changing layer of GIS image and gentrification factors during the spatiotemporal change.

CONCEPTUALIZING SUSTAINABLE COMMUNITY DEVELOPMENT AND NATURAL RESOURCE MANAGEMENT WITHIN WEST YELLOWSTONE, MONTANA BETWEEN 2000 AND 2010

Ryan Dennis Bergstrom, *Kansas State University*

The Greater Yellowstone Ecosystem has long been known to researchers as an ideal location to study the interactions and interdependencies of economic growth and environmental protection due to the region's complex mosaic of private and public lands, rapid population growth, and competing extractive and recreational natural resource uses. To facilitate community objectives towards sustaining the natural environment, while simultaneously sustaining economic activity, it is imperative that the perceptions of local communities regarding their natural environment be documented, as well as the ways in which those perceptions are prioritized and acted upon. As such, the objective of this study was to determine how an amenity-driven, gateway community within the Greater Yellowstone Ecosystem perceived, prioritized and acted upon issues of sustainable community development and natural resource management, through the content analysis of their community newspapers between 2000 and 2010.

POPULATION GROWTH, WILDLAND-URBAN INTERFACE, AND WILDFIRE IN AUSTIN, TEXAS

Gang Gong, and Joe Hallonquist, *Sam Houston State University*

As one of the most fast-growing metropolitan areas in the United States, Austin, Texas has seen rapid population growth in the past decades through interregional migration and immigration. The huge change in the demographic landscape has caused profound impacts on the natural landscape and ecosystem in the local area, most noticeably through the expansion of the wildland-urban interface, which has subsequently triggered a number of environmental issues. Wildfire in the wildland-urban interface has been one of them and deserves special public attention due to its potential risk to human lives and properties. This paper focuses on the analysis of population growth pattern in Austin metropolitan area and its interaction with the expansion of the wildland-urban interface from 1990 to 2000. The distribution of wildfire in the wildland-urban interface is also addressed.

Economic Geography

Room: *Llano*

Chair: Rajiv Thakur, University of South Alabama

CITIZEN PARTICIPATION AND PUBLIC FUNDING IN OHIO

Amy Rock, *Kent State University*

Publicly funded projects have often been criticized for excluding the public from the decision making process. Low- and moderate- income (LMI) communities rely heavily on public funding for large-scale community projects, such as Community Development Block Grant (CDBG) funds are federal funds channeled through states to county and municipal governments for the benefit of LMI populations. In Ohio, as with other states, CDBG funds are assigned based on the number of LMI persons within the jurisdiction. Citizen participation is encouraged in the project selection process, but may or may not impact the final decision on how the money is spent, a fact which has been criticized by scholars and citizen action groups (Fagotto and Fung 2006).

Neighborhood Revitalization (NR) grants are a set-aside of the CDBG program, but are competitive, rather than formulaic. In Ohio, the Department of Development (ODOD) awards only 10 such grants every year. Unlike the formula program, citizen participation is a key aspect of the rating process for applications. In large urban areas, it has been observed that lower income neighborhoods are more likely to participate in community meetings and citizen action groups (Foster-Fishman et al. 2009, Wang and Loo 1998, others). It is the purpose of this paper to examine Ohio's NR grant applications from 2006-2009 to evaluate the level

of citizen participation as it relates to socio-economic factors to determine if this pattern holds true for rural communities. Citizen participation scores will be compared with tract or township data from the 2000 Census. It is expected that income and educational levels will have the strongest correlation with participation scores.

EMPLOYMENT CENTERS AND TRAVEL BEHAVIOR IN BATON ROUGE MSA Angela Antipova, *Louisiana State University*

This paper examines the employment distribution and its effect on travel behavior patterns in the Baton Rouge region of Louisiana. First, based on the notion of in-net commuting, we used the employment to resident workers (E/R) ratio as the main criterion to define employment (job) concentrations in the study area in 1990 and 2000 and we examined the changes from 1990 to 2000. Second, using the individual-level data of 1997 Baton Rouge Personal Transportation Survey of 1,395 households, we investigated the commuting patterns both from the perspectives of the monocentric and polycentric urban structures. For that purpose, commuters working in the Central Business District (CBD)(considered a major center) and other employment areas (considered polycentric subcenters) were identified and their commuting times (in minutes) and distances (in miles) were compared. Our results indicate that the polycentric system contributes to a reduction in individual commuting times and distances in the study area.

EVALUATING THE SUCCESS OF AN INDUSTRIAL CLUSTER Neil Reid, *University of Toledo*; Bruce W. Smith, *Bowling Green State University*

Industrial clusters have received considerable attention as a regional development strategy. While their efficacy has been debated by academics, clusters have become popular among practitioners. Despite clusters' acceptance, there have been few attempts to measure their success or their impact on constituent firms. This paper discusses the initial metrics developed to evaluate the success of the northwest Ohio greenhouse cluster. The cluster was launched in 2004 to help the industry become more competitive through collaborative problem solving. In identifying success metrics, we were cognizant of the fact that they had to reflect the clusters' objectives and goals. Thus metrics that measured the impact of branding and marketing efforts, reducing energy costs, and increasing collaboration among cluster stakeholders were developed. The work reported in this paper is only the beginning phases of a longer-term, on-going effort to track the progress and success of the MVGA.

THE SPATIAL DYNAMICS OF THE GULF COAST SHIPBUILDING INDUSTRY: A COUNTY-LEVEL ANALYSIS OF GROWTH SHARE, 1998-2007

Rajiv Thakur, *University of South Alabama*; Jay Gatrell, *Indiana State University*

This paper investigates the spatial dynamics and characteristics of the Gulf Coast shipbuilding industry. The study identifies clusters in Gulf Coast states of Louisiana, Mississippi and Alabama and investigates the observed geography of the ship building industry clusters at the county scale. The research provides a descriptive analysis of observed growth and identifies high-performing counties. The study uses data collected from the US Census County Business Patterns between 1998 and 2007 to explore economic change in the industry's geography. Additionally, we examine how the strategic science and technology planning process contributes to the formation of innovative and strategic partnerships within and between institutions of higher education, the private sector and government to reinforce and expand a regions competitive advantage. The findings suggest that only limited growth has occurred in the shipbuilding industry based on observed growth and relative shares of employment, payroll, and firms.

Place and Ethnicity

Room: *Pheasant Ridge*

Chair: Stephen R. Butcher, *American Military University*

GEOGRAPHIC CHARACTERISTICS OF RESETTLED REFUGEE POPULATION IN WORCHESTER, MA

Nick Cuba, *Clark University*

The US State Department contracts domestic voluntary agencies to resettle refugees. Resettlement brings stateless people from a temporary country of asylum to start a new life in the US. Efficient, cost-effective decision-making is necessary throughout this process to ensure medical and financial obligations to those resettled are met at minimum cost. This study uses GIS and spatial statistics to examine how the location of refugee residences may impact refugee community formation, access to health care providers, public transportation, and jobs, the most important aspects of refugees' first few months in America. The multifaceted process of resettlement justifies inquiry in pursuit of a more informed resettlement process; the ubiquity of problems stemming from limited transportation call for geographic study in particular.

The study analyzes data collected by Lutheran Social Services of New England between 10/1/2008 and 9/30/2009 for Worcester, MA. LSSNE

resettled 542 individuals during this span, the major ethnic groups Iraqis (246), Bhutanese (152) and Burmese (92), who together comprised 90% of all cases. These cases constitute 24.6% of all refugees resettled in Massachusetts during the same time period.

Point pattern analysis is used to identify clusters of residences, for major ethnic groups and the total refugee population. GIS is used to assess transportation costs associated with refugees' access to health care, grocery stores, bus routes and social service providers. These costs to refugees are compared to those same that face the broader low-income and foreign-born populations in Worcester (each of which counts newly arrived refugees as a subset).

ADMINISTRATIVE CARRYING CAPACITY OF MUNICIPALITIES IN A TRANSPORTATION CORRIDOR IN CHIAPAS, MEXICO FOLLOWING DECLARATIONS OF REBELLION

Eric L. Samson, *Texas State University-San Marcos*

The cogency of rebellion is investigated with statistics supplied by four state recognized municipalities, Ocosingo, Chilón, Yajalón and Tila, in a connected linear transportation corridor in northeast, highland, Chiapas, Mexico. Reviewing the history of the Zapatista rebellion (also known as the Zapatista Army for National Liberation (EZLN)), considering pertinent theoretical models, direct research, and descriptive statistical analysis are used to explore the complexities of an indigenous population beyond its tolerance level for the post-colonial status quo to the point of rebellion and declaring new autonomous geopolitical subdivisions.

The conclusion of this analysis is that there are disparities between the select municipalities in administrative resources. It is hypothesized that there exists an administrative carrying capacity for municipalities that creates a hazard of rebellion when municipality population and area exceed the capacity of the administration to distribute resources when coupled with tensions of race and ethnicity.

ANALYSING THE RELATIONSHIP BETWEEN RESIDENTIAL SEGREGATION AND SOCIAL CAPITAL IN METROPOLITAN AREAS

Kerstin Hermes, *Macquarie University, Australia*

In many major cities, residential segregation is determined by the socio-economic and ethnic background of its inhabitants. The residential situation of people can influence their social capital and vice versa. Social capital in turn has many positive benefits; among them is access to information as well as mental and physical health. This paper examines the relation between residential segregation and social capital providing

examples from Sydney in Australia and Los Angeles in the United States. Analyses of the residential environment require data for small geographic units like the neighbourhood level. To obtain data for such small areas, synthetic spatial microdata was created using combinatorial optimisation and data from the census and other social surveys.

ENVIRONMENTAL JUSTICE AND EMBODIED COGNITIVE GEOGRAPHIES: APPLIED COGNITIVE LINGUISTICS ON THE ISSUE OF MOUNTAINTOP REMOVAL IN WEST VIRGINIA

Aron Massey, *Kent State University*; Stephen R. Butcher, *American Military University*

Embodied cognitive geography extends theories of embodied cognition from Cognitive Science into human geography research. This project relies on the field of Cognitive Linguistics to analyze natural language use in the semantic framing of environmental justice issues. The case in which Cognitive Linguistics is applied is that of Massey Energy's mountaintop removal practices in coalfields of West Virginia versus resistance groups opposing mountaintop removal on environmental grounds. Data consists of Massey Energy talking points released by their public advocacy group Friends of Coal for one side and interviews of laborers and activists on the other. Data are analyzed vis-à-vis their employment of idealized cognitive models, prototyping effects, and conceptual blends that produce semantic coherence within the opposing semantic frames on the issue of mountaintop removal. This project has implications for future research on social and environmental justice movements and methods in political and cultural geography.

Water Resources

Room: Driftwood

Chair: Paul Hudak, *University of North Texas*

USING MULTIVARIATE AND SPATIAL STATISTICAL TECHNIQUES IN UNDERSTANDING THE GROUNDWATER QUALITY OF THE TRINITY AQUIFER

Jennifer M. Holland, *University of North Texas*

Groundwater quality data for the Trinity Aquifer during a period from 2000 to 2009 was analyzed using multivariate statistical techniques known as Factor Analysis and Cluster Analysis as well as other nonparametric statistical techniques. The results of these analyses were further examined using spatial statistical techniques such as Spatial Autocorrelation and Average Nearest Neighbor to obtain an understanding of the groundwater

quality for the Trinity Aquifer during the study period. Early results obtained by the Factor Analysis indicate that hard water, sodium, chloride, total dissolved solids, and silica dominate the aquifer while the Cluster Analysis results show two large clusters of wells along with several minor clusters. In addition, these results follow spatial patterns identifying different groundwater processes and formations within the aquifer. Based upon the analyses, a multivariate approach in understanding groundwater quality has proved useful in gaining a complete representation of the water quality for the Trinity Aquifer.

HISTORICAL TRANSFORMATION OF URBANIZED WATERSHEDS BY INDUSTRIAL DEVELOPMENT: A CASE STUDY OF THE ROUGE RIVER WATERSHED IN SOUTHEASTERN MICHIGAN

Martin M. Kaufman, *University of Michigan-Flint*; Kent S. Murray, *University of Michigan-Dearborn*; Daniel T. Rogers, *Amsted, Inc.*

The Rouge River watershed in southeastern Michigan, USA is characterized by a long history of industrial development and the highest population density in the eastern United States. Through a case study approach, this watershed's industrial history within a glacial-lacustrine physical environmental framework is investigated to determine if a disconnect exists between science and land use planning. Methods employed include literature and document review, field studies, and GIS/map analyses. The results indicate there has been a failure to properly consider the near-surface geology and physical geography in industrial site selection, which has contributed to the significant levels of groundwater and surface water contamination existing within the watershed. Another key concern is the existence of high levels of heavy metals in groundwater that pose increased risks to the lower Great Lakes ecosystem.

ESTIMATING INUNDATION PATTERNS IN DETENTION WETLANDS: METHODOLOGY AND APPLICATION TO NORTH-CENTRAL TEXAS

Paul Hudak, and Nicholas Enwright, *University of North Texas*

The objective of this study was to develop and apply a method for estimating hydroperiods in proposed detention wetlands. We applied the method to a riparian mitigation project in north-central Texas, USA. The approach used in this study incorporates field measurements of hydrologic variables, historical observations, and digital elevation data – all processed in a geographic information system (GIS) linked to a dynamic water budget model. Using GIS, 3-D models of the wetlands were analyzed to understand inundated areas associated with wetland volumes, allowing for the model to adjust areas for potential runoff, direct precipitation,

evaporation, and seepage based upon fluctuating ponded area. It predicted general inundation patterns observed in the field. Based upon historical data for representative, wet, and dry years in terms of total precipitation, the model estimated a pulsing hydrology that could potentially sustain wetland plants for three of four proposed excavations. Based upon model results, the fourth site was deemed unsuitable for wetland construction. Useful for planning excavations to mitigate for wetland loss due to land development, the methodology described herein could be adapted to other field settings to similarly predict inundation patterns.

8:00 am – 12:00 pm

Poster Session

Room: *Driftwood Hall way*

APPLICATION OF DEFINIENS DEVELOPER FOR MID-SCALE GLACIAL
LANDFORM EXTRACTION

Kakoli Saha, *Kent State University*

USING GIS TO EVALUATE PRECIPITATION CHARACTERISTICS OF THE
TROPICAL CYCLONE'S INNER AND OUTER CORE

Ian Jacob Comstock, *University of Alabama*

CLIMATOLOGICAL DESCRIPTION OF TORNADOES ASSOCIATED WITH
GULF COAST-LANDFALLING HURRICANES (1950-2005)

Todd W. Moore, and Richard W. Dixon, *Texas State University-San
Marcos*

METHODS FOR COMPARING AND EVALUATING SIMILAR SPATIAL DATA
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Heather Schafer, and Matthew J. Gerike, *University of Missouri*

QUESTIONING THE "CONE OF UNCERTAINTY": PROPOSING
ALTERNATIVE HURRICANE WARNING GRAPHICS

Laura Michelle Radford, *University of Alabama*

JOHN FILSON'S BLUEGRASS AND THE DEVELOPMENT OF AFRICAN
AMERICAN SLAVERY AND INDUSTRY ON THE KENTUCKY FRONTIER

Stacy Brooks, *University of Louisville*

HISTORICAL GIS: ARTILLERY AT THE BATTLE OF ANTIETAM
(SHARPSBURG)

CDT Rhys A. Hearn and Peter Guth, *U.S. Military Academy*

SPATIAL CORRELATION OF FORECLOSURE AND CRIME: HOW
INCREASING NUMBERS OF FORECLOSED HOMES HAVE AFFECTED CRIME
DISTRIBUTION IN LOUISVILLE, KY NEIGHBORHOODS

Tyler F. Kerr, *University of Louisville*

HIV/AIDS in Texas for Adults Aged 50 Years and Older, 1999-2007

Mara Hedrich, *University of North Texas*

DOCTOR DEFICIT? PHYSICIAN ACCESSIBILITY IN OKLAHOMA CITY,
OK. Stacey R. Brown, *Oklahoma State University*

5:30 pm – 6:00 pm

Pre-Field Trip Briefing

Room: *La Bodega Boardroom*

6:30 pm – 7:30 pm

Board of Directors Meeting

Room: *Llano & Pheasant Ridge*

SATURDAY, October 23, 2010

8:00 am – 2:00 pm

Field Trip

Organizer and Leader:

Murray Rice, *University of North Texas*

Jeff Roet, *Texas Christian University*

Gather at Hotel Lobby @ 8:00 am

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