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*Abstracts submitted for presentation are sorted alphabetically by last name of first author.*

## **THE CASE OF THE MISSING LAUREATE: THE COMMUNICATION GEOGRAPHY OF THE 2010 NOBEL PEACE PRIZE**

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In 2010, the ceremony conferring the Nobel Peace Prize was unusual in that the laureate, Liu Xiaobo, was unable to attend. The dynamics of presence and absence that were generated as a consequence highlight four complementary facets of communication geography. The framework of communication-in-place reveals how the illocutionary communication act of conferring the prize depended on Oslo City Hall and the people who came together in that physical container to share various performances honoring Liu Xiaobo's life, his activism, and even his absence. The framework of place-in-communication was manifested by the various ways in which China was represented in and by the discourses associated with the Prize, including certain shared assumptions and certain areas of disagreement. The framework space-in-communication helps elucidate the experiential movements that were possible for those who passed through and beyond the website of the Norwegian newspaper *Verdens Gang*. Finally the framework communication-in-space is evident in the uneven geographic distribution of information, and particularly in how that unevenness set the stage for Liu's political activism and the international relations enacted by his prize.

Keywords: communication geography, media, peace prize, space, place

## **ESTIMATING THE WIND POWER RESOURCE IN DATA-POOR IRAQ**

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World-wide wind power development has come far in the last decade. The technologies have proved durable and cost effective. Iraq lags behind in wind development because its resource is clearly not superb and the past government did not guide development in this direction. Iraq is a large country with an overall geography of open landscape and low population density so that physical and cultural hurdles to the employment of wind power seem surmountable if the wind resource can become well understood. This paper gives results from a wind power analysis comprised of modeling using a digital elevation model, land cover, and surface weather observations. The wind observations represented the largest data concern in terms of paucity of coverage, time series continuity, and coarse time resolution. We present a wind power density map for Iraq and provide evidence showing correspondence with the more generalized maps of earlier studies. In standard wind utility terms there are enough "fair" and "good" areas in Iraq to offer the promise of significant wind development.

Keywords: wind power, Iraq, wind modeling

## **TAXONOMIES AND SCALES FOR GEOGRAPHICALLY-EMBEDDED NETWORKS**

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This paper presents taxonomies, scales and vocabulary to guide the analysis of geographically-embedded social networks (GESN) and social flows. The main purpose is to formalize tasks for using big data to evidence spatial telecommunication, movement, or friendship connections in a way that reflects human socialization in geographic space and can be used for urban planning, sociology, and geographic theory. Methods include trajectory/flow, geospatial network and cluster analyses that represent evidence of human connectivity through telecommunications, movement, settlement structures

or friendship in geographic space. We conclude that though some technical tools are in place for this type of analysis, bringing GESN into the geography domain may require more organization of network and flow types, and the assumptions and treatments that pertain to each type.

Keywords: GIS, social networks, graphs, flow data

## **LANDSCAPE CHANGE IN THE GREATER GILA ECOSYSTEM, 1953-2011**

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The U.S. West is experiencing rapid land changes in the form of urban, exurban, and rural residential development. In southwestern New Mexico development is encroaching upon the Greater Gila Ecosystem (GGE), an ecologically and socially vulnerable wilderness landscape that includes the Gila National Forest and surrounding unprotected lands. Thoughtful land management in the GGE is critical in order to maintain biodiversity, protect watersheds, and conserve working landscapes. However, the spatially explicit information needed to make informed management decisions is currently lacking. The objective of this study was to quantify the patterns and rates of landscape change and identify the drivers of development across the GGE. Using multi-temporal (1953, 1976, 1996, 2011) high spatial resolution aerial photography, detailed land change data was collected, processed, and interpreted. Buildings and roads were digitized, and landscape metrics were calculated to assess patterns of landscape fragmentation and connectivity. Since the mid-1970s, the landscape has undergone significant fragmentation and perforation by roads and buildings. The piñon-juniper woodland and herbaceous grazing lands that were prevalent in the 1950s at each of the study sites have been displaced by exurban and mixed development landscapes. This trajectory of development is likely linked to local economic development such as copper mining. Additionally, the maturation of exurban landscapes across the study area suggests that the GGE may be experiencing a post-productivist restructuring like many “New West” communities. County planners, land managers, and conservation groups can use this critical information in order to help understand current - and prepare for coming - landscape changes within the GGE.

Keywords: New West, exurbanization, landscape fragmentation, Greater Gila Ecosystem

## **DESERTIFICATION RESEARCH IN THE 21ST CENTURY: AN EVALUATION OF RESEARCH AND RECLAMATION EFFORTS WORLDWIDE**

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In August and September of 1977, 500 delegates from 94 countries met in Nairobi, Kenya for the United Nations conference on desertification. Although awareness and research concerning desertification existed decades prior, this conference constituted an extraordinary gathering of the global community for the purpose of assessing the magnitude of desertification worldwide and engaging the global scientific community in the task of identifying measures to combat this “insidious and widespread loss of land productivity.” (Peel 1979). In the 35 years since the UN conference, a tremendous body of research has been compiled on the causes of desertification and its potential remedies. The purpose of my research is to classify the spatial and temporal distribution of the research efforts and revegetation progress over the past two decades. To that end, I retrieved, reviewed and catalogued approximately 100 articles from peer-reviewed journals acquired using these keywords: desertification, revegetation, reclamation, soil degradation, food scarcity, fungal hyphae, water transport, clayball seeding, aerial seeding, native seeding, and rangeland management. My objective has been to gain a more complete understanding of the historical perspectives on desertification, what methods have been employed to combat it and what level of success these methods have achieved. Mapping the distribution of desertification and revegetation research will elucidate promising strategies for the reclamation of

degraded and unproductive land.

Keywords: desertification, revegetation, reclamation, soil degradation

### **RULES OF ENGAGEMENT: THE SPATIALITY OF JUDICIAL REVIEW**

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Legal geographers investigate dynamic relationships between spatial forms and social discourses and their corresponding productions of boundaries and control. Examined here are law's "the rules of engagement": the operational tenets of litigation that create the space in which various actors—plaintiffs, defendants, judges and juries, expert witnesses, etc.—perform within the highly formalized legal arena that is the courtroom. Often described as "procedural" as opposed to "substantive" aspects of the law, these legal requirements tend to operate under a veil of neutrality. They are comprised of numerous requirements embedded within the legal system—ranging from jurisdictional limitations to burdens of proof—that reflect a number of cultural assumptions about power, privilege, and authority. Of particular interest for this presentation are the rules that govern the ability to challenge government conduct. They include not only statutory requirements such as the Administrative Procedure Act but also constitutional issues related to the "standing requirement" and various other rules regulating access to the courts. These rules determine not only when the government can be challenged in court but also the level of scrutiny brought to bear on state conduct. Benson examines why, for these reasons, the rules of engagement often play a dispositive role in environmental litigation.

Keywords: legal geography, socio-legal, judicial review

### **ENHANCING THE RELEVANCE OF GEOGRAPHY IN EXPLORING HUMAN-ENVIRONMENT RELATIONSHIPS IN THE ROCKY MOUNTAIN WEST**

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Many faculty members in university geography departments realize that enhancing geographic literacy among our society would provide a stronger ability to help meet many of the challenges we face. Towards that end, geographers with an interest in applied approaches to contemporary challenges have deployed a range of efforts to advance such literacy. Two such efforts include development of a class entitled "Geography Behind the Headlines; Geographical Foundations to Current Issues" by Victor Konrad at Carleton University and a book written and published by Harm DeBlij entitled, "Why Geography Matters; More than Ever." Two specific themes that are at the heart of the underlying argument in these efforts are the value of examining the spatial dynamics of human environment interactions and the value of geographic information science and technologies in conducting applied geographic research. In this paper, I explore how we can build on these pioneering efforts through exploration of place-specific challenges related to human-environment interactions in the Rocky Mountain West. Such explorations could serve as the foundation for a university undergraduate class to advance geographic literacy.

Keywords: geographic education, human-environment interactions

### **MAPPING THE LANDSCAPE OF QUALITY OF LIFE IN DONA ANA COUNTY**

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In the last few years, political leaders, social services staff, and university researchers have been working on a collaborative research project to examine quality of life as a social justice issue in Dona Ana County in New Mexico. As part of this effort, students, faculty and staff at New Mexico State

University have been mapping a range of quality of life indicators within a GIS framework and have produced a series of map products that begin to paint the picture of the landscape of quality of life in the area of investigation. In this paper, we introduce the preliminary map products that have come from this collaborative effort and lay out a research agenda that can build on this early work. This latter work draws on the human development index that has been developed by the United Nations Development Program and used by other researchers in the US-Mexico border region.

Keywords: quality of life, human development

### **LESS COTTON AND MORE HELL: THE EMERGENCE OF THE MODERN AMERICAN WOMAN FROM THE 1800S AMERICAN WESTERN EXPERIENCE**

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In researching the westering experience of women during at least two of Borchert's Epochs (1830-1920), one finds the roots of modern feminism germinating in the American frontier. At the intersection of geography and its requirements for human adaptation, the American West largely forged the modern American woman. Women dealt with many of the same tasks they did before moving west, but were also faced with unique situations, such as a lack of supplies, utensils, and accommodations. Westering women mastered cooking without the usual ingredients, they doctored loved ones without medicines they were accustomed to using, and they gave birth to children without the comfort and assistance of family members. Overall, the experience was a challenge that women bravely faced and overcame, establishing many innovations in behavior, clothing, and thought, as well as establishing interpersonal bonds and a unique western women's culture. No longer is the 1800s westering woman represented as the reluctant drudge, sexless and faceless in her ragged sunbonnet, or by the larger-than-life, tenderhearted harlot. On the contrary, women of the American West, with the support of their men, dispelled the Cult of True Womanhood, "saw the elephant," and by the early 1900s, achieved amazing advances in the home as well as American law, politics, and culture. The Old Wild West definitely had a feminine side and it was as vivacious and "wild" as the territories settled.

Keywords: women, Old West, Borchert, feminism

### **INTENSITIES AND PATTERNS OF LAND TRANSFORMATIONS: THE CASE OF THE NORTHERN CHIHUAHUAN DESERT**

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Land use and land cover changes are rapidly transforming the northern Chihuahuan Desert. However, the intensities and patterns of these land changes, and consequently their impacts on ecosystem services and human well-being, are unknown. As a first step toward narrowing these knowledge gaps, this study aimed at mapping land use and land cover (LULC) in and around Las Cruces, NM at roughly 5-year intervals between 1985 and 2009 using Landsat TM satellite imagery; measuring intensities of land change during the 24-year time period using interval-, category-, and transition-level intensity analysis; and quantifying patterns of land change using class- and landscape-level landscape metrics. The results indicate that urban or built-up land increased by 73% between 1985 and 2009, especially at the expense of rangelands and agricultural lands. Land change time intensity was nonlinear: land was transformed quickly between 1985 and 1995, slowly between 1995 and 2005, and fast again between 2005 and 2009. Land change category intensity was nonlinear: rangeland lost the greatest area but agricultural land lost ground more intensively. Land change transition intensity to urban or built-up land, the 'winner' of land transformations in the study area, was nonlinear: agricultural land and wetland were targeted more than rangeland, but most of what became urban or built-up land used to be rangeland. The landscape has become increasingly fragmented as indicated by increasing patch and edge densities, decreasing mean

patch sizes, and increasing Simpson's diversity and evenness indices.

Keywords: land change, remote sensing, intensity analysis, landscape metrics, Chihuahuan Desert

## **DOG PARKS AND THEIR USERS**

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Dog parks are fenced, off-leash parks reserved for the recreation of dogs and their owners. These parks have become an increasingly common component of the contemporary urban and suburban landscape in the United States. These spaces have not been explored from a geographic view –point, a deficiency that this project hopes to fill. As pets have taken on a more prominent role in American lives, they have begun to play a more important role in the personal and economic lives of their owners. This new importance can be seen in the increasing pet centric social opportunities offered to accommodate pets and their humans. However, dog parks and how they are used have not been explored in this context. It is unclear if these spaces serve as a utilitarian space, a social space or some combination of these possibilities. Also, due to the fact that public space is a finite resource and dog parks are often carved from existing green space, and their audience is ambiguous. It is unclear if access to the resource is adequate or equitable for all community members who would care to use it; some community members may be excluded due to accessibility, the parks are often best accessed by car. This project will explore the uses, users and spatial patterns of establishment of these social spaces using ethnographic research methods and the spatial display and analysis offered by GIS.

Keywords: human animal relations, green space, urban, dogs

## **THE EFFECTS OF RIPARIAN LANDSCAPE DIFFERENCES ON AVIAN SPECIES DIVERSITY IN THE GILA LOWER BOX WILDLIFE HABITAT AREA, NEW MEXICO**

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Riparian landscapes such as the Gila Lower Box Wildlife Habitat Area, Grant County, NM represent an important avian habitat type in the arid southwest. A variety of avian habitat requirements are met in riparian landscapes including breeding habitat in the summer, stop-over habitat for migrating birds in fall and spring, over-wintering habitat for short-distance migrants and year-round habitat for resident species. The area of investigation lies perpendicular to the central migratory flyway and is currently managed as an Area of Critical Environmental Concern. The primary objectives of my research were to evaluate differences in riparian landscape patches, determine avian species diversity associated with patches, and to describe the combination of patch characteristics that support the greatest avian diversity. Point counts were conducted monthly at 40 sites within the 97 hectare area. This research identifies 5971 individuals of 119 species over the one year of surveys. Shannon-Wiener diversity ranged from 3.139 – 4.109. Avian diversity was correlated with the area of Hackberry ( $r = 0.305$ ,  $P = 0.028$ ). Linear regression revealed no significant relationships between avian diversity and patch size. Avian abundance increased moderately with decreases in the amount of edge ( $r = 0.328$ ,  $P = 0.020$ ). Of eight land cover types compared with avian abundance, area of River was the only significant correlation identified ( $r = -0.311$ ,  $P = 0.026$ ). This research suggests that the vegetation patches function as areas of similar habitat in this arid riparian landscape and management to reduce the amount of edge could increase avian abundance and diversity

Keywords: avian species richness, riparian habitat, Shannon-Wiener Diversity

## **RURAL-TO-RURAL TRADING IN THE CITY: ARTISANAL SUGARCANE LIQUOR COMMERCIALIZATION IN THE NORTHEASTERN PERUVIAN AMAZON**

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Much of the literature on the commercialization of rural products in the northeastern Peruvian Amazon focuses on exports (e.g., timber) or items with an urban demand, like foodstuff, particularly considering the main regional market, the city of Iquitos. As Iquitos' population nears half a million, its supremacy as the only market for smallholder products—in a region physically isolated from comparable markets—continues to be emphasized in the literature. This paper complicates such perspective with a case study that illustrates the commercialization strategies of artisanal sugarcane liquor (rum), drawing from interviews conducted in 10 smallholder communities. I explore Iquitos' relevance as a place where smallholders sell products to other smallholders—with or without the help of urban intermediaries. I also look at the relationship between increased market accessibility and smallholder livelihood activities that produce for other rural—rather than urban—residents. Findings indicate that, for some smallholders, Iquitos is considerably important as a place for trading with other smallholders in addition to the opportunities derived from urban consumers. Results also suggest that a project intended to increase accessibility to Iquitos—the Iquitos-Nauta Road—may have inadvertently facilitated the growth of secondary regional markets and rural-to-rural trading outside Iquitos. This research brings attention to other markets available to smallholders, moving beyond perspectives that only consider the urban consumers of Iquitos, and exploring rural income strategies that integrate other sectors of this urbanizing Amazon region.

Keywords: Amazon, livelihoods, urbanization, market accessibility

## **USING LEGAL GEOGRAPHY TO IDENTIFY LEGAL MECHANISMS FOR ENACTING PROGRESSIVE CHANGE**

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This paper seeks to trace potential directions forward for using critical legal geography to identify juridical logics that are ripe for activist intervention. There is a growing sense within our discipline that geographic theory should properly lead to practice beyond academia. The challenges of translating critical approaches to spatial knowledge into change “on the ground” remain substantial. By revisiting a series of legal concepts and mechanisms that have been critiqued by critical legal geographers – including property, corporations, condominium, residential associations, and the like – this paper proposes ways to make these concepts “jump tracks” for the purpose of enabling progressive activism.

Keywords: legal geography, praxis, activism, property, contract

## **SPATIAL ANALYSIS OF WOODY SPECIES IN NORTHWEST BOTSWANA**

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Spatial patterns of vegetation can inform as to underlying biotic and abiotic processes, including disturbance. Here, two statistical procedures for analyzing spatial patterns will be used to comparatively describe the distribution of woody species for twelve 10 x 25 meter plots sampled in a Kalahari savanna in Northwest Botswana. Nearest neighbor analysis uses tree-to-nearest-tree distances, while local Ripley's K analysis considers patterns around individual trees. Taken together, these methods allow for disentangling variable clustering patterns. These analyses will be conducted on a per-species basis to better understand intra-species distribution as a lens into dispersal and competition. The results will be compared to high resolution, GeoEye-digitized vegetation associations in order to assess both the

relative utility of field- and satellite-derived data as well as how representative the plots surveyed using a standard sampling interval were of the surrounding region's vegetation distribution. It is hypothesized that the presumed encroaching *Acacia* species will be distributed similarly to each other but differently from other species in the area, and that *Mopane* and *Combretum* species will exhibit tighter localized clustering. The results will inform as to the utility of these spatial analytical tools for quantitatively assessing and linking field- and satellite-derived vegetation distribution to aid in assessing vegetation dynamics and disturbance.

Keywords: spatial analysis, Ripley's K, Kalahari Desert, vegetation patterns, savannas

## **AN EVALUATION OF PROTECTION EFFORTS FOR THE MEXICAN SPOTTED OWL IN LINCOLN NATIONAL FOREST**

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Establishing a balance between environmental and human well-being is difficult. In the Sacramento Mountains of southwestern New Mexico, for example, it is challenging to protect the threatened Mexican Spotted Owl while maintaining the economic and cultural well-being of the local human community. It is currently unclear what the relationships are between the owl's protection parameters, the distribution of the owl, and human well-being. This study seeks to address this issue and thus help inform forest and community management. I acquired and analyzed spatial data pertaining to the owl distribution and human well-being of the local community. Factors that limit or facilitate the growth of the owl population, such as human interference and environmental factors including forest fire and competition from other species were included in the data. To evaluate human well-being data representing natural resource cultivation and average income were also considered. Visual analysis and interpretation of maps and charts created in ArcGIS with available data suggested a somewhat neutral to slightly-positive relationship between the protection parameters that were put into place and the Owl's distribution, as human influence is not the only threat but the only one restricted within the guidelines. In addition, a negative relationship between the protection parameters and human well-being in the region was also observed. It was determined with the data derived, that more data be collected and analysis performed pertaining to the impact of protection parameters in Lincoln National Forest. Although the relationships previously mentioned are apparent in this study and warrant further attention, the data currently available is not sufficient for a thorough analysis. It is also proposed that once enough data has been collected and a completed spatial analysis assembled, the protection parameters currently in place on the Mexican Spotted Owl be reviewed to better owl efforts and seek to improve human well-being.

Keywords: Lincoln National Forest, human well-being, threatened species, spatial analysis, Mexican Spotted Owl

## **THE CHICKASAW NATION POINTS EAST: AN ANALYSIS OF HISTORICAL REPRESENTATIONS IN THE CHICKASAW NATION USING GIS**

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Historical preservation has been a priority of the Chickasaw Nation. This paper explores the importance of historical representations in the context of the Chickasaw Nation. Using data gathered through field observation across the Chickasaw Nation, this paper analyzes the geographical distribution of official and unofficial historical markers. This study uses GIS methods to highlight an east/west divide in the historical representations. Chickasaw history is more strongly represented through historical markers in the eastern region of the Chickasaw Nation while Anglo history is more strongly represented in the western region. The paper explores the impacts of climate and historical geography on the Chickasaw



Nation. We conclude that history and climate are contributing factors to the east/west divide in the distribution of historical markers in the Chickasaw Nation.

Keywords: Chickasaw, memory, memorialization, GIS, indigeneity

## **LAW, PROPERTY, VIOLENCE**

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Violence, as legal scholar David Delaney has argued, “is domesticated, concentrated, rationalized, and deposited in law for safekeeping.” The violence that constitutes law is most evident, according to political theorist Timothy Mitchell, in legal struggles over property. The violence of law, he has argued, is a central “principle of property.” To Robert Cover, struggles over and claims to property are always “staked in blood.” While such an argument is, perhaps, on the fringe of mainstream legal thinking, as the above implies the law-violence nexus is at the heart of much recent critical legal scholarship. This paper reviews the various ways legal geographers, critical legal studies scholars and political philosophers have theorized law's relationship to property and violence.

Keywords: law, property, violence, social theory

## **PHENOLOGICAL CHANGE ALONG AN ELEVATIONAL GRADIENT IN A SKY ISLAND WATERSHED**

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Elevation plays a key role in explaining the spatial distribution of climate, vegetation, and water resources. Consequently, an understanding of climate-vegetation-water interactions in mountain environments is central to geography and is paramount to predicting potential impacts caused by human activity and climate change. Sky Islands are mountain ranges that are isolated from neighboring mountain chains by large expanses of desert, much like oceanic islands are separated by water. Moreover, isolated altitudinal zones extend up the mountain that parallel latitudinal ecosystem zones across a much larger geographic region. Because of their isolation, sky islands are particularly sensitive to external disturbances caused by human or natural processes (e.g., climate change), and changes in the ecological function of sky islands may be early indicators of portending changes over a broader geographic region. This research measures in situ phenology and compares it to land surface phenology (LSP) measured via satellite from Great Basin National Park. Phenological data from both sources are used as inputs into the Regional Hydro-Ecological Simulation System (RHESSyS) watershed model. Initial data collection and model development provide insight into vegetation dynamics in the park and elucidate their relationships with water, carbon and nutrient fluxes.

Keywords: phenology, elevation gradients, watershed modeling

## **FINDING FARMLAND IN URBAN NEIGHBORHOODS: A GIS APPROACH**

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Urban areas across the Southwest are experiencing a renewed interest in the reuse and revitalization of previously unused plots of land. Denton, Texas provides a representative example of a growing city that has seen a rise in urban small-scale agriculture within its municipal boundaries. However, the demand for fresh produce exceeds the current supplies and urban farmers are looking for new plots of land to cultivate. In this project, I develop a protocol for determining best locations for the expansion of urban small-scale farming in Denton. First, NRCS soil surveys are used to identify prospective areas for farms. Second, interviews with current farmers help to identify the types of plot variables they look for. Third, the accuracy of the soil surveys will be tested using random soil sampling over a 4 km diameter area. By

finding the spatial location of sandy soil formations in town, and combining this with farmers' criteria, the results will provide a justification for whether using the soil surveys in an urban environment is feasible for determining locations for expansion of agricultural land.

Keywords: urban agriculture, GIS

### **A GEODESIGN PROJECT TO AUGMENT A TRADITIONAL GIS COURSE**

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This paper presents a description of a geodesign project that parallels traditional GIS course content. Research suggests that today's neomillennial learner is particularly receptive to this type of educational experience. The exercise is based on a study of the Valles Caldera National Monument of Northern New Mexico. There is pending congressional legislation that, if passed, would transfer management of the caldera from the Valles Caldera Trust to the National Park Service. A primary focus of the exercise is to both immerse the students in a real-world scenario with real outcomes, thus enhancing the practicality of the exercise. Initial experiences begin by assigning discussion questions that ask them to acquire a familiarity with the preserve, to describe its significance, to evaluate the spatial components that comprise it. Additional discussion questions require them to read and respond to existing management documents and strategic plans, to evaluate the existing Valles Caldera geodatabase, and to ascertain the degree to which the GIS as it exists satisfies the existing strategic plans. Embedded in this exercise is a GIS analysis requirement where the students employ the geodesign tools of ArcGIS 10 to build scenarios in anticipation of what the National Park Service do to change the face of the caldera should they become the managers. The students use a relatively standard grading rubric for discussions based on quality and content, and a more specific rubric for the geodesign component that focuses on spatial thinking, creativity, and collaboration.

Keywords: GIS education, geodesign, project based learning

### **MONTHLY TEMPERATURE AND PRECIPITATION PERSISTENCE IN NEW MEXICO**

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Climatological persistence is the tendency for conditions in one period to remain the same into the next. This study will examine persistence in monthly temperature and precipitation in New Mexico. Data from state climate divisions covering 1950-2010 will be analyzed using the chi-square technique for independence. A binomial test will be applied to identify the pattern of persistence relationships throughout the year. Comparisons will be made with earlier climatological studies of persistence.

Keywords: New Mexico, temperature, precipitation, persistence

### **THE REMARKABLE, HYPOTHESES, AND CRITICAL THINKING**

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Some physical geography topics can be intense and alarming for students. My introductory classes include standard content as well as current topics, such as climate change, natural hazards, and environmental issues. A student once asked, "Is geography always so depressing?" and my response was, "No, but it is often sublime". As we examine human interaction with the environment, some aspects are dismal, yet we must not overlook the remarkable and the marvelous in the world around us. "Remarkable" describes the way I see the natural world, and it is that quality that I want to convey to students, as well as the serious realities of the problems we face. Natural phenomena are amazing, surprising, and wonderful; what could be better for engaging the interest of students? An excellent way

to explore the remarkable in class is to use multiple working hypotheses to examine topics such as apples falling from the sky, the Mima mounds of Washington state, or the mobile rocks of Racetrack Playa in California. These natural occurrences and features may seem like pseudo-science, but they exist and ask for explanation. Discussion of potential causes leads to lively classroom interactions. Using basic principles introduced in lecture, students work with ideas, think critically, and find strengths and weaknesses in their own arguments.

Keywords: education, physical geography, critical thinking

## **TWO PORTRAITS OF WATER SCARCITY IN THE MIDDLE EAST**

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Geographers and many others pay close attention to the increasingly problematic issue of water scarcity, particularly as the global population grows and places greater demands on the world's very limited fresh water supply. It has been posited by some that the big wars of the 21st century are more likely to be fought over water than other resources such as oil. Nowhere is this issue more pressing today than in the Middle East, where less than 1% of the world's precipitation falls, and 85% of what little that falls here is lost through evaporation. What's more, in the most recently released Water Stress Index, seven of the world's top ten extreme water-stressed countries were situated in the Middle East. With that backdrop in mind, this paper takes a closer look at two countries in the Middle East – Jordan and Oman – and explores their water-related histories and innovations, along with their contemporary water portraits, highlighting perspectives, perceptions, and hydro-political issues that permeate within these two countries. Additionally, Oman and Jordan's water-based similarities and distinctions will be explored in more detail.

Keywords: water, scarcity, Jordan, Oman

## **RACE/ETHNICITY IN SEBASTIAN COUNTY, ARKANSAS**

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Using ArcGIS to analyze the 2000 and 2010 United States Census Data revealed some interesting patterns in the demographics of Sebastian County, Arkansas. The total population of Sebastian County increased by nine percent during the decade with the largest ethnic/racial increase occurring in the Hispanic population. Maps of the County show that each racial/ethnic group has a distinctive pattern of settlement as well as a distinctive pattern of population growth or decline and that the racial/ethnic distribution of the population has changed across the County.

Keywords: race, ethnicity, Arkansas, US Census

## **CEMENT: DEPENDENCY, GLOBAL CO<sub>2</sub> EMISSIONS, AND REORIENTATION**

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Portland cement became a material embodiment of modern society during the twentieth century. Currently, production of this quintessential component of the built environment accounts for ~5-7% of total global CO<sub>2</sub> emissions. In this paper, I address the dilemma of society's dependency on cement -- how to resolve the global environmental impacts of a material widely regarded as 'necessary'. Mexico provides the setting for my analysis. Cement production began here in 1906; by the 1930s, seven factories supplied ~350,000 tons of cement annually. During this time period, cement was hailed as an innovation that would revolutionize Mexican architecture as well as its civil society, one that came to

symbolize both nationalism and industrialization. Today, 34 cement plants produce ~35 million tons of Portland cement annually. Cement companies own professional football teams, promote brand loyalty through advertising, and market themselves as environmental stewards. Here, I show how the historical growth and spatial proliferation of the Portland cement industry and cement consumption in Mexico are outcomes of industry narratives and processes of social regulation that served to create a sociotechnical path-dependency that is at the root of cement's dilemma. To change paths and ultimately decrease cement production's environmental impacts, the literature identifies three possibilities: new technological innovations, adoption of substitute materials, and sociotechnical reorientation. After discussing each of these, it will be shown that cement's global environmental impacts will likely continue unless dramatic change occurs. For this reason, the most radical of the three, reorientation away from cement is likely the best solution.

Keywords: path dependency, built environment, environmental change, CEMEX, Mexico

### **MODELING VEGETATION HEIGHTS FROM HIGH RESOLUTION STEREO AERIAL PHOTOGRAPHY: AN APPLICATION FOR BROAD-SCALE RANGELAND MONITORING**

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Vertical vegetation structure in rangeland ecosystems can be a valuable indicator for monitoring rangeland health or progress toward management objectives because of its importance for assessing riparian areas, post-fire recovery, wind erosion, and wildlife habitat. Federal land management agencies are directed to monitor and manage rangelands at landscapes scales, but traditional field methods for measuring vegetation heights are often too costly and time consuming to apply at these broad scales. Emerging remote sensing techniques (e.g., LiDAR or synthetic aperture radar) are too expensive, require specialized sensors, or are not of high enough resolution for broad-scale application. An alternative remote sensing approach is to measure vegetation heights from digital stereo aerial photographs. The purpose of this study was to test the feasibility and accuracy of estimating shrub heights from high-resolution (HR, 3-cm ground sampling distance) digital stereo-pair aerial images. Overlapping HR imagery was taken in March 2009 near Lake Mead, Nevada and 5 cm resolution digital terrain models (DTMs) were created for twenty-six 2,500 m<sup>2</sup> test plots. We compared the heights of individual shrubs and plot averages derived from the DTMs to field measurements. Modeling success was highly variable, dependent primarily on the type of vegetation in the plot. The resolution of the imagery was too coarse to accurately capture the heights of herbaceous vegetation and fine shrub branches. However, compact shrubs were modeled very accurately. Through the use of statistically derived correction factors, though, vegetation heights from HR DTMs could be a valuable technique for broad-scale rangeland monitoring needs.

Keywords: rangeland monitoring, stereo aerial photography, vegetation heights

### **TOWARDS A MULTIDISCIPLINARY APPROACH TO THE STUDY OF GENOCIDE**

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Social sciences outside of geography are undergoing a spatial turn. Based on research conducted in the last several years, in this presentation I will argue for a multidisciplinary perspective to the study of genocide that combines the theories, concepts, tools, and methods of GIScience and cartography with social networks analysis and forensics science. Established models of genocide (Staub 1989, Kiernan 2007, Waller 2007) provide powerful explanatory perspectives but lack a spatial dimension. Drawing in large part on Holocaust case-studies, I will make the case for an approach to the study of genocide that combines spatial analytical and cartographic perspectives with the study of social networks. I will conclude my presentation by exploring how a spatial turn in forensic science can shed light on patterns

of death at small and large scales, adding another powerful analytical and explanatory dimension to the study of genocide.

Keywords: GIScience, forensic science, social networks, Holocaust, genocide studies

### **LINKING GEOGRAPHIC INFORMATION SYSTEMS AND COST-BENEFIT ANALYSIS TO AID LAND MANAGEMENT DECISIONS RELATED TO ECO-LABELED VITICULTURE**

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Recently the wine market has seen increased differentiation in terms of ecological production standards. These standards have to be transmitted to the consumer via eco-labeling programs. Farmers taking part in these labeling programs have to be certified by the agencies awarding individual labels, as in the case of the United States Department of Agriculture (USDA) Organic label or the Demeter, USA Biodynamic label. While there are a number of positive environmental externalities to organic farming (improved soil quality, reduced water pollution, etc.), for most farmers the financial viability of converting their farm towards one of these certified production standards is of paramount importance. This paper proposes a modeling approach that wine farmers can employ in order to streamline their decision making process regarding the possible conversion of their vineyard(s) from conventional to eco-friendly production. The proposed modeling approach links Geographic Information Systems (GIS)-based Site-Suitability Analysis with a Cost-Benefit Analysis framework in order to assess the economic viability of converting operations to viticulture practices that are in compliance with USDA organic production standards at the farm level. While the focus of the research presented in this thesis is on the development of a method, the modeling approach presented is operationalized using empirical data from two grape growing operations in Connecticut.

Keywords: viticulture, organic agriculture, GIS, cost-benefit analysis, Connecticut

### **A HISTORICAL-GEOGRAPHICAL SURVEY OF OKLAHOMA'S MALARIA PROBLEM**

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Public health surveys and studies in the early 20th century documented the “Southernness” of Oklahoma with respect to its disease geography. Tropical diseases such as malaria and yellow fever existed in the state alongside hookworm and pellagra, as in other parts of the American South. What were the geographical dimensions of Oklahoma’s malaria problem, and how was it managed? This paper draws on archival data and secondary sources to begin to answer these questions, and highlights scenarios for further research.

Keywords: malaria, Oklahoma, disease, historical geography

### **SPATIO-TEMPORAL VARIABILITY IN ATMOSPHERIC WET DEPOSITION ACROSS BORNEO: BIOMASS BURNING, ENSO, AND URBANIZATION**

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Sulfur and nitrogen emissions from biomass burning and ENSO-associated fires on the island of Borneo are expected to contribute to increasing atmospheric deposition in Southeast Asia. Elevated atmospheric deposition of sulfate (SO<sub>4</sub><sup>2-</sup>), nitrate (NO<sub>3</sub><sup>-</sup>), and ammonium (NH<sub>4</sub><sup>+</sup>) has the potential to affect ecosystems locally as well as regionally due to seasonal rainfall and wind patterns. Here, we synthesize results from wet deposition studies conducted at 13 sites in Indonesia and Malaysia from 1992 to 1998. We also analyze wet deposition data collected by the East Asia Acid Deposition Monitoring Network

from 2000 to 2008 to better assess and describe patterns in sources and rates of deposition in this region. Biomass burning comprises ~14% of annual sulfur dioxide (SO<sub>2</sub>) emissions in Indonesia, but both atmospheric emissions and deposition display high spatial and temporal variability. Annual sulfate inputs ranged from 15.4 kg ha<sup>-1</sup> yr<sup>-1</sup> to 76.9 kg ha<sup>-1</sup> yr<sup>-1</sup>, while NO<sub>3</sub><sup>-</sup> inputs ranged from 0.3 kg ha<sup>-1</sup> yr<sup>-1</sup> to 60.8 kg ha<sup>-1</sup> yr<sup>-1</sup>. During non-El Niño years, urban sites (N = 7) experienced higher deposition rates than rural sites (N = 6). Vegetation and peat fires associated with the 1997-1998 El Niño event contributed to substantial increases in atmospheric emissions and a doubling of nitrate, sulfate, and ammonium wet deposition. In combination, these studies indicate that biomass burning, urbanization, and El Niño-associated fires all contribute to enhanced emissions and deposition of sulfur and nitrogen, with potentially detrimental effects on ecosystem function and human health.

Keywords: Borneo, ENSO, deposition, sulfate, nitrate

### **ACEQUIA CULTURE IN THE MESILLA VALLEY**

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My presentation will be a quick introduction to the history, maintenance, and eventual replacement of the acequia or traditional gravity-driven irrigation system of the Mesilla Valley during the nineteenth century. Compared to other parts of the state, the introduction of the acequia system occurred late in the Mesilla Valley. During the course of the nineteenth century acequia irrigation allowed communities like Doña Ana, Las Cruces, and La Mesilla to thrive. But as the century continued several factors made acequia irrigation in the valley unsustainable. By the turn of the century, federal development of water changed irrigation and demographics in the valley and effectively replaced the acequia system.

Keywords: acequias, irrigation, Chihuahuan Desert, riparia, borderlands

### **TOYOTA PRIUS VS. HONDA FIT: IN RESPECT TO CARBON FOOTPRINT**

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With the increased concerns of global warming, some people are trying to conserve resources and reduce their carbon footprint. Manufacturers are responding to demand for a cleaner environment by building more efficient, hybrid vehicles. The leader of this trend has been Toyota with the introduction of its extremely popular Toyota Prius line. These cars have almost become a symbol of the ecofriendly elite. Many consumers believe they are making an environmentally conscious choice by purchasing the hybrid Toyota Prius. In this project we examine how the fuel saving capacity of the Prius stacks up against another comparable economic car, the Honda Fit. The method of analysis involves fuel usage data from both vehicles. Approximations for carbon footprints of both vehicles were made in association with fuel consumption.

Keywords: ecofriendly, hybrid, carbon footprint, global warming

### **IMPLEMENTATION OF PUBLIC-PRIVATE PARTNERSHIP INITIATIVES FOR TRANSPORTATION DEMAND MANAGEMENT: A STUDY OF SOUTH FLORIDA COMMUTER SERVICES**

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Almost all research on transportation demand management (TDM) implementation has focused on employer initiatives or, to a lesser extent, regional transportation management organization (TMO) initiatives. Increasingly, however, TDM implementation takes place through public-private partnerships between regional TMOs and employers. South Florida Commuter Services (SFCS) is a typical TMO the

primary focus of which is to promote TDM through such partnerships. Eight case studies of companies with which SFCS has worked to promote TDM programs reveal important information about factors that affect the effectiveness of such initiatives. Size of employer appears to be a significant factor that adversely affects TDM implementation. Variable working schedules negatively affect employee attitudes about the likelihood that they will be able to find rideshare partners and this results in diminished interest in TDM. Specific attributes, needs, and circumstances of employees that can affect their interest in TDM and are very likely to be known by employers constitute information that TMOs must work to find out if they are to be able to help employers develop effective TDM programs. Public-private partnerships promoting TDM present certain challenges that are different from those faced by either employers or regional TMOs acting independently of each other. Therefore, such partnerships need to be studied more extensively.

Keywords: transportation demand management, alternative transportation

### **THE ECONOMIC GEOGRAPHY OF AGRICULTURAL LAND PARCELS AND LAND USE IN THE HISTORICAL EX-PLANTATION ARKANSAS 'DELTA' REGION**

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The greater Mississippi River Delta region experienced an economic revolution in agriculture during the twentieth century, transitioning away from an agrarian realm characterized by hand-picked cotton, small plots of land, and tenant farmers such as sharecroppers. By 2000, the Arkansas Delta in particular was a depopulated landscape (due to decades of out-migration by farmers and farm workers) dominated by large commercial farms. However, rural agrarian change in the U.S. South is too often discussed at macro-level scales. Land use, land change, and individual land parcels must be analyzed at the spatial level of the farm in order to understand the manner and method of the Delta's twentieth-century agricultural remaking. Historical documents (county atlases, U.S. Census records, U.S. Census of Agriculture records) are used to support the argument that, in hindsight, widespread cotton production in a region of small land parcels and small average farm sizes was clearly unsustainable in an increasingly modernizing Arkansas Delta. Mechanization and non-cotton crop production intensified the rate of agricultural change from smaller farms and land parcels to larger farms and land parcels. A treatment of the ex-plantation Arkansas Delta-as-postcolonial allows for possible transferability of economic development strategies to the once-colonized world in Latin America, the Caribbean, Africa, and Asia.

Keywords: agriculture, economic, rural, Arkansas, historical

### **ERASING NATIVE WOMEN IN THEIR HOMELANDS: HUMAN RIGHTS AND THE VIOLENCE AGAINST WOMEN ACT (VAWA)**

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The security of one's body is a human right, and in Indian Country the maze of jurisdictional oversight on Indian Land forecloses on this right for Native women. VAWA, which was recently reauthorized during the summer of 2012, does not include adequate protections for Native women on Indian Lands. The statistics of violence against Native women are disheartening, one in three will be violated and often at the hands of non-native men. The intersection of sovereignty, land, federal policy, race, and human rights all collide to produce zones where Native women's rapes and battery often go unprosecuted. I term these areas "free rape zones", because perpetrators often walk free after committing these acts against Native women on Indian land. This paper will examine how existing federal policies produce the conditions from which these zones emerge and enable the reproduction of settler colonialism on indigenous homelands and indigenous women's bodies.

Keywords: human rights, settler colonialism, Indian land, sovereignty, women's rights

## **WITH A LITTLE HELP FROM FRIENDS: TRANSBORDER INDIGENOUS GEOGRAPHIES AND COMMUNITY DEVELOPMENT IN THE MIXTECA REGION OF OAXACA**

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In this presentation I propose research on the transborder connections between Indigenous coffee cooperatives in Oaxaca, Mexico and apple farmers in the United States. First, I review the history of coffee organizations in the region just before, during, and then after the drop of global coffee market prices between 1989 and 1994. Next I outline how the resultant transborder migration has linked Indigenous communities in Oaxaca to non-profit social justice organizations focused on agricultural sustainability that then help fund community development projects and facilitate access to fair trade coffee markets. With the help of a video posted to the internet, I introduce Broetje Orchards in Prescott, Washington, which relies heavily on a migrant labor force from the Mixteca region of Oaxaca. I describe this business's Vista Hermosa Foundation that helps fund initiatives like the building of coffee roasting facilities and women's cooperatives. For the transborder expansion of its foundation, Broetje Orchards has enlisted the help of other small non-profit organizations with relations to religious groups such Catholic Relief Services. After setting the stage, I propose research that will investigate the growing role of religious organizations in light of shifting state-society relations in Oaxaca, the production of knowledge in regard to community development programs, and the role of women in the decision-making processes.

Keywords: indigenous geographies, transborder, Latin America, coffee, development

## **BECOMING A STATE DIFFERENT: NEW MEXICO'S STUMBLE TO STATEHOOD**

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"Becoming a State Different" explores the sixty-two year period that New Mexico labored to become a state. This illustrated presentation will examine the underlying causes, including racism, sectionalism, and just plain incompetence that prevented New Mexico from gaining statehood. It also will discuss the uniqueness of the state, its boundary creation, and its rich heritage.

Keywords: New Mexico, statehood, obstacles

## **OBJECT-ORIENTED GIS: A 'FLAT' ONTOLOGY OF PIXELS**

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This project attempts to bring about an object-oriented position towards pixels of all kinds consistent with Graham Harman's speculative realist object-oriented philosophy. For decades, spectral pixels have retained an ostensibly privileged status in remote sensing science. More specifically, scientific materialism and two of Harman's seven "radical" approaches to objects have characterized digital remote sensing science since its advent. That is, by denying both the distinction between an object and its qualities and the difference between an object and its accidents, spectral pixels are regarded as being 'actual' and directly representative of remotely sensed phenomena. Furthermore, any so-called "ancillary" data is typically relegated to the modeling domain of the 'potential'. This is a mereological approach to the detailed vegetation mapping of topographically complex landscapes that uses a geomorphometric Topographic Relative Moisture Index (TRMI). By first classifying DEM-derived land-surface parameters as ecologically relevant objects, these objects then become the component parts and ultimately, the qualities of unified multiscaled thermal/hydro-geomorphic objects segmented with eCognition<sup>TM</sup>. Not only are these classified chorologic TRMI objects irreducible to their component parts and qualities, they can now be "encrusted" and further segmented with surface accidents, i.e.,



spectral pixels of any spatial and spectral resolution. This project thereby introduces a realist metaphysics and interobjectivity to geomorphometry and the analysis of remote sensing data that is capable of extricating geographers from the quandary produced by a pervasive scientism. The qualitative is quantitative in an object-oriented approach that upholds the autonomy of objects from their translations and shifting surface profiles.

Keywords: interobjectivity, speculative realism, geomorphometry, eCognition™, scientism

## **HOLOCENE DEVELOPMENT AND PROGRESSION OF AEOLIAN DUNE BLOWOUTS ON PADRE ISLAND NATIONAL SEASHORE**

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Recent evidence suggests that development of dune blowouts along Padre Island National Seashore, Texas, and migration of the parabolic dunes to the backbarrier shoreline are the primary mechanisms by which the island transgresses in response to relative sea level rise. This study characterizes the development and migration of dune blowouts at decadal and century scales in order to understand these changes. An initial breach, caused by the removal of vegetation, develops along the dune line allowing sediment to be funneled into the dune field. The entrance of the blowout focuses the wind velocity, allowing sediment to be transported into the dune field, covering any vegetation that is present. This process continues as sediment is eroded from the foredune increasing the size of the blowout until the foredune is rebuilt and vegetation stabilizes the entrance. With the front stabilized, the blowout begins its movement across the island. Aerial photographs, LIDAR data, ground penetrating radar, and optically stimulated luminescence were used to track and date the migration of these blowouts.

Keywords: blowouts, LiDAR, GPR, coastal geomorphology

## **THE BIOGEOGRAPHIC IMPACT OF CLIMATIC EXTREMES IN THE CHISOS MOUNTAINS OF BIG BEND NATIONAL PARK, TEXAS**

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The year 2011 was traumatic for Big Bend National Park in west Texas. Plants and animals in the park were significantly impacted by an extreme freeze in February followed by exceptional drought for the duration of the year. The Chisos Mountains serve as a biogeographical island in the Chihuahuan Desert. Climatic extremes killed significant stands of the Mexican Pinyon Pine in the High Chisos. Many Lechuguilla, a regional agave indicator species, also withered in the repressive conditions. Aggressive behavior observed by Mountain Lions and Mexican Black Bears were also linked to the climatic extremes of 2011. Park rangers and botanists speculate that the climatic extremes are associated with climate change and may be initiating a shift in floral composition. Photographic evidence in the Chisos Mountains for the last six years (2006 - 2012) supports these conclusions.

Keywords: climate change, Big Bend National Park, Chisos Mountains, Mexican pinyon pine, lechuguilla

## **GOLDEN-CHEEKED WARBLER POPULATION AND CONSERVATION IN TEXAS**

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Now a federally protected bird, the endangered golden-cheeked warbler is a unique species for the state of Texas. Texas the only state in North America where one can find the warblers and more importantly, it is the only place in the world where they nest and reproduce. However, the population of golden-cheeked warblers continues to rapidly decrease with each passing years; in order to address the

conservation of this species, one must both consider the vast variety of factors threatening their survival and locate the specific areas suitable for successfully producing and raising new generations of golden-cheeked warblers.

Keywords: golden-cheeked warbler, endangered, population

### **JOURNALMAP: GEO-SEMANTIC SEARCHING FOR RELEVANT KNOWLEDGE**

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Ecologists struggling to deal with rapidly changing environments and evolving ecosystem threats need quick access to relevant research and documentation of natural systems. The advent of semantic and aggregation searching (e.g., Google Scholar, Web of Science) has made it easier to find useful literature across disciplines and publishers. However, the ability to find out what is known about a specific ecosystem, species or landscape is hindered by current search technologies that rely on keyword, topic, text, and author searching – concepts of publication cataloging and searching that date back to the late 1800's. Much of the published research conducted on ecosystems around the world is tied to specific places, and these locations can be exploited to search for literature based on geography in addition to traditional searching. Our objective was to develop a geographic as well as thematic (i.e., geo-semantic) system for searching for published natural resource literature. We parsed article text from back issues of ecological journals to extract reported study area locations (place names as well as geographic coordinates). Here we look at only papers that reported geographic coordinates. Citation information, keywords, abstracts, and standardized geographic coordinates were added to a database which allowed us to create a web interface capable of searching for literature based on geographic and thematic queries. Search results are available for the last six years of two journals, Rangeland Ecology and Management (REM) and Journal of Arid Environments (JAE). However, additional journals are being added. Of the 2,335 studies published in REM and JAE from 2005 to 2011, 76.5% of studies reporting a study area included geographic coordinates; the rest included only place names. Of the 1,721 REM and JAE studies reporting geographic coordinates, eight different coordinate formats were used. Obvious location errors were found in 36 studies, or 2.1% of studies reporting geographic coordinates. Beyond easily seeing what has been published for specific areas, georeferenced publication databases open new possibilities for discovering and using ecological knowledge. A user can analyze the distribution of published knowledge about a species or topic, or identify relevant knowledge sources from similar areas based on themes like soils and climate. To promote robust geo-semantic literature searching in the future we recommend: 1) adopting standard geographic coordinate formats in journals to increase ease of extracting location information and validate coordinates, 2) requiring authors to report geographic coordinates for study areas unless privacy or proprietary concerns dictate otherwise, and 3) making geographic information publically available as a part of an article's basic citation metadata.

Keywords: metaknowledge, literature search

### **AN ANALYSIS OF SPATIAL CONCORDANCE BETWEEN ECOSYSTEM SERVICES AND BIODIVERSITY: A CROSS-REGIONAL COMPARISON AT THE SUB-BASIN SCALE**

**KOPP, DARIN A.<sup>1</sup>, KENNETH G. BOYKIN<sup>1</sup>, WILLIAM G. KEPNER<sup>2</sup>, AND DAVID F. BRADFORD<sup>2</sup>**

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Ecosystem services are broadly defined as the benefits humans derive, either directly or indirectly, from ecosystems. Ranging from agricultural productivity to nature's aesthetic beauty, this concept provides an opportunity to amalgamate human needs with ecological conservation. Biodiversity is the variety of life from genes to organisms to ecosystems and is often a focus of management and conservation practices.

Although biodiversity is considered a critical component for ecosystem service provision, spatial representations of the two do not always correspond. Here, we investigate the co-occurrences of 4 ecosystem services and 6 metrics representing aspects of biodiversity to elucidate broad-scale patterns. Soil retention and carbon storage were derived from data provided by the Soil Survey Geographic Database and the Carbon Dioxide Information Analysis Center, respectively. Harvested species richness, threatened and endangered species richness and metrics representing biodiversity were calculated from the Gap Analysis Program's landcover dataset and vertebrate habitat models. Spatially explicit predictions of each service and biodiversity metric were made for New Mexico and North Carolina. We conducted pair-wise assessments for all possible combinations of ecosystem services and biodiversity metrics to identify potential relationships within each state. Comparisons between states were used to give an indication of the cross-regional variability in the observed relationships. The results from this study are intended to direct finer scale studies, enhance local and regional conservation planning and further our understanding of the spatial relationships between ecosystem services and biodiversity.

Keywords: ecosystem services, biodiversity

### **GEOGRAPHICALLY WEIGHTED REGRESSION (GWR) MODELS FOR EXPLAINING MODAL CHOICE: EVIDENCE FROM ST. LOUIS**

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The relationship between modal choice and urban development may vary more widely across space than traditional planning and non-geographic approaches typically account. This research analyzes the spatial characteristics of modal choice and land-use locally rather than globally. The proportion of people in traffic analysis zones (TAZ) is modeled as a function of socio-economic and environmental variables, spatial proximity to transit, and spatial autocorrelation among those variables by using geographically weighted regression (GWR). Data for St. Louis, Missouri from the 2000 Census Transportation Planning Package (CTPP) is used as a test case to assess spatial variability in travel behavior as a function of job opportunities, transit infrastructure, and other key influences on travel behavior. The modeling generates spatially variant regression coefficients and R-square values that highlights variation in the effect of key variables on modal choice across space. The results suggest significant spatial variation across different neighborhood types in St. Louis of the significance of environmental factors. This suggests that there are planning and policy implications for how to employ investments to alleviate congestion, expand transit or automotive infrastructure and operations, and re-develop urban environments. This is the first step in research that will examine these effects changing over time from 1990 through 2010.

Keywords: modal choice, urban form, autocorrelation

### **FLUID COURTS: THE CULTURAL-LEGAL GEOGRAPHY OF WATER CONFLICTS IN TERRITORIAL NEW MEXICO**

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Geographical and historical investigations of arid landscapes and communities in the American West have long focused on the pivotal influence of federal reclamation policy, characterizing it as the application of scientific and technological methods to a variety of water resource management issues. This presentation departs from traditional views of reclamation by highlighting the highly variable and contingent ways in which new science-based forms of water management were proposed and negotiated in specific local places with particular cultural, legal, and historical geographies. Specifically, the paper examines water-related legal disputes entered and argued in district courts throughout New Mexico's Rio Grande valley between 1900 and 1912. It uses these cases to probe the ways in which authority for a scientific approach to water management was created, negotiated, and expressed in local and regional

contexts.

Keywords: legal geography, historical geography, water management

## **EVALUATING BICYCLE RACK PLACEMENT IN DOWNTOWN DENTON, TEXAS**

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Once nearly abandoned, the Denton, Texas Courthouse Square recently reemerged as a bustling commercial center. Simultaneously the student population living in the city increased, spurring renewed interest in cycling. In response Denton installed seven bicycle racks near the Square in addition to three owned by private businesses. Activist group Bike Denton approached our department to obtain information on rack use around the square. This project is designed to inform the city council on the efficiency of rack placement. Previous literature suggests bicyclists use racks closest to their destination, ignoring more distant options. We collected rack occupancy rates and noted on a map other locations people chose to park. We gathered data every two hours for four days. Collection included two weekdays and two Saturdays, including one festival. We performed nearest neighbor analyses and found strong evidence of clustering. Bicycle rack occupancy and off-rack parking density are highest closest to the courthouse. We then calculated the spatial mean, central feature, and standard deviation ellipses for both the off-rack parking data and the number of available spaces on the racks. When the spatial mean and standard deviation are compared on a map the spatial mismatch is clear. More spaces exist to the southeast of the busiest areas, where racks are rarely used. We recommend that the city move several racks from a large, unused parking lot to the highly trafficked areas near the northwest corner of the square.

Keywords: transportation geography, urban planning, bicycles

## **THE HEAT ISLAND NEW ORLEANS: PRELIMINARY RESULTS OF DETERMINING THE IMPACT OF HURRICANES KATRINA AND ISAAC ON AN URBAN PHENOMENON**

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New Orleans had long been established as a city by the time Luke Howard made his initial observations of the phenomenon known as urban heat island (UHI) in 1833, though it did not follow typical patterns of urbanization of other American cities because its growth and shape was limited by an encompassing, watery topography. Because of its location in the Mississippi River Delta, and its close proximity to Lake Ponchartrain and the Gulf of Mexico, several floods and tropical cyclones have impacted the City for over two centuries, some of which caused widespread degradation of the urban ecosystem of the Greater New Orleans Metropolitan Area. In 2005 and 2012, hurricanes Katrina and Isaac damaged or destroyed old growth shade trees and other vegetative cover, increasing the exposure of impervious surfaces, such as paved streets, buildings. Thus, the slow intensification of urbanization processes since the founding of the City, in combination with climate change and the impact of extreme weather events, have made the understanding of the UHI phenomenon and its affect on urban ecosystems increasingly important for urban planners, governmental leaders and citizens. The purpose of this study is to create a UHI model of New Orleans used to examine the impact of an extreme weather event on vegetated land cover, i.e. rapid tree loss and increase in impervious surfaces. The research will utilize satellite-based data imagery from Landsat TM and ETM+ sensors, and in-situ data in order to assess the changes in land cover over time.

Keywords: heat island, New Orleans, remote sensing, environmental management, urban planning

## **AN EVOLVING HOME: COMMUNAL VISION AND CHANGING LIVELIHOOD IN AN AMAZONIAN RELIGIOUS COMMUNITY**

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This paper seeks to analyze the trajectory of an Amazonian religious community called Céu do Mapiá. Located in southwest quadrant of Amazonas state in Brazil, Céu do Mapiá (translated as “Heaven of Mapiá”) is an important center for the religious group known as “Santo Daime,” which orients around the ritual use of ayahuasca, an indigenous plant concoction with psychotropic effects, and a Roman Catholic cosmology centered on the Virgin Mary, dubbed as “the Queen of the Forest.” The community was formed in the early 1980s, led by a rubber tapper named Padrinho Sebastião and adhered to a utopian vision of creating a “new world” in which members of the community shared all goods collectively. Over time, as the group began attracting followers from around the world, the dynamics of the community changed. Where they once relied on small holder plantings and the small income they made from tapping rubber, the community has become increasingly reliant on the tourism generated during their biannual festival seasons and has received the support of a handful of NGOs. The result within the community has been a continuing rearticulation of their socio-natural worlds and an evolving set of livelihood strategies melded with spiritual concerns.

Keywords: Amazonia, Ayahuasca religion, community, livelihood

## **CHARQUINI GLACIER SOUTHEAST ICE THICKNESS MEASURED IN 2012 USING GROUND PENETRATING RADAR TO INFORM TROPICAL GLACIER VOLUME-AREA SCALING**

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In glaciated regions with distinct dry seasons policy makers require information regarding the size of glacial water reservoirs in order to make decisions regarding currently available water resources and ensuring an adequate water supply for the future. However, glacier volume measurements are sparse due to the harsh conditions of these environments and the logistical difficulty in accessing high altitude glaciers. Remote sensing can supply information on glacier areas but volume measurements are difficult to obtain. To overcome this, volume-area relationships can be derived from existing volume-area measurements and applied over respective regions. In August 2012 a field campaign to measure the ice depth of Charquini Glacier Southeast, in the Cordillera Real of Bolivia, using ground penetrating radar (GPR) was undertaken. Differentially Corrected GPS Coordinates (position and elevation) were collected along six longitudinal GPR transects spaced fairly evenly across the glacier. Glacier thicknesses were inferred from the GPR transects. Both surface elevation and glacier depth were interpolated to produce bedrock and surface topographies for the glacier. This fieldwork will be used, along with a handful of other volume estimates, to establish a representative volume-area scaling relationship for small glaciers which are typical in the tropical region of the Andes. This work represents a successful collaboration between the Department of Geography at Texas A&M University and the Instituto Geográfico Militar in Bolivia. The Instituto Geográfico Militar was not only instrumental in the planning and execution of this field expedition but also provided 1956 and 1963 aerial photographs and GPS base station measurements.

Keywords: ground penetrating radar, tropical glaciers, water resources

## **RE-PHOTOGRAPHY AND LANDSCAPE CHANGE: DEVELOPING A MODEL FOR MONITORING HUMAN IMPACT IN COLORADO'S SAN JUAN MOUNTAINS**

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Re-photography has become an important tool in geography, history, environmental studies, and landscape ecology over the past 40 years. It became best known through the work of Mark Klett (Second View, 1984) who used the tool to reconstruct nearly a century of landscape change in the American West. Re-photography has subsequently been used to document transformations in the human landscape and in ecoregions as well as a tool to monitor glacier coverage. This paper builds upon the use of re-photography in geographic studies of landscape, with a focus on the San Juan Mountains of southwestern Colorado. Nearly 150 photographs of the region from the late 19th and early 20th centuries have been identified including those of William Henry Jackson who took photos with the Hayden Geological Survey (1873-1876). In an attempt to understand the impacts of human use and climate change, this project has identified nearly one dozen sites in the San Juan region where these historical photographs were taken. In these locations, monitoring stations for re-photography will be established. In an attempt to understand the dimensions and scope of landscape change, historical data from streams, climate stations, historical maps, satellite images, NRCS data, and interviews will be used to augment the photographs. This data will be used to construct visual, cartographic, and human topographies of these locations as a means for understanding the historical geographies of the region. The data will also be used to monitor current and future landscape transformation.

Keywords: San Juan Mountains, re-photography, landscape change, methodology

## **MAPPING COMMUNITY SOCIAL HEALTH: A SPATIAL GEO HUMANITIES TRANS-DISCIPLINARY SERVICE LEARNING PROJECT**

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San Augustine County in East Texas is one of the poorest counties in the state. Under leadership of the County Judge, a multi-agency, trans-disciplinary team designed a needs assessment that incorporated service learning activities, community involvement and geospatial analysis to better understand the where as well as the what for issues affecting the social health in the county. The project is based on a participatory action model with the aim to include all levels of the community in the needs assessment. Undergraduate and graduate service learning students were involved in the project. The project involved integration of survey cafes and case sensitive data into a geospatial database utilizing census block level analysis. Preliminary results identified significant community challenges including family abuse, drug abuse and significant lack of access to services for citizens. These parameters are now being used in development of grant writing efforts that are based upon recommendations to generate a model from the assessment to enable county officials to improve service delivery to citizens in conjunction with state, regional and federal agencies.

Keywords: mapping social needs, trans-disciplinary, spatial geo humanities

## **COMPARISON OF THE CAUSES OF THE 1980 AND 2011 HEAT WAVES IN THE SOUTHERN PLAINS** **MCGREGOR, KENT<sup>1</sup>**

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The summer of 2011 was arguably the hottest and driest on record in the North Texas region. Although 4 of the 10 hottest summers have occurred since 1998, only the summer of 1980 is comparable in the modern record. In Dallas – Ft. Worth and Waco, Texas, both summers of 1980 and 2011 received 70

days or more above 100° F. and more than 40 days consecutive days above 100° F. Virtually no rain fell for over two months. The atmospheric dynamics during both summers were compared using data from NOAA's Reanalysis Model and also NASA's Earth Observing System. The patterns of 500 mb pressure, outgoing longwave radiation, geopotential height, temperature anomaly and pressure anomaly were extremely similar in both years. Data from the North American Land Data Assimilation System (NLDAS) also revealed that the relative humidity values were unusually high and helped maintain near record night-time temperatures across the central plains in July. Finally, La Niña conditions in the Pacific Ocean contributed to the 2011 drought but not the one in 1980.

Keywords: drought, heat wave, Reanalysis model, summer 2011

## **AMERICAN GRAFFITI? SENSE OF PLACE AND TRANSGRESSION OF IMAGINARY SPACE IN MARLOW, OKLAHOMA**

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In this paper, we examine contested space in Marlow, Oklahoma. On a site physically within the Chickasaw Nation, a memorial to Anglo ranching culture generally and five hero/outlaw brothers particularly is embedded within the landscape, locally articulating a facet of what Peet (1996) terms a "regional discursive formation" (RDF). Expanding upon Swain's (2008) analysis of this monument and its place in Oklahoma's RDF, we document and analyze a third group's transgressive attempt to lay claim to this nominally public space. Members of this group, known as Juggalos, are often the subjects of much scorn and mockery, yet we find that the impulses underpinning their transgressive place-making to be oddly congruent with messages transmitted by the original monument.

Keywords: sense of place, juggalos, regional discursive formation, cultural landscape, Oklahoma

## **GROCERY STORES AS POTENTIAL RECYCLING FACILITIES**

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My thesis work involves an in depth look at recycling facilities within the San Antonio-Austin metropolitan areas. Some cities within the area do not contain recycling facilities, while every community in the area contains a grocery store. This presentation considers the possibility for grocery stores to serve as collection center for recycling. Many communities include access to Wal-Mart or Target in addition to the local grocery chain. Official recycling policy for both Target and Wal-Mart advocate for company sustainability and provide recycling options for their customers. Currently, HEB is the dominant grocery store chain in central Texas, and does not provide many recycling options for their customers beyond providing a cardboard box located in the front of the store to collect used shopping bags. In addition, HEB utilizes elementary school programs to teach students about recycling as the students sort the recovered bags into larger bags before shipment to a processor where the bags are transformed into a HEB brand trash bag created solely with recovered plastic bags. Other grocery stores, such as Randall's and Albertson's, might also serve as collection points, as well. A comparison of local maps showing recycling facilities and grocery stores unveils the potential for grocery stores to actively recover resources for possible production of store products. Materials recovered from residential populations mostly originate at the grocery store including both organic waste and recyclable packaging. Grocery store networks utilize distribution centers, economies of scale, and transportation fleets to deliver products to commercial locations. Networks utilized for delivery might possibly work in the reverse, that is, instead of delivery of goods, they might pick up goods that have served their useful lives. This would allow firms to recover resources at the local level thereby enabling local production of end-products utilizing locally recovered resources.

Keywords: recycling, grocery, network, end-product, resource recovery

## **REMOTE SENSING AND INTEGRATED ENVIRONMENTAL ASSESSMENT: CASE STUDIES OF AFRICA'S WATER RESOURCES**

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Sustainable exploitation of water resources is crucial for Africa's socio-economic development, but the continent's water sector faces numerous challenges. Many people still lack access to potable water and adequate sanitation, and there is inadequate allocation of water for ecosystems in the face of population growth, increased economic activity, and a changing climate. This presentation highlights some broad based applications of remote sensing in supporting integrated environmental assessment in Africa.

Through the interpretation of satellite images to support the analysis of previous and current conditions, the pressures and drivers of change, and the environmental and social impacts associated with water resources development and utilization, the results clearly illustrate some of the opportunities for improving the sustainable management of ecosystems to ensure improved access to adequate and clean water. Remote sensing is an important tool for highlighting water issues, and for providing guidance to decision makers in addressing the issues.

Keywords: remote sensing, sustainability, water, environmental assessment

## **EMPIRICALLY DERIVED STAGE-DISCHARGE RATING CURVE**

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Rather than being measured directly, discharge at the U.S. Geological Survey (USGS) gauging stations is estimated through a stage-discharge rating (SDR) curve based upon measurements of river stage. This SDR rating curve is developed using discharge values physically measured at the gauge site during different stream stage conditions. However, at any ungauged cross section, discharge and river stage measurements are not available for developing this SDR curve, which greatly hampers the development of monitoring and measuring ungauged or poorly gauged watersheds from space. To solve this problem, this study focuses on the spatial and temporal variations of the SDR curves, and develops and tests a new approach to constructing the SDR curves at ungauged sites based on watershed characteristics and other measurable variables. In this study, spatial and temporal variations of the SDR curves are investigated at three USGS gauge stations along the Tickfaw River in Louisiana. A multivariate regression analysis will be performed to determine a series of empirical relationships among the rating curves and independent variables such as drainage area, drainage density, bankfull width, channel bed slope, sinuosity, annual mean, maximum and minimum air temperature, annual, winter, spring, summer and fall precipitation, slope, flow accumulation area, topographic index, soil particle distribution, soil erodibility factor, bedrock tensile strength, and annual mean, winter, spring, summer and fall leaf area indexes. Additional USGS gauges in Louisiana as well as across the nation will be analyzed in a similar fashion in the future.

Keywords: stage-discharge rating curve

## **MULE DEER (*ODOCOILEUS HEMIONUS*) HABITAT PREFERENCES IN A SEMIDESERTIC ECOSYSTEM: SEASONAL DIET QUALITY AND COMPOSITION CHANGES**

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The efforts of various researchers in learning about the current biological condition of the Mule deer (*Odocoileus hemionus*) in Mexico have been insufficient, there is a lack of knowledge about crucial aspects for its protection and survival. This work aims to study the nutritional ecology and habitat use of the Mule deer in the central region of the Chihuahuan desert. We use Geographical Information Systems



for teledetection of areas of potential use in a desertic shrub region found in the central part of the Chihuahuan dessert. We determine diet by micro-histology; diet quality by measuring nitrogen content, as a proxy of raw protein percentage and finally we evaluate vegetation resource quantity through the use of remote sensing to calculate area with different vegetal cover as well as water accessibility. Current results suggest that diet for the warm-dry season is made of 80% opuntias and their main source of raw protein comes from the ocotillo flower (*Fouquieria splendens* flowers). We currently have a database available of satellite geo-referenced points of several polygons of six different vegetal covers, water sources, as well as mule deer population's distribution. In summary our results imply that for the warm-dry season Mule deer on the central region of the Chihuahuan desert have a restricted distribution and diet, but it has however access to an adequate protein resource

Keywords: Chihuahua, desert mule deer, diet, remote sensing, habitat

## **THE IMPACTS OF CLIMATE CHANGE ON LAKE LEVEL VARIATIONS IN THE TIBETAN LAKES: LANDSAT OBSERVATIONS AND NUMERICAL SIMULATIONS**

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Climate warming and global change caused glacier retreat and resulted in lake level rising in the Tibetan lakes, while higher temperatures increased evaporation from the lakes and resulted in the decline of lake level. Some studies suggested that the lake levels of some large Tibetan lakes rose, while in the small-sized lakes water levels dropped. Through employing the Landsat observations and numerical simulations, we found that the lake size plays a less important role in controlling lake level changes in the Tibetan lakes during 2000-2009. In addition to changes in precipitation and temperature, the groundwater flow regime in the Tibetan Plateau has changed and such change is one dominant factor controlling the lake level variations in the Tibetan lakes. If the net groundwater flow is negligible, precipitation and evaporation dictate the water level variations in the Tibetan lakes. For the lakes with a net groundwater inflow, the lake level is rising, and the rising rate is elevated by increase in precipitation and reduced by increase in evaporation. For the lakes with a net groundwater outflow the lake level is dropping, and the decline rate is intensified by decrease in precipitation and increase in evaporation. The degradation of the permafrost in the Tibetan Plateau due to rising temperatures may be a direct cause for the change of the groundwater flow regime in this region.

Keywords: climate change, Tibetan lakes, groundwater flow, Landsat, numerical simulation

## **ENVIRONMENTAL CHARACTERIZATION OF RANGELAND PASTURES IN PIÑON-JUNIPER GRASSLAND MOSAICS IN CENTRAL NEW MEXICO**

PRILESON, VANESSA J.<sup>1</sup>, ANDRÉS F. CIBILS<sup>1</sup>, MICHAELA BUENEMANN<sup>2</sup>, CAITRIANA M. STEELE<sup>3</sup>, ERIC J. SCHOLLEGERDES<sup>1</sup>, DARREN K. JAMES<sup>3</sup>, RICHARD L. DUNLAP<sup>1</sup>, SHAD H. COX<sup>1</sup>, WENDY TAYLOR<sup>1</sup>, AND STEPHANIE LÓPEZ<sup>1</sup>

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Describing the biotic and abiotic characteristics of rangeland grazing environments is critical to explaining spatial distribution of grazing livestock. We characterized the environment of two adjacent, 300 acre pastures containing piñon-juniper grassland mosaics during spring, summer, fall, and winter in two consecutive years. Landsat-derived NDVI, herbaceous vegetation cover, forage biomass, chemical (nutrient) composition, and weather variables were measured in grassland ridges, grassland swales, open woodlands (8 – 19% tree cover) and closed woodlands (32 – 37% tree cover). A mixed-model ANOVA was used to analyze the effects of year, season, and vegetation type on all environmental variables. Most vegetation and weather variables varied across seasons ( $P < 0.05$ ), year ( $P < 0.05$ ), and vegetation types.

NDVI and forage NDF values were higher in woodlands than in grasslands ( $P < 0.05$ ) while forage biomass, CP content, and herbaceous vegetation cover were higher in grasslands than in woodlands ( $P < 0.05$ ). Forage biomass and chemical composition of open woodlands and grasslands was similar ( $P > 0.05$ ). Closed woodlands had detectably less herbaceous cover and forage biomass ( $P < 0.01$ ). Forage chemical composition did not differ ( $P > 0.05$ ) between open and closed woodlands. Average ambient temperatures were similar in woodlands and grasslands ( $P > 0.05$ ) across all seasons. Maximum ambient temperatures and average wind chill corrected temperatures were warmer in woodlands than in grasslands ( $P < 0.01$ ) across all seasons. Average wind speed decreased with increasing tree cover ( $P < 0.01$ ). Results confirm earlier studies at this site, which suggested that open woodlands can offer similar quality and quantity of forage and more opportunities for thermal comfort in cooler weather compared to adjacent grasslands.

Keywords: spatial distribution of livestock, microclimate, grazing environment, woodland cover, remote sensing

### **LATE-NIGHT LAUGHS AT THE ARAB SPRING**

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The role of humor in popular geopolitical practices is a recent theme in geopolitics scholarship. One area that is relatively unexplored is the impact of late-night comedians and their role in framing international events. Late-night comedy has been criticized as undercutting the idea of politics and political processes as American politicians pander to the comedians. We argue that this extends to American knowledge of international events. Our research poses several questions in the context of the Arab Spring Revolutions. First, what was the presence of jokes about this complex political situation? Second, what were the topics of these jokes? Third, how can these jokes be classified in terms of their focus and potential impact on the audience and their geographical imagination?

Keywords: humor, popular geopolitics, North Africa, Arab Spring

### **SPATIAL-TEMPORAL ANALYSIS OF THE VECTORS OF SYLVATIC DENGUE AND CHIKUNGUNYA**

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Both dengue virus and chikungunya virus originated in a sylvatic cycle between non-human primates and arboreal *Aedes*. Dengue has emerged into an endemic cycle between humans and anthropophilic *Aedes* four times and chikungunya once. The risk that a sylvatic strain will emerge into human hosts is in part determined by the spatial and temporal distribution of the arboreal vectors of the two viruses, which at present is not known. The goal of this study was to narrow this gap by mapping the spatial and temporal distribution of the arboreal mosquito carriers of these diseases in the Department of Kédougou, Senegal. Abundance data on seven mosquito species in were collected as part of the larger Mechanisms of Sylvatic Dengue Emergence Project for 50 collection sites in the study area for each month between July 2009 and March 2010 excluding April 2012. Abundance data were then mapped and analyzed by time, location, and land cover type. The overall temporal patterns of abundance are very similar between the two years, with peaks in July and October, a dip in September, and minimal activity during the dry season between December and May. There is significant clustering of high abundance sites and low abundance sites for both years in July and August ( $p < 0.05$ ) and the location of the clusters is similar in both years. Furthermore, abundance varies by land cover class and is highest in forest sites and lowest in urban sites.

Keywords: mosquito borne disease, emergence, dengue, chikungunya

## **OKLAHOMA INTER-TRIBAL MEETING ON CLIMATE VARIABILITY AND CHANGE**

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Oklahoma tribal representatives convened for a meeting on December 12, 2011 to 1) enhance and foster dialogue between tribal representatives and climate scientists that was previously initiated through two statewide meetings in which tribal representatives were invited and some attended, 2) educate tribal representatives about climate science and climate change, and 3) develop recommendations for material to be included in the 2013 National Climate Assessment. Hosted by the Haskell Environmental Research Studies Center at Haskell Indian Nations University, in collaboration with the Oklahoma Climatological Survey and Southern Climate Impacts Planning Program, the meeting brought together representatives of 22 tribal nations and three tribal colleges. This presentation will include findings from the meeting's breakout session in which tribal representatives discussed the impacts of climate variability and change on tribal sectors and cultures, and long term recommendations for implementing climate change adaptation and mitigation strategies. Currently, drought and heat constitute tremendous climate stressors and impact water resources, ecology, human health, agricultural practices, and energy supply and use. In fact, water resources were seen as the most important sector since water is vital for agriculture and many ceremonial practices. The ability to gather certain plants and food was described as very important for ceremonies, and potentially vulnerable to a changing climate. Moving forward, representatives were interested in working with state and federal partners to use more climate change data and information, considering indigenous perspectives, and increasing their capacity through formal and informal education to make adaptation and mitigation decisions.

Keywords: climate change, climate variability, tribal nations

## **THE EFFECTS OF A HALF-HEARTED NEO-LIBERAL TRANSFORMATION ON WATER RESOURCES AND THE ENVIRONMENT IN TAJIKISTAN**

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This paper will show the political and economic means that Tajikistan employed to more effectively move away from the twin economic devastations of de-modernization and a civil war before analyzing how this path has affected water resources and the local environment. By viewing the situation through the lens of political ecology, the research will focus on the incomplete methods by which the Tajik government has attempted to implement economic reforms on a population that is 75% rural while maintaining at all costs the primacy of cotton as the agricultural staple. The resultant outcome of these methods is a degraded environment and an inability to maintain and manage water resources that has occurred concomitantly with accelerated migration of male farm laborers from the Tajik countryside to Russia. While the focus in recent literature has been on the loss of human labor capital in the rural areas through migration, the effects on the environment have been less effectively documented. This paper will therefore focus more on the growing environment costs of government planning that has had no intelligent policy on maintaining environmental quality and water resource access.

Keywords: environment, water resources, Tajikistan, political ecology

## **(RE)MAKING “ARTIST” IDENTITY THROUGH ART, TOURISM, AND NEW ORLEANS’S JACKSON SQUARE** **SHEEHAN, REBECCA<sup>1</sup>**

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For decades artists have painted sold their work to tourists on the sidewalks of New Orleans’s Jackson

Square. Together the city and the artists decided that to work in the Square area, artists must be their own representative (present on the sidewalk), clearly show art prices, pay an annual permit fee, and display and sell only original paintings, sketches, or drawings on plain, flat surfaces. Any other form of art, such as photographic, sculpture, and computer-based art are not legal in the Jackson Square area. Relying on a specific discourse associated with the venerated artist and a particular historical geography of Jackson Square, artists have successfully restricted activities and art, and therefore some people, from the area. However, the messiness of everyday cultural and economic pressures has required Jackson Square artists to continually (re)make an artist identity. Using a performative lens, I illustrate how various art ideas are constantly employed and reworked by individuals through tourism in the ongoing (re)making of “artist” in Jackson Square. Through artists’ competition and pricing strategies as well as subject matter and means of production, nuanced identifications emerge which interconnect different scales as well as different (historical) moments. Thus, my primary aim is to contribute to research that explores how identity is constructed through interrelated realms in tourism. In doing so, I also show broader exclusionary implications, those beyond the individual level, in the performance of identity in such contexts.

Keywords: artist, identity, public space, tourism, performativity

### **USING THE KALDOR-HICKS TABLEAU TO ASSESS SUSTAINABILITY IN COST-BENEFIT ANALYSIS IN PUBLIC TRANSPORTATION**

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Sustainability is an important issue for current and future generations, as more information is providing better understanding of global finite resources. Among many realms of impact is increase in interest of sustainable urban planning initiatives that promote desired offsets environmentally, economically, and equitably. At present the metrics and measurements as they apply to sustainability are not fully understood, still many cities nationally have adopted policies that require its implementation into city-wide plans. New installments and or improvements of public transportation are potentially quite relevant in urban sustainability. Despite the potential importance of sustainability, there has been little work in incorporating or measuring sustainability into cost – benefit analysis in transport. The presentation will address initiatives of sustainability in public transport and its potential integration in cost - benefit analysis. Then, a Kaldor-Hicks Tableau (KHT) is proposed as a potentially useful aid for analysis of concepts associated with sustainable planning. The relevancy of using the KHT and the subsequent discussion could apply towards more accurate applications of sustainability in transport projects cost – benefit analysis. Implications from defining sustainable terms and applying measurement and metrics towards sustainable components are discussed as well.

Keywords: sustainability, transit, Kaldor-Hicks Tableau

### **DETECTION OF *ERAGROSTIS LEHMANNIANA* (LEHMANN LOVEGRASS) USING MULTISPECTRAL IMAGERY FROM AN UNMANNED AIRCRAFT SYSTEM**

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Lehmann lovegrass (*Eragrostis lehmanniana* Nees) is an invasive species which has the potential to dramatically alter rangeland ecosystems. The spread of this prolific grass leads to effects such as altered fire regimes and loss of diversity in native plant and animal populations. Traditionally, ground-based techniques have been used to determine population measures. Our research explores the potential for use of a remote sensing platform, an unmanned aircraft system (UAS), to identify and map Lehmann lovegrass populations on a rangeland site located near Tombstone, Arizona. Using multispectral, high

spatial resolution imagery acquired with the Bat 3 UAS, classifications were made using an object-based approach with Trimble's eCognition software. A rule set was developed and classifications were executed at the spectral difference segmentation level. A hierarchical approach was used to separate out shadow and non-vegetation classes as well as vegetation classes. Initial results suggest that Lehmann lovegrass can be identified and discerned from other rangeland species, including other rangeland grasses, using this type of imagery. This is an important step in developing a methodology that allows researchers and land managers to detect and map populations in a repeatable and cost-effective way.

Keywords: Lehmann lovegrass, Bat 3, unmanned aircraft system, multispectral imagery

## **PARTICIPATORY VIDEO: A POSSIBLE PATHWAY TO INTER-EPISTEMOLOGICAL CONVERSATIONS ABOUT CLIMATE CHANGE?**

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Participatory video arose out of an effort to make development practices more inclusive. Because this process includes extended feedback and exchange, it is useful for dialogic activities such as community mobilization, public consultation, and participatory research. A growing body of research demonstrates that when distinguished by this kind of collaboration, video offers an alternative to the hierarchical power relations that have historically characterized the production of authoritative knowledge about Indigenous geographies. In other words, video-mediated collaborations undertaken by Indigenous activists, academic advocates, and other allies can decolonize authorship. Participatory video research is useful for investigating strategies for and barriers to communicating scientific knowledge alongside more localized knowledge so that both traditions might be meaningful. It helps identify visual technologies and communication strategies that allow more localized actors to operate as agents of authoritative knowledge production. Participatory video also has the potential to suggest innovative means for conveying scientific knowledge that can help historically marginalized communities reduce social vulnerabilities to environmental risks. Given its promise, can participatory video provide a pathway to inter-epistemological conversations about climate change? In this presentation, I draw on research on Indigenous video production in Oaxaca, Mexico to argue that it's worth trying, although initiating, coordinating, undertaking, and sustaining such initiatives is far from simple or easy.

Keywords: indigeneity, video, participatory research, decolonization, hope

## **PARADIGM FOR LANDSCAPES**

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Landscapes are political statements. Most decisions made by individuals, and virtually all of the decisions made by corporations and governments, that have visible consequences are made within the context of public policy. We need to pay more attention to that context.

Keywords: landscape, public policy

## **DERIVATION OF BATHYMETRIC INFORMATION FROM MULTI-SPECTRAL SATELLITE IMAGERY USING CO-KRIGING INTERPOLATION METHOD**

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Bathymetric information is of fundamental importance to coastal and marine planning and management, nautical navigation, and scientific studies of marine environments. Multi-spectral remote sensing imagery offers a cost-effective alternative to traditional echo sounding survey for measuring water depth. Most previous studies utilized a log-linear regression model to invert the multi-spectral

observation into bathymetric measurement. Using Cokriging interpolation technique, this research looks at this problem from a different perspective: spatial interpolating water depth truth points with multi-spectral observation as secondary information to improve estimation. Cokriging better estimates depth values since the distribution of secondary variables (multi-spectral observation) are sampled more intensely than the primary variable. This method has been successfully applied to IKONOS images and digital aerial photos. It is proved to be more accurate than the previous one

Keywords: water depth, inversion, remote sensing, co-kriging

## **WIND-BLOWN SAND: INITIATION OF MOTION**

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The prototypical and most commonly cited threshold of motion model used in sand transport predictions was derived by R.A. Bagnold in 1936. His wind-tunnel experiments resulted in two thresholds: (1) a fluid threshold, where particles are moved by the action of the wind alone, and (2) a dynamic threshold, where particles are moved by the fluid and saltating grains. However, Nickling (1988) advocated that the number of particles moving from the dynamic threshold greatly exceeded the number of particles moving by the fluid threshold alone. Since his publication, it is common practice to use only the impact threshold in sand transport models. Recently, Sherman et al. (in press) recalibrated six of the most commonly used transport models under ideal conditions (Bagnold 1937; Kawamura 1951; Zingg 1953; Owen 1964; Hsu 1971; Lettau and Lettau 1977). Recalibrating empirical constants, root-mean squared errors from model predictions decreased by as much as one order of magnitude, increasing the predictive power of models to determine observed transport rates. Yet, they found the largest deviations from recalibrated models occur at smaller transport rates (Sherman et al. in press), and these errors in the recalibrated transport models are attributed to errors in the threshold of motion. This calls for a re-examination of threshold of motion demarcation at small transport rates. This study presents a field experiment designed to separate particle initiation from the fluid and dynamic thresholds at small transport rates. To do this, a bedload trap was designed capable of separating bedload from saltation transport.

Keywords: aeolian, transport models, bedload, threshold of motion, geomorphology

## **TERROIR-ISM IN CALIFORNIA'S WINE INDUSTRY: WINERIES' USE OF PLACE TO INDICATE QUALITY ON THEIR WEBSITES**

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Terroir conveys that a quality wine is achieved by “matching” a grape variety to a vineyard site, situation, geophysical conditions and viticultural techniques. Over the last couple of decades, the range of consumers of fine wines has grown and the population of aficionados has diversified. To reach a growing population of middle-income wine consumers, wineries, wine marketers and wine advertisers have increased their efforts to “educate” the new customers, particularly through magazines and internet resources. In a previous analysis of the content of print advertising, 16% of a magazine’s advertisements used terroir, either implicitly or explicitly, to sell a brand or a variety of wine. Half of these were ads for California wines. This paper examines the content of websites of California wineries to answer the following questions: Who claims to have “found” terroir for the grapes in their wines? Who claims that geographical characteristics of their vineyards contribute special qualities to their wine(s)? Where are such wineries and their vineyards located? Are there spatial patterns to the users of this perspective? Could terroir simply be a wine-marketing gimmick that obscures the French term’s meaning or is it a realistic approach to making and selling a quality wine?

Keywords: wine, place, terroir, marketing, California

## **EMERGING TECHNOLOGIES FOR FIELD DATA COLLECTION**

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The opportunity to use GIS and GPS cutting edge field data and feature collection solutions that are inexpensive and easy to use will be presented with a variety of examples for geographic research and for positions geographers may have in a variety of agencies. With spatial data collected in the field easily integrated into cartographic presentations and databases the time involved for presentations and decisions can be significantly reduced. Field teams who may be assisting in the collection of data no longer need to understand complex equipment and can be trained in five to fifteen minutes. Data they collect can be collected at the end of the day or sent immediately using Bluetooth capabilities with cellular phones or blackberry devices. Those involved in research as well as those in the day to day workflow requirements are thus better prepared to assist others who are relying on their input. This can be critical for those who work with others for solutions for disaster and emergency events that could happen, during the events and for post event response to save lives and protect infrastructure and property. Geographers after they acquire the geospatial data can publish, distribute and geo-collaborate in real time in standard, secure and manageable GeoPDF formats that can be accessed by those who need or want access without cost using Adobe Reader. Those who receive the information can also comment and markup the maps and then send their input back as a shape file manifest to be reviewed or added.

Keywords: field data collection, GIS, GPS

## **COLLECTION AND USE OF MEDICINAL PLANTS IN TWO BULGARIAN VILLAGE COMMUNITIES IN THE CENTRAL RHODOPE MOUNTAINS**

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This research documented traditional knowledge (TK) of medicinal plants in two Bulgarian village communities in the Central Rhodope Mountains and compared it to existing records. Additionally, the research tried to determine whether TK of healing plants could be used to gain insights into their conservation. The general method employed was interview series, which revealed in-depth the economic life, migrations, and plant collecting practices of 3-4 villagers from each community. Interviews were required to fill in a gap in unique local knowledge unrecorded before and to reveal within-community differences. To really get an insight into participants' stories, the researcher performed participatory observation (PO) by living in the community, going to the surrounding natural areas with its members, and sitting in community discussions. The study found out that the villagers collected and used 34 plants - 60% of encountered medicinal plants in the region. The main origin of TK is books and less information passed down from previous generations. Although ethnographers in the country have performed similar studies, it has not been for a long time and not at all for the two communities. Young generations leave villages, where TK exists and makes sense, and go to cities. TK of healing plants, along with knowledge of plants' various uses is disappearing and studies such as this are required to preserve it. A growing body of evidence shows that it makes more sense to preserve both the natural heritage and the cultures that depend on it rather than just one or the other.

Keywords: traditional knowledge, medicinal plants, Bulgaria, Rhodope Mountains

## **PERCEPTION OF RIP CURRENT HAZARD IN GALVESTON ISLAND**

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Drownings and near-drownings at the coast represent a major but preventable health problem, and

reflect the juxtaposition of heavy surf and rip current development with the personal and group behavior of beach users. Understanding which features beach users associated with rip currents is an important step in the development of appropriate programs and educational materials aimed at improving the ability of beach users to identify conditions commonly associated with rip current development. The purpose of this study is to analyze public perceptions of the rip current hazard on Galveston and South Padre Islands and to identify appropriate programs to improve the ability of beach users to identify rip currents. Here we report results of interviews of 229 beach users during July and August 2012 following a spatially randomized sampling protocol. Respondents in the sample were asked to rank five photographs of the surf zone in terms of most and least dangerous for swimming; we recorded the order and scored responses against a “perfect” score, so that zero was “perfect” order and eight or more represented a “failing” grade. Moreover, we recorded the location on the “most dangerous” image as the “best example of a rip current.” Scored responses (mean = 3.4) indicate that 22% of respondents (n = 121) ordered the photographs well (scores of 0-2), evidence of general knowledge of potential for rip currents; moreover, 114 respondents correctly indicated which photograph was “most dangerous for me to swim.” However, only 43 respondents chose the correct location on the photo, while 61 chose incorrect locations. The “correct” group had significantly different response to other questions, such as age, number of beach visits, age, and confidence in identifying rip currents.

Keywords: hazard, rip current, subjectivity

### **EXAMINING AQUIFER POLLUTION SENSITIVITY IN THE CENTRAL PASO DEL NORTE REGION USING THE DRASTIC MODEL**

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In the Paso del Norte watershed, reliance on ground water continues to increase dramatically, especially during times of drought. As reliance increases, so does the need to protect this resource from traces of contamination. When visually inspecting the ground, a land owner, planner, manager, or administrator may not know how easily the aquifer under their feet can be polluted nor their activities affect neighbors around them. The DRASTIC model can be used as a preliminary test to help with the task of evaluating areas that may be vulnerable to ground water contamination from sources of pollution. DRASTIC is an acronym for the components of a standardized, risk assessment model used to determine the sensitivity of an aquifer to pollution from a surface contaminant. The DRASTIC model uses ArcGIS to compile data gathered from public sources into ranked layers for seven components. The component layers are hydrogeological factors that affect the capacity of pollutants to reach the aquifer from the ground surface. These factors are: (D)epth to water table, net (R)echarge to the aquifer, (A)quifer media, (S)oil media, (T)opography, (I)mpact of the vadose zone, and hydraulic (C)onductivity of the aquifer. When these weighted and ranked layers are overlaid and added together, a pollution risk surface is mapped over the study area. The finished project that this model will be used for will eventually examine the risk that septic systems in central Paso del Norte pose to the Mesilla Basin aquifer.

Keywords: aquifer sensitivity, DRASTIC, Geographic Information System, Mesilla Basin, pollution risk

### **INFLUENCE OF MONSOON-RELATED RIPARIAN PHENOLOGY TO YELLOW-BILLED CUCKOO HABITAT SELECTION IN ARIZONA**

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We mapped habitat for threatened Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) in the state of Arizona using the temporal greenness dynamics of the landscape, or the landscape phenology.



Landscape phenometrics were derived from Advanced Very High Resolution Radiometer (AVHRR) Normalized Difference Vegetation Index (NDVI) data for 1998 and 1999 by using Fourier harmonic analysis to analyze the waveform of the annual NDVI profile at each pixel. We modeled the spatial distribution of Yellow-billed Cuckoo habitat by coupling the field data of cuckoo presence or absence and point-based samples of riparian and cottonwood-willow vegetation types with satellite phenometrics for 1998. Models were validated using field and satellite data collected in 1999. The results indicate that Yellow-billed Cuckoo occupy locations within their preferred habitat that exhibit peak greenness after the start of the summer monsoon and are greener and more dynamic than “average” habitat. Identification of preferred phenotypes within recognized habitat areas can be used to refine habitat models, inform predictions of habitat response to climate change, and suggest adaptation strategies. Keywords: yellow-billed cuckoo, land surface phenology, habitat, AVHRR-NDVI satellite data, Fourier harmonics, phenotype, riparian

### **SUSTAINABLE PUBLIC TRANSPORTATION IN CENTRAL ARKANSAS: A PROPOSAL FOR THE IMPLEMENTATION OF BUS RAPID TRANSIT**

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Central Arkansas is an area that has grown considerably in recent years. It contains Arkansas’s capital, Little Rock, a rapidly growing mid-sized urban area witnessing significant suburban sprawl in all directions. The region’s infrastructure presently caters almost exclusively to automobiles, and as a result, it experiences severe traffic problems. Public transit options within Little Rock have failed to keep up with the rise in population due to low tax revenues that remain insufficient for overcoming the costs of implementing an efficient mass transit system such as light rail. This paper discusses the current congestion and revenue problems occurring in Little Rock and Central Arkansas, and examines Bus Rapid Transit (BRT) as a more viable option of public transit than the current system or light rail. To illustrate the feasibility of BRT, the paper provides examples from a variety of different locations in which the implementation of BRT has proven successful and effective—especially in models where pedestrian and bicycle transportation are incorporated. The paper concludes that BRT would be the most appropriate form of public transit for Little Rock because it is highly sustainable and beneficial to overall public health.

Keywords: transit, Arkansas-Little Rock, Bus Rapid Transit, urban planning

### **THE NEW MEXICO LAND CONSERVANCY: COMPARING STRATEGIC AND OPPORTUNISTIC LAND PROTECTION APPROACHES**

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Biogeographers and landscape ecologists stress targeting land conservation efforts to maximize the protection of at-risk and keystone species, connective corridors, and vital habitats such as big game winter range. Cultural geographers stress the importance of framing land conservation programs within the core “geographic thoughts” of residents living in differing cultural landscapes. NGOs such as land trusts operate within both frames by both strategically conserving land of the highest ecological merit while remaining open to important opportunities to conserve cultural landscapes outside priority areas. The on-going actions of the New Mexico Land Conservancy (NMLC) will be explored to show the assets and liabilities of both strategic and opportunistic efforts at “saving places.” NMLC (founded in 2002) has used conservation easements on private land to protect over 100,000 acres of wildlife habitat, ranches, farms, and open space from subdivision and development. Wright helped create this organization and served as Chair of the Board for its first ten years. He has 35 years of experience with land trusts, has completed 112 conservation easements, and is the co-author of *Saving the Ranch*:

Conservation Easement Design in the American West.

Keywords: land conservation, strategies, New Mexico

### **LAND COVER CHANGE IN SERONGA, BOTSWANA BETWEEN 2003 AND 2011**

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Land cover change is taking place globally at an unprecedented rate, and is becoming of great importance in both research and practical applications. This study examined land cover changes in Seronga, Botswana between 2003 and 2011, using IKONOS imagery. We performed unsupervised classification (Isodata) for the images of these two years. Land cover was classified into four classes: 1) bare land, 2) trees and shrubs, 3) wetland and 4) water. Post-classification change detection was then performed, resulting in a land cover change matrix. The result suggests that the bare land area decreased considerably during this period, at the expense of significant increases in all other classes. While the increase in wetland and water areas may be explained by natural factors, the increase in the class of trees and shrubs seems connected to social factors. I found that the study area experienced depopulation because of difficult access to resources for everyday life, thus this area was subjected to less human disturbance during this period.

Keywords: land cover change, Botswana, IKONOS, unsupervised classification, wetland

### **A NETWORK-BASED COMPARISON OF ACCESSIBILITY TO HEALTHCARE SERVICES IN A RURAL AREA. EVIDENCE FROM THE CHICKASAW NATION OF OKLAHOMA**

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Access to health care is one of the important determinants of population health status globally. This research focuses on quantifying access to healthcare services, giving special attention to differences in accessibility between and within populations in rural Oklahoma. GIS based network analysis was used to measure travel distances between neighborhoods and local healthcare services to study the impact of distance on access to care. The differences in travel distances to clinics in the Chickasaw Nation were analyzed with data from the U.S. Census Bureau and primary care clinics. Spatial analysis was used to determine the sensitivity of results by experimenting with the friction of distance using the gravity model and how socioeconomic status affects accessibility to healthcare services. This method can be used to help healthcare providers to identify areas where gaps in primary care exist and enable decision support for improved designation of Health Professional Shortage Areas.

Keywords: accessibility, health systems, rural, GIS

### **TRANSPORTATION DEVELOPMENT AND ECONOMIC PROMOTION IN THE FORT SMITH METROPOLITAN AREA**

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Urban geography as a discipline is incomplete without inclusion of studies of small and mid-sized cities. Smaller metropolitan areas of the US vary considerably in terms of land use patterns and function within the national and global economies. It is, therefore, appropriate to carry out case studies of such places. This paper examines the evolving transport geography of the Fort Smith, Arkansas Metropolitan Area and its role in the region's economic development since the mid-twentieth century. Fort Smith is the state's second largest city. Its metropolitan region is traversed by the navigable Arkansas River and is linked by three major rail lines, two "short line" railroads, and two interstate highways. The paper considers the ways that transportation is utilized as a tool by the private and public sectors to promote

the locale for economic investment and development. Attempts to develop the region as a secondary intermodal (truck, rail, and barge) hub are still in progress, and have thus far met with mixed results  
Keywords: economic development, urban geography, transportation, Arkansas