Annotated Bibliography | Ashley Meredith | Feb. 21, 2025

1. Feng, D., Shi, X., Renaud, F., 2023. Risk assessment for hurricane-induced pluvial flooding in urban areas using a GIS-based multi-criteria approach: A case study of Hurricane Harvey in Houston, USA. *Science of The Total Environment,* 904.

This study notes that many flood risk assessments are missing important urban ecosystem elements and proposes a flood risk assessment framework that better includes social-ecological factors, using a case study from Houston during Hurricane Harvey. They collected data from different sources: land cover and precipitation (raster), city boundaries and surface water (vector), and data from the census to determine some of the social factors. The flood risk was determined from many indicators placed into 3 categories: food hazard, exposure, and vulnerability. Next, the authors used a weighted equation to combine the indicators and estimated the flood risk of the Houston area for this hurricane event, before comparing it with damage data from the negative impacts to assess the accuracy of parts of their tool.

There are limitations to any case study, and in this one, the damage data doesn’t provide a holistic overview of the effects of the hurricane, so further research and different indicators would need to be measured to better assess the flood hazard framework. This study is useful because this framework can be tweaked to determine the local flood hazard for other cities or regions with relative ease, though the authors note that the weighting method needs to be carefully considered for each location because it affects the outcome greatly.

1. Cillis, G., Lanorte, A., Nole, G., Sanarsiero, V., Ronco, F., 2022. Fire Planning of Urban-Rural Interface in Open Source GIS Environment: Case Study of the Apulia Region (Southern Italy). *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences,* XLVII (4-W1-2022), 97-102.

This study examines methods used by fire forecasters to create a vulnerability index to improve fire management before, during and after fire-related disasters, especially in areas where vegetation areas are close to urban areas. They used data about these vegetation-human interface zones to estimate hazard likelihoods based on criteria like vegetation, morphology, and past fires. The vegetation factor uses information on vegetation type (species) and density to determine the scale of hazard since these factors influence how fire might behave. Slope and terrain contribute to the morphological hazard factor, as these characteristics help determine how fire behaves in a landscape. They used an algebraic sum of all the factors studies to produce a map of vulnerability index.

The study had some difficulty obtaining current map data regarding areas where vegetation and urban areas meet, but they turned to OpenStreetMap and other open-source databases to find applicable data. A strong point of this study was that they used raster data for some of their final summary maps to provide more detailed maps. Lastly, the authors posit that this methodology could be made into a model that could be updated with new layer data as it becomes available.

1. Cho, S., Baral, S., and Burlakoti, D., 2025. Afforestation/Reforestation and Avoided Conversion Carbon Projects in the United States. *Forests*, 16 (1), 115-133.

This article examines afforestation/reforestation (A/R) and avoided conversion (AC) projects currently in the United States, with many projects in Arkansas, Montana, and Colorado. A/R projects plant new trees on non-forested land or areas that have been disturbed by events such as farming, logging, development, or natural disaster. AC projects aim to conserve land that is at risk of being deforested for use as farmland or development. A/R projects tend to have a larger benefit over AC when it comes to environmental and socioeconomic goals, but AC projects have larger impact in areas at risk for large-scale development The researchers used a GIS to integrate data on project details (acreage, ownership, location, external benefits) with census information to map each project. A GIS was also used to measure and map the benefits of each project – for example, biodiversity conservation, soil erosion reduction, recreation opportunities and local economic benefits.

The study does a good job contextualizing conservation efforts across the country and providing background information for what land was previously used for and who owns each project in each state. The study is limited by only researching projects with publicly available data – and by the fact that there were fewer credits issued than projects. This resulted in 15 projects being left out of the study due to lack of carbon credit information and thus limiting the number of projects in the study.

1. Clevenger, A., Wierzchowski, J., Chruszcz, B., Gunson, K., 2002. GIS-Generated, Expert-Based Models for Identifying Wildlife Habitat Linkages and Planning Mitigation Passages. *Conservation Biology*, 16 (2), 503-514.

The authors of this study developed three models on black bear movement around roadways based on expert opinion, expert literature review, and empirical data. They then compared these models to determine which model best represented the observed bear behavior. They used nine variables in their analysis, including elevation, slope, and aspect. For the expert-opinion model, experts helped in selecting weights for each variable, while in the literature-based model, authors selected the weights based on existing literature since they had no knowledge of bear movements in that region. They assumed that the probability of bear-vehicle collisions and bear crossings increased when a highway crossed premium bear habitat. The expert literature-based model was the best match for empirical data. This study supports future efforts to decrease animal-vehicle collisions with road-mitigation strategies like wildlife corridors using field studies and remotely sensed data.

The authors did well to only consider variables with matching digital layers when asking experts about those variables, as well as using experts with no knowledge of local bear populations to review the literature for the literature-based model. This study was limited by the fact that they did not use vegetation cover in the models because the data was not ready in time and instead used a measure for “greenness”.

1. Anuchiracheeva, S., Demaine, H., Shivakoti, G., Ruddle, K., 2003. Systematizing local knowledge using GIS: fisheries management in Bang Saphan Bay, Thailand. *Ocean and Coastal Management,* 46 (11-12), 1049-1068.

Fisheries management is improved with the input of local fishers, and to use their input, this study mapped Participatory Rural Appraisal (PRA) data. Fishers are also more likely to abide by management decisions and fishery regulations if they trust the data on which it is based. The authors worked to systematize local knowledge into readable maps so that it could be used more readily by policy makers. Information that researchers collected from the PRA survey was entered into a GIS, and 3 main issues emerged. There was significant overlap in fishing grounds by fishers from different groups; maps showed that fishers fished in areas outside the project boundaries; and some techniques violated fishing law at the time.

The biggest limitations of this study lie in how quickly fisheries change – management plans must be kept current to keep up with changing supply and technology. Today, there are plenty of GIS applications that could help keep up with these rapidly changing conditions. One strength of this study is that the data they collected from fishers could be used in a variety of other research applications without having to conduct expensive or time-consuming sampling in the same area.