Visitor monitoring in the Swiss National Park – towards appropriate information for the wireless consumer

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Abstract

The Swiss National Park (SNP, Switzerland, Central Alps), is the main test area for the EU project WebPark. Its main issue is to specify and evaluate the information needs of visitors to recreational and protected areas and to provide accurate data for mobile platforms. To ensure a user focused development of the information service, a special kind of visitor monitoring termed *shadowing* was used. Visitors were accompanied on different trails to gather the information topics in which visitors of protected areas are interested in while hiking. Their on site questions were recorded and located. Spatial (*location based*) and general (*non location based*) information needs mainly concerned the topics fauna, flora, landscape/navigation and geology/geomorphology.

1   Introduction

The Swiss National Park (Switzerland, Central Alps), is the main test area for the EU project WebPark (IST-2000 31041). This research project aims to develop personalized value-added Location Based Services (LBS) for recreation in protected coastal, rural and mountainous areas. These services will enable users to request information from several databases by mobile phone and/or Personal Digital Assistant (PDA) and similar devices. In the project high importance is attached to information design in order to guarantee user focused information services. In addition to that, handling must be as easy as possible. This is achieved by extensive user needs assessments and analysis based on different techniques like visitor monitoring, surveys (questionnaire) and scenario testing to determine the cognitive tasks around which the interfaces should be built.

2   Theory and Issues

The recreational use of wilderness areas increased steadily during the last decades (Cole, 1996). Facing the increasing visitor numbers, managers of recreational and protected areas must deal with additional management issues like environmental and social impacts. Furthermore, monitoring and planning processes in such areas include *information services*. What kind of *experience* and *information* shall be provided to visitors (Eagles et al. 2002)? Recreation, tourism and safety administrations currently deal with a large number of enquiries such as „when is it possible to go, where can I see or what is the state of this and that?“. Such queries take time at the user side and require staff to respond, from a management point of view. Hence, many administrations of protected/recreational areas and tourism have created web pages, digital media and different printed products to address these needs. However, information is not available precisely when many users need it, i.e. when they are outside on a hike. Information needs are affected by a variety of factors, such as background, professional orientation and other individual characteristics of the user, or social, economic and political systems around the user (Devadason & Pandala, 1997). Usually used methods of visitor monitoring or observation were not supposed to be appropriate for the aims of the project. Therefore, an experiment with a new method for gathering information needs was created. The principle was to follow visitors within the National Park (*shadowing*) and to detect and record their questions and problems including the location where they occurred. Such case studies lead to possible scenarios for the utilisation of LBS and answer the following questions:

- Which information topics (e.g. fauna, flora, orientation, landscape etc.) are highly requested?
- What kind of spatial (location based) and general (non location based) information is needed?
- Are the topics dependent on the area?
- Do different visitors have different information needs or are they in general similar ?

3   Methods

Besides counting methods to get information about numbers of visitors, interviews or surveys (questionnaire) can be conducted to get an overview of visitor behaviour and needs. Different methods of visitor monitoring are described by Watson et al. (2000). Surveys are the most frequently used method to obtain detailed information on visitor characteristics, visitor attitudes, and visitor preferences. However, surveys conducted

after a visit to a specific area tend to provide filtered answers, maybe the visitors cannot remember all the questions and problems that occurred during the hike or they skip the ones they consider to be not important enough. By accompanying visitors these problems can be solved. For obvious reasons the visitor monitoring cannot be done „under cover": the researcher has to be hot on the visitors trail. An intensive exchange of information between himself and the visitor is created. The researcher must be well informed about the landscape, history, flora and fauna of the particular environment, acting as a „human LBS". It is very important that the researcher never offers any information by himself but only answers the questions of the shadowed visitors. Respecting this rule the researcher ensures that the visitors own information needs and questions are recorded. Wide results might be expected based on visitors who had never been to the specific place before. The visitors observed in this study comply with this requirement. They only prepared themselves by means of the official printed guide.

When following the visitor, all questions coming up were registered as well as time and GPS-position. In addition to that, a photograph was taken when the question concerned a specific item. For the evaluation the questions were separated into two groups: general questions and questions with a spatial reference. This is important to conclude the different sorts of data layers that have to be provided in the system, which are either general or refer to a specific location. The questions were added to one of the following main topics.

- fauna
- flora
- landscape / navigation
- geology/geomorphology
- history
- research
- Swiss National Park (SNP) general
- others

Questions with a spatial reference were completed with information about the type of spatial reference (point, line, area) and the level of accuracy required (5m, 20m, 100m, 500m).

4 Results

In autumn 2001 and summer 2002 ten case studies were carried out, five of them with adult visitors and five with children and their families. A total of 203 questions were gathered from adult visitors, 101 questions were recorded by shadowing children. A mean number of 40 questions occurred during each session (min 32, max 57) while shadowing adults, a mean number of 20 questions while shadowing children. There

was no significant difference between the distribution of the information-topics of different observed adult visitors (figure 1, χ^2, p<0.05).
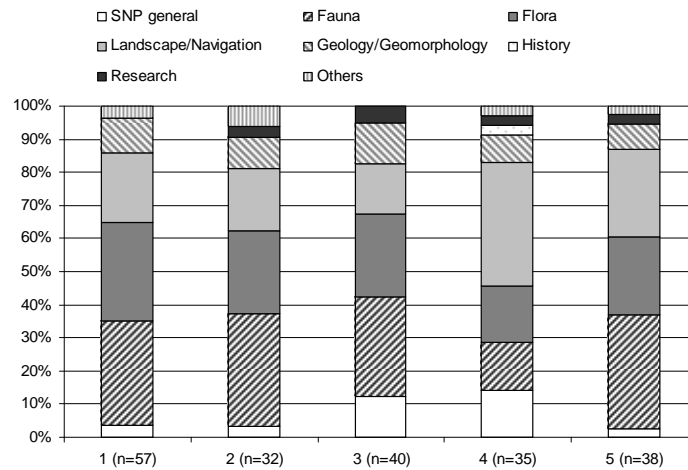
Fig. 1. Distribution of information-topics dependent on the visitor (adults nr 1 - 5), figure includes general and spatial questions

Examples for the different information-topics for questions with spatial reference are given below (table 1). Questions about fauna and flora mainly concern the occurrence of certain animal or plant species at a specific location (spatial reference). or special phenomena that catch the visitors' eye (blossom of flowers, rutting behaviour of red deer). Questions about landscape and navigation pertain location names or progress of the chosen route.

Table 1. Examples for questions with spatial reference from different information topics

information topic	question	spatial reference	accuracy
fauna	*Are there any marmots here?*	area	20 m
	Do Ibex occur here?	area	500 m
	Is it possible to observe animals in the Ftur valley?	area	500 m
	What tit species do occur here?	area	500 m
	Is there fish in this creek?	line	20 m
flora	*Why do so many trees have two or more stems?*	area	20 m
	Are all these stumps remnants of the last woodcut ?	area	20 m
	At which altitude is the timber line? Will we pass it on our way?	area	20 m
	What kind of flower is this?	point	5 m
	Is this Edelweiss?	point	5 m
	Is this a mountain pine?	point	5 m
landscape/navigation	*Are we at the border of the Swiss National Park now?*	area	20 m
	Which mountain is this?	area	20 m
	Is this an artificial lake?	area	100 m
	Is this the lake of Livigno?	area	100 m
	Are we arriving at Alp La Schera?	area	100 m
geology/geomorphology	*Is this a moraine?*	area	20 m
	Is this a frost phenomenon?	area	20 m
	Is permafrost an important process in this area?	area	100 m
	What kind of rock is this?	area	100 m
	What kind of caves are these? Are they artificial or natural?	point	5 m
history	*Why was it necessary to cut so many trees here?*	area	100 m
	Did the sumpter-mules also pull carts?	line	5 m
research	*What is this pole for?*	area	5 m
	What is this? (visible installation for research purposes)	area	5 m
SNP general	*Why was it necessary to cut so many trees here?*	area	20 m
	If these dead trees are getting dangerous for the visitors, will they then be removed?	area	20 m
	Are these trails re-created every spring?	line	20 m
	Are the signs maintained by SNP?	point	5 m
	Do all the bridges have to be renovated in spring?	point	5 m
others	*This doesn't look nature like. What is it?*	point	5 m
	What is this? (mobilephone-antenna)	point	20 m

Concerning spatial reference, 64% of the questions had a spatial reference, and 36% were general ones. This result did not differ significantly between the different visitors (Table 2, χ^2, $p<0.05$).

Table 2. Number of questions in different spatial categories (adults)

monitoring ID	point	line	area	general	total
1	12	3	21	22	58
2	4	4	9	15	32
3	7	3	14	16	40
4	8	2	14	11	35
5	14	3	12	9	38

Most of the general questions (73, table 3) concern the topic fauna (24) or flora (20). Most of the 130 questions with a spatial reference concern the topic

navigation/landscape (41), flora (30), fauna (26), and geology/geomorphology (19). Only a few questions apply to historical themes and research or the park in general.

Table 3. Examples for general questions on different information-topics

information topic	question
fauna	*Are the marmot lairs always exposed south?*
	Have the marmots already started hibernation?
	Are there also snakes?
	Have been living bears / wolves / lynxes in this area?
	Do the red deer have a certain daytime of activity?
flora	*Are the mountain pines on the south exposed slopes of different colour?*
	What flower is there still in blossom?
	What are the main tree species of the SNP?
	Can there also be found deciduous trees in the SNP?
	What's the tree limit in SNP?
research	*How many animals are radio-tracked in the SNP at the moment?*
	Are the bearded vultures radio tracked as well?
	Is the animal stock documented in SNP?
SNP	*Is the heraldic animal of the Swiss National Park a golden eagle?*
	Are there poachers in the SNP sometimes?
	How is the SNP financially organised?
	Do visitors of SNP sometimes get ill because of the height?
	When does the onset of winter come in the SNP?

5   Discussion

Defining the geographic relevance of the data is essential to the efficient supply of personalised information to mobile users, since this can increase the value to that individual. Assessing users information needs through shadowing visitors contributes to understand the data which are to be provided. For example, as information about flora was demanded, the flowering period of certain plants can be used to define a cyclical periodical pattern for when queries about flowers in general are relevant. Many of the recorded questions base upon such natural temporal patterns.

Generally, the principle of shadowing visitors gives a quick and good overview of the questions and information needs of visitors that come up on site while hiking and exploring nature in protected areas. The cognition benefit declines after each shadowing, as there are main topics of interest; for every new shadowing only a few new questions arise, as each visitor touches each information topic at least once. This kind of monitoring technique causes a high burden for the observed visitor, making it difficult to motivate park visitors to attend this research approach. The method is time consuming and therefore cost intensive, if significant statistical data on different

visitor groups and places is needed. For the specific purpose of the WebPark project, i.e. information needs for LBS, this disadvantage is balanced by several advantages. The monitoring pictures a real scenario for the future utilisation of LBS and allows understanding of the visitor's approach to nature. The questions and problems that arise are spontaneous and unfiltered. This is much better than a questionnaire conducted after a trip, with results depending on the memory of the visitors and answers already weighted. General questions and specific location based questions can be assessed at the same time. Location based questions (GPS position) directly lead to location based answers. The question „Is there red deer up here?" can be answered by a digital map presenting red deer concurrency for the specific location. Thus, information contents for LBS can be affiliated in a very direct and simple way from the gathered questions.

Fig. 2. Is this the artificial lake of Livigno? A typical question with a landscape / navigation aspect.

6 Conclusion

The results of the study define the range of information topics to be provided for a LBS information system. The direct way of gathering these topics results in an information service containing data of high relevance to the visitor. One part of the information has to be displayed in a spatial context, the other part of general information will be most likely presented in form of a lexicon. Spatial data must be combined with a temporal aspect (i.e. when are certain flowers in blossom?) and a footprint based upon habitat preferences for individual species (elevation, slope, behavioural patterns). This will lead to a probability of occurrence for these species at a specific location and time. The results are due to a mountainous area and can be

representative for any other region with a similar environmental equipment. As it is very easy to conduct, the used method illustrates a practicable approach to explore information needs for an LBS information service.

7 Acknowledgement

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