EUROPEAN ACADEMIC RESEARCH
Vol. II, Issue 2/ May 2014

Impact Factor: 3.1 (UIF)
DRJI Value: 5.9 (B+)

ISSN 2286-4822
www.euacademic.org

The Role of Geospatial Technology in Bridging the Gap between Physical and Human Geography

PANKAJ ROY
Research Scholar
Dept. of Geography, North-Eastern Hill University
Shillong, Meghalaya
India

Abstract:

The interaction between physical and human geography is obvious as both are two sub disciplines of parent subject Geography. But it has been felt that the gap between the two sub disciplines has been increasing as time passed. It has been tried to seek answer of the question that why the gap between these two sister disciplines has been increasing day by day putting the Tobler's first law of Geography, 'Everything is related to everything else, but near things are more related than distant things' as the base statement in the growth of specialization also. If we follow the first law of Geography, physical and human geography place nearest of each other than the subject of sociology, political science, economics etc. as they bifurcated from the same discipline. But most probably it's the geographers attitudes due to which the gap between physical and human geography has been increasing. The development of Geospatial Technology opens up new vistas to the geographers for the spatial or geographical analysis of the infinitely complex earth. It helps improve the data acquisition, analysis, interpretation and storing irrespective to physical or human geography. This paper will try to analyse the role of Geospatial Technology in dislocating or bridging the gap between physical and human geography as a holistic science for the people and place.

Key words: physical geography, human geography, geospatial technology, gap and role.

1. Introduction:

Geospatial Technology is one of the emerging areas of modern sciences. The faster development of Geospatial Technology has not only expanded the dimension of its own as a subject of study but in its diversified application areas also. The Geospatial Technology is the integration of GIS with global positioning systems (GPS), remote sensing and mobile devices has found applications in locational or spatial analysis and its interactive mapping with large storage and future predicting capabilities. As of early 2006, geospatial technology is listed by the US Department of Labour as one of the three emerging fields, along with nanotechnology and biotechnology.

GIS remains no longer for its developer. It has come to the people working in diversified fields across the globe as powerful and affordable computer software along with the vast knowledge of its use. A Geographic Information System (GIS) is a computer system for capturing, storing, querying, analysing and displaying geospatial data. Geospatial data are geographically referenced data that describe both the locations and the characteristics of spatial features such as water bodies, vegetation, roads and houses on the earth's surface. The ability of a GIS to handle and process geospatial data distinguishes GIS from other information systems. It also establishes GIS as a technology important to such occupations as market research analysts, environmental engineers and urban and regional planners (Chang, 2010). Then why not the geographers! And geographers find it making things happen and getting things done faster than before and in a convenient way and more precisely. Farther they started to develop application models with the help of model builder applying logical reasoning.

2. Where is the Gap between Physical and Human Geography:

The more concentration on physical sciences by the physical geographer making the subject more natural science centric against the inferiority of human geographer as they are lacking the skill of pure sciences. The Human Geography, another branch of geography trying to be more humanistic in nature as it has linked with social sciences. Why the more concentration on physical sciences by the physical geographer and on social sciences, on the other hand by human geographers? Is this tradition bringing the geographers away from the parent subject? Is Human Geography placed itself more distant from Physical Geography than the Economics, Political Science, Sociology, Zoology, and Botany etc.? Alexander Follmann, an PhD candidate in Human and Economic Geography from Institute of Geography, University of Cologne (Germany) sadly expressed his views in an International School of Geography organised by the Geography Department of North Eastern Hill University held at Indian Council for Social Science Research-North Eastern Regional Centre (ICSSR-NERC), Shillong (India) in 2013 that why the Departments of Physical & Human Geography are in different buildings at Cologne University (Germany)? Why the Physical Geographer and Human Geographer even don't meet in the same university rather than work together? Is it due to the Geographers attitudes? Why does scholar of geography (Goudie, 1986) talk

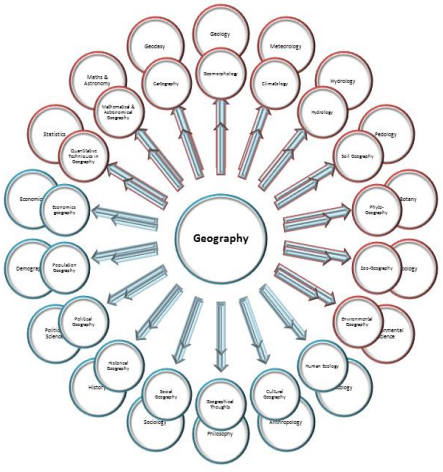

Figure 1: The Holistic Approach of Geography

about integration of physical and human geography if is not there any gap between these two? These are the some questions which need to be addressed in near future.

3. Geography as a Science of Sophistication:

Geography is a holistic and integrative discipline (Fig.-1) that is unique in bridging the contemporary natural and social sciences. Physical and human geography are both at the core of the discipline. Physical geography is a field based science which involves significant laboratory work with sophisticated and specialist laboratory facilities and a high-end technological base that incorporates computer modelling, remote sensing and geographical information system (Geospatial Technology). It underpins our understanding of earth surface environmental processes and change and the impacts of society upon these (and vice versa). Human geography also requires extensive field work, the use of Geographic Information Systems, (Remote Sensing and Global Positioning System also) and the statistical analysis of large data sets such as census (and NSS) records. This means that all geography students are exposed to significant non-classroom teaching (field, lab and computer based) throughout their undergraduate (post graduate and research oriented) courses. Thus, geography teaching at university is not only half science-based (?)(rather fully scientific) but it social science aspects are distinct from many other social science and humanities disciplines , notably in the computer based teaching requirements of GIS (along with RS and GPS) and dataset analysis and field work (Geography in Higher Education).

People have used maps for centuries to represent their environment. Maps are used to show locations, distances, directions and the size of areas. Maps also display geographic relationships, differences, clusters and patterns. Maps are used for navigation, exploration, illustration and communication in

the public and private sectors. Nearly every area of scientific enquiry uses maps in some form or another. Maps, in short, are an indispensable tool for many aspects of professional and academic work (Department of Economic and Social Affairs, 2000). Map making is very fundamental and most essential task for the geographers whether physical or human geographer it doesn't matter. But, thing is that no geographer can prepare a map of fairly large area alone. For that purposes, primarily he/she has to depend on topographical maps published by Survey of India though there are some semi-govt. agencies are also involved in different kinds of map making. Looking at the rapid changes taking place all over the globe, the topographical sheets are not enough to provide finer details seeking by a researcher as these sheets take fifteen to twenty years for up gradation. The satellite images acquired by remote sensing technology provide coarser to finer detail in a synoptic view for a larger area with more repetitively.

Finally, it is this technology that can be used by the physical and human geographer both for the understanding of infinite complexity of the mother earth.

4. New Technologies Bring New Opportunities for Geographers:

In a presidential address at the Centennial Meeting of the Association of Annals of American Geographers (AAG) held at Philadelphia in 2004, the past president of AAG and the Provost of Kansas State University M.D. Nellis rightly stated: "In my role as a university administrator and as a geographer, I have not seen before such widespread opportunity and potential for geography to create a central place for itself in society, within the university…than it has today". In many ways, emerging technologies in geography and related developments in our discipline have given us new and exciting opportunities that we must seize and continue to advance (Nellis, 2005, pp. 1-

10). Richardson and Solis mention in their paper in The Professional Geographer (2004), GIScience and more specifically computer based geospatial information systems, global positioning systems and remote sensing can help geographers to catalyse research, scholarship and teaching within geography and to enhance geography's standing within the university, without diminishing our traditional methods or threatening the diversity and richness of our discipline. But we cannot sit back and wait while other disciplines in areas such as biology, sociology, landscape ecology, engineering and business try to position themselves to seize these geography technologies and approaches as somehow their own.

5. The Need of Third Eye in Geographical Analysis:

The core questions of geography what, where, why, when and how are remained no more merely what, where, why, when and how. It involves another important part i. e. social welfare because in the present world situation everything is viewed from the beneficiary to community people. It is very important to address the community people in the time of emergencies such as cyclone, flood, tsunami, earthquake, volcano etc. but, doing the estimation going through horizontally in a traditional method is more time consuming, risky and difficult for the data gatherers and sometime it is impossible to physically go there. On the other hand it is not a convenient way to collect data looking the vertical dissect of the catastrophes moving horizontally to measure the dimension and extents of these catastrophic events over a large area. The impact of phenomenon like the global warming, climate change, see level rise etc. are so vast that it can't be assessed moving horizontally. And hence, there is a need of "third eye" which can see the horizontal extent of such type of events from top for a synoptic view or greater coverage. The satellites placed at different height are observing the entire globe and its

happenings and hazards for every moment restlessly. So, these satellites are playing the role of third eye not only for the catastrophes but for the all kind of activities on earth surface. It can provide much better facility to gather data and information for all kind of geographical analysis.

Another advance in remote sensing has been the leap in scientific development and technology transfer of usable sensor systems producing reliable, cost-effective data. The newest developments have occurred in high spatial resolution satellite data in the visible and near infrared spectrum, radar and hyper spectral and laser illumination sensors (LIDAR). The new data forms create the opportunity to ask new spatial questions and develop new models for understanding our complex world. Geographers with the perspective of linking the remote sensing not only to the physical and human geography but other social sciences also, have been able to "socialising the pixel" and "pixeling the society".

In recent times, the remote sensing data or satellite images or geospatial data has come to market in large quantities due to their multifaceted use and commercialisation. These commercial data, some with less than one-metre spatial resolution, create new opportunities for understanding some social dimensions of urban areas, detail analysis of natural hazard impacts or more detail analysis of agricultural areas. Rural-urban migration is an important social and ecological process that remote sensing can help to understand by considering the pattern-process relationships of people and the environment at source and destination locations (Nellis, 2005).

6. Cyber Geography:

Geography had been remained as traditional subject until for the mid of the 20th century. Most geographical analysis and map making were done either by hand or simple computers. Making maps and their up gradation is a very complex and

time consuming task which needed skilled hands. After the development of computer technology, geographers started map making with the help of this technology as it provided easy manipulation and up gradation facilities along with better storing capability. But, the earliest mapping applications implemented on computers in 1960s did not find wide application beyond a few government and academic projects due to its graphical output capabilities. It took until the 1980s for commercial geographic information systems to reach a level of capability that would lead to their rapid adoption… (Department of Economic and Social Affairs, 2000).

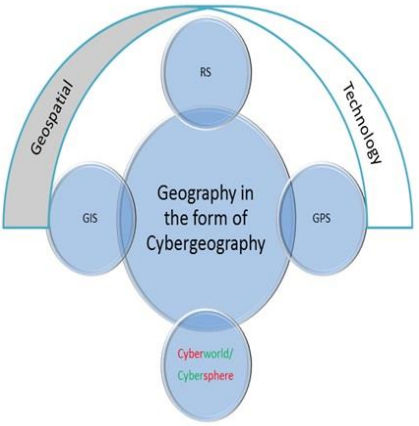

Figure 2: The new look of Holistic Approach of Geography (The Umbrella Concept of Cybergeography)

The development of Geographic Information System has led a new dimension to field of geography. GIS has benefitted from developments in various fields of computing. Better database software allows the management of vast amounts of information that is referred to digital maps. Computer graphics technique provides the data models for storage, retrieval and display of geographic objects. Advanced visualisation techniques allowed to create increasingly sophisticated representations of our environment. GIS data display functions go far beyond static two-dimensional displays and provide animation and three-dimensional modelling capabilities. Just as the input of textual information is facilitated by optical character recognition, fast, high-resolution scanning and sophisticated software speed up map data conversion that previously relied exclusively on manual digitisation or tracing... The most important recent developments have been in navigation and remote sensing. The

Global Positioning System (GPS) has revolutionised the field data collection in area ranging from surveying to environmental monitoring and transportation management. A new generation of commercial, high resolution satellites promise images/pictures of any part of the earth's surface with enough detail to support numerous mapping applications... Similar advances are occurring in the areas of geographic data dissemination.

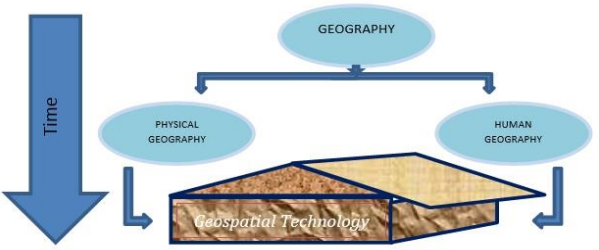

Figure 3: The integration of Physical and Human Geography

All major GIS vendors now provide the tools to make geographical databases accessible via the Internet on the world web wide. Government agencies at all levels are embracing this technology to provide access to vast amount of spatial information to the public cheaply and quickly (Department of Economic and Social Affairs, 2000). The World Wide Web has become an extremely efficient channel for transferring data across the Internet because of its visual capabilities and the relatively advanced hypermedia and on-line geographical information tools currently being developed. Subsequently, there has been a growth in web-based GIS portals and services. One of the growing paradigms associated with online access to geographical information is public participatory GIS (W Cartwright, 2004). The Internet is likely to replace the printed maps and digital media as the most important means of data distribution. Internet mapping programs are one indication that the tools to utilise digital spatial information are constantly becoming cheaper and easier to use. Digital mapping is also becoming more closely integrated in standard computer applications such as spreadsheet, graphics and business

management software (Department of Economic and Social Affairs, 2000). As a whole the outlook of Geography as a discipline is going to look like and umbrella where GIS, RS and GPS, and Geospatial technology as an integration of these all playing the role of the roof and the cybersphere or internet facility as the stick are at hand of common men (Fig-2).

7. Opportunities/Challenges Ahead:

All though it has a multidisciplinary utility yet, above all it's a geographical tool. Geographers are fortunate to having received such a tool like GIS and, RS and GPS as input to it from the modern technological development. When the geographers are fighting among themselves as human and physical geographer the advantages of this technology is taking by almost all discipline somehow else. So it's the right time to come forward by physical and human geographer, and geographer as a whole to best use the technology before being used in geographic analysis by non-geographers. It will be a welcome step by the geographers to enrich the subject for their own as well as for the society through meaningful research works. Otherwise non-geographers will overcome geography and the geographers will have to lose many.

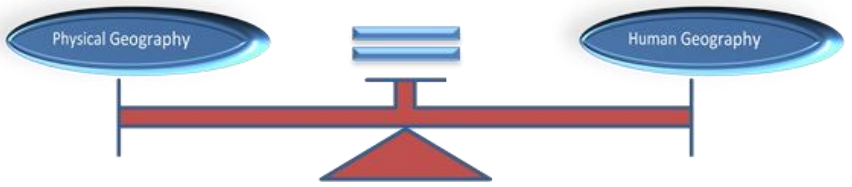

Figure 2: Balancing the Physical and Human Geography

Table 1: Challenges/Opportunities for geographers to best utilising the Geospatial Technology [modified from (Gregory, 2004)]

Value of Geographers	Danger	Challenges/Opportunities
To physical geographer	Danger of loss to environmental sciences or earth system analysis	Emphasise holistic approach to the physical environment.
To human geographer	Separation so that other social science discipline 'step in'	Develop ways in which physical and human geography interact.
In education	Danger of reduced role and competition from other subjects	Emphasise relevance of physical geography and the contributions made. Demonstrate singularity of contributions by physical geographers in multidisciplinary teams.
In and by other discipline	Danger of perception as eclectic discipline	Communicate ways in which physical geography research provides strategic or applied results.
To managers and decision makers	Danger that other disciplines investigate problems that are physical geography in nature	Use every opportunity to explain a contemporary physical geography approach.
To the general public	Physical geography not understood	Physical geography is an integral part of geography but because of its role in multidisciplinary teams can be a significant element in other environmental sciences structures.
Overall	Physical & human geography is perceived as independent of other discipline	

REFERENCES:

Cartwright, S. M. 2004. "Geographical Visualisation: Past, present and future development." *Journal of Spatial Science,* 49(1).

Chang, K.-t. 2010. *Introduction to Geographic Information Systems* (4th ed.). New York: Tata McGraw-Hill.

Department of Economic and Social Affairs, S. D. 2000.

Handbook on Geographic Information Systems and Digital Mapping. New York: United Nations.

Geography in Higher Education. (n.d.). *Royal Geographical Society with IBG*.

Goudie, A. S. 1986. "The integration of human and physical geography." *Transaction of Institute of British Geographers* 11.

Gregory, K. J. 2004. "Valuing Physical Geography." *Geography* 89(1).

Nellis, M. D. 2005. "Presidential Address: Geospatial Information Technology, Rural Resource Development and Future Geographies." *Annals of the Association of American Geographers* 95(1).