Assignment 1 – GIS Project Examples

1. Project of interest found on the internet


Project Name: Establishment of a GIS monitoring system for schistosomiasis japonica in Kofu, Japan

Researchers: N. NIHEI, N. KAJIHARA, M. KIRINOKI, Y. CHIGUSA, H. MATSUDA, Y. SAITOH, R. SHIMAMURA, H. KANETA and S. NAKAMURA

Department of Medical Entomology, National Institute of Infectious Diseases, Toyama, Shinjuku-ku, Tokyo 162-8640, Japan

Yamanashi Institute for Public Health, Fujimi, Kofu, Yamanashi 400-0027, Japan

Department of Tropical Medicine and Parasitology, Dokkyo University School of Medicine, Kitakobayashi, Mibu, Shimotsuga, Tochigi 321-0293, Japan

Department of Parasitology, Azabu University, Fuchinobe, Sagamihara, Kanagawa 229-8501, Japan

Geographic Information Systems Institute, Pasco Corporation, Higashiyama, Meguro-ku, Tokyo 153-0043, Japan

Department of Appropriate Technology Transfer and Development, Research Institute, International Medical Centre of Japan, Toyama, Shinjuku-ku, Tokyo 162-8655, Japan

Study Objectives: The main study objective was to map the distribution of an intermediate host organism that plays an essential role in the propagation of schistosomiasis. The intermediate host of schistosomes is always a snail that is found in, or breeds near, fresh surface water. Schistosomiasis was eradicated in Japan in 1977, but remains endemic in nearly eighty other countries. The authors of this study assessed the risk of reemergence of disease as determined by the number and location of snails at particular mapped sites between 1996 and 2003.

Time Period of Study: The study took place between 1996 and 2003 and time-series data was collected.
Data Source / Data Used (see also Software and Analytic Methodology):  
Handheld GPS devices were used to map the location of each snail monitoring site. A topographic map (1:25,000) came from the Geographical Survey Institute of Japan. In 1995, stereoscopic aerial photographs were used to map the initial site selections.

Geographic Extent of Study Area:  
The study was restricted to the Kofu Basin in Japan.

Software and Analytic Methodology:  
The location of sites and snail data were stored via ArcView software (ESRI, Redlands CA) and Pathfinder Office GPS-to-GIS (Trimble). GPS data was entered into the maps via the program Fresh Map (Pasco, Tokyo). ArcView was used for editing and data exploration. When the physical size of the map became unwieldy for field use, the map was transferred to a hand-held GPS (GeoXMTM; Trimble) with ArcPad (ESRI).

What was Done during the Study:  
The topographic maps were overlain with a 1 km² grid. Rice fields within selected grid spaces were selected for study sites. Snail counts were made at individual locations annually and the number of live/dead snails was recorded. Snails were examined for schistosomes. Originally, the locations of the sites were determined by hand and plotted on the 1:25,000 map, but in 2000, handheld GPS units were used to plot individual sampling locations more accurately. Overall site areas were calculated and the water inlet/outlet locations were determined via GPS devices and plotted.

Results of the Research:  
The locations and quantities of snails collected at each sampling site were mapped. The sites of highest snail density appeared to migrate southward towards the later half of the study. Overall, no schistosome-infected snails were found, but the percentage of snail-positive sites increased over time.

Maps:  
The following maps were presented by the researchers:
2. Two additional questions:
   a. Think about the issues or research questions addressed in the project, and why the spatial/geographic aspects in the project are significant (assuming they are). Could the project be accomplished without mapping or spatial analysis?

   The objective of the project was to determine at-risk locations in terms of the potential for schistosomiasis japonicum to reemerge. Presumably, the project could have been carried out without mapping because snail data could have been collected and simply recorded for each known site. The quality of the data would likely have been poor, in such a case, because of lack of precision of sampling locations without use of handheld GPS units. The spatial aspects of the map allowed the study authors to see the southward pattern of the snail movement; it is unlikely that such a pattern would have been determined without the map.

   b. What further questions would you like to see explored in a project like this? Are these questions spatial or non-spatial? Explain.
I would have liked to see the locations of sanitary facilities because schistosomiasis spreads through fecal contamination of fresh water bodies. I would also like to have seen some data on population demographics in each spatial area. Specifically, I’d be interested in knowing the primary occupations of each demographic group and whether the individuals were native to Japan or immigrants. The reason is because schistosomiasis japonicum is endemic in many other Asian countries and infected individuals from these countries could, theoretically, reintroduce the disease to Japan if the intermediate host snail is present in surface water (which it is). These are spatial questions. I would also like to see this type of study carried out in countries where schistosomiasis is still endemic, enhanced by data on the location of infected individuals, the location of sanitary facilities, and the location of health facilities.