



**APPLICATION OF GOOGLE EARTH IMAGE INFORMATION FOR
IDENTIFY PHYSICAL AND CULTURAL FEATURES OF
NORTHEASTERN BOUNDARY OF BANGLADESH ALIGNED WITH
MEGHALAYA, EASTERN ASSAM AND TRIPURA**

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Abstract:

A frontier has a significant role of national boundary and security which is discussable matter for any country. Bangladesh and India share international border which is the fifth-longest land border in the world. In the Indian part, Assam, Tripura, Mizoram, Meghalaya, and West Bengal on the other hand Dhaka, Khulna, Rajshahi, Rangpur, Sylhet and Chattagram (Chittagong) are the Divisions of Bangladeshi. The purpose of this research is to identify the physical and cultural features along the border area. Google Earth images are used to identify and quantify different features of the study area with help of Geographical Information System (GIS). GIS techniques are also used to calculate the area of different features. Using Google Earth and GIS technique, research Physical features are tropical rain forest, river, pond, hilly areas, char land, waterfall etc., cultural features are settlement, road, homestead vegetation, agricultural land, fallow land, hat bazar, check post, land port, tourist spots etc. in the north eastern boundary which are located in the border area of India and Bangladesh along the Meghalaya frontier play significant role on local and national economy. For that this research play a vital role for developing physical and cultural environmental baseline information doing sustainable development activities in national development by economic development through tourism income, promoting concerned central place for business and creation of a wide range of jobs.

Keywords: Physical Features; Cultural features; Boundary; Google Earth; GIS.

Cite This Article: Md. Rejaun Nabi, Mohammad Ismail Hossain, and Dr. Md. Shahedur Rashid. (2018). "APPLICATION OF GOOGLE EARTH IMAGE INFORMATION FOR IDENTIFY PHYSICAL AND CULTURAL FEATURES OF NORTHEASTERN BOUNDARY OF BANGLADESH ALIGNED WITH MEGHALAYA, EASTERN ASSAM AND TRIPURA." *International Journal of Engineering Technologies and Management Research*, 5(7), 112-120. DOI: 10.5281/zenodo.1342777.

1. Introduction









A frontier has a significant role of national boundary and security which is discussable matter for any country. In Asian region, the border of Bangladesh first came into being when the Bengal Presidency was created by the British. In 1947, United Kingdom was divided among Muslim and non-Muslim majority areas where the provinces of Panjab, Bengal and Sylhet district of Assam were also bifurcated and the border came into being (Chaudhari 1995 and Bakht et al 2002). Muslims were the majority in the western part of India and the eastern part of Bengal province. These two areas formed the new Islamic republic of Pakistan and another India. The eastern part, East Pakistan, became the People's Republic of Bangladesh in the Bangladesh Liberation War of 1971. Bangladesh and India share a 4,096-kilometer (2,545-mile)-long international border, the fifth-longest land border in the world, including 262 km in Assam, 856 km in Tripura, 180 km in Mizoram, 443 km in Meghalaya, and 2,217 km in West Bengal (Adams and Brad 2011 and Islam 2011). The Bangladeshi Divisions of Dhaka, Khulna, Rajshahi, Rangpur, Sylhet and Chattagram (Chittagong) are situated along the border. A number of pillars mark the border between the two states. Small demarcated portions of the border are fenced on both sides. According to the Land Boundary Agreement (LBA) has been ratified by both India and Bangladesh, which was passed on 7th May, 2015. Due to geographical position and trade between two borders shared countries occur through the border. Moreover, the boundary of Bangladesh, including with Meghalaya, Eastern Assam and Tripura is highly unstable, unprotected and suffers from different phenomenon because of international and local law (Bhattacharjee 2013). Recently Bangladesh faces huge number of women and children trafficking through a border area (India and Myanmar) due to trade and illegal business. In a view of Geographical features (such as hill, waterfalls, valleys, landforms and vegetation etc) and tourist spots (e.g. watch tower, land port, etc) are located in the border area of Bangladesh along the Meghalaya frontier play significant role on local and national economy. Generally, most of maps include some basic physical or cultural features as a central part of topographic maps which a cartographers (people who construct maps) use a wide variety of techniques to represent well-known features, such as capital cities, major mountain ranges, landforms, transportation and others (Haining 1990, Bednarz et al. 2004 and Gersmehl 2005). To show the different heights, shapes and slope of the landscape, physical maps use a scientific form of shading (Jacquez et al 2008). Keeping the above views, this research attempted to measure the present physical and cultural condition and assess the environmental impacts and economic condition of northeastern boundary of Bangladesh aligned with Meghalaya, Eastern Assam and Tripura. For that developing physical and cultural environmental baseline information will help for doing sustainable development activities. Present research tries to introduce application of use of Google Earth Satellite Images information for identifying physical and cultural features in international borderline.

2. Materials and Methods

This research used a mixed approach of quantitative and qualitative data and methods. Most of the data collected from the field survey, field observation, photograph taking, feature identification, GPS reading and expert discussion. The secondary data were collected through the literature review on study area of different bureaus, statistical, and also through collection of relevant other published and unpublished reports and publications. The secondary data were also collected from Centre for Environmental and Geographic Information (CEGIS) and Bangladesh Space Research and Remote Sensing Organization (BSPARRSO), Ministry of Commerce (MoC) and Bangladesh

Foreign Trade Institute (BFTI) reports and others related reports. Relevant internet sources were also used for collecting secondary data. Maps and images have been collected from Survey of Bangladesh (SoB) and BSPARRSO, Google Earth Search Engine and CEGIS respectively. After collecting data from these sources, Google Earth software was used to downloading images of the study area. Geographic information system (GIS) software like ArcGIS 10.2.1 and ArcView 3.3 were used for digitizing maps and identify different (physical and cultural) features and, digitized images used for calculation for quantifying general features in the study area. Lastly, qualitative modes of analysis have mainly been concerned with textual analyses.

Table 1: Features Identification Elements with Features Name from Study area

Features	Image	Size	Shape	Tone	Texture	Shadow	Pattern	Association
River		Large	Liner	Light Black	Coarse	Deep dark	Irregular	Settlement, Agricultural land
Char Land		Small	Rectangular	Light Gray	Fine	Light	Regular	River
Water body(pond)		Small	Rectangular	Deep Black	Fine	Dark	Regular	Settlement
Homestead Vegetation		Small	Circular	Deep Green	Coarse	Dark	Irregular	Settlement
Fallow Land		Small	Rectangular	Light Gray	Fine	Light	Regular	River
Road		Large	Liner	Light Gray	Coarse	Light	Regular	Settlement, Agricultural land
Settlement		Large	Liner	Light	Coarse	Light Gray	Cluster	Road, River
Agricultural land		Small	Rectangular	Pink	Coarse	Light Gray	Random	Fallow land, Road

3. The Study Area

The study area is surrounded by Meghalaya Tura, Bagmara nongstoin, Jowl, Shillong on the North, Dhaka and Sylhet division on the South, Tripura and Assam (Bongawon, Dhuburi, Silchar, Karimganj) on the East and Rangpur division on the West. Total length of study area is 979.52 km and width is 11 km (in Bangladesh 10 km & Meghalaya, some part of Assam & Tripura 1 km.). The total area of my study area is 5,948.345 square kilometers.

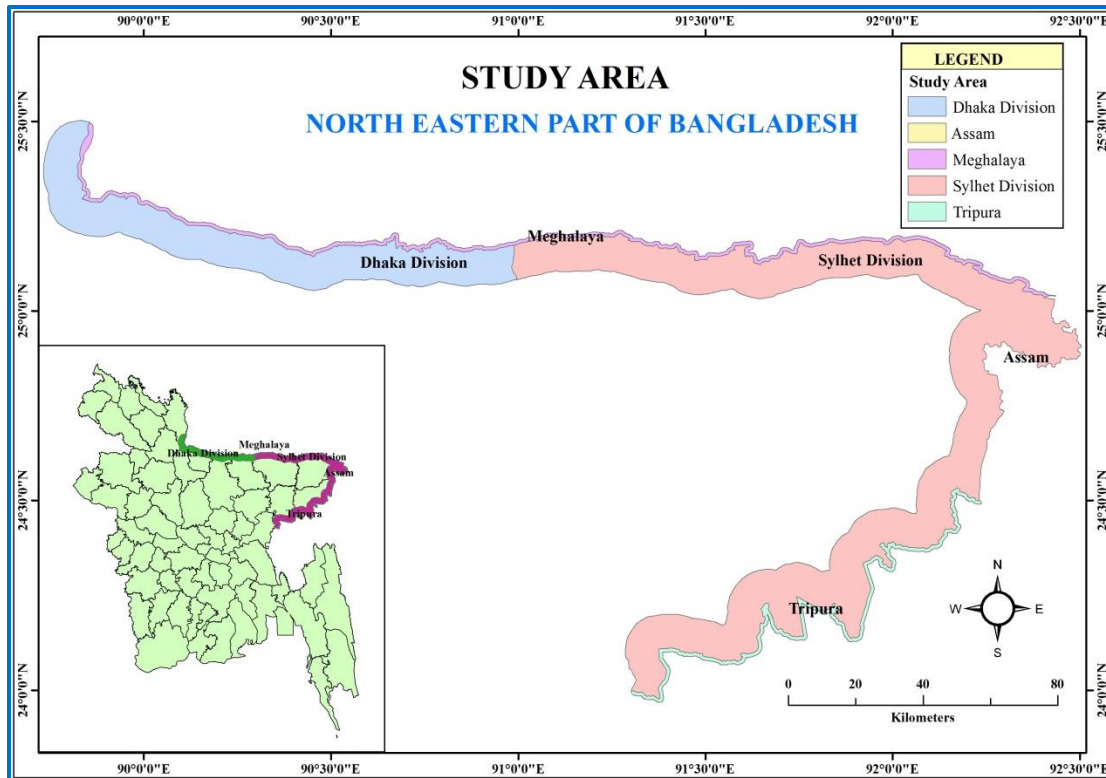


Figure 1: Study Area (North Eastern Part of Bangladesh)

4. Results and Discussions

Physical and Cultural maps are similar to topographic maps, since they also show the terrain and topography of the Earth's surface. Physical maps, however, display this information in a different way to topographic maps. It shows the different heights, shapes and slope of the landscape, physical maps use a scientific form of shading. Shaded relief relies on the use of sunlight and shadow effect, which makes the map appear almost three dimensional. Surface features can be difficult to identify, as they are often represented by different techniques depending on the type of map. Aqueous (relating to water) features are simpler to identify, since they are often depicted according to certain conventions which apply to most maps. Whether in political, physical, or topographic maps, aqueous landforms such as lakes and rivers are commonly coloured blue.

The analytical results percentage of physical and cultural features of the study area are shown in table-2 and figure -2, 3 and 4 respectively, The sample -01, the dominant physical features which are covered 217.374ha forest and river 7.998ha. On the other hand cultural features like agriculture land 120.636ha and pond 1.171ha. In another sample-02 represented total river 17.817ha, 8.875ha and 5.695ha of river, char land and water body of total physical features and 15.526ha, 88.074ha, 6.784ha like agricultural land, homestead vegetation and fallow land respectively. Sample-03 showed that forest area 1840.433ha and water body 0.985ha physical features and 82.733ha, 60.289ha and 3.167ha covered cultural features agricultural land, homestead vegetation, fallow land respectively.

Table 2: Physical and Cultural Features Cover Area of Sample- 01, 02 and 03

Features	Features types	Sample -01 (Fakirkona, South Garo Hills and Haluaghat)		Sample-02 (Zakiganj and Shambhu Sagar)		Sample-03 (Kamalganj)	
		Total Area in (ha)	Percentage	Total Area in (ha)	Percentage	Total Area in (ha)	Percentage
Physical	Forest	217.374	63%	0	0%	1840.433	93%
	River	7.998	2%	17.817	12%	0	0%
	Char land	0	0%	8.875	6%	0	0%
	Water body	0	0%	5.695	4%	0.985	0%
Cultural	Agricultural land	120.636	35%	15.526	11%	82.733	4%
	Homestead vegetation	0	0%	88.074	62%	60.289	3%
	Fallow land	0	0%	6.784	5%	3.167	0%
	Pond	1.171	0%	0	0%	0	0%
	Study Area	347.179	100%	142.771	100%	1987.607	100%

In the three samples of study are located in Fakirkona to the East, Bandarkata, Haluaghat to the side of East- South, Dakiapara to the South, and Rangrapara to the West. Forest cover plays a vital role for protection biodiversity and ecosystem in the area. It supplies wood, food, occupation of local people of this area. From the table, forest Covered 63% hectares. River is the easy communication systems for any country. But in the study area was 7.997 hectares which is only 2% comparably low. On the other site, agricultural land area is 118.133 hectares which is comparably high. But here, forest cover area is higher than all other features and pond area is lower than all other features.

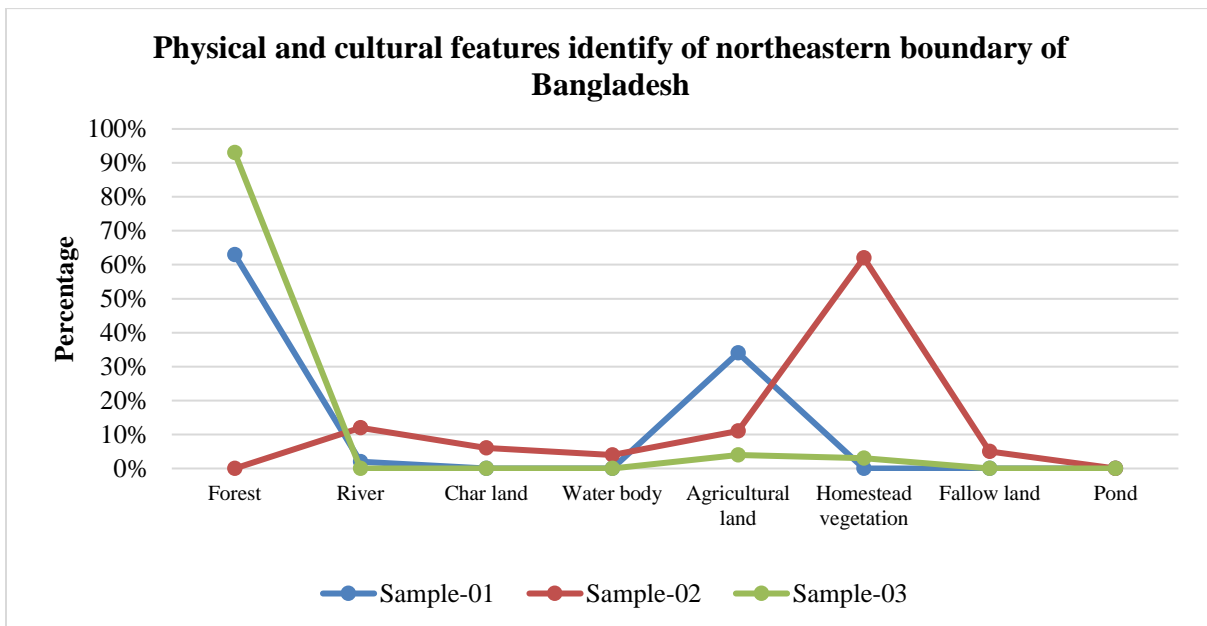
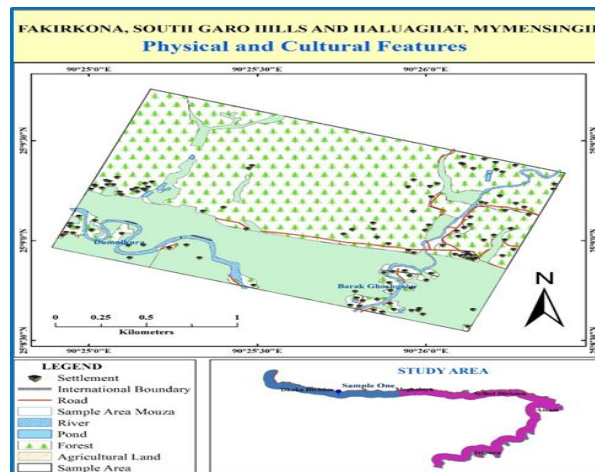


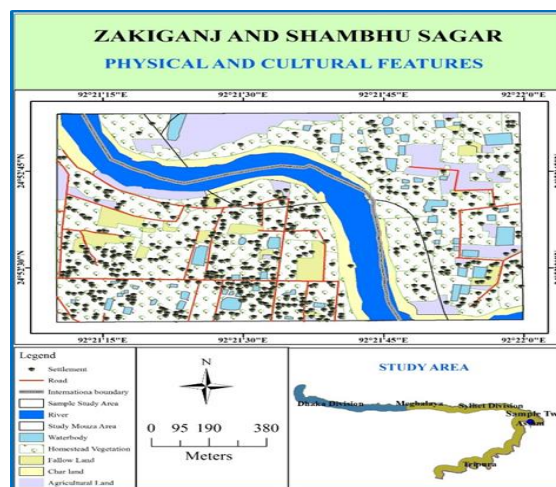
Figure 3: Physical and Cultural Features Cover of Sample Areas

Sample two area is located Shambhu Sagar, Karimganj in Assam. In study area, it is found Zakiganj upazila in Moulvibazar district. Total features cover area of study area was 142.771 hectares. In the area, Homestead vegetation cover is 62% hectares, river area is 12% hectares, Water body (pond) area was only 4% hectares, fallow land area 5% hectares, char land 6% hectares and agricultural land was 11% hectares. But here, homestead vegetation cover area was higher than all other features and water body (pond) area was lower than all other features.

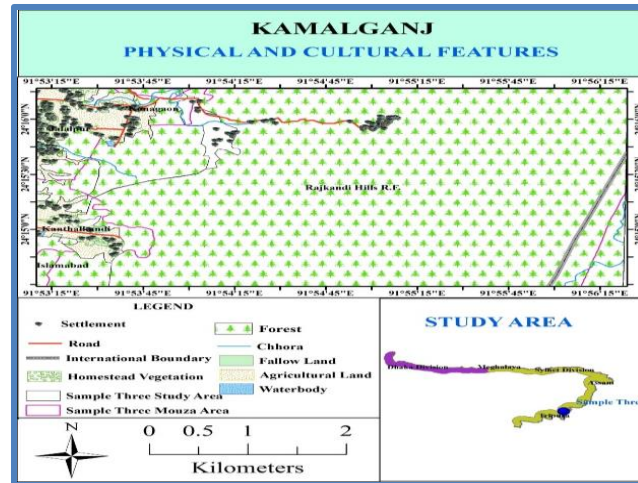
Sample three area is located Golakpur in Tripuratotal area was 1987.607 ha. Most of three areas was hilly forest area. Forest cover area was 93% hectares, Agricultural land area is only 4% hectares, homestead vegetation area was 4% hectares, fallow land was 3.167 hectares, and water body was 0.985 hectare. Vegetation is assemblages of plant species and the ground cover which reference to particular taxa, life forms, structure, spatial extent, or any other specific botanical or geographic characteristics. A forest is a large area of land covered with trees or other woody vegetation. Hundreds of more precise definitions of forest are used throughout the world, incorporating factors such as tree density, tree height, land use, legal standing and ecological function.



Sample 1: Digitize Map of Physical and Cultural Feature Types of Fakirkona, South Garo Hills and Haluaghat



Sample 2: Digitize Map of Physical and Cultural Feature Types of Zakiganj and Shambhu Sagar



Sample 3: Digitize Map of Physical and Cultural Feature Types of Kamalganj

5. Conclusions and Recommendations

Physical and cultural features play a vital role to the economy of the country. In this research work, there are different types physical and cultural features are found here, such as river, pond, agricultural land, settlement, hilly area etc. This area used as tourism spots, land port, border haat which keep great role for national and local economy of the country. It is also an important skill to be able to recognize physical and cultural features on a map. However, since these features are represented differently depending on the type of map.

Acknowledgements

The Authors wish to express sincere thanks to the Head of the Department of Geography and Environment, Jahangirnagar University, savar Dhaka-1342 for providing all necessary institutional support also Bangladesh Space Research and Remote Sensing Organization for providing geophysical data.

Appendices

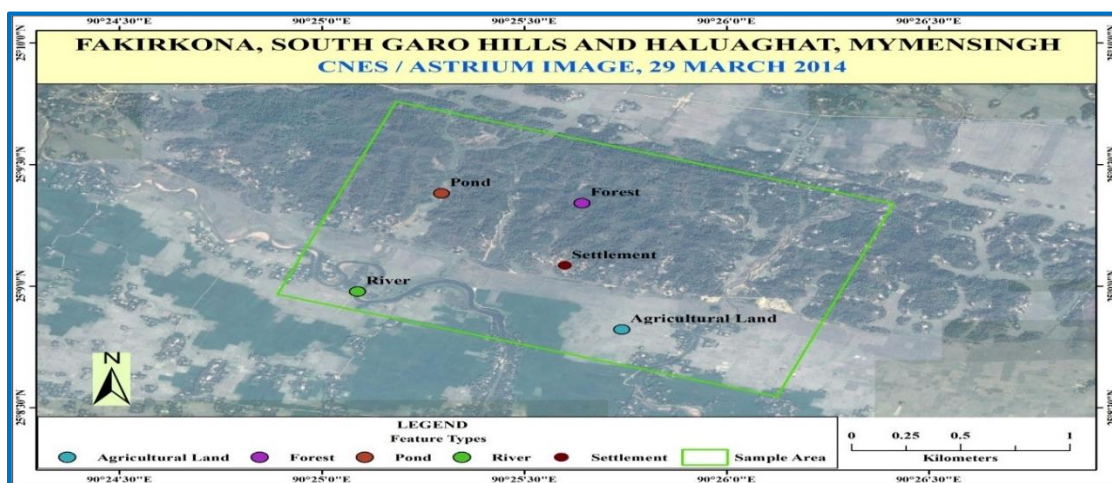


Figure: Sample 1: Google Earth Image of Fakirkona, South Garo Hills and Haluaghat

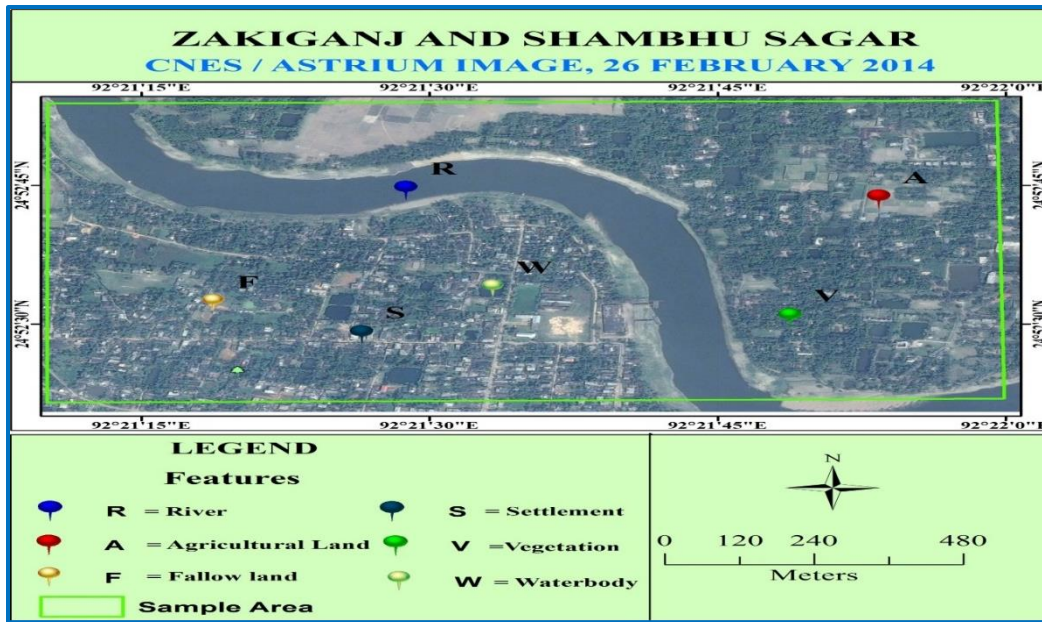


Figure: Sample 2: Earth Image of Zakiganj and Shambhu Sagar

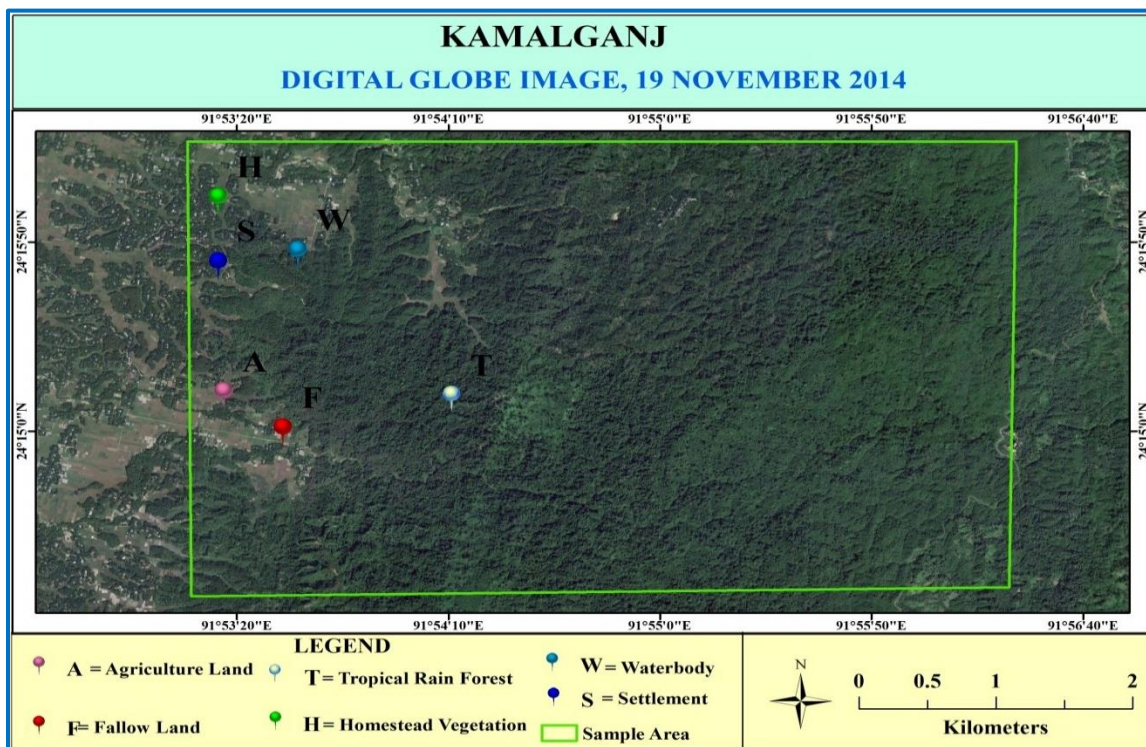


Figure: Sample 3: Google Earth Image of Kamalganj

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