

GIScience teaching method in Japan

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Motivation

GIS is an academic field guided through its application by various disciplines, and not a one tool for research in one discipline as presently practiced in Japan. Recognizing that GIScience can only be carried out well through multidisciplinary approach, we at SIS are developing a systematic GIScience teaching method, and have designed a theoretical framework of GIScience teaching in Japan.

Outline of research

- Development of GIScience teaching method
- Development and systematization of education contents on GIScience
- System design for GIScience education
- Application of GIScience teaching method in various disciplines
- Development of diffusion approach of GIScience teaching method

Poverty in the Philippines

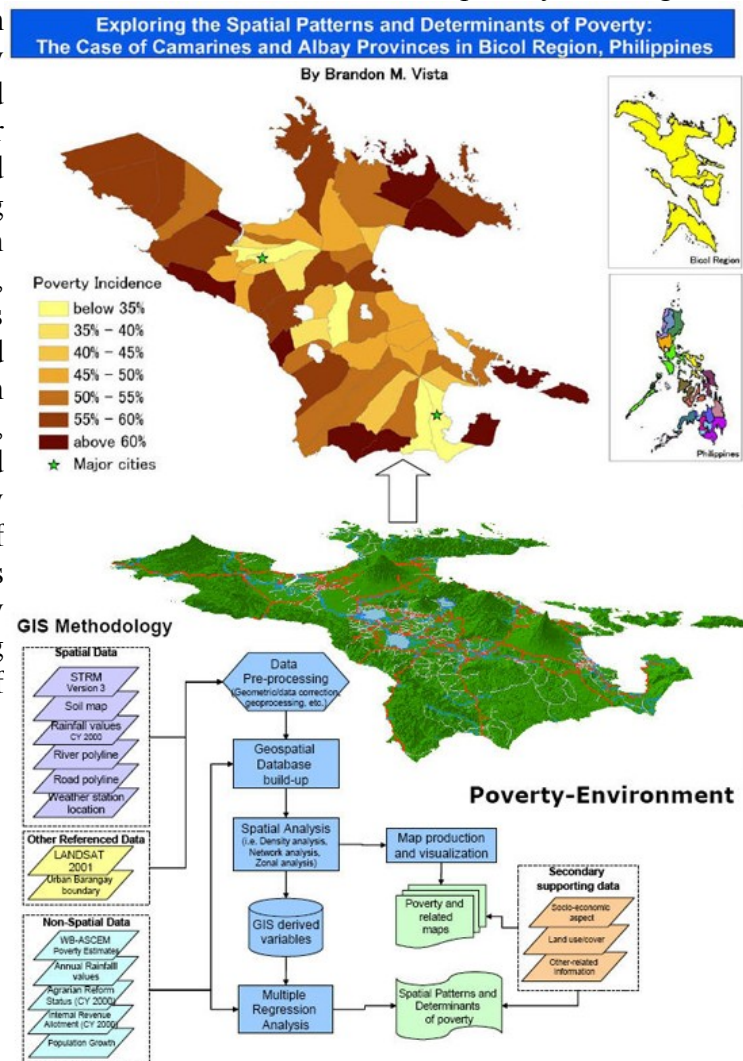
Brandon Manalo Vista, MA

Motivation

Poverty has a spatial dimension. Geography, particularly the physical environment, plays a significant role in the poverty condition of communities and of the people living in disadvantaged regions. However, this spatial dimension of poverty has not been given much attention in many poverty studies, especially in the Philippines.

Outline of research

This study explores the spatial patterns and the possible underlying determinants affecting poverty condition in two adjacent provinces of Albay and Camarines Sur, located in Bicol Region, one of the poorest in the country. Agro-climatic condition which consists of slope, elevation, soil, rainfall and access to river, as well as access to road infrastructure and proximity to major markets were all derived using GIS. Together with the influence of government programs and policies i.e., fiscal decentralization and land distribution, and population growth, all of these variables were combined using multiple regression analysis to investigate their effect on poverty. Results of the study show that the spatial patterns of poverty in terms of incidence exhibit spatially heterogeneous characteristics. The spatial variation in the incidence of poverty is mainly caused by disparities on access to road infrastructure which is further exacerbated by loopholes and geographical bias in fiscal funding priorities and deficiency in agrarian reform implementation. Moreover, proximity to major cities where there is a high concentration of development and economic activities and differences in agro-climatic features, particularly, elevation, slope, and rainfall also proved to be significant determinants to poverty and suggest the presence of geographically disadvantageous areas within the study site. Thus, geography and facets of public policy have a strong impact on the condition of poverty of communities.



Modelling and predicting urban growth in Africa's Major Cities

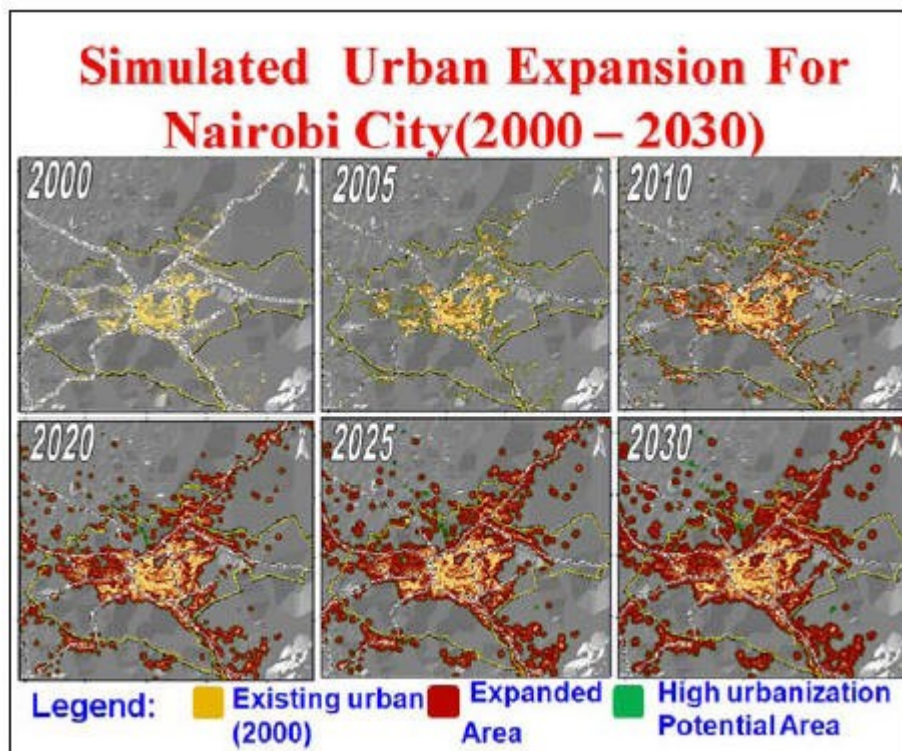
Charles N. Mundia, Dr., Yuji Murayama, Dr.

Motivation

Africa's urban population growth has been very rapid, averaging about 5 percent per year over the last two decades. As a result, many urban areas have experienced dramatic growth which is seriously outstripping the capacity of most cities to provide adequate services for their citizens. The rapid population growth, expected to double by 2030, is leading to dramatic sprawl with associated undesirable environmental and social consequences.

Outline of research

Using Nairobi as an example of a major African city, we studied the dynamics of land use and land cover changes using satellite data and addressed the need for urban management tools that can guide sustainable urban planning policies. Urban growth simulation for Nairobi city using Cellular Automata (CA) that integrates biophysical factors with dynamic spatial modelling is described. The results showed that the model is very useful for urban modelling and an effective tool to foresee the spatial consequences of poor planning policies in the context of many African cities. The forecast for Nairobi shows an unsustainable sprawled urban growth. The results show that urban simulations can represent a useful approach to an understanding of the consequences of current planning policies or their incompleteness.



School district study

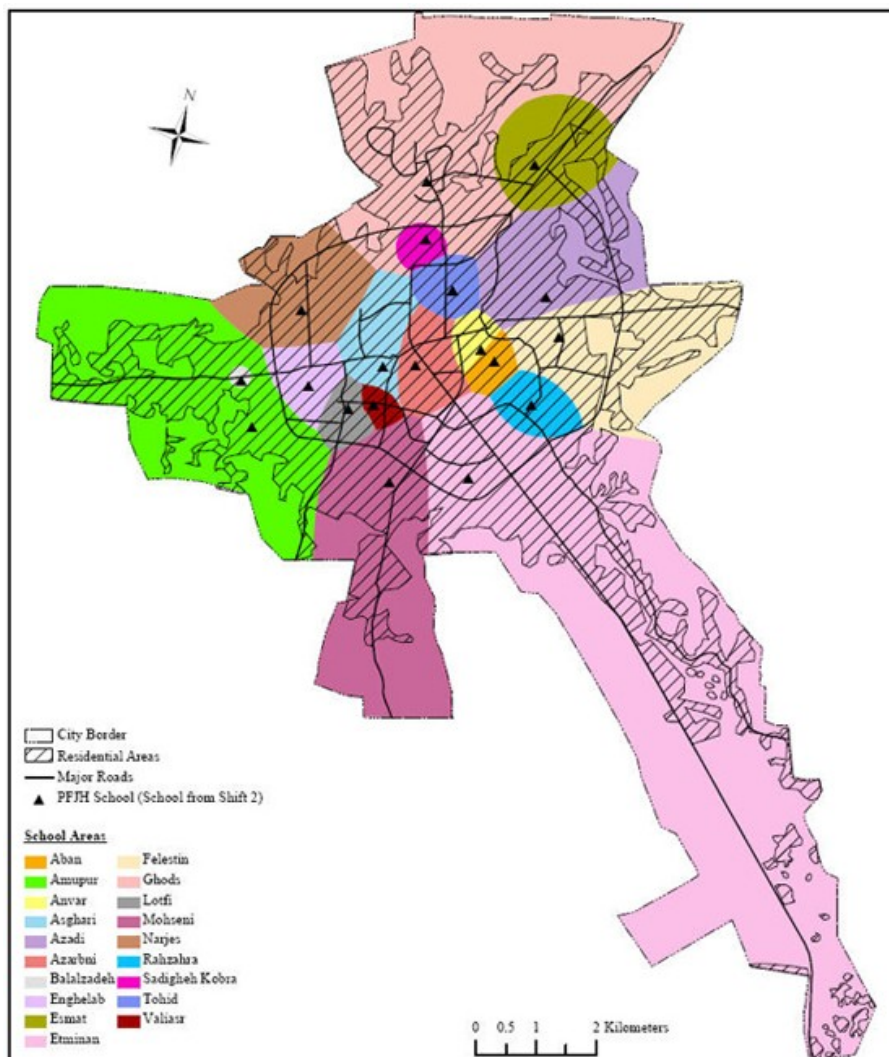
Fatemeh Ahmadi Nejad Masouleh, Dr.

Motivation

Issues of school road safety such as traffic-related accidents and stranger danger are major concerns for parents of children commuting to and from schools. A look at leading causes of death by age group showed that road traffic injury was the second leading cause of death in the world for children aged 5-14 in 2002 while HIV/AIDS was the fourth leading cause.

Outline of research

With these concerns in mind, the recent work focused on the allocation of students to closest local schools within school attendance areas and discusses how it can result in shorter walking distances and less motorized commutes for students, which in turn, increases the safety of school to home travel. I used the Multiplicatively Weighted Voronoi diagram (MWVD) to construct attendance areas, given its utility in demarcating spaces, so that all journeys within them are closest to a chosen point.



MWVD-based attendance areas for Shift 2 Rasht PFJH schools showing city residential areas

Ecological environment in China

Fengqin Zhao, Dr.

Motivation

The western part of Songnen Plain is in the east of the farming-grazing transitional zone in north China, with an area of 46,879.37km², where the sensitivity of ecosystem is high, the disturbance resistant performances and capability of natural regeneration are low. In the last 50 years, with the global warming aggravation, western region is increasingly becoming arid. Under the simultaneous action of nature and human, land use and land cover have been changed, and the balance of land ecosystem has been seriously destroyed. Ecological problems such as soil desertification, land salinization and soil deterioration and social problems such as population pressure, low income of the rural population are interrelated problems in the southwest of Songnen Plain.

Outline of research

During the evaluation of land ecological environment security, with the aid of the space analyses function of GIS, territory range of the west of Songnen Plain was divided into 47,114 bar 1×1km² evaluation units. From the viewpoint of systematic pressure, state and response, the index system was designed according to AHP. With the model of gray relevancy evaluation, the evaluation of land ecological environmental security in the west of Songnen Plain in 2001 was carried on through VB software program. The result of evaluation was represented in the form of digital picture. The result indicated that the land ecological environment in the west of Songnen Plain was generally unsafe. The area of risk grade and worse grade was 34.37% accounted for the whole, which could show the land ecological environment security was bad. Some preventive measures and adjustive measures should be taken to protecting the land ecological environment.

Spatial modeling and geocomputation

Yaolong Zhao, Dr., Yuji Murayama, Dr.

Motivation

GIS has three main functions: data collect, data management, and spatial analysis through spatial modeling. The function of data collection and management has been very strong and standardized in current GIS platforms, whereas spatial modeling is still a complicated process. As urbanization and consequent urban problems become critical in the world, we try to enhance and rationalize the function of spatial modeling for GIS using urban geosimulation as case study.

Outline of research

1. Fuzzy semantic representation of urban phenomenon
2. Spatio-temporal scale problem in spatial modeling
3. Data structure problem for urban geosimulation;
4. The ability of urban geosimulation models in capturing the realistic spatial processes of urban dynamics
5. Quality control of urban geosimulation models
6. Interpretation of neighborhood interactions in urban dynamics
7. Integration of multi-scale factors in urban geosimulation models