



Mif Technique Integrated Site Suitability Geospatial Analysis For Potential Tourism In Kalimpong, India

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Abstract: The following study focuses on the identification of potential adventure tourism sites using Geographical Information System (GIS) and Weighted Multi-criteria Analysis (WMCA) techniques in the district of Kalimpong, West Bengal, India. Five thematic parameters have been incorporated in this study, namely: slope, terrain ruggedness index, vegetation, elevation, and aspect. The Analytical Hierarchy Process (AHP) was used to determine the weights of various multi-influencing factors (MIF) for the identification of different potential areas for the development of adventure tourism within the district. The study concluded by showing that about 87.56% of the district's total area has high to the very high potentiality of developing sites for adventure tourism. Finally, a total of 15 adventure tourism potential sites have been marked within the very high potential zone, which covers about 34.20% of the total land area. The study provides a feasible yet efficient mechanism to develop tourism and allied services.

Index Terms - Tourism, GIS, FAHP, MIF, WMCA, Kalimpong

Introduction

The adventurous nature of human beings was always present. It was because of this nature, several philosophers and explorers like Ibn Battuta and Christopher Columbus set out to travel across the Earth to discover new land and to learn about other cultures. In recent years with improvements in technologies and more sharing of beautiful photos of nature through social media, people have rediscovered their desire for adventure, and among the younger generation, this kind of tourism is growing rapidly. Thus, according to Ismoiljonov (2015) adventure tourism can rightfully be defined as a type of tourism that “involves exploration or travel to remote, exotic, and hostile areas”; it can be further be categorized into two basic types, Hard Adventure and Soft Adventure. Hard adventure includes activities like rock climbing, mountaineering, trekking, river rafting, paragliding, skydiving, etc. On the other hand, soft adventures include activities like hiking, camping, bird watching, etc.

Geographical Information System (GIS) has great applications in the development of Tourism industry. Fung and Marafa (2002) used Ikonos satellite images involving both spectral and textural data to show its application in this sector. Kanga et al. (2011), adopted geospatial techniques to develop suitability gradients for tourism. For West Bengal, Indian researchers like Datta (2017), Debnath and Saha (2019) and Mahata (2021) have used GIS to show how much potential, different regions of the state like Garhbeta, Dooars and Jangal Mahal respectively holds for the development of tourism sector.

Within GIS a very important analysis, the MCDA (Multi Criteria Decision Analysis) or as in this study the WMCA (Weighted Multi-Criteria Analysis), plays a major role in conducting these assessment (Manumpil et al., 2023). MCDA is concerned with making decisions when multiple criteria (or objectives) are to be considered concurrently in order to rank or select between alternatives. The MCDA involves the following 4 major components: (i) Alternatives that are to be ranked or selected from; (ii) The criteria that is to be used to evaluate and compare the alternatives; (iii) Weights representing the relative importance of the criteria.; (iv) Decision-makers and possibly other stakeholders whose interests must be represented (Juliet 2020). Thus, when

dealing with multiple data sets within a single study, the MCDA methods and techniques come in handy to find and organize the best of all chronologically based on their relevance and importance (Islam et al., 2022; Roy et al., 2023).

There are several methods for collecting data like, interview, questionnaires, focus group discussions, field observation, rainfall, and temperature data obtained from Shuttle Radar Topography Mission (SRTM) have been used extensively (Doke, 2017). Methods like Decision Support System (DSS), Remote sensing techniques, land surveys, investigations and spot observations are widely used for data collection (Yildirim, 2018; Zerihun & Ayele, 2020; Salunke et al., 2021). These data collected datasets are then integrated using the Geographic Information System (GIS) software and the Analytic Network Process (ANP) (Aminu et al., 2017), which gives the results that can be very beneficial in providing analytical tools for the spatial planning of a particular region for the development of tourism industry. GIS-based multi-criteria (MCA) analysis for wildlife habitat suitability integrating various uncertainty levels in Analytical Hierarchy Process (AHP) also produced promising results (Sinha et al., 2011; Sinha, 2020). GIS-MCA-AHP technique can be used in modeling and mapping of real-world scenes (Sharma et al., 2012).

In this paper, we specifically focus on one of the most beautiful districts of West Bengal, India i.e., Kalimpong. Thus, in this paper, using GIS, AHP method, and Weighted Multi-Criteria Analysis (WMCA) techniques, and by using several validation points, new potential spots, and areas for adventure tourism within Kalimpong have been suggested. The study proposes to find out the potentiality to develop more areas and spots for Adventure Tourism over the district of Kalimpong, in addition to the already established points of Adventure Tourism. Hence, the objectives of the study are to analyze the Kalimpong District for suitability for adventure tourism and to suggest areas where adventure tourism can be developed in Kalimpong. Since the demand for adventure tourism is on the rise and the district of Kalimpong has a lot of potentials to support this kind of tourism. This paper explores its possibilities and suggests more suitable areas where this kind of tourism can be developed, using GIS and WMCA techniques and also using already established spots as

I. STUDY AREA

The district of Kalimpong is located in the northern part of the state of West Bengal, India. It initially fell under the district of Darjeeling but was separated on 14th February 2017 to form a completely new district of Kalimpong and has been divided into three administrative blocks namely Kalimpong I, Kalimpong II, and Gorubathan. The district lies between $26^{\circ} 51' \text{ N}$ - $27^{\circ} 12' \text{ N}$ Latitude and $88^{\circ} 24' \text{ E}$ - $88^{\circ} 53' \text{ E}$ Longitude (Kalimpong District Administration, 2021), covering an area of about 1111 km² (Fig. 1). Its elevation ranges between 86 m – 3124 m with an average elevation of about 1605 m above mean sea level. As a result, the district experiences a mild and temperate climate, the temperature ranges between 27°C - 16°C during summer while in winter it varies between 17°C and 5°C , and the area receives about 2200 mm of annual rainfall (Kalimpong District Administration, 2021). Kalimpong, like the rest of India, has five distinct seasons. Spring runs between March to April, summer from May to June, monsoon begins in mid of June and continues till September, autumn is from October to November and finally, the winter stretches between December and February. The prime time to visit this district is during spring and autumn (Kalimpong District Administration, 2021). Kalimpong has a lot of beauty to offer. This northern district of West Bengal is covered with lush green mountains, densely forested areas like the Neora Valley National Park and has some of the most beautiful tourist destinations like Kalimpong City, Sillery Gaon, Pedong, Jhalong, Bindu, Lava, Lolegaon, Rishop where one can just admire the natural beauty of the surrounding. The district is decorated with several beautiful waterfalls and mesmerizing views of Mt. Kanchenjunga. The district of Kalimpong also has a lot of potentials to sustain several categories of adventure tourism like trekking, hiking camping, paragliding, and river rafting and thus won't disappoint its adventurous tourists. Recently various other offbeat tourist destination spots have evolved that not only satisfy the tourists but also bring economic strengths to the inhabitants (Fig 1, a, b and c).

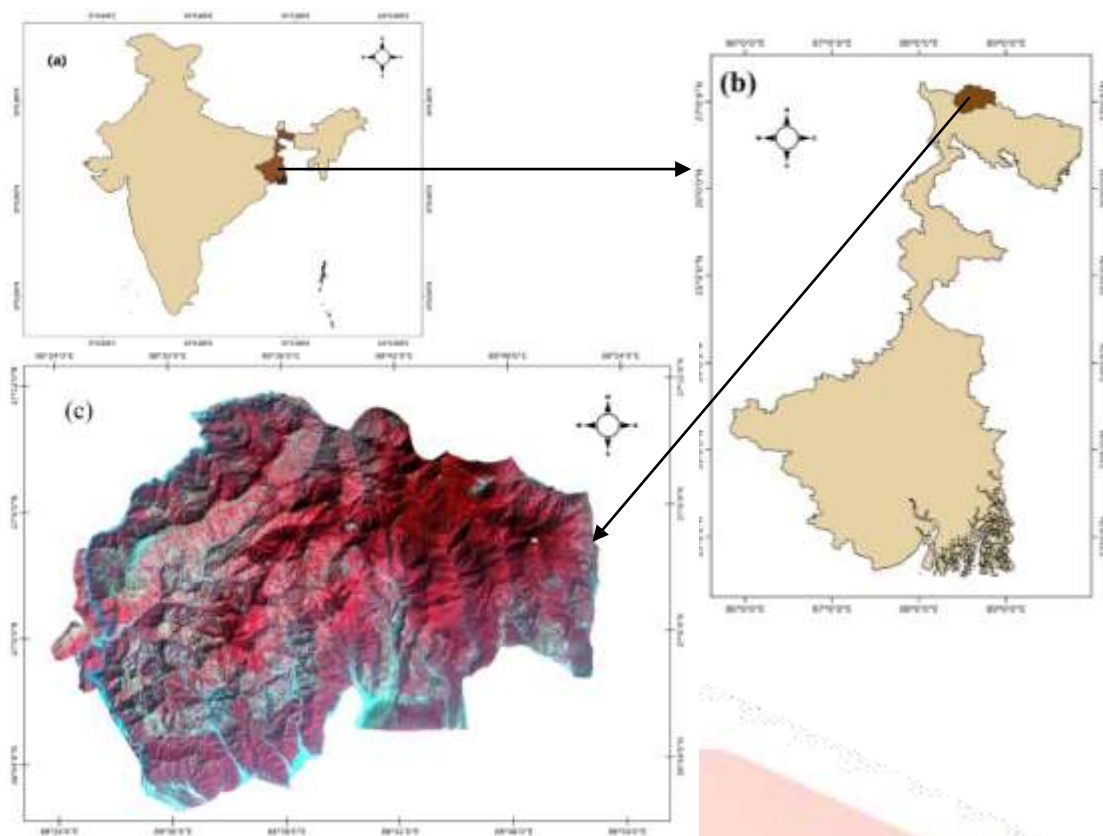


Fig. 1 (a) Location of West Bengal in India, (b) Location of Kalimpong in West Bengal, (c) Landsat 8 (Standard FCC) image of Kalimpong district.

II. DATA AND METHODS

3.1 Materials

For completing the research objectives and answering the research question there was a requirement for spatial data and maps for justification, which have been prepared using the QGIS software (Version 3.16.8). The analysis of several topographical factors of the Kalimpong district such as Slope, Terrain Ruggedness Index, Elevation, and general Aspect of the district, was carried out using the Cartosat-1 Digital Elevation Model (CartoDEM All versions) having 30 m spatial resolution from Bhuvan, Indian Geo-platform of ISRO. The information related to vegetation cover has been calculated and analyzed through the normalized differential vegetation index (NDVI) using Landsat 8 satellite imagery having 30 m spatial resolution from USGS the Earth Explorer.

3.2 Methods

The process of selection of areas or prediction for the potential and suitable sites for Adventure tourism in Kalimpong consists of three steps: (1) generation of geospatial data layers, (2) generation of weights via Analytic Hierarchy Process (AHP) and (3) Weighted Multi-Criteria Analysis (WMCA) for suitable site selection. For the assessment of the Adventure tourism potential of the district, five basic and most important parameters are considered, namely, Slope, Terrain Ruggedness Index, Vegetation, Elevation, and Aspect. These parameters are converted to thematic layers in GIS to be implemented in the model. The elements selected for the adventure tourism potentiality in the Kalimpong district are quite similar to that of eco-tourism. This is mainly because both are a specialized segment of the tourism industry and are quite similar to each other in terms of basic requirements for their development since both of them are nature-based tourism but at the same time, they are quite different from one another in terms of their objectives and goals. (Fig 2)

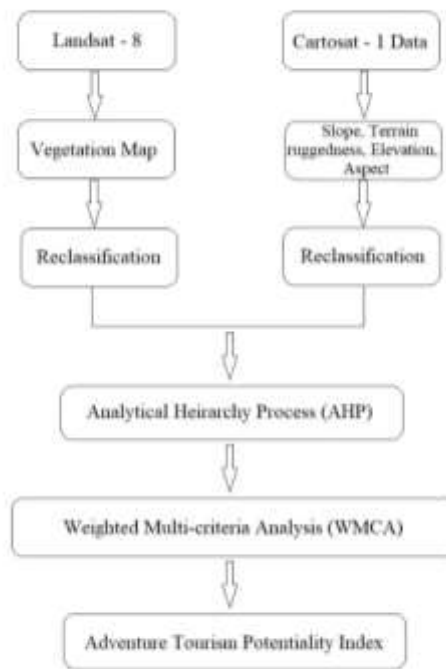


Fig. 2 Methodology adopted for showing potential Adventure tourism spots in Kalimpong district

3.2.1 Population and Sample

Slope:

To generate any form of tourism within a mountainous region, the slope of land plays a very important role (Islam et al., 2022). For the construction of any form of tourism, like adventure tourism or eco-tourism, the sites require a lower gradient of slope (Sahani, 2019). Moreover, for a district like Kalimpong which mostly lies in the Middle Himalayas, the number of landslides and soil erosion is much higher mainly because of the huge amount of rainfall the area receives as well as the Himalayas are young fold mountains, which means they are still growing. As a result of which steeper slopes will hinder all forms of tourism activities and might put the life of a tourist in danger. Therefore, the lower the slope greater is the possibility for adventure tourism in Kalimpong. The thematic layer of the slope was generated using Cartosat-1 Digital Elevation Model (CartoDEM All versions) having 30 ms spatial resolution in the QGIS software.

$$\text{Slope (in degrees)} = (\text{Rise (Vertical Distance)}) / (\text{Run (Horizontal Distance)}) \times \tan^{-1} \quad (1)$$

The ranges of the slope (Fig 3a) were reclassified into 4 classes, 0-20, 20-40, 40-60, 60-80 (in degrees) where the range 0–20-degree sites are most suitable and 60–80-degree sites are least.

Terrain Ruggedness Index:

The Terrain Ruggedness Index (TRI) is used to show the topographic characteristics of a particular region. Since the Terrain ruggedness index is widely used for ecotourism potentiality (Sahani, 2019), this can be regarded as another very important thematic layer for demarcating the potentiality of an area for sustaining adventure tourism as well (Raha et al., 2021). TRI is inversely related to the adventure tourism potentiality which means the higher the value of TRI lesser is the possibility of adventure tourism and vice-versa. Cartosat-1 DEM (CartoDEM All versions) was used to generate the thematic layer of the Terrain Ruggedness Index. This was calculated using the Ruggedness Index algorithm in QGIS which calculates the quantitative measurement of terrain heterogeneity described by Riley et al. (1999). This algorithm is calculated for every location, by summarizing the change in elevation within the 3x3 pixel grid. Each one of these pixels has the difference in elevation from a center cell and the 8 cells surrounding it. The resulting layer (Fig. 3b) was further classified into 4 classes; 0-45, 45-90, 90-135, and 135-180 where 0-45 is most suitable and 135-180 is least suitable.

Vegetation Cover:

Since adventure tourism is nature-based tourism, there is a direct relationship between the vegetation of the area and the potentiality of adventure-based tourism (Raha et al., 2021; Islam et al., 2022). Adventurous activities like camping, trekking, and hiking all prefer an area with a good forest cover so that the adventurers can fully experience nature and the beauty she has to offer. Thus, more the vegetation of the area better are the chances for adventurous activities. For generating the vegetation thematic layer Landsat 8 satellite imagery of USGS Earth Explorer was used to calculate the Normalized Differential Vegetation Index (NDVI):

$$NDVI = (NIR - R) / (NIR + R) \quad (2)$$

Where NIR indicates the digital number value of the near-infrared band and R is the digital number value of the red band of the Landsat 8 imagery. The resulting layer (Fig. 3c) has been further classified into 4 classes; <0, 0-0.3, 0.3-0.6, and >0.6 where 0.3-0.6 have been given the most important and <0 the least.

Elevation:

The elevation of a region plays a key role in the development of adventure tourism sites and tourists prefer higher altitudes (Apollo et al., 2020; Islam et al., 2022). Unlike the other factors, the elevation and potentiality of adventure tourism can't be given defined by a proper relation. This is because both very high and very low elevations are not preferred mainly because of the lower levels of oxygen and rougher environment in the higher altitudes, which are not suitable for all. Keeping all sorts of adventurers in mind, the sweet spot and the best suitable areas for the development of adventure tourism activities like trekking, hiking, camping, and paragliding in the Kalimpong district have been decided to be kept between 1000m to 3000m. Moreover activity like river rafting is not possible in very high altitudes and also because the elevation range of Kalimpong varies between 86 m – 3124 m. Thus, the entire region has been categorized into four elevation classes (Fig. 3d); 0m – 1000m, 1000m – 2000m, 2000m – 3000m, and 3000m – 4000m, where the area which falls between 2000m – 3000m is the most suitable one and between 3000m – 4000m is the least.

Aspect:

Aspect is another topographical factor that is important for the development of adventure tourism within the district of Kalimpong (Raha et al., 2021). The thematic layer has been prepared using Cartosat-1 DEM (CartoDEM All versions) and the method used for generating the layer was the Aspect algorithm from QGIS software. The final output layer contained values from 0° - 360° which expresses the slope direction. It starts from North (0°) and continues clockwise. The output raster layer (Fig. 3e) was further classified into 4 directions; 0° - 90° (North), 90° - 180° (East), 180° - 270° (South), and 270° - 360° as West. Among these 4 directions, 270° - 360° (West) has been given the most important. This is mainly because of the view of Mt. Kanchenjunga which resides north-west of Kalimpong and thus is mostly and more clearly visible along the western slopes giving a much more beautiful view of the peak to the adventurers (Fig. 3).

3.2.2 Analytical Hierarchical Process (AHP)

The selected factors for the study create different effects on the potentiality of Adventure Tourism in Kalimpong. Therefore, to avoid such effects it is necessary to determine their weightage co-efficient while conducting a multi-criterion evaluation (Hoang et al., 2018) and, the analytical hierarchy process (AHP) is a widely used technique for determining the weightage coefficient of thematic layers in the multi-criteria analysis (Saaty, 1980). The AHP is also used in decision-making, where a problem is divided into several parameters and then arranged in a hierarchical structure making a judgment on a relatively important pair of elements and then synthesizes the result (Sahani, 2019). For the analysis of the potentiality of adventure tourism in Kalimpong, 5 basic thematic layers required for developing any form of nature-based tourism i.e., slope, terrain ruggedness index, vegetation, elevation, and aspect have been taken into consideration

Table 1: Saaty’s 1-9 scale for pairwise comparison in AHP

Numerical Rating	Scale	Interpretation
1	Equal importance	Both of the criteria are equally important.
3	Moderate importance	One criterion is moderately more important than the other one.
5	Strong importance	One criterion is strongly important than the other one.
7	Very strong importance	One criterion is very strongly important than the other one.
9	Extreme importance	One criterion is extremely important than the other one.
2,4,6,8	Intermediate values between two adjacent judgements	When compromisation is required.

Table 2: Average consistencies of Random Matrices

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R	0.0	0.0	0.5	0.9	1.1	1.2	1.3	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.5
I	0	0	8	0	2	4	2	1	5	9	1	4	6	7	9



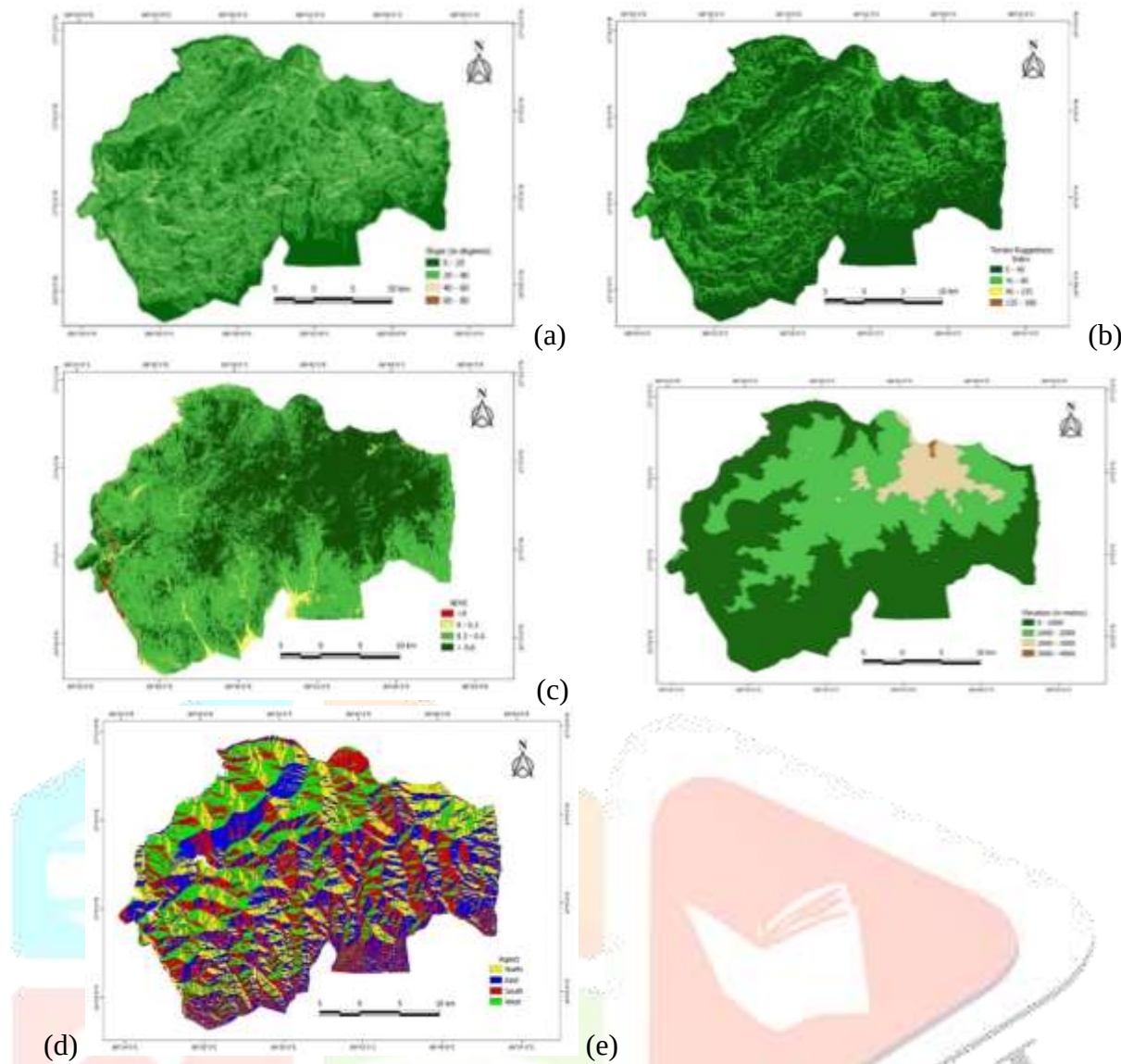


Fig. 3 Geospatial parameters (in form of map layers) a) Slope b) Terrain Ruggedness Index c) Vegetation Density d) Elevation and e) Aspect of Kalimpong District

For assigning the weight to each thematic layer Saaty's 1-9 scale was applied (Saaty, 1980): (Table 1). Using Saaty's scale, a pairwise comparison of 5 thematic layers was carried out and the comparison matrix was prepared for delineating the potential tourism sites. Then the normalized weight of all the 5 thematic layers and the Consistency Ratio (CR) was calculated. All of the mentioned processes were carried out and calculated using an online AHP Calculator (AHP Priority Calculator, 2019). As per the AHP method, to get the final relative weight of each of the thematic layers, the pairwise comparison of all 5 layers was taken as inputs. The final weightings for the 5 thematic layers are called the normalized value of the eigenvectors and these are associated with the maximum eigenvalue of the matrix ratio (Sahani, 2019). The CR is measured using the following expression:

$$CR = CI/RI \quad (3)$$

Where CI = Consistency Ratio and RI = Random Index; CI is calculated using the following expression:

$$CI = ((\lambda_{\max} - n)) / ((n - 1)) \quad (4)$$

Where, λ is the maximum eigenvalue of the matrix and 'n' represents the total no. of the thematic layers. On the other hand, RI has a standardized table for average consistencies (Hoang et al., 2018). (Table 2) The final result of the Consistency Ratio (CR) is 0.04 and the maximum eigenvalue is 5.208. Since the final CR value is 0.04 it is less than 0.1. This implies there is a reasonable level of consistency within the pairwise comparison. Saaty (1980) said that the CR value should always be less than 0.1. Fuzzy numbers consist of four parts of the fuzzy number set denoted as α , β , γ and δ where $0 < \alpha \leq \beta \leq \gamma \leq \delta$. $\beta = \gamma$ in triangular membership function. Geometric mean is used for fuzzifying the AHP (Sharma et al., 2012; Sinha, 2020).

The pairwise comparison in Table 3 and Table 4 show the weights generated by fuzzy-AHP (FAHP) are given below.

Table 3 The pairwise comparison table

	Sl	Tr	Vg	El	As
Slope (Sl)	1	2.00	3.00	5.00	6.00
Terrain Ruggedness (Tr)	0.5	1	3.00	4.00	6.00
Vegetation (Vg)	0.33	0.33	1	3.00	4.00
Elevation (El)	0.20	0.25	0.33	1	3.00
Aspect (As)	0.17	0.17	0.25	0.33	1

Table 4 Weights generated by FAHP method

Category	Rank	Normalized Weight	Influence (%)
Slope	1	0.415	41.5
Terrain Ruggedness	2	0.302	30.2
Vegetation	3	0.157	15.7
Elevation	4	0.082	8.2
Aspect	5	0.044	4.4
		Total = 1	Total = 100

3.2.3 Weighted Multi-Criteria Analysis (WMCA)

This is the final step for the creation of the final output map to show the potential areas for the development of adventure tourism in the district of Kalimpong, West Bengal. Using QGIS 3.16.8. First, all the raster models were reclassified into a measurement suitability class using the reclassify tool (the details of this process can be found under the Generation of Geospatial data). Then using the Weighted Multi-Criteria Analysis (WMCA) technique in the software all the weighted thematic layers were combined to produce the adventure tourism suitability map. The WMCA is a plugin in QGIS which displays a raster model's pixel values and allows its user to assign weights to each raster model and grades for each class within the raster model. The process can statistically be represented using the following expression:

$E_{ij} = \sum w_k S_{ijk}$, Where, E_{ij} is the composite suitability value (in this case the Adventure Tourism Potentiality Index), ij represents each pixel value, w_k is the weight assigned for criteria k and S_{ijk} is the standardized grade value of the pixel (ij) (Mansour et al. 2020). The standardized grade values of pixel (S_{ijk}) range between 1 and 4, where 1 signifies the most suitable zone and 4 signifies the least suitable zone. (Table 5)

Table 6 Areal extent of Adventure Tourism potentiality in Kalimpong District

Factors	Reclassified Classes	Assigned values pixel	Standardized grade value of the pixel (S_{ijk})
Slope (In degrees)	0 – 20	1	1
	20 - 40	2	2
	40 – 60	3	3
	60 - 80	4	4
Terrain Ruggedness	0 – 45	1	1
	45 – 90	2	2
	90 – 135	3	3
	135 – 180	4	4
Vegetation	< 0	1	4
	0 – 0.3	2	3
	0.3 – 0.6	3	1
	>0.6	4	2

Elevation (In meters)	0 – 1000	1	3
	1000 – 2000	2	2
	2000 – 3000	3	1
	3000 - 4000	4	4
Aspect (in degrees)	0 – 90 (North)	1	2
	90 - 180 (East)	2	3
	180 – 270 (South)	3	4
	270 – 360 (West)	4	1

The above table (Table 5) show each thematic layer with its reclassified classes along with its assigned pixel values and the standardized grade value of the pixel (Sijk).

III. RESULT AND DISCUSSION

4.1 Results

The final maps as mentioned earlier have been prepared using the QGIS software, based on the AHP method and WMCA techniques. The final Adventure Tourism Potentiality index (API) values of the map were between 1 and 3.44 where 1 signifies the area's most suitability and 3.44 signifies the areas with the least suitability for the development of adventure tourism. The final map was further classified into 5 suitability classes, Very High (1 – 1.5), High (1.5 – 2), Moderate (2 – 2.5), Low (2.5 – 3), and Very Low (3 – 3.5). The areas covered by the Very High, High, Moderate, Low, and Very low suitability zones are 380 km² (34.20%), 595 km² (53.56%), 120 km² (10.80%), 6 km² (0.54%), and 0.04 km² (0.004%) respectively within the Kalimpong District Map. For an area of about 9.96 km² (0.896%) data could not be generated. (Table 6 and Fig 4)

Table 6 Areal extent of Adventure Tourism potentiality in Kalimpong District

Suitability Classes	Adventure Tourism Potentiality	Area (in km ²)	Area (in %)
1 - 1.5	Very High	380	34.20
1.5 – 2	High	595	53.56
2 – 2.5	Moderate	120	10.80
2.5 – 3	Low	6	0.54
3 – 3.5	Very Low	0.04	0.004
Total		1101.04	99.104

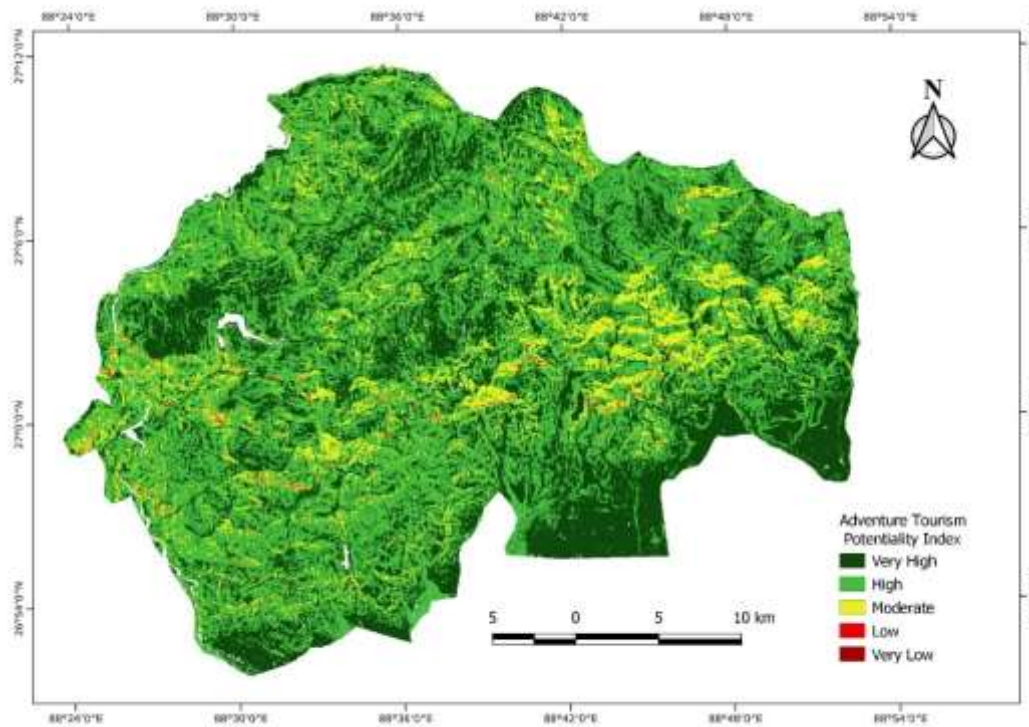


Fig. 4 Adventure Tourism Potentiality Index Map of Kalimpong District

4.2 Validation of result

To check if the output results were corrected or not, several established tourist destinations as well as established adventure tourism sites were used as validation points. The maps showing both tourist destinations and adventure tourism sites are provided below: (Fig 5)

From the above maps, we can see that the established tourist destinations (Fig. 5a) such as Kalimpong, Pedong, Deolo, Sillery Gaon, Icche Gaon, Lava, Lolegaon, Rishop, and others all fall inside the dark green zone which signifies Very High suitability. On the other hand, if we consider the established adventure tourism spots (Fig. 5b), like Deolo Paragliding point, River Rafting Point, Prasan Home for trekking, camping points like Chumang river camp, Samsing Forest camp, West Bengal Forest Department Corporation Ltd. (WBFDC) – Jhalong River Camp and others, all of them fall within the Very High suitability zone (Dark Green) of suitability index for adventure tourism. Thus, it can be considered that the result output map showing the potential areas for the development of adventure tourism within the district of Kalimpong is correct and as is further used to mark more potential spots for the development of adventure tourism in Kalimpong.

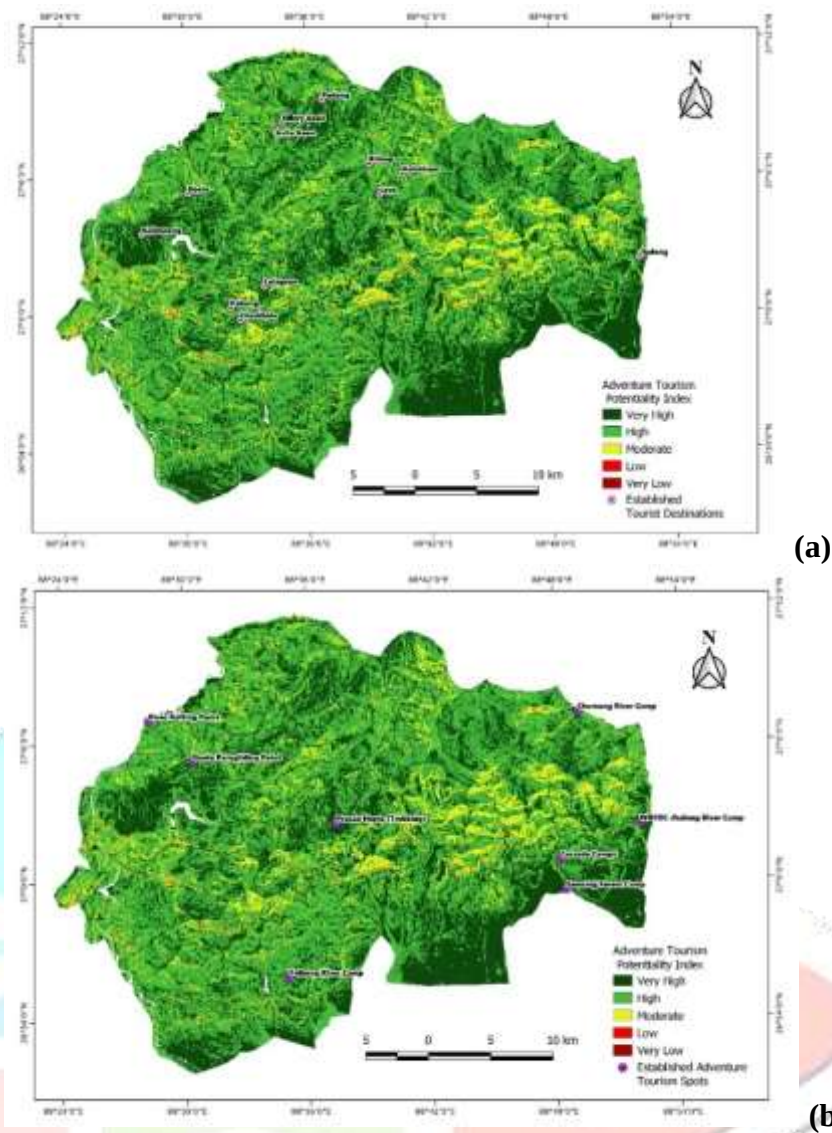


Fig. 5 a) Established Tourist Destination Map and b) Established spots for Adventure Tourism Map of Kalimpong District

4.3 New spots for adventure tourism in Kalimpong district



Fig. 6 Suggested spots for the development of Adventure Tourism for Kalimpong District

Table 7 Potential spots with their coordinates (in decimal)

No.	Name	Latitude	Longitude
1	K1	26.90705	88.62309
2	K2	26.92281	88.52455
3	K3	26.92949	88.53144
4	K4	26.9417	88.718
5	K5	26.99791	88.76734
6	K6	27.04928	88.77699
7	K7	27.11568	88.75896
8	K8	27.10146	88.72404
9	K9	27.16376	88.57762
10	K10	27.08987	88.70166
11	K11	27.06208	88.66634
12	K12	27.09971	88.64642
13	K13	27.05501	88.61867
14	K14	27.03313	88.59274
15	K15	26.99901	88.58181

Since most of the land of Kalimpong is suitable for developing adventure tourism, 15 new potential spots where adventure tourism can be developed have been marked within the very high suitability zone. The 'very high suitability zone' is specifically chosen because, first Kalimpong falls under the young fold mountains (Himalayas) which means they are still growing in their height and second it receives a lot of rainfall during the monsoon season, as a result of which it makes the land quite loose and unstable and the region experiences a lot of landslides and flash floods. Thus, its best to develop all kinds of adventurous sports within the 'very high suitability zone' only for better safety of the travelers. (Fig. 6 and Table 7)

The 15 new potential spots for the development of Adventure tourism have been marked in the above map (Fig. 6) and they have been named from K1 – K15. All of the 15 new spots have also been provided with their respective coordinates in the above table (Table 7.) The new spots that have been marked can be used to develop adventurous activities like camping, trekking, hiking, and paragliding. River rafting has been not included in the suggested spots list, mostly because it requires a lot of on-field data for its development.

IV. CONCLUSION

Nowadays, adventure tourism is one of the most demanded forms of tourism and the authorities of tourism planning give a lot of importance in the development of the spots or sites which have some adventurous potentiality. Through an integrated approach and using GIS, AHP Method, and the WMCA techniques, an entire district of Kalimpong has been evaluated for the adventure tourism potential zones. The results showed that Kalimpong has about 34% of the total land area which is highly suitable for developing this kind of tourism. A total of 15 potential sites have been identified where adventurous activities like camping, hiking, trekking, and paragliding can be developed. If this district is developed with a proper plan, it can become "An Adventurers Paradise".

ACKNOWLEDGMENTS

The authors would like to convey heartiest regards to the reviewers and editors who enriched the study with their valuable reviews. The authors would also take this opportunity to convey gratitude to Amity University Kolkata where the study was conducted.

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