

# **Application of Geographic Information System (GIS) and Analytic Network Process (ANP) for sustainable tourism planning in Cameron Highlands, Malaysia**

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**Keywords:** Conservation; tourism, sustainable development, Analytic Network Process, Geographic Information System.

**Abstract.** This paper discusses an approach based on an integrated use of GIS and ANP for sustainable tourism planning of Cameron Highlands, Malaysia. ANP was utilized to evaluate the relative priorities for the sustainable tourism development of the highland based on chosen criteria and indicators (elements). Pair wise comparison technique was used in order to evaluate possible alternatives from different perspectives. Having derived the weights from the pairwise comparison method, unweighted supermatrix, weighted supermatrix and the limit supermatrix were then computed. The limit supermatrix was normalized to derive the priorities; the result was then transferred into GIS framework. Elements evaluated and ranked are represented by criterion maps. The criterion maps were evaluated by reclassifying the data layers, to represent different needs for the sustainable tourism development of the highland. Spatial models reflecting the views of experts involved were aggregated using the weighted sum method of GIS. Subsequently sustainable tourism development model was generated, which will ensure that future generations benefit from the natural endowments of Cameron Highlands.

## **1. Introduction**

Tourism is a sector that has increasingly identified the natural environment as a crucial attraction of many destinations and one that can be utilized as important resource product [1]; [2]. Increased environmental awareness in the 1980s resulted in the reassessment of the role of tourism and an increased recognition of its adverse effects [3]; [4]; [5]. Even though it is acknowledged that tourism contributes to environmental deterioration of natural areas and can be self-destructive [6]; [7], there is also acknowledgement of tourism's potential to lead to significant improvement of the environment as well as economic benefits [8]; [9].

Sustainable tourism can be a major tool for the conservation of natural areas and for raising the environmental awareness of residents and visitors. Such form of tourism conserves both natural and cultural assets; it guarantees the protection of nature and indigenous cultures. Sustainable tourism provides mechanisms to preserve threatened areas that could protect wildlife [10]. Sustainable tourism planning is enhanced by applying a tool like Geographic Information System (GIS). GIS is a useful instrument to environmental managers in identifying localities that need immediate attention, and allow the experimentation of these areas with various management approaches, without risking them in experimentation. GIS data can be used to identify conflicts, examine impacts and support a decision-making process.

GIS is further strengthened by its capability of working along with Analytic Network Process (ANP) of Multi Criteria Evaluation (MCE). ANP of MCE can help the decision makers to translate environmental, economic and social issues into manageable units of information. ANP has the