Use of Modern Information and Communication Technology in Large Protected Areas

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Abstract

Several management objectives of large protected areas involve information and communication activities. This particularly refers to management actions in terms of recreational use and tourism, environmental education, visitor information, and public relations. However, due to the advance of modern information and communication technologies (ICT), the way we exchange and share information, communicate and catch up on content changed remarkably in recent years. Today, communication processes are strongly linked to the use of Web 2.0 tools running on desktop computers and mobile devices. This offers unique and innovative opportunities for information and communication work in general. Such benefits and challenges of modern ICT are relevant for large protected areas as well and thus should be kept in mind.

But, to what extent modern ICT is used in large protected areas? How do these sites leverage modern ICT for their information and communication activities? The current situation has been investigated, on the one hand, through an online survey of large protected areas in Germany, Austria, and Switzerland. On the other hand, web sites and tools implemented by these sites have been studied. Best practices examples were found, challenges and opportunities became obvious. Based on this, selected application areas of modern ICT in large protected areas are presented in this paper.

Keywords

modern ICT, Web 2.0, information and communication activities, recreational use, environmental education, public relation

Background and research question

Information and Communication Technology (ICT) is progressively embedded in many aspects of our daily lives. Related applications are widely used in business and public administration organizations, as well as for private purposes (URL 1). Meanwhile, (modern) ICT has become a major force of changes in modern societies showing impact on social, economic, and political concerns (SCHNORR-BÄCKER 2004; WORK 2010).

While ICT, in general, encompasses all issues related to enable transmission of digital information between humans, modern ICT refers to the so-called new media, saying the Internet and associated aspects (OECD 2003; SCHNORR-BÄCKER 2004). Modern ICT is closely linked to Web 2.0, which covers a wide range of interactive, dynamic applications allowing for exchange and cooperation between users (ZEW 2010). These applications are running on both, desktop computers and mobile devices such as smartphones, tablets or pocket PCs, which are used to a growing extent by society (TNS INFRATEST 2012; URL 2).

As highlighted in literature (see e.g. MECKEL 2008; SCHNORR-BÄCKER 2004), the use of modern ICT shows strong impact on human information and communication structures: Related tools enable fast and easy access to large amount of actual information (benefitting e.g. from multimedia elements, links etc.). In response to technological possibilities, users' attitude towards these tools also changed: Today, users request customizable applications and information that is tailored to their needs and personal preferences (content, design, output mode etc.). Furthermore, they are eager to share and publish own opinions, experiences, and ratings on the Internet. The growing importance of this so called user generated content is closely related to users changing from passive information consumers to active information producers (LANGE 2007). This is facilitated by interactive functions, permitting for participation and cooperation. Among others, they provide opportunities for online discussions, online evaluation processes, establishing and maintaining contacts as well as online community building.

The possibilities offered by modern ICT are also interesting for large protected areas, encompassing nature parks, national parks, and biosphere reserves. This is particularly true for the manifold information and communication activities playing a key role in large protected area management objectives in terms of recreational use and tourism, environmental education, visitor information, and public relations. For protected areas the relevance of modern ICT use is underlined by research revealing the steady increase of Internet usage and growing demand for digital information directed towards their web sites on behalf of their visitors (see e.g. EBERLE 2009; HENNIG et al. 2012). But in practice, what does the use of modern ICT in large protected areas look like? How are different Web 2.0 components used? Which suggestions can be derived in order to improve benefits from using modern ICT? These questions have been investigated on the case of large protected areas in Germany, Austria, and Switzerland.

Methods

To gain insight into the use of modern ICT in large protected areas, a questionnaire was conducted among according sites in Germany, Austria and Switzerland. This took place during the first half year of 2012. In accordance, with basics and methods of empirical social science research, the questionnaire was prepared using SurveyMonkey (www.surveymonkey.com), a free online questionnaire and survey software. Primarily, the questionnaire focused on revealing and assessing the use of multimedia elements (photos; videos; audio files; and virtual tours), geomedia (static web maps; interactive, dynamic web maps; Web GIS; and route planners), social media tools (blogs and forums; newsletters; and social media platforms like Facebook), and different types of applications running on mobile devices (apps, eGuides, geocaching).

The data collected through the web-based questionnaire was preprocessed (e.g. data cleansing) and statistically analyzed (using SPSS 20). Afterwards and based on the questionnaire results, selected web sites and tools provided by large protected areas were studied in detail. Attention came up to content, structure, and design of these sites as well as implemented Web 2.0 components.
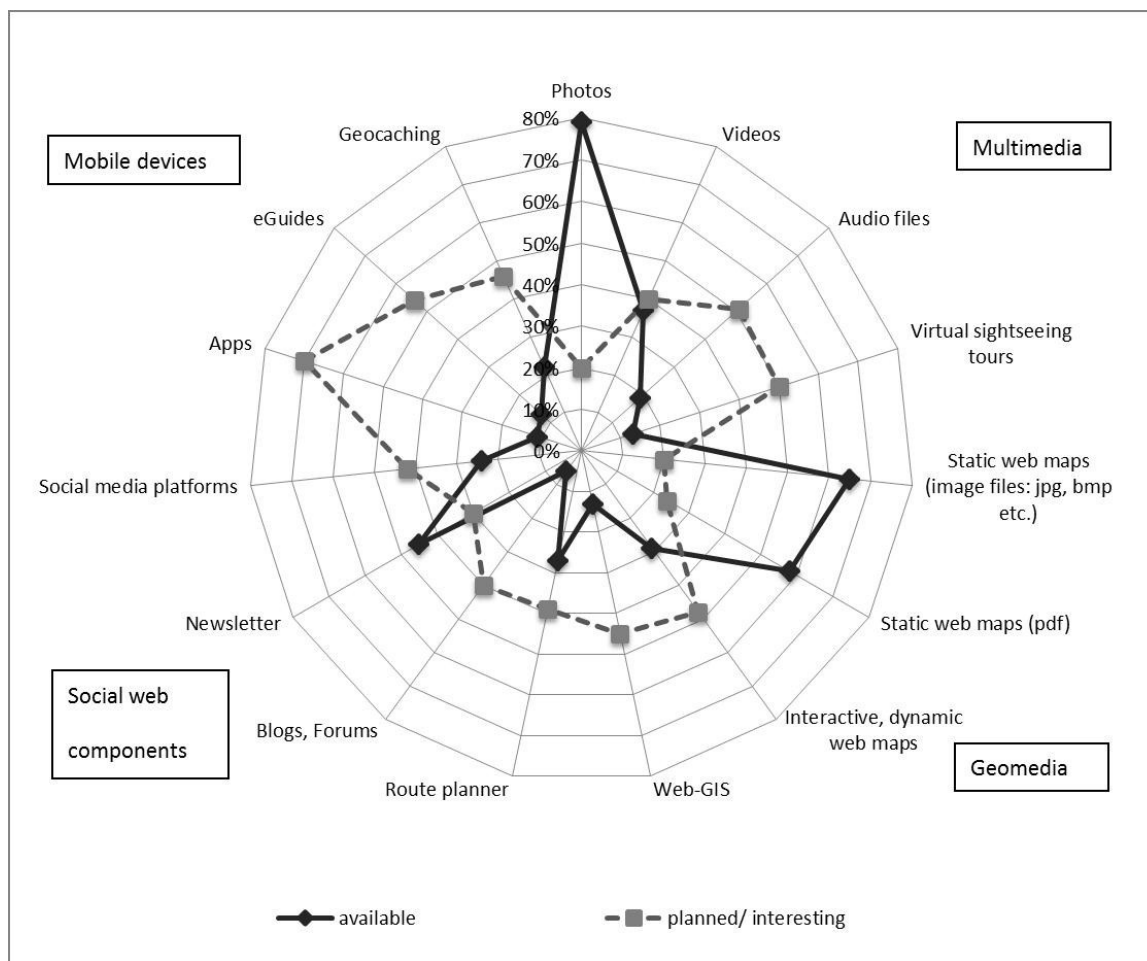

Figure 1

Results

The web-based questionnaire was sent to 138 large protected areas; 62 (45%) participated in the survey. In detail, 38 (61%) questionnaires were answered by German, 18 (29%) by Austrian, and 6 (10%) by Swiss protected areas. While national parks showed most interest in the survey (80%; 16 of 20), this was a little less in biosphere reserves (67%; 16 of 24) and considerably less in nature parks (32%; 30 of 94).

The overall study revealed that, in general, large protected areas make use of ICT to a quite different extent. The results in figures are comprehensively presented in Figure 1 and Table 1, and are shortly described in the following:

1. Particularly relevant for most sites are multimedia elements and geomedia: While photos and static web maps are widely used, videos, audio files, virtual tours, interactive, dynamic web maps, Web GIS, as well as route planners are considered to be interesting topics and/ or are planned to be implemented in the near future.

2. Social web component are deemed differently: Some large protected areas regard the use of these tools as quite useful, offering unique opportunities for information and communication work; others suppose them to be useless for their purposes.

3. Concerning mobile devices it has to be stressed, that even though only few applications are available, they are seen as highly interesting.

Table 1: Examples referring the use of modern ICT and web2.0 components in large protected areas (nature park NP, national park NLP, and biosphere reserve BR) in Germany Deutschland (DE), Austria (AT) and Switzerland (CH)

Modern ICT/ web 2.0 components		Examples	
Multimedia	Photo	Image gallery	NLP Schleswig-Holstein. Wattenmeer (DE)
		Slide show	NP Lauenburgische Seen(DE) BR Schwäbische Alb (DE)
		Linking (e.g. Flickr)	NLP Donauauen (AT)
	Video	Embedded objects	BR Südostrügen (DE) NP Ötscher (AT) NLP Schleswig-Holstein. Wattenmeer (DE)
		Linking (e.g. Youtube)	BR Entlebuch (CH) BR Südost-Rügen (DE) BR Oberlausitz (DE)
	Audio files	Audio podcasts	NLP Hohe Tauern (so called NLP-Radio) (AT) NLP Schleswig-Holstein. Wattenmeer (DE)
		Verbal description on the website	NLP Harz (DE)
	Virtual sightseeing tour	3D-flight	NLP Hohe Tauern (AT)
		(Interactive) panoramic image	NLP Hainich (DE)
		Google Earth animation	NLP Hohe Tauern (AT)
		Animated image show	NL Sparbach (AT)
Geomedia	Static web map (image files: jpg, bmp etc.; pdf)	Location, nature environment	NLP Berchtesgaden (DE) NP Barnim (DE)
	Interactive, dynamic web map	location/ direction (to find the site; within the site: regarding hiking, biking tours etc.); information related to the site	NLP Donauen-Auen (AT) NLP Hainich (DE) NLP Bayerischer Wald (DE) Schweizer NLP (CH)
	Web-GIS	Information related to the site	NLP Hohe Tauern (AT)
	Route planner	Arrival, on-site excursions	BR Mittelelebe (DE) Schweizer NLP (CH)
Social web components	Blog/ Forum	Posts covering different topics	NLP Donau-Auen (AT) NLP Thayatal (AT)
	Newsletter	News, Events etc. (e.g. via sms service)	NP Zillertaler Alpen (AT) Schweizer NLP (CH)
	Social media platform	Linking (e.g. Facebook)	BR Schwäbische Alb (DE) NLP Hohe Tauern (AT) NLP Schleswig-Holstein. Wattenmeer (DE) NP Altmühltal (DE) BR Oberlausitz (DE)
Mobile devices	App	Information related to the site	BR Vessertal-Thüringer Wald (DE) NLP Hohe Tauern (AT) Schweizer NLP (CH)
	eGuide	Information related to the site	Schweizer NLP (CH)
	Geocaching	Geocaching (basic information, GPS data)	NLP Hohe Tauern (AT) NP Diemelsee (DE)

Discussion on raising opportunities

Despite the existing extent of use of modern ICT, these tools can provide large protected areas a lot more opportunities. This is highlighted below.

<u>Multimedia Elements</u>

Multimedia is an important aspect of Web 2.0. Photos and videos open up possibilities to present large protected areas in an impressive way. Furthermore, the use of multimedia elements allows to provide the diverse user

groups with tailored content and material. Since *different* media address *different* senses, the availability of *different* media facilitates the users to make a choice of information channels suitable to their personal preferences, abilities and needs (WEIDENMANN 2006). This is particularly relevant, bearing in mind, that some user groups are characterized by very specific requirements. Examples therefore are disabled people (e.g. the visually impaired) as well as the elderly (HENNIG et al. 2009; NEUSCHMID et al. 2012). Both demand for accessible ICT products (URL 3).

Thus regarding web accessibility, multimedia elements open up unique opportunities (NEUSCHMID et al. 2012). This is well shown by the website of Eifel National Park (see URL 4). Meeting accessibility guidelines (see e.g. URL 5), user interface and interactive functions (design output, interaction mode etc.) are implemented to improve accessibility and usability of this site: Users can control font size and contrast settings (between font color and background color). They can switch between different versions of the web site: a text-based version, a version offering to the user clear, comprehensible content in simple language, a version using video to deliver content via sign language.

Geomedia

On the Internet, geomedia plays a increasing role, today. This is reflected in rising numbers of static and interactive, dynamic web maps (e.g. embedded Google Maps objects), whose availability, meanwhile, is taken for granted in many situations (ORIGEL-GUTIÉRREZ 2004; THIELMANN et al. 2012). These cartographic products are mainly used to support people in navigation and orientation, as well as to find addresses. Furthermore, relying on interactive functions available in dynamic web maps (e.g. zoom, pan, access to context information using information windows adding multimedia elements), users are enabled to explore an area and become geographically informed without being there personally (PETERSON 2008). This also applies for web maps integrated in protected area web sites (see Table 1).

However, interactive, dynamic web maps provide further advantages: Due to its spatial contextualization, maps and cartographic presentations improve the understandability of the information visualized. The visual access to data and/ or information enables to convey information in a fast and powerful way. It is essential, well-known and generally accepted, that visually communicated contents are easier to access and understand than textual ones (PAIVIO 1986). WOOD (2010) states, that maps – and above all interactive, dynamic maps – are very powerful and useful tools for publishing and communicating spatial referenced content, and to encourage users to explore areas by themselves. JEKEL et al. (2010) underline, that maps fulfill relevant functions to impart information using interactive functions, and thus to enthuse users for the presented content.

These aspects are relevant for protected area management objectives as well. Properly developed web maps open up innovative presentation opportunities for information and communication activities in terms of recreation, tourism, and environmental education: On the one hand, information and education topics can be communicated benefitting from the spatial reference of infrastructure and natural attractions. On the other hand web maps can be explored by the users themselves and thus support the planning of visits as well as visitor management objectives (guiding visitors, attracting or avoiding the visit of some locations).

Social Media

In the past years social media applications – and in particular social media platforms (e.g. Facebook) – gained in importance for many domains. Since large parts of society use such tools frequently and regularly, business and public administration organizations began to integrate social media platforms to a growing extent in their communication strategies (URL 1).

Concerning their functionalities, these applications are based on so-called social networking services (SNS). They constitute the framework for user registration, identity management, contact management, information exchange (personal messages, chat, pin board etc.) as well as group building (EBERSBACH et al. 2008). Leveraging SNS, social media applications and platforms offer the opportunity to generate and use a wide range of interesting and useful data (KÖRNIG-PICH et al. 2010). In part, such data already exists (owing to contact management, posts etc.), and just needs to be recognized. Moreover, users can be contacted and asked directly to get, i.e. gather, relevant information. Hence, large protected areas have the possibility to answer open questions on their visitors: Which main visitor target groups can be outlined? What is (most) interesting to them? How to deliver information to different user groups in a tailored way? This can provide background for the development of (on site) management measures, suitable for different visitor groups (see e.g. HENNIG et al. 2009).

Applications running on mobile devices

One type of modern ICT applications which is deemed to be very attractive by large protected areas are the ones running on mobile devices. However, to date there are only few applications available to the users, i.e. visitors of protected areas (see Figure 1; Table 1). Mostly, they are used to convey information on site (focusing the protected area, natural and cultural attractions, the region etc.). Here it has to be underlined that – among others, by benefitting from GPS and LBS (locational-based services) – a wide range of innovative opportunities arises from using these tools:

- Topics and aspects which can be observed and encountered directly in nature, i.e. on site, can be explained comprehensively using actual information as well as multimedia elements and geomedia, and benefitting from links to additional interesting and related aspects and topics. On the one hand, information provision can be optimized and enlarged; on the other hand, information presented can vary in content, depth, and amount as well as the media used. Hence, information can be delivered in a customized and personalized way (e.g. referring to needs on accessible ICT products) focusing on different user groups, i.e. visitor groups.

- Interactive functions support for different modes of information presentation. This can motivate the users to experience and discover aspects directly on-site. Therefore, different ways exist: learning by play (e.g. by

Quizzes, leveraging geocaching), learning through own research (e.g. animating for personal experience and discovery), and learning through emotions (e.g. engaging all senses).

- Relying on the possibilities of Web 2.0 to facilitate and foster user participation, involvement, and collaboration everyone can be invited, i.e. encouraged, to publish and share opinions, experiences, and impressions somehow related to the site. Thus, people can enrich information and communication processes by their (valuable) input and become part of an online "protected area" community.

Conclusions and Outlook

The research (questionnaire and web site study) shows that modern ICT is manifoldly used in large protected areas. In doing so, these sites pay attention to actual and very relevant social trends. Since, by the mean of "technology", large parts of society (particularly youngsters) can get into nature and related topics, numerous, innovative opportunities arise to get people involved.

Generally, it seems that large protected areas are still not tapping the full potential of modern ICT use. In order to increasingly benefit from it, a lot of intense work is still necessary. This refers to the design of modern ICT applications being more user and task-oriented as well as improving the outlook and interaction capabilities of web sites, i.e. applications' usability and accessibility. Furthermore, to effectively and efficiently use and integrate modern ICT for protected area work, specific (didactical) concepts should be considered. Approaches can be adapted from different fields such as e-learning and learning with geoinformation.

Concerning this, the queried protected areas stressed scarce financial and personal resources which play a pivotal role for the implementation and maintenance of modern ICT applications. Therefore, several interviewees highlighted the need and relevance of exchange of expertise.

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