

Tourism information system of South West Khasi Hills District, Meghalaya, India

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Abstract. Rich in its natural beauty, culture and tradition is South West Khasi hills, a district in Meghalaya which is having a great potential. An initiative was made to identify and collect valuable information of the various tourist spots situated in Mawkyrwat and Ranikor Community Rural Development Blocks of South West Khasi Hills Districts, Meghalaya. Using GIS platform and web based applications namely- Geoserver and Map Server for Windows (open source) Tourism Information System of South West Khasi Hills District was prepared. In this paper, demonstration was made on the identification of new tourist spots in South West Khasi Hills District including connectivity by different types of roads along with route and direction from source to destination analysed and fly-through were created over these networks. Web based applications were developed to reach out the different user groups, that is, service provider and end –users providing them with visual description of the location, photographs of the sites, proper route channels to reach the destination with shortest distance navigation offline and online. The web application is user friendly for future collaboration with numerous possible department information updates. The nature of work is unique and one of its kind done for the area as these tourist spots were recently identified. The outputs from the study will be useful for identifying potential services to develop tourism in the area.

Keywords. Tourism information system, web based application, fly-through and shortest distance navigation

1. Introduction

With the increase of time and advances in transportation and information technology, tourism has become a fast growing segment in the sphere of development. Tourism information is predominantly based on geographically related information. Tourism and leisure industries are currently searching for ways how to explore the potential of technologies for presenting



geographical data [1]. The concept however, covers an efficient data management for the service providers and the art of visualization techniques for offline, online and mobile applications. This type of information cover the 2D as well as the 3D representation of geo related tourism information and also interfaces to third party –users platforms. The strength of tourism planning can be enhanced by Geographical Information System (GIS) applications- a platform of techniques and technologies for various tourism development planning. The tourism information system based on GIS is to focus on the information of travel sites like presentation of electronic maps, on-line tourism site details (climate, accessibility, pictorial presentation, etc). This will provide intuitive information user friendly timely queries to the tourism information which may fulfill the queries tourists need [2].

An overview of the tourism information system revealed that the approach does not start from data collection methods but from the user's requirements: geo-spatial information product can provide information useful and valuable to the user [3]. In the terms of tourism information system, GIS can be a tool that can be used for identifying tourist spots, to determine the best site for a new tourist spot of an area, route and direction analysis, fly-through from source to destination, etc. Tourism information can be geographically related information. GIS has the potential to explore the means and ways of representing geographical data and thus stands the existence of tourism information system.

The tourism industry can be seen as one of the first areas to do business electronically [4]. Tourism information systems based on GIS platform can further be enriched by presenting in a Web-based platform, so making it more accessible to the users. This will be a value added service. The Austrian tourism information system called TIScover, meets this challenge by focusing on three crucial points. First, high-quality access is provided, by the WorldWideWeb, info and phones. Second, the content is of a high quality that is achieved by enabling tourism information providers directly. Third, the weather information is gathered via file transfer protocol in the form of a structured file [5].

Meghalaya is blessed with natural beauty like-caves, waterfalls, river sand-bars (river beach), magnificent garden and forest areas (sacred groves, community forest). Rich in its natural beauty, culture and tradition is South West Khasi hills, a district in Meghalaya which is having a great potential for ecotourism. The unexplored tourist spots of this district have marvelous charm to amaze tourists. Basin Development Unit of South West Khasi Hills District and Soil and Water Conservation Department have taken an initiative to identify and collect valuable information of the various tourist spots situated in Mawkyrwat and Ranikor Community Rural Development Blocks of South West Khasi Hills District, Meghalaya. Using GIS and web based applications, North Eastern Space Application Center (NESAC) has prepared a Tourism Information System of South West Khasi Hills District. In the present study, demonstration is made on the application of GIS for generation of Tourist Information system for South West Khasi Hills District, Meghalaya, India. The nature of work is unique and one of its kind done for the area as these tourist spots were recently identified.

It may be noted here that no spatial database on the GIS platform was available for the tourist spots of South West Khasi Hills District. The study was taken up with the objectives to map existing and new tourist spots using Global Positioning System (GPS), to identify directions from the source to

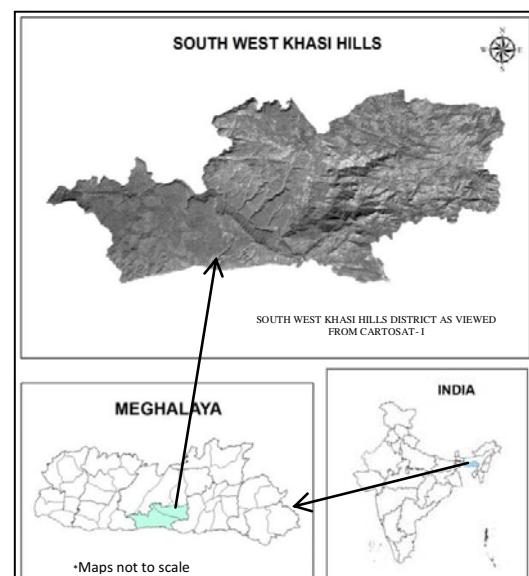


Figure 1. Location of South West Khasi Hills District

destination of each tourist spots, to prepare shortest path from source to destination for each tourist spots, to create a flythrough of the tourist spots and to build a tourist information system using web applications.

2. Materials and Methods

2.1. Study Site

South West Khasi Hills district was carved out of the West Khasi Hills district on 3 August 2012. Mawkyrwat is the district headquarters. The district occupies an area of 1,341 km² with a total population of 110,152 with the density of 82/km² (Figure 1). It is located in the southern flank of the Meghalaya plateau bordered in the south by the Bangladesh plain. The district is connected to other Districts of Meghalaya by roads. The district is abundantly blessed with rich in its natural beauty, culture and tradition. There are various unexplored tourist spots in this district have the potential for eco-tourism development. Total numbers of tourist spots surveyed in the district are presented in Table 1.

2.2. Methodology

Data were collected from various sources in order to understand the study area and its valuable information required in building a tourism information system. CARTOSAT-I (Panchromatic), CartoDEM and RESOURCESAT-II LISS IV (Multispectral) data from 2011-2016 have been used. Ancillary Data namely SIS-DP Data for Road networks, Socio-economic vulnerability assessment for South West Khasi Hills district project for location of villages and road names and Tourist spots from Meghalaya Basin Development Unit of South West Khasi Hills District and locations from O/o Soil and Water Conservation for the ground truth information were collected. The overall methodology is presented in (Figure 2).

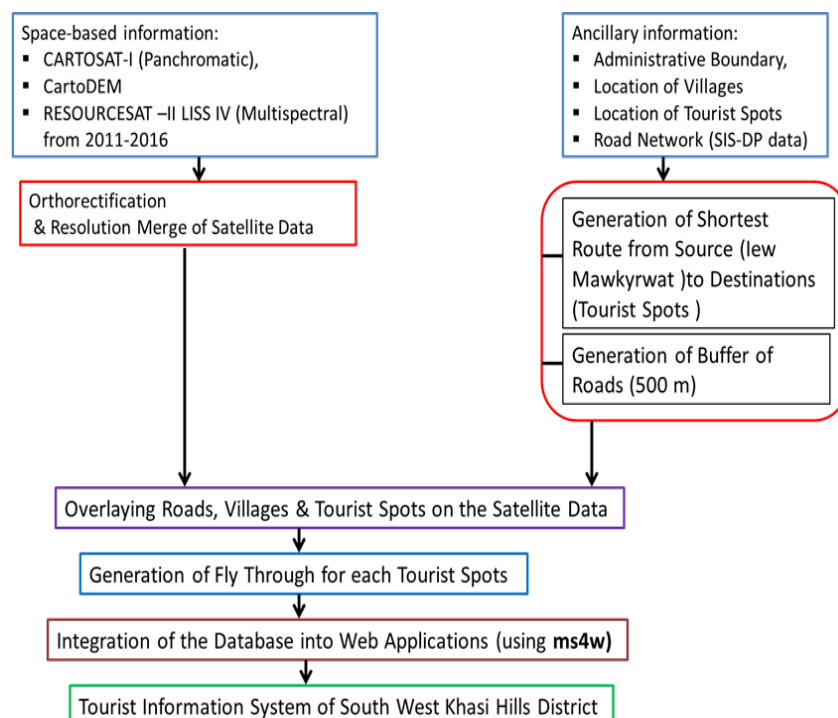


Figure 2. Methodology adopted for generation of Tourist Information System of South West Khasi Hills District

Table 1. Tourist spots in South West Khasi Hills District, Meghalaya

Sl. No.	Longitude	Latitude	Tourist Spots
1	91.43 °E	25.36 °N	Stone Garden Tynrong,Mawlangwir
2	91.41 °E	25.38 °N	Mawranglang viewpoint,Mawranglang
3	91.45 °E	25.34 °N	Porangkchu,Nonglang
4	91.48 °E	25.35 °N	Langwarai, Mawten
5	91.47 °E	25.35 °N	Synrang Mawrin, Mawten
6	91.46 °E	25.35 °N	Synrangbah, Nonglang
7	91.45 °E	25.31 °N	Tynnai viewpoint, Tynnai
8	91.46 °E	25.37 °N	Iew Mawkyrwat, Mawkyrwat
9	91.38 °E	25.31 °N	Dompynnon, Photjaud Rangthong
10	91.38 °E	25.31 °N	Tynrong pynnon, Photjaud Rangthong
11	91.39 °E	25.31 °N	Mawpait, Photjuad Rangthong
12	91.39 °E	25.32 °N	Mawkhyllaw,Photjuad Rangthong
13	91.39 °E	25.32 °N	Middle of Mawkhyllaw,Mawpait &Tynrong pynnon, Photjaud Rangthong
14	91.34 °E	25.33 °N	Mawiong, Kensimphlang
15	91.29 °E	25.29 °N	Ngunraw Dancing Fish,Tirom, Ngunraw
16	91.31 °E	25.26 °N	Pitcher plant Sanctuary,Nongkdait(Nongnah)
17	91.22 °E	25.24 °N	Borba Sing Syiem (Jadugata)Bridge, Ranikor
18	91.24 °E	25.22 °N	Ranikor River Beach, Pamdaba
19	91.55 °E	25.40 °N	Shillong-Mawkyrwat Umngi Bridge
20	91.54 °E	25.41 °N	Hot Spring, Umjarain(Jakrem)
21	91.43 °E	25.40 °N	Fish Santuary,Rohbah
22	91.50 °E	25.42 °N	View Point(Rilang),Nongbrei nongdom
23	91.47 °E	25.42 °N	Nongsynrih Peak, Nongsynrieh
24	91.52 °E	25.32 °N	Tourist spot (Cave) Phlangjaud Rangmaw
25	91.49 °E	25.36 °N	Tourist spot (Synrang) Synrangsnagi, Rangmaw
26	91.51 °E	25.34 °N	Tourist spot (Synrang)Mawpohlieh, Rangmaw
27	91.54 °E	25.43 °N	View Point,Pynden Diwah
28	91.34 °E	25.40 °N	ViewPoint (Jyrhap)Rangblang Nongbah
29	91.36 °E	25.41 °N	View Point(Jyrhap) Mawlwai, Rangblang Sohsynyang
30	91.38 °E	25.40 °N	Lake,Nongtylla Khon, Diwian Mawiong
31	91.37 °E	25.41 °N	View Point(Jyrhap)Dombah Sumsier
32*	0	0.00	Umpung Umngi Bridge
33*	0	0.00	Kyllailynsngun Peak,Myriem
34*	0	0.00	Kubah, Lake Inside a hill & Kuboit Peak, Pyndenumjarain
35*	0	0.00	Iawpaw Peak, Nongnah
36*	0	0.00	Ur-nar Falls, 1. Mawrap, 2.Mawtngam
37*	0	0.00	Mawtangden-Nongnam Trekking Route

*NB. The GPS of the tourist spots not collected in the field but have been identified on satellite images

The methodology followed in the study involved the use of geospatial based inputs (Road network data from Spaced based Information System for Decentralized Planning (SIS-DP) project (based

on Cartosat –I data), collection of baseline data from the field using GPS system for the tourist spots and village locations. Satellite data ortho-rectification was done. Road data was updated and shortest path analysis was performed for each tourist spots from the source to destination. Road buffer analysis (500m), generation of fly- through and transferring the data into web application were carried out.

Shortest routes from a common source running toward different destinations of tourist spots within South West Khasi Hills District was generated giving the information on the route and direction. Fly Through for the tourist spots is an animation generated for an aerial view of the topography from source to the destination. Web application was created so that the Information system can be easily run on a PC's internet browser and which makes it possible to store the information in package system and so can be ported easily. Software used for the above technique are mentioned namely Arc GIS 10.2 for database generation and network analysis, uDig for styling and modification of the shapefiles, Geoserver (1.8.0) as an open source software server, Map Server for Windows (MS4W) for creating a package to create and distribute Map Server Application, Arc Globe for generating fly-through, Erdas 2015 for Orthorectification and Resolution Merge and QGIS 1.8 for map server export.

3. Results and Discussions

Information system of tourism transforms the whole idea to a more transparent informative user friendly technology. This project is an initial stage of exploring the unidentified tourist spots to its transformation into a more advanced new generation technology which can be easily access by anyone -anywhere with only a click of a button. Outputs of the project include the following:

- Base Map of South West Khasi Hills having the village locations, roads and administrative boundaries (Figure 3).

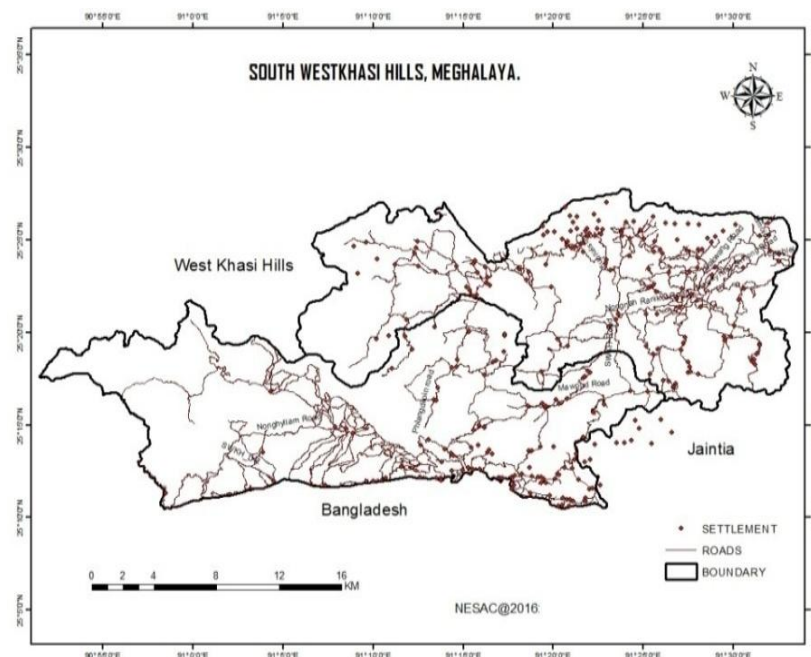


Figure 3. Villages, Roads and Administrative Boundaries of South West Khasi Hills District

- Tourist Spots and Shortest Routes from Source (Iew Mawkyrwat) to Destinations, i.e., tourist spots (Figure 4a & 4b).
- Fly Through for each tourist spots from Source (Iew Mawkyrwat) to Destinations (Figure 5a & 5b).

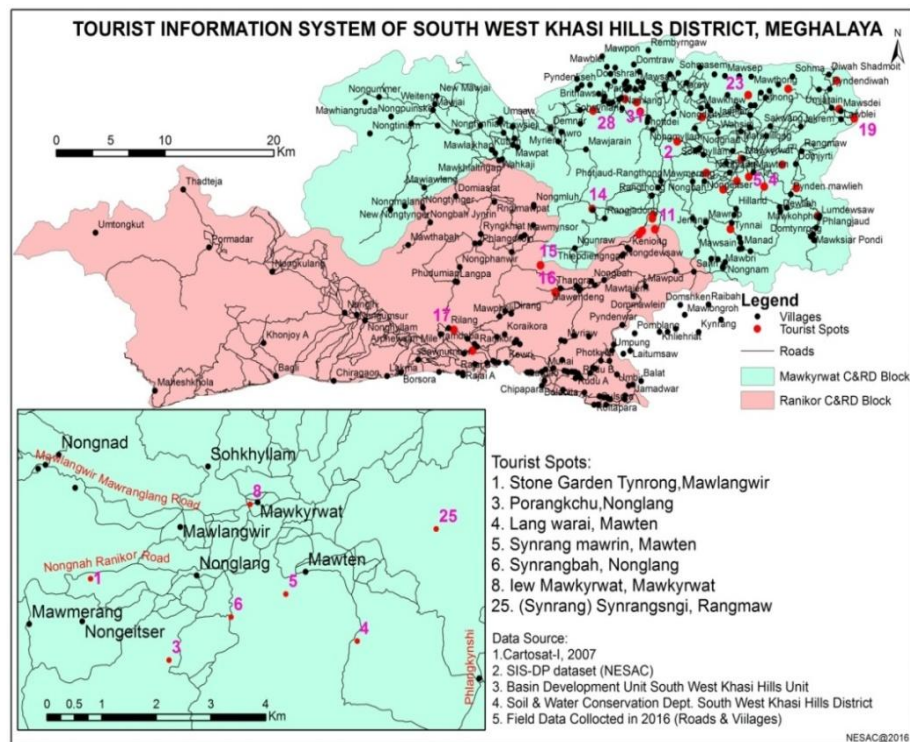


Figure 4 a. Tourist spots and Villages of South West Khasi Hills District

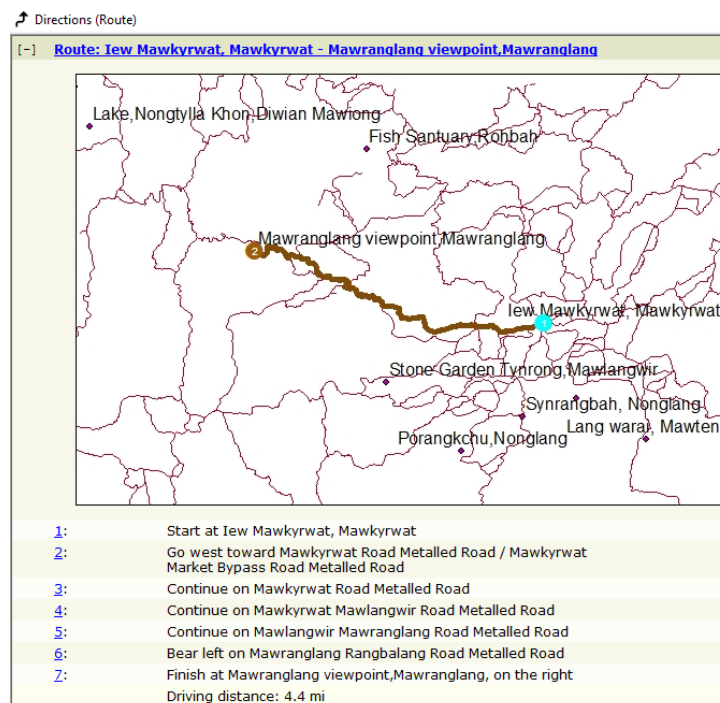


Figure 4 b. Shortest Route from Mawkyrwat to Mawranglang View point of South West Khasi Hills District

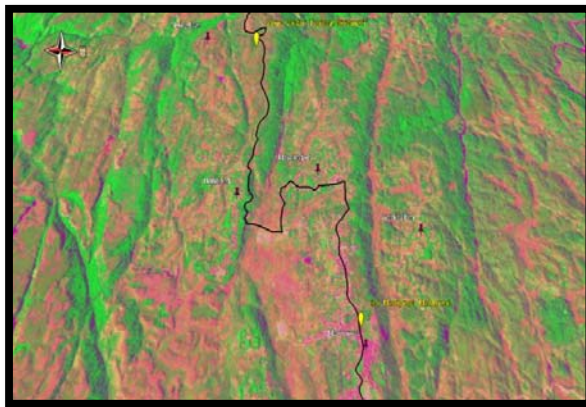


Figure 5 a. Fly Through from Iew Mawkyrwat to Ranikor

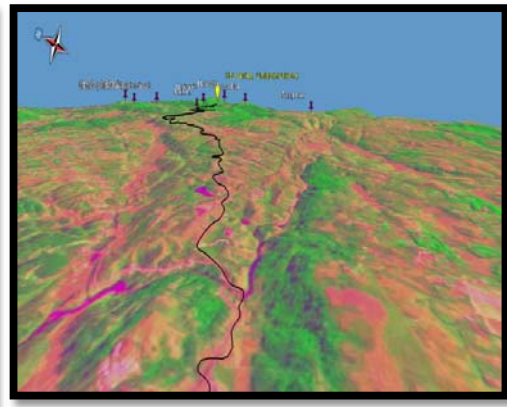


Figure 5 b. Fly Through from Iew Mawkyrwat to Hot Spring at Jakrem

- Web Applications- Using open source web applications - MS4W (Figure 6) and GeoServer (Figure 7)

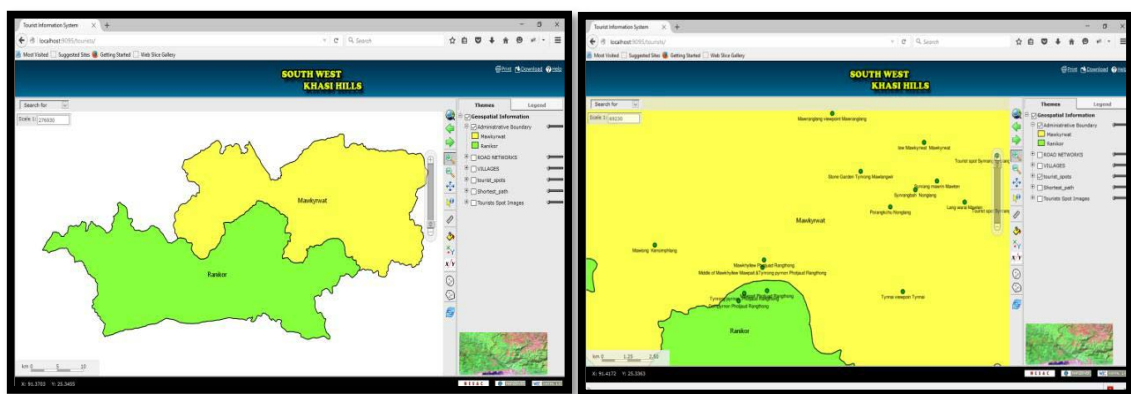


Figure 6. Web Page Look using MS4W

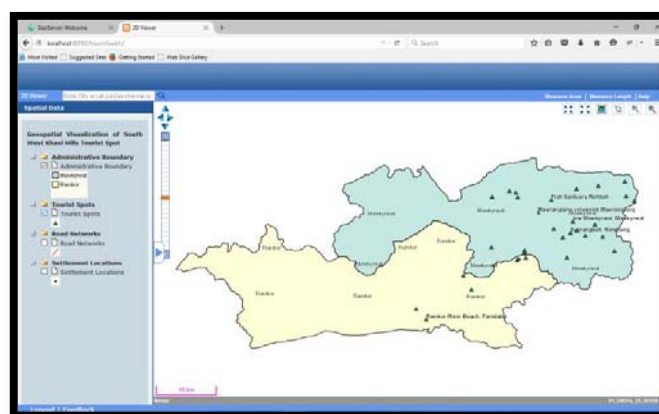


Figure 7. Web Page Look using GeoServer

- Glimpses of the Tourist Spots with descriptions (Plate 1 &2).



RANIKOR RIVER

Ranikor is a small town on the border of India and Bangladesh of India. Ranikor River originates from the Rilang. Also known as angler's paradise, this river offers one of the best wild fishing spots in the state of Meghalaya. In the past, this place was famous amongst the local anglers for fish species like- Golden masheer, Chocolate masheer, Goonch (Catfish), eels etc. Fishing area on the river Kynshi at Ranikor is approximately 15 to 16 km. This river also offers great birding experience. One can find birds like Brahmini kites (a rare species), kingfishers, lapwings and sunbirds gliding in for a catch.

Plate 1. A Glimpse of Ranikor River with description



KREM KUBAH

Krem Kubah formerly known as "Krem ki Puri" is a deep and large cave located in the middle of Kubah Peak of Pyndeng umjarain and Mawnore Village, which is approximately 65-70 km away from Mawkyrwat. This cave is currently filled with water. It measures approximately 2000 sq.ft in width, 18ft in depth and 20ft in height. This cave is home to approximately a 1000 bats, which makes it distinct from other caves. Myth reveals that two fairies who were the daughter-in-laws of Thaw niangram (Lyngdoh or Basa) used to visit this cave during the night primarily to bathe in the water.

Plate 2. A Glimpse of Krem Kubah with description

4. Conclusions

In building the Tourism Information System (TIS) of South West Khasi Hills, it can be concluded that for the first time, tourist spots of South West Khasi Hills District are identified and

represented in GIS and Web Base platforms using both space based and ancillary information. Through various new technology such as web applications and fly through model, the information system will be useful to tourists for getting the first hand knowledge about these tourist spots before planning their tours. In near future when these tourist spots are well established, web application can be updated to create additional information and values. For future, e-commerce transaction support, mobile access, and other applications can be developed to the support of e-commerce facilities would allow tourists plan to assemble a whole holiday package.

Acknowledgments

The authors of this paper were grateful to the Director of North Eastern Space Application Centre, Meghalaya Basin Development Unit, South West Khasi Hills District, Office of Soil and Water Conservation Department, South West Khasi Hills District, Meghalaya.

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