Geospatial Technology: Opportunity in Fostering Social Enterpreneureship

Navendu Chaudhary*

ABSTRACT

Geographic Information Technology, or Geospatial Technology, is a blend of computer hardware and software used to analyse and visualise spatial data (Goodchild, 2001). The mapping techniques employed in Geographic Information System (GIS) has evolved into an intelligent mapping system that can support various fields of inquiry. For the last two decades, these systems have become an indispensable tool in the hands of decision makers, researchers, as well as participants in social sectors in economically advanced countries (Hilier, 2007). In India, however, these technologies are in a nascent stage. This paper argues that these technologies are well suited for fostering social enterpreneuership, and greatly advance the capabilities of social sector undertakings. This paper examines the role that Geospatial Technology can play in fostering social enterpreneureship with specific case studies carried out at Symbiosis Institute of Geoinformatics, Pune.

Keywords: Social Enterpreneureship, Geospatial, GIS, Remote Sensing, Spatial Analysis

What is Geospatial Technology?

Geospatial Technology is a blend of computer hardware and software designed to capture, store, display and analyse geographic . The capturing

* Symbiosis Institute of Geoinformatics, Pune.

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of geographic data often relies on remote sensing and global positioning technology. Remote sensing is a common term used for data acquisition from platforms such as aircraft or satellites, that provide a bird's eye view. Providing social services are inherently involved in working with underprivileged and inert-connected human settlements. Geography thus matters in project planning and execution. Remote sensing, coupled with Geo-positioning technology and traditional surveys can give us the real-time perspectives upon project management. The economically advanced countries have already embraced Geospatial Technology to serve as a standard framework for project management (ESRI, 2011). In India, the social services sector can greatly benefit from their experience to effectively serve the pressing needs of the large Indian population.

Considerations of Geospatial Technology

1. *Hardware:* Computer systems have evolved in the last decade to handle enormous amount of data. They are today reasonably priced and easily available. The hardware needs to be checked for memory, storage and graphics capacity. These requirements will vary based on whether the user will visualise or analyse the data. Analytical capabilities will require more robust systems
2. *Software:* Multitude of geospatial softwares are available in the market. Some are simple viewers, generally available free of cost. Some are sophisticated and possess a wide range of geospatial tools. Many are proprietary, but recent advances in open source Geographic Information System (GIS) have created much simpler and cheaper alternatives. Good geospatial software should be able to work with geographic data, can interface with relational database management system, possess necessary geospatial tools to analyse the spatial data, and have user friendly graphic user interface. Some of these softwares allow user to customise the Graphical User Interface (GUIs) which come in handy for entrepreneurs to create products to suit their client needs.
3. *Data:* Geospatial softwares rely largely on good quality data sets. The data sets are mainly of two types: one is Spatial data which represents the location features, such as addresses, coordinates, etc. The second

type is an Attribute data which is the data that holds the information about a particular location or coordinate in the spatial data set, such as the number of people living at a particular address. The successful implementation of geospatial techniques will largely depend on the quality of data collected.

Social Services in India

Social work grew out of humanitarian and democratic ideals, and its values are based on respect for the equality, worth, and dignity of all people (Hazra, 2014). In India a large number of people depend on public provision of food, housing, health care and education. To serve such a large section of the society is a mammoth task. The service sector in India is beset with inadequacies in terms of funding, resources and the use of technology. The services such as food provision and health care are often critical enough to warrant use of highly efficient systems. The government machinery is often overwhelmed due to the large, dependant population that is distributed over a country as large as India. India is currently the seventh largest country in the world in terms of area, the third largest in terms of population, and ranks first in terms of population under the poverty line. It is believed that this pressure of public provisions will hamper India's progress through its inefficiency and inequality (Banerjee, 2014).

In India the social and community services budget of the central and state government has been increasing year on year, and yet has remained woefully inadequate. This gap in the need for public provisions and the timely supply through various government programmes have given rise to social enterpreneuership. Various non-governmental organisations are filling in for the perceived inability of the government to provide these essential services, for example, in cities like Mumbai more than 2,50,000 children are being educated by NGOs on a daily basis. These NGOs often work together in their own synergistic environment (Segran, 2008). This creates the need for effective communication and coordination. The NGOs have been relatively successful in fulfilling the objectives while having meagre means to do so. This is where technology can help in increasing the reach and efficiency. It is essential for these social entrepreneurs to have a collaborative network of social entrepreneurs that

enables them to share ideas, spread innovations and manage projects. The Indian Parliament is currently in the process of passing the New Companies Bill with amendments to Corporate Social Responsibility (CSR) policy. This would give rise to better opportunities for entrepreneurs to take up the social route.

Needs of Social Service Sector

These social workers played a leading role in the social survey movement that brought activists, journalists, social scientists, businessmen, academics, and charitable foundations together for a common cause, that is, to serve the neediest of people. These early social entrepreneurs used field surveys, interviews, statistics, and maps to document the living conditions of the poor in modern cities (Hilier, 2007).

There are three broad levels of intervention for social work professionals. The first is 'Macro' social work which is regional in nature and involves the society or communities as a whole. This type of social work practice would include policy forming and advocacy on a national or regional scale. The second level of intervention is 'Meso' social work practice. This level would involve work with NGOs , smaller organisations, or self help groups (SHGs). This practice would include policy making within a social work agency, or developing programmes for a particular neighbourhood. The final level is the 'Micro' level that involves services to individuals and families. These are very small scale works carried out at the hut level in a slum, or school, etc. (Hazra, 2014).

The social sector, thus needs: (1) Social surveys, (2) Framework, (3) Management of Resources, and (4) Improving Delivery on the Micro, Meso and Macro levels.

For centuries social surveys have generated awareness amongst the population of various societal ills, such as hunger, poverty, disease, inequality, etc. Landmark survey by Charles Booth in London or Jane Adams in Chicago paved the way for social surveys as a starting point in the social intervention movements (Bulmer et al., 2011). Today, Geospatial Technology can help us realise the full potential of these surveys. Integrating Geospatial Technology in the survey work will allow the social work professional to strengthen the survey methodology. The

surveys can be seamlessly shared, reproduced and visualised in both time and space. Such integration is commonly used by public health professionals in the study of epidemics.

The social survey is one of the best known and most widely used approaches to investigation in the social services. It helps the understanding of the current status of services, and allows the agency to evaluate the 'Gaps' in the services. It is often conducted by filling up a questionnaire for data collection used by surveyors. These surveys are not mere data collection techniques, but involve designing research in order to meet specific goals. Such surveys need to be tested and evaluated periodically to ensure that they do indeed represent the social landscape. Geospatial techniques are found to be useful in order to design and execute such surveys and aid in visualising or analysing the data in space and time (O'leary, 2003).

Geospatial applications show the ability and potential in addressing important social issues at the international, national, and local levels. Spatial analysis capabilities, which allow users to examine and display health data in new and highly effective ways are the key to successful implementation of geospatial techniques. Spatial analysis refers to the 'ability to manipulate spatial data into different forms and extract additional meaning as a result'(Clarke, 1999).

It involves several methods and procedures, pertaining to geography, statistics, and other disciplines, for analysing and relating spatial information. Spatial analysis also helps in understanding Spatial relationships, those based on proximity and relative location. Such understanding is vital for social work involving interaction with communities or their environments. The social entrepreneurs can utilise Geospatial Technologies such as GIS, Remote sensing and Global positioning System to serve social sectors by contributing to governmental/ NGO, business or academic sectors (Figure 1).

The social surveys are never analysed in isolation, they always have a context. Often the context is the ecosystem or general population, or a combination of both. For example, if we are to study epidemics, we need to address the context of climate, landscape and population distribution. The climate influences the disease proliferation, the landscape interlinks the climate and human settlement, which in turn influences the spread

of the disease. Integrating these influences is a mammoth task and can be made simple by use of Geospatial Technology. At Symbiosis Institute of Geoinformatics, we have used Geospatial Technology to map the dengue epidemic in the city of Pune, in association with the National Institute of Virology.

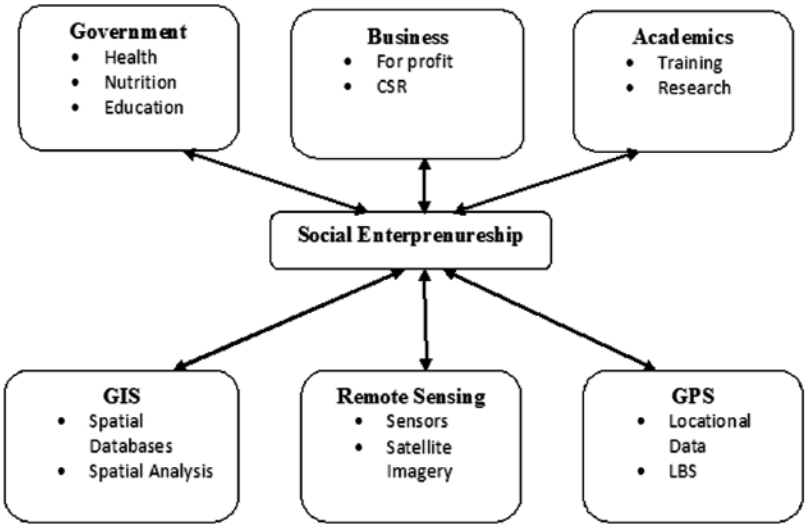

Figure 1: Social Enterpreneureship Positioning

Geospatial Application in Social Service Sectors

At Symbiosis Institute of Geoinformatics, we encourage students to create Geospatial applications specifically designed for the needs of social sectors. The Figure below shows an application developed by a student to record and archive data received during spotting and collection of snakes by 'SarpaMitra', or friend of snakes. This group of people have been tasked to respond to the spotting and subsequent 'catch and release' snakes. They are largely voluntary groups and have little means to invest in a system that caters to their need. The application was developed with the help of mobile device (GPRS) and android platform, whereby the cost is minimal and the device is commonly available. The software developed records the location and photo of the captured snake, and sends the relevant information along with a geotagged photo to a server or to the registered email. This information, thus can be archived centrally, and can

be maintained and retrieved on need basis. This information can later be analysed and used for setting up proper policies of snake handling and possible remuneration for the individuals (Shedge, 2014).

Geospatial applications are especially useful in cases like mapping diseases and their patterns. Following is a joint effort of Symbiosis Institute of Geoinformatics and the National Institute of Virology to map the prevalence of vector borne diseases in the city of Pune (Figure 2). The analysis was carried out by using the Global Positioning System (GPS), Remote Sensing and Geospatial tools.

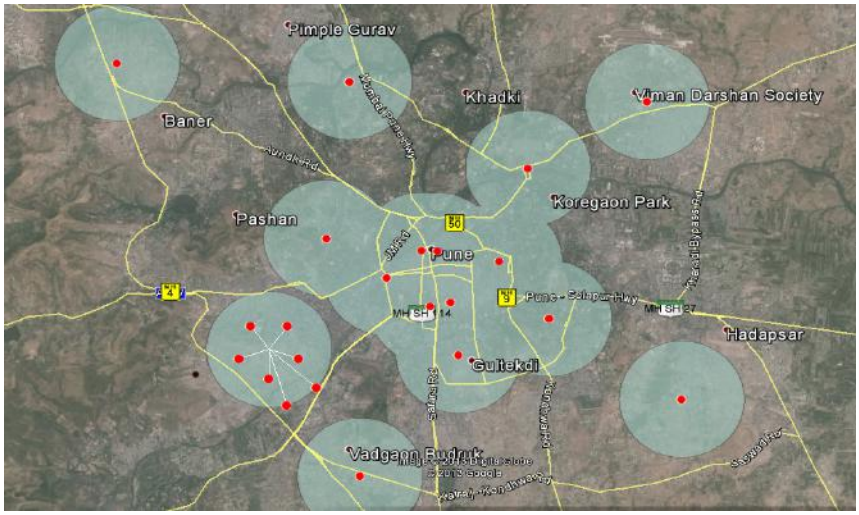

Figure 2: Incidences of Vector Borne Diseases with Underlying Landscape

This type of system can be used to map location of patients juxtaposed with the presence of mosquito and climate/environmental data to bring about trends in existing epidemics and predictive model for future epidemics. Remote sensing and GIS technologies have been used to study the effects of environmental factors, socio-economic factors, and weather conditions on the reported number of dengue incidences. These technologies have been widely used in the public health sector for disease surveillance. Remote sensing data is utilised to enumerate environmental factors, such as changes in land use/land cover, Normalised Difference Vegetation Index, land surface temperature, topographic variations, etc. Remote sensing data was also useful in generating the Digital Elevation

Model (DEM), and a Google Earth Satellite Imagery is an ideal base-map on which all other layers can be overlaid. These data were stored together with other ancillary data obtained from relevant agencies in the GIS database for further analysis and mapping (Chopda, 2012). The results are illustrated as Figures 2 and 3.

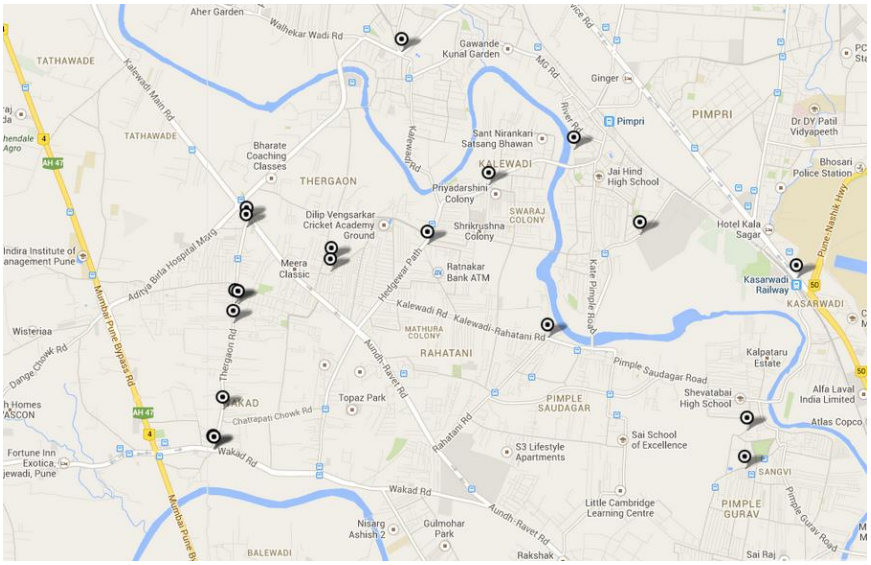

Figure 3: Patient Location with Underlying Attribute Data

Limited physical access to primary health care is a major factor contributing to the poor health of populations in developing countries, particularly in mountain areas with rugged topography, harsh climates and extensive socio-economic barriers. Assessing physical access to primary health care is an important exercise for health care planners and policy makers. The development of GIS technology has greatly improved this assessment process in industrialised countries where digital cartographic data are widely available. In developing countries particularly in mountain areas, however, detailed cartographic data, even in hard copy form, are non-existent, inaccurate or severely lacking.

Public health and health care are important concerns of developing countries, and access to health care is a significant factor that contributes to a healthy population. In response to these issues, the World Health Organization (WHO) has been working on the development of methods

and models for measuring physical accessibility to health care using spatial information integrated on to a Geospatial platform . Geospatial Technology is used to assess physical access to primary health care in blocks or *talukas* of Pune district, Maharashtra, India. The methods involved extensive fieldwork in the region, utilising GPS technology in the development of the GIS and gathering other pertinent health data for the study. Satellite imagery also contributed to the development of the GIS and the modelling process. More importantly, the study highlights

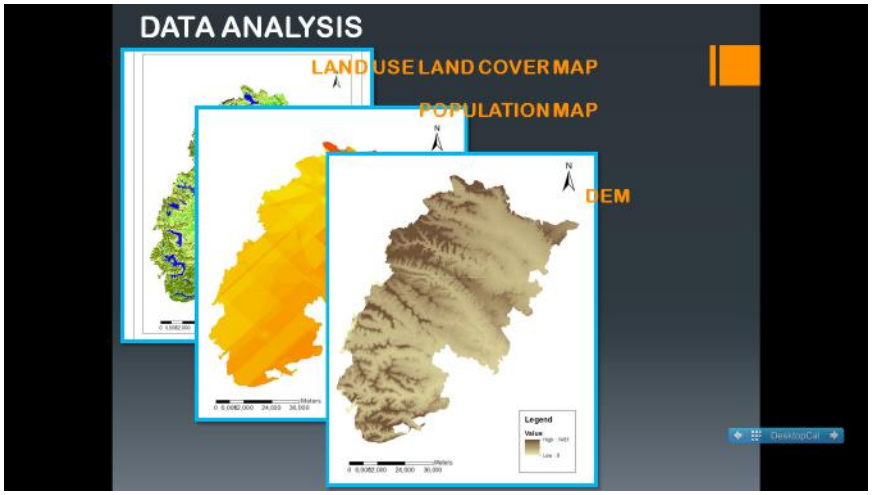

Figure 4: Resource Map of Service Area

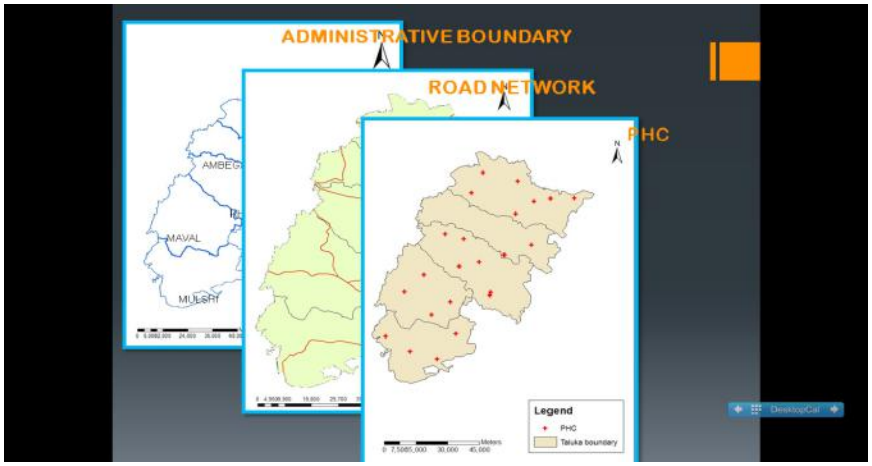

Figure 5: Resource Map with Location of PHCs

the use of GIS technology as a powerful tool in improving physical accessibility of primary health care centres in developing countries. The results of these methods are used for cost effectiveness analysis, population coverage estimates, as well as for resource planning within countries. There are several benefits for better health planning and policy development through the use of geospatial methods for potential improvements in the future (Banerjee and Dasgupta, 2013). The results are illustrated in Figures 4 and 5.

Summary

The examples discussed above provide a mere glimpse of what can be achieved using geospatial technology. These technologies are already prevalent in economically advanced countries such as the USA or Canada. The use of Geospatial Analysis improves the delivery of social services by manifolds. In India, however, this is still a nascent technology. At Symbiosis Institute of Geoinformatics we are creating opportunities for the students to become social enterpreneures through developing applications on geospatial platforms that can be readily applied in the social services sector.

References

Hilier, Amy , 'Why Social Work Needs Mapping', *Journal of Social Work Education*, vol. 43, no. 2, July 2007, pp. 205–21.

Banerjee, Anandini and Sriparna Dasgupta, *Measuring Physical Accessibilty to Primary Health-Care Centres in Pune District, Maharashtra is using Geo-spatial technologies*, Thesis, Symbiosis Institute of Geoinformatics, 2013.

Hazra, Anupam, 'Current Prospects of Social Work in India', Career Guide, *Employment News*, 2008.

Banerjee, Debosree,'Social Sector in India', *ICRIER Think Ink*, 2014.

ESRI, 'Place Matters in the Helping Professions: GIS for Human and Social Services Organisations', ESRI White Papers, 2011.

Whal, Grace Segran, 'Social Entrepreneurship Emerging in India', The International, Social Entrepreneurship Conference, Chennai, 2008.

Clarke, Keith C.,Sara L. McLafferty and Barbara J. 'Perspective On Epidemiology and Geographic Information Systems: A Review and Discussion of Future Directions, *Tempalski, GIS and Public Health*, vol. 2, no. 2, 1999.

Bulmer, Martin, Kevin Bales and Kathryn Kish Sklar, *The Social Survey in Historical Perspective, 1880–1940*, Cambridge Publication, 2011.

Miller, Robert L. and John D. Brewer, *The A-Z of Social Research*, Sage Publication, 2003.

Chopda, Sneha, *Combining Google Earth and GIS Mapping Techniques in a Dengue Surveillance System to Develop Dengue Risk Map for Pune Municipal Corporation,* Thesis, Symbiosis Institute of Geoinformatics, 2013.

Maheswari, T., 'Social Sector Scenario of India after the Economic Reforms', *Socio-economic Voices*, vol. 2, no. 2, April 1996.