Assessing hiking trails condition in Iceland using GIS – Implication for sustaining visitor use in vulnerable arctic environments

Rannveig Ólafsdóttir, University of Iceland, Iceland, ranny@hi.is;
Micael Runnström, Lund University, Sweden

Introduction

During the past decades arctic regions have gradually been gaining increased interest by tourists and subsequently by tourist's operators. At the same time, many of the rural areas in the arctic have been facing considerable migration of local residents to more populated areas. Tourism is thus most often seen as a positive development in the arctic. The arctic regions are generally characterised by vast natural areas and mainly attract tourists who are interested in experiencing nature and nature based activities. Natural area tourism has over the past decades grown at an explosive rate worldwide and according to Newsome et al. (2002) has a capability to change both natural areas as well as tourism itself. This increased popularity in natural area tourism is thus likely to cause severe stress upon the most vulnerable ecosystems such as represent the many of the subarctic and arctic areas.

In Iceland tourism has grown rapidly over the past decades, from c. 4000 foreign visitors in 1950 up to 565.611 in 2011, with a mean annual increase of 7% over the last ten years (ITB, 2012). Half a million visitors may not seem extreme, but it has to be kept in mind that Icelanders numbered only 319.575 on the 1st of January 2012 (Statistic Iceland, 2012), and that most tourists visit the country during the three summer months. Hiking is one of the most popular tourist activities in Iceland, especially in the highlands. Thus, to be able to manage the environmental impact of nature tourism as well as to plan tourism in a sustainable manner a holistic overview of hiking trail condition in the most popular tourist destination of Iceland is fundamental as well as a better understanding of the relationship between the trails location and its physical properties. This study aims to evaluate environmental condition in relation to tourism in two popular tourists' destinations within the Icelandic southern highlands by: i) mapping and analysing the severity of current trampling impacts; ii) examining the relationship between trail condition and some vital physical factors related to the trails location; and by iii) assessing tourists' perception as regard the areas' environmental condition.

Data and methods

To obtain a holistic overview of the condition of the current hiking trails in the various tourists' sites in Iceland, a compatible condition measurement scale is critical. Such a scale allows for the availability to assess much larger areas in less time and lower costs than other methods of hiking trail assessment. Therefore, as a first step to assess trail conditions in relation to tourism in Iceland, a condition scale for hiking trail assessment was designed (Table 1). The scale used in this study is developed from condition class descriptions presented by Marion et al (2006) and adjusted to Icelandic conditions from field findings related to this study and earlier ones (i.e. Ólafsdóttir, 2007). To minimize subjectivity a minimum of two observers were used to assess and interpret each hiking trail. To prevent complexity in interpretation of the class assessment definitions, a classification system was further developed and each assessment factor given special scores ranging from 0 to 3 according to its condition. To analyse the severity of current trampling impacts within the two selected study areas, field inventories were carried out in Þórsmörk and in Fjallabak Nature Reserve. The hiking trail selection criterion is based on trails that are marked in field and presented on hiking maps published for tourists. Hence, each trail was hiked by two to three observers simultaneously and sample points taken every 100 m. At each point measurements of the trail's width and depth was taken as well as visual assessment of the trampling impact on the ecosystem and severity of erosion. A total of 890 sample points were collected and classified within the two study areas. A geographical information system (GIS) was used to examine the spatial interrelation between the measured trail condition in field and physical factors related to the trails location, i.e. ecological sensitivity; vegetation cover, altitude and slope angle. A tourism survey was furthermore carried out to compare tourism experience with the measured reality.

Results

The results reveal that less than half, or 41%, of the hiking trails assessed within the Þórsmörk area are classified as being in good and very good condition according to the condition measurement scale. A total of 29% are in acceptable condition. Trails classified as bad and very bad condition are 19% and 12% respectively. The majority (61%) of the hiking trails assessed within Fjallabak Nature Reserve are on the other hand in good and very good condition. A total of 27% are in acceptable condition, and 11% are classified as bad condition. Less than 1% is in very bad condition. Hence, the trails' physical condition is noticeable much worse in the Þórsmörk area than in Fjallabak Nature Reserve. Majority of the hiking trails in Þórsmörk are located within vegetative areas, mainly by the sensitive heath moss cover, while majority of the assessed trails in Fjallabak are located within areas that are unvegetated. That is likely to explain part of the difference between the study sites. However, no significant correlation is found between the physical properties tested and the trail condition. Despite serious soil erosion as a result from tourists hiking in many of the trails, most tourists consider the hiking trails in general in a good condition.

Table 1. Condition scale for hiking trails

Scale	*Condition*	*Score according to classification*	*Definitions*
0	Very good	0-1	No stress. Trail is hardly seen. Little or no disruption to the vegetation cover and/or the parent material. No erosion
1	Good	2-4	Little stress. Trail noticeable. Disruption of vegetation cover and/or the parent material significant. No erosion
2	Acceptable	5-7	Some stress. Trail obvious. Disruption of vegetation cover and/or the parent material considerable. Significant erosion.
3	Bad	8-10	Much stress. Vegetation heavily degraded or dead. Parent material eroded. Active erosion.
4	Very bad	11-12	Very heavy stress. Vegetation dead and soil erosion striking. Active gully erosion from trail.

ITB (Icelandic Tourist Board) (2012). Foreign visitors to Iceland 1949–2010 Retrieved 10.01.2012 at http://www.ferdamalastofa.is/Category.mvc/Display/654

Marion, J.L., Leung, Y.F. and Nepal, S.K. (2006). Monitoring trail conditions: New methodological considerations. The George Wright Forum, 23 (2), 36–49

Newsome, D., Moore, S.A. and Dowling, R. (2002). Natural Area Tourism. Ecology, impacts and management. Channel View Publications

Ólafsdóttir, R. (2007). Þolmörk umhverfis [Environmental carrying capacity]. In: Anna Dóra Sæþórsdóttir, Rannveig Ólafsdóttir and Rögnvaldur Ólafsson, 2007: Tourism at Laki. The Hornafjordur University Centre Series no. 5. pp. 35–49

Statistic Iceland (2012). Mannfjöldi – yfirlit [Population – overview]. Retrieved 26.02.2012 at http://hagstofa.is/Hagtolur/Mannfjoldi/Yfirlit