GIS DAY 2012 Poster Presenters Titles & Abstracts

Presenter: Chelsea Martin, University of Oklahoma, Dept. of Geography and Environmental Sustainability
Title: Green Infrastructure Site Location Decision Support Tool
Author(s): Chelsea Martin
Classification: Graduate Student
Abstract: Green Infrastructure (GI) and Low Impact Development (LID) techniques are increasingly being used as Best management Practices (BMP) in order to mitigate the ecological impacts of land use change and urbanization. GI and LID approaches include riparian buffers, grassed swales, urban nutrient management, constructed wetlands, detention/retention basins, bio retention basins, green roofs and rain barrels, and have been shown to manage pollutant loads and decrease surface runoff. A decision support mechanism that will effectively select locations to benefit most from implementing GI and LID will be useful to water quality managers, particularly in the Great Plains Region, who are working towards improving water quality in cities.

Presenter: Pradeep Adhikari, University of Oklahoma, Dept. of Geography and Environmental Sustainability
Title: Estimation of Croplands over West Africa: A Review of Eight Remote Sensing Datasets
Author(s): Pradeep Adhikari and Dr. Kirsten de Beurs
Classification: Graduate Student
Abstract: A set of eight remote sensing data sets are used to estimate croplands in West Africa. This poster presents the comparative analysis of the findings.

Presenter: Cui Jin, Earth Observation and Modeling Facility / Geoinformatics Program
Title: Modeling gross primary production of savanna woodlands in Southern Africa using MODIS imagery
Author(s): Cui Jin, Xiangming Xiao, Lutz Merbold,Almut Arneth,Elmar Veenendaal
Classification: Graduate Student
Abstract: Accurate estimation of gross primary production (GPP) of savanna ecosystem is valuable for evaluating the role of Africa in the global carbon cycle. An eddy flux observation network has been established to continuously measure the net CO2 fluxes (NEE) across various savanna vegetation types in Africa (CarboAfrica). Several publications have reported the seasonal dynamics and interannual variation of GPP for the savanna vegetation through partitioning of the measured NEE data. The satellite-based Production Efficiency Models (PEM), which calculate GPP as the product of absorbed photosynthetically active radiation (PAR) and light use efficiency (LUE), have been developed to scale up in situ GPP estimation from the eddy flux towers to regional scale. In this study, the Vegetation Photosynthesis Model (VPM) and the Moderate Resolution Imaging Spectroradiometer (MODIS) data were evaluated for their capacity to model GPP for savanna woodlands at two eddy flux towers in Botswana and Zambia, respectively. These two sites have different woodland types and precipitation pattern (Mopane woodlands vs. Miombo woodlands, semi-arid vs. semi-humid). In the VPM model, GPP is simulated as the product of photosynthetically active radiation (PAR), air

temperature, Enhanced Vegetation Index (EVI), and Land Surface Water Index (LSWI). The results show that the simulated GPP by the VPM track well the temporal dynamic of GPP estimated from the eddy covariance measurements at these two sites. In addition, the land surface phenology of savanna woodlands, described by the satellite vegetation indices, especially the water-sensitive satellite indices-LSWI, are proved to match the phenology based on vegetation physiology activity measured by eddy covariance towers. The information of the timing and duration of vegetation growing season is useful for assisting the VPM modeling. Further evaluation of VPM simulations for and other savanna ecosystems is necessary before the VPM model is applied to estimate GPP of savanna ecosystems in Africa.

Presenter: Nicole Grams, Center for Spatial Analysis/ Geoinformatics Program
Title: Assessment of CI-FLOW and remote sensing-derived flood depths during Hurricane Irene
Author(s): Nicole Grams and May Yuan, PhD
Classification: Graduate Student
Abstract: The Coastal and Inland Flooding Observation and Warning (CI-FLOW) project is an innovative coupled modeling system that predicts the combined effects of waves, tides, river flow and storm surge in order to provide routine total water level forecasts for tidally-influenced watersheds. Current evaluations of the modeling system are restricted by the number of land-falling storms in the test basins as well as the number of water-level observations against which model output can be compared. Furthermore, even with available observations from gauges or sensors, validation efforts are only relevant at point locations without considerations of spatial variability over an entire model basin. Such spatial variability is most effectively captured by remotely sensed imagery if available. The premise of this research is that improved remote sensing measurement of water depth can lead to better validation of the CI-FLOW modeling system, and hence, better address issues about spatial and temporal uncertainty, advance understanding of CI-FLOW intricacies, and continue to establish the basis for the application of CI-FLOW in other watersheds.

In August 2011, Hurricane Irene offered the opportunity to investigate CI-FLOW performance in the Tar-Pamlico and Neuse River test basins of coastal North Carolina in real-time. This study utilizes the best available satellite data collected before, during and after Hurricane Irene in conjunction with DEM datasets to derive flood extent and height at various times during the storm. Water level observations are used as ground truth measurements to compare with derived flood heights and CI-FLOW estimates. The ISODATA classification algorithm was used to separate the remotely sensed pixels into inundated areas, and spatial analysis determines the flood depth by subtracting underlying DEM data from flood heights. Preliminary findings indicate that the derived flood heights are adequately representative of ground-truth observations, which demonstrates potential for improved flood detection in the absence of real-time measurements.

Presenter: Grant DeLozier, Center for Spatial Analysis / Geoinformatics Program
Title: Place Name Classification and Geo-Referencing

Author(s): Grant DeLozier
Classification: Graduate Student
Abstract: Geographic Information Systems (GIS) are not equipped to handle textual sources as input data. Despite textual sources—journals, letters, newspapers, web pages, and different forms of social media—containing spatially and geographically rich language, texts remain disconnected from the primary means of spatial data visualization and analysis. This poster looks at a few methods for transforming textual language to spatial data. A novel Named Entity Classification and Place Name Disambiguation process is proposed and evaluated in this study.

Presenter: Hanqing Yang, University of Oklahoma School of Computer Science
Title: Extracting Patterns from Uncertain GPS Data
Author(s): Hanqing Yang, Le Gruenwald, Oscar Olarte
Classification: Graduate Student
Abstract: The rapid development and deployment of location-acquisition equipment such as GPS systems and GSM communication networks has made collection of city spatio-temporal trajectory datasets possible and led to the demand of managing and mining patterns from trajectory datasets to discover objects' movement behavior. Due to technology limitations and the nature of trajectory applications, it is difficult to get certain (exact) location and timestamp information in all space and at all time. This inherent uncertainty existing in location and time information within trajectory data needs to be properly handled and mined. In this poster, we present our efforts in facilitating this demand by developing a novel data mining algorithm to discover sequential patterns from trajectories considering space, time, and especially uncertainty in data. We also propose a new data structure, called an uncertain pattern forest (UPF), to store and represent up-to-date trajectory patterns.

Presenter: Maleeha Shahid, Oklahoma University Health Sciences Center, COPH
Title: Trauma Correlates in Mental health; A GIS approach towards Trauma Informed Care in the State of Oklahoma
Author(s): MALEEHA SHAHID
Classification: Graduate Student
Abstract: Over the last 3 decades, we have developed a sound understanding of epidemiology of Potential Traumatic Events (PTEs) , its demographic correlates and its outcomes in relation to mental health. We know that most individuals recover from traumatic experiences without developing mental health issues. Of those who are affected, less than 10% develop Post Traumatic Stress Disorder; PTSD. Other post-traumatic mental health problems include depression, suicidal inclinations, substance abuse and anxiety disorders. History of trauma in all its complexity is not easy to ascertain and therefore can be easily missed during patient's assessment. At times clinicians and therapists do not feel the need to inquire for trauma history mostly; essentially because they are not 'Trauma Informed'. There is a strong; growing body of research evidence linking evidence-based-trauma-informed treatment with significant outcomes both from rapid improvement and recovery to long term resilience in mental health patients. There are various factors associated with PTE such as gender, race, age, socioeconomic status (Income, education and employment status), current

living situation, homelessness and marital status. Understanding these associations can help us identify the selection bias that presently exists in the process of trauma history screening; ultimately leading to underestimation of PTE in high risk population (e.g. Increased life-time prevalence of PTSD in females but higher rates of PTE in males, whites, low income population, uneducated, unemployed, unmarried, individuals living alone and homeless). CDC recommends trauma screening for every single patient coming to mental health facilities. Oklahoma Department of Mental Health and Substance Abuse services with affiliate agencies are paving the way towards universal trauma screening for all mental health patients seeking services at county level within the State of Oklahoma.

Presenter: Ram Prasad Poudel, Oklahoma University Health Sciences Center, COPH
Title: Global Patterns of Malaria: A Spatial Statistical Approach
Author(s): Ram Prasad Poudel
Classification: Graduate Student
Abstract: A meta-analysis of the data was done to examine the global patterns of malaria. More than 216 million cases and 655,000 total deaths occurred in 2010 by malaria. The findings indicated malaria was concentrated in the sub-Saharan Africa. Case fatality rate (CFR) was higher in countries with less income. Thirty countries in sub-Saharan Africa and five in Asia accounted for 98% of global malaria deaths where only Africa shared 89% of total deaths worldwide in 2010. Almost half of the world's population (3.3 billion) lives in areas at risk of high malaria transmission in 109 countries and territories.

Presenter: Nick Wilgruber, University of Oklahoma, Dept. of Geography and Environmental Sustainability
Stream Burial in Central OK
Author(s): Nick Wilgruber
Classification: Graduate Student
Abstract: Headwater streams are an essential part of stream networks. They transport organic matter and nutrients downstream and provide ecosystem services and habitat for aquatic life. However, in urban areas streams networks can be drastically altered. Headwaters are often to the first to be buried. I used hydrologic modeling to estimate the prevalence of stream channels in Norman, Oklahoma prior to development. I compared these data to a current, accurate stream map of Norman to calculate loss of streams. I found that 23 percent of streams in the Norman area have been piped or buried with the majority of them being headwaters. Stormwater data from the city of Norman was added to show how urban development changes natural stream networks.

Presenter: Trung Tran, University of Oklahoma, Dept. of Geography and Environmental Sustainability
Title: Investigating forest disturbance in Southeast Oklahoma between 2000 and 2011
Author(s): Trung Tran
Classification: Graduate Student

Abstract: Southeast Oklahoma has been known to have the highest land-cover change rate in the United States primarily attributed to the timber industry and urban expansion. There has been a need to investigate the spatial and temporal patterns of forest disturbance in the area to understand the impact of forest disturbance on the ecosystems and carbon budget. In this study, forest decaying and re-growing periods, and the disturbance frequency between 2000 and 2011 were identified based on high spatial- and temporal-resolution (30-meter and 8-day) imagery data. A fusion algorithm was proposed to blend Landsat and MODIS data for the high spatial- and temporal-resolution data. The Tasseled-Cap Disturbance Index was used to detect disturbances. Validation of disturbances was carried out using field-trip photos.

Presenter: Ravi Teja Bellam, Oklahoma Geological Survey
Title: Parallel methods for rapid computations of large grids in geophysical forward models.
Author(s): Ravi Teja Bellam
Classification: Graduate Student
Abstract: We present an algorithm to rapidly calculate geophysical forward models from grid based 3D geology. Our technique is well suited for high-resolution elevation datasets with grid size typically in the range of 1m to 30m. Our approach can perform rapid computations on large topographies including crustal-scale models derived from complex geologic interpretations. Most importantly since the proposed model is location independent we can exploit parallel techniques. Our radius based decimation of grids provides useful insights to perform accurate forward model calculations in other geophysical and GIS based applications.

Presenter: Dong Yan
Title: The impacts of weather and institutional change on vegetation dynamics in China's Loess Plateau
Author(s): Dong Yan
Classification: Graduate Student
Abstract: We present an analysis of the impacts of weather change and large scale vegetation conservation programs on the vegetation dynamics in the Loess Plateau from 2000 through 2009. We employed a multiple lines of evidence approach in which multi-scale and multi-source data were used. We applied the seasonal Mann-Kendall trend test to NDVI derived from MODIS at 500m to identify vegetation changes in the Loess Plateau since 2000. Meteorological data, land cover data from MODIS, vegetation conservation activities and crop yield data reported by statistical yearbook were used to examine the causes of the positive vegetation changes identified by MODIS NDVI. Anthropogenic biomes were used to understand how vegetation conservation programs chose target regions. We found significant increases in vegetation in 44.9% of the Loess Plateau. Significant increases in precipitation and temperature intensified agricultural production and vegetation conservation programs contributed to these vegetation increases.

Presenter: Zhao Kun
Title: GIS Implementation in Urban Planning
Author(s): Zhao Kun
Classification: Graduate Student

Abstract: The poster contains two of the 4 projects from my GIS class RCPL 5463 from regional and city planning in College of Architecture. One is on day-care center site selection, the other is on tornado analysis since 1950.

Presenter: Daniel Ofsthun
Title: Detecting Patterns of Urban Growth Using GIS
Author(s): Daniel Ofsthun and Zhao Kun
Classification: Graduate Student
Abstract: This poster is our final GIS project for RCPL 5463. We used Wake County, NC parcel GIS database to identify urban growth patterns over the past 150+ years. Especially, we looked at different type of housing and urban land parcel growth over the years.