Use and Potential of Geo-ICT for Nature-Based Tourism and Recreation in Kyrgyzstan

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Abstract
Modern information and communication technologies (ICT) – and in particular Geo-ICT which relies on the availability and use of spatial data – is receiving increasing attention from nature-based tourism and recreation across different countries, regions, and natural sites. But, how is Geo-ICT used in the context of nature-based tourism and recreation in Kyrgyzstan? What benefits are there from using Geo-ICT in support of Kyrgyz nature-based tourism and recreation? And what has to be done in order to better exploit the existing potential? To answer these questions different methods such as a questionnaire survey, literature and Internet review, and Analysis of Similar Systems AoSS were applied. Results indicate a low level of use of Geo-ICT applications and features, and great potential to support in one way or another nature-based tourism and recreation in Kyrgyzstan. But, among the users (i.e. planners and managers, tourists and recreationalists) certain skills must be built to enable them to (fully) benefit from Geo-ICT, and awareness-raising on such applications and features must take place and, last but not least, people must be motivated to make use of Geo-ICT.

1. Introduction and Research Question

Tourism including recreation is among the largest and steadily growing industries worldwide. Both are important components of many national, regional, and local economies and they contribute in numerous ways to aspects such as quality of life, sense of place, social connection, physical wellbeing, and learning. This is particularly true for nature-based tourism and recreation which are related to the performance of outdoor activities such as hiking, trekking, cycling, horse riding, ski mountaineering, and snowshoeing (Immoos and Hunziker, 2015). Typically, these activities take place in natural settings or otherwise involve in some direct way elements of nature (e.g. terrain, water bodies, plants, and wildlife). Popular destinations for nature-based tourism and recreation are protected areas like national parks and biosphere reserves, wilderness areas, and developing countries (Cordell, 2008, Kuenzi and McNeely, 2008 and Wood et al., 2013).

Due to the current technical possibilities, the high Internet user penetration rate and the steadily rising numbers of mobile Internet users worldwide, modern information and communication technologies (ICT) and in particular Geo-ICT is increasingly used for a wide range of purposes including those related to nature-based tourism and recreation.

While ICT encompasses all issues related to the transmission of digital information between humans, modern ICT refers to the so-called new media, saying the Internet and associated aspects, i.e. devices used to capture, store, distribute and present all kinds of digital content. Further, modern ICT is closely linked to the Web 2.0 and, thus, to different types of interactive and/ or dynamic applications allowing the users to exchange and to participate. Modern ICT particularly makes use of spatial data due to products such as web maps and location-based services as well as geotagging, mapping, or GPS-tracking (Hennig et al., 2013 and Zeile, 2011).[1]

Benefits of Geo-ICT regarding nature-based tourism and recreation are well-known and widely discussed in literature: The according applications and features support a wide range of aspects related to the needs of planners and managers as well as of tourists and recreationalists. Examples refer to the support of management, guidance and information of visitors as well as contributing to visitors' nature experience.

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[1]In the following, even though the term modern Geo-ICT would be correct, just Geo-ICT is used to keep the text more readable.

Therefore it is not surprising that many efforts to use Geo-ICT in the context of nature-based tourism and recreation can be found around the world (see, e.g., Lupp et al., 2016, Monteiro, 2016 and Walden-Schreiner and Leung, 2016). However, the question is to which extent Geo-ICT is currently used in support of nature-based tourism and recreation in Kyrgyzstan? Which benefits are particularly related thereto? And, what has to be done to even more leverage the potential of Geo-ICT for nature-based tourism and recreation in Kyrgyzstan?

2. Study Area

Kyrgyzstan emerged in 1991 after the dissolution of the Soviet Union. The small Central Asian country (area: 198,500 km^2; population: ~ 5 million) is bordered by Kazakhstan, Uzbekistan, Tajikistan, and China.

The literature outlines that the country has a considerable tourism potential and that it provides great opportunities for domestic as well as international tourism development. Since the landscape of Kyrgyzstan is dominated by mountains, which cover about 94% of the land area, and the nature is (still) largely unexplored and unspoiled, the current tourism product portfolio – as marked by the main tour operators – is a range of tours related to nature-based activities such as trekking, mountaineering, horse riding, and skiing. Here, it has to be highlighted, that for Kyrgyzstan – facing socio-economic problems typical of low-income developing countries – nature-based tourism and recreation are seen as a significant source of income, and, moreover, with a great growing potential for the next years (Mogilevsky and Omorova, 2011, Schofield, 2004 and Thompson and Foster, 2003).

2. Methods

Different methods were applied to gain insight into the current use and potential of Geo-ICT in support of nature-based tourism and recreation in Kyrgyzstan: a questionnaire survey, literature and Internet review, and Analysis of Similar Systems AoSS.

To find out about the status-quo of Geo-ICT use from the perspective of providers of nature-based tourism and recreation offers a questionnaire with 18 open and closed questions was created. It was prepared using the Internet survey tool SurveyMonkey (https://www.surveymonkey.com/). The questionnaire was distributed through direct contact and email (summer 2017) among 51 organizations focusing on nature-based tourism and/ or recreation. All of them were located in Kyrgyzstan.

The questionnaire results as well as the finding from the literature and Internet review helped to identify Geo-ICT applications and features related in one way or another to nature-based tourism and recreation in Kyrgyzstan. The identified Geo-ICT applications and features were analyzed following the method of Analysis of Similar Systems (Nemeth, 2004). Therefore a list of analysis criteria was developed focusing e.g. on type and range of Geo-ICT used, availability/ accessibility of data and media, tools used to develop the application or the according features, and demands addressed towards the users to use applications and features in a competent capable manner (i.e. skills).

3. Status Quo and Potential of Geo-ICT use

Even though the response rate was only 16%, the questionnaire results give some insight into the use of different Geo-ICT applications and features from the perspective of providers of nature-based tourism and recreation offers in Kyrgyzstan (Figure 2). The questionnaire findings, combined with results from the literature and Internet review and the AoSS, are discussed in the following. Considering the different Geo-ICT applications and features – being of interest to nature-based tourism and recreation in general and in Kyrgyzstan – the focus is on web maps, crowd sourcing applications, and applications making use of location based services.

3.1 Web Maps

Web maps which today are omnipresent on the Internet are great information and communication tools whenever spatial data is available (Thielmann et al., 2012). They support experts, among others, in spatial planning, administrative tasks, and research. By the general public they are used, e.g., to get informed, to orientate oneself in physical space, to navigate from place to place, and to find particular sites.

In regions where nature-based tourism and recreation have a long tradition, usually abundant information material such as printed hiking guides and maps, brochures and flyers, and on-site signposts and boards exists (e.g. European Alps). Web maps are one of many information sources. For Kyrgyzstan, this is different: traditional information sources are less available and, thus, web maps can be seen as a (cheap and easy to implement) solution to fill this gap. Despite this benefit, web maps in support of nature-based tourists and recreationalists are still (largely) missing in Kyrgyzstan.

Generally, only short verbal tour descriptions posted on blogs and forums or presented on tour providers' web sites are available. Thus, tourists and recreationalists often lack detailed information on relevant infrastructure such as trails (e.g. course, degree of difficulty, height difference), locations of campsites and yurt camps (traditional nomadic tents as popular option for overnight stays during several days lasting trips), and wells/ springs (i.e. availability of drinkable water). One of the few exceptions is the web site of the tourist information center "VisitAlay" (http://www.visitalay.kg/tours/): each tour's verbal description is completed by a static map presenting the course of the trail and by the according elevation profile. Both, static map and elevation profile, are created using Google Earth (https://www.google.com/intl/en/earth/).

The findings which outline a low use of web maps are also confirmed by the questionnaire results (Figure 1): Most respondents indicated to not provide dynamic web maps to, for instance, illustrate tour offers; if at all only static web maps are provided.

3.2 Crowdsourcing Platforms

Crowdsourcing platforms involve the general public in data collection. This opens up new possibilities to gather data and to close existing data gaps. Among existing tools, media sharing platforms, GPS sharing platforms, and crowd mapping platforms should deserve special attention from nature-based tourism and recreation.

On media sharing platforms (Table 1) users share photos, videos, and sounds. Information on location (i.e. geotags) can either be added when the media is created or afterwards by using specific tools (i.e. geotagging software).

For the use of geotagged media in support of planning and management of nature-based tourism and recreation several examples can be found. Thus, for instance, geo-tagged photos shared on photo-sharing platforms are helpful to provide certain information on tourists' and recreationalists' activities, their preferences and needs (Lupp et al., 2016 and Walden-Schreiner and Leung, 2016). The approach is seen as an alternative to traditional empirical social research methods like questionnaires, interviews, and observation (Brown and Weber, 2011). Since one of the immediate problems of planning and management of tourism and recreational use in Kyrgyzstan is the absence of up-to-date, reliable, and consistent data (Schofield, 2004), these platforms can be seen as a remarkable data source for planners and managers: The number of photos taken and uploaded to Flickr might serve as indicator for the popularity of sites and destinations (i.e. identification of visitor hotspots). This is underlined by Figure 2a which shows the locations in the Ala-Archa National Park (located 20 km south of the Kyrgyz capital Bishkek) where photos were taken. Moreover, the pictures themselves can give insight on the availably and condition of infrastructure. With respect to media sharing platforms, survey results indicate that organizations make use of these systems and/ or consider them important. But, respondents mostly refer only to the use of such platforms for publishing own media and not to analyze data and media provided by other users.

Table 1: Selected media sharing platforms (free of charge)

Media	Platform	URL
Photo	Flickr	https://www.flickr.com/
	Instagram	https://www.instagram.com/
	Twitter	https://twitter.com/
Video	Youtube	https://www.youtube.com/
	Vimeo	https://vimeo.com/
Sound	Freesound	https://freesound.org/
	Soundcloud	https://soundcloud.com/

GPS sharing platforms allow users to publish tracks. Usually the tracks are captured while people are on-site, performing certain outdoor activities. Using a GPS device or a tracking app such as OSMand (osmand.net/) or Geo Tracker (https://geo-tracker.org/) installed on GPS-capable mobile devices GPS/ GPX files are created. Different attributes that characterize the track (e.g. degree of difficulty, scenery, and track visibility, i.e. easy to find/to follow the track) can be added. Besides this information (i.e. the tracks themselves and their attributization), the number of track downloads and views as well as the number and content of comments on the particular tracks is a valuable source of information. This refers not only to tourists and recreationalists in search of valuable information, but also to planners and managers (Monteiro, 2016).

Regarding Kyrgyzstan, a considerable number of GPS/ GPX files representing tours referring to different outdoor activities is available on the different GPS sharing portals. For example, for the Ala-Archa National Park more than 30 tracks can be found on Wikiloc (https://www.wikiloc.com/) and on GPSies (www.gpsies.com). Some of the trails explicitly refer to tours offered by certain providers who on their web site only roughly describe their tours by words (e.g. tours provided by the Trekking Union of Kyrgyzstan TUK; http://www.tuk.kg).

Hence, using the available GPS/ GPX files, web maps can be created to inform tourists and recreationalists about these tours. Despite these benefits, the majority of the questionnaire respondents outlined to not make any use of these portals or the data published there. Not addressed by the questionnaire, but even important are crowd mapping platforms. These platforms allow the general public to add spatial data on real world features.

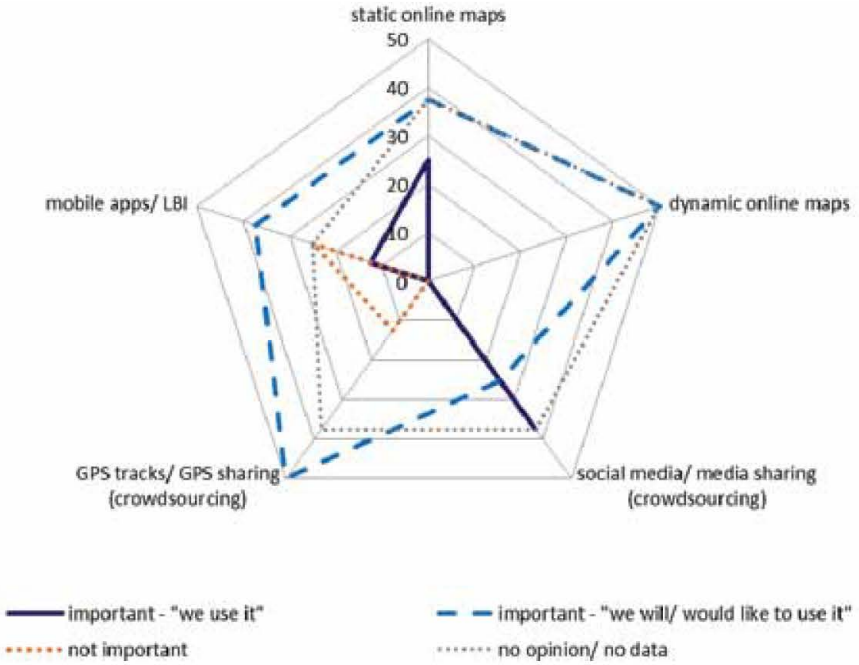

Figure 1: Questionnaire results (N=8)

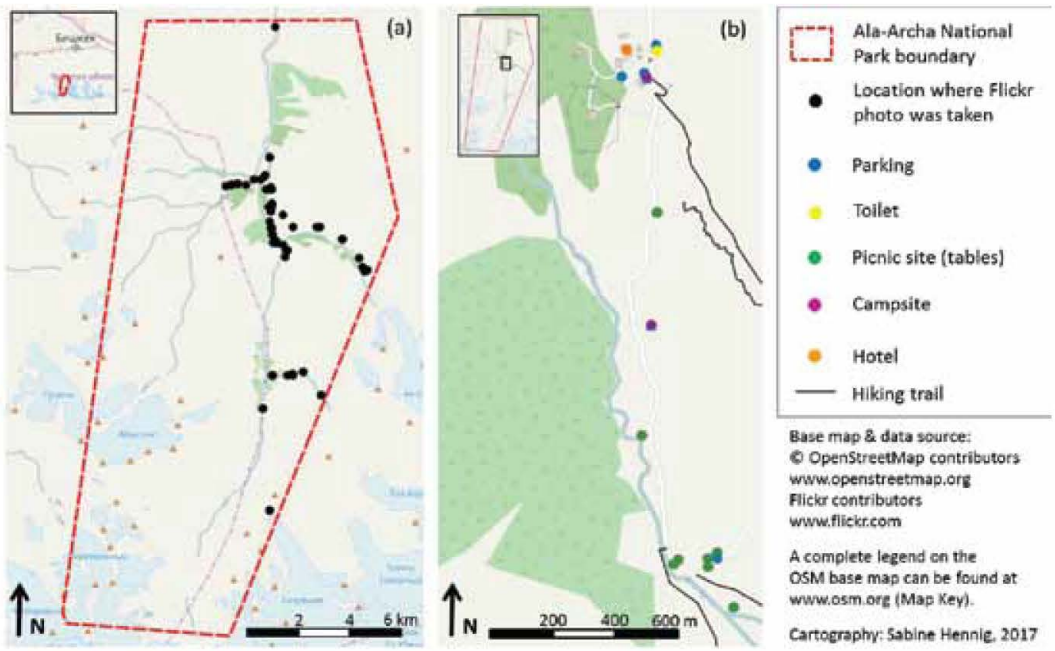

Figure 2: Crowdsourced data related to the Ala-Archa National Park: (a) places where photos uploaded to Flickr were taken; (b) features mapped in OSM

In many domains, crowdsourced spatial data is seen as an alternative method for obtaining and maintaining authoritative spatial data (Hennig, 2017 and Herfort et al., 2015). Since in Kyrgyzstan, spatial data on recreational infrastructure is hardly available such initiatives are of particular value to build up according spatial databases and, thus, for instance, to create web maps. Among the existing public collections of spatial data OpenStreetMap (OSM; www.osm.org) is currently the largest one (see, e.g., Schneider, 2011). To describe features, OSM provides a specific tagging system with tags, consisting of a key and a value to describe real world features (OSM Wiki, 2017; Quinn and Dutton, 2014). Even if numerous tags exist to describe recreational infrastructure in general, for elements specific for Kyrgyzstan, i.e. Central Asia, tags are still missing. Thus, for instance, there are still no tags which are in particular useful to describe yurt camps being an important accommodation facility for tourists and recreationalists. This, first or foremost, requires for submitting according tag proposals to the OSM community. Regarding the spatial data hold in the OSM database, for the example of the Ala-Archa National Park Figure 2b shows that basic elements such as parkings, toilets, picnic sites (tables), campsites, hotels, Alpine huts, viewpoints, and trails are mapped.

3.3 Location Based Services

Location based services (LBS) are based on a variety of localization methods for determining a user's position and providing different kinds of web-based services referring to the identified position. As outlined by Lonthoff (2007), LBS encompass different types of services including location based information (LBI) and location based games (LBG). Both are of particular interest to nature-based tourism and recreation.

LBI means that depending on the identified location site-specific information is given to the user. LBI are used in the context of mobile apps specially developed to inform and guide visitors throughout natural sites (e.g. mobile app "iWebPark" of Swiss National Park; http://www.nationalpark.ch/en/). Although, site-specific mobile apps benefitting from LBI can contribute to environmental education, visitor enjoyment and experience (see, e.g., Haller and Kias, 2015), in Kyrgyzstan according apps are not or barely used in support of nature-based tourism and recreation. This is underlined by the literature and Internet review results as well as the questionnaire findings (Figure1).

Many LBG are GPS-based outdoor adventure games and depending on the focus, they are considered a "modern" type of nature-based tourism and recreation activity (see, e.g. BfN n.d.). Depending on the manner of implementation two categories of LBG can be distinguished: First, accessing and using coordinates of certain locations which have been provided by the players themselves on specific platforms, other players can find these sites. Therefore, today mainly GPS-capable mobile devices are used. The most prominent example for this type of LBG is Geocaching (https://www.geocaching.com/). For Kyrgyzstan currently only about 30 geocaches are available through Geocaching.com. Most of them are located in the Issyl-Kul region. Apart from the coordinates provided, locations (i.e. geocache) are usually also described by some additional information. Thus, for instance, on the geocache "view of the glacier South Inylchek" information on the glacier is provided (https://www.geocaching.com/geocache/GC351WZ_view-of-the-glacier-south-inylchek?guid=67cd748-9-9f1b-439e-a5a4-b0eb201d0780), and on the geocache "largest walnut forest of the World" a hint where to find the tourist information center is given (https://www.geocaching.com/geocache/GC4MMC1_largest-walnut-forest-in-the-world). Other games of this category are e.g. Munzee (https://www.playmunzee.com/), Ingress (https://www.ingress.com/), or Sighter (http://sightergame-.com/).

The second category of LBG refers to entire tours particularly designed in line with a certain aim. Selection of locations that have to be visited (following a track, being guided by coordinates etc.), content provided, and tasks to be solved focus on a certain target group and purpose. Examples therefore are ActionBound (https://en.actionbound.com/), MyGeoQuest (http://mygeoquest.appstor.io/) and Wherigo (http://www.wherigo.com/). For this category of LBG, regarding nature-based tourism and recreation in Kyrgyzstan, no example could be found.

3.4 Improving and Increasing Geo-ICT use

Planners and managers as well as tourists and recreationalists are usually no GI experts. This is not necessary in view of the availability of tools, which, today, are becoming increasingly easier to use. Nevertheless, users require certain skills to benefit from Geo-ICT. For both user groups the required skills vary (Table 2).

Table 2: Skills required on part of planers and mangers as well as tourist and recreationalist to (competently) use Geo-ICT, i.e. different tools related thereto

Geo-ICT Applications/ Features	Planners & Managers	Tourists & Recreationalists
Web maps	off-the-shelf tools (e.g. Google Maps/ Earth, ScribbleMaps): spatial skills APIs (e.g. Google Maps, OpenLayers, Leaflet): GI skills, programming/ query languages, etc.	Spatial skills
LBI	Content Management Systems CMS & Plugins (e.g. Drupal, Joomla): GI and CMS skills	LBI app: spatial skills
LBG	Spatial skills	LBG app: spatial skills
Media sharing platform	GIS applications & Plugins: GI skills APIs: programming, query languages	Digital and media skills
Crowd mapping platform	GIS applications & Plugins: GI skills APIs: GI skills, programming, query languages	Spatial skills
Platform for GPS tracks	GIS applications: GI skills APIs: GI skills, programming, query languages	GPS tracking apps: spatial skills

Tourists and recreationalists require spatial literacy skills including digital and media literacy skills (to create and share content; work cooperatively; know/ understand base maps/ overlays; navigate/ search maps; add, download, convert spatial data; know relevant terms; be able to critical reflect on the power of maps etc.). Since Geo-ICT today plays a pivotal role for all kinds of everyday activities, these skills are gaining importance all over.Based on concepts like spatial literacy (Vogler and Hennig, 2013) and spatial citizenship (Gryl and Jekel, 2012) the demanded skills are ever more imparted in school education and education throughout many countries worldwide. Referring to planners and managers, they must provide of some more advanced background on geoinformatics (e.g. to download, preprocess, analyze, combine, and manage spatial data). Courses offered by experts (e.g. in cooperation with universities, lifelong learning initiatives), online material developed to meet these user's needs, and possibilities to exchange with others coming from different countries, regions and/ or natural sites (e.g. conferences, workshops) are suitable means (Hennig, 2017). The relevance of education and training measures is also underlined by the questionnaire results: the majority of the respondents outlines the need for more qualified staff (88%).

Moreover, users must be encouraged to make use of Geo-ICT: Tourists and recreationalists have to be encouraged to contribute to crowdsourcing platforms (e.g. being aware why it is important to contribute; Engels, 2015). Planners and managers – for whom technical barriers are generally higher – need to be motivated to use Geo-ICT considering its potential and to overcome starting difficulties usually related to the use of new tools and methods.

Finally, people must know about applications and features. Missing awareness and knowledge becomes obvious due to the high percentage of answers with respondents having no opinion or not answering questions at all (i.e. no data; Figure1).

4. Conclusion and Outlook

Geo-ICT applications and features such as web maps, LBS, and crowdsourcing applications open up potential for nature-based tourism and recreation. Even though Geo-ICT is still not much used in the context of nature-based tourism and recreation in Kyrgyzstan many reasons account for increasing its use among planners and managers as well as tourists and recreationalists (e.g. source of information to plan excursions, to know visitor hotspots, to assess infrastructure, to increase visitor experience). This requires for educational measures (to build the required skills) and for motivation strategies (to encourage for use and contribution of data/ media). Further, in expectation of rising visitor numbers to Kyrgyzstan the use of Geo-ICT can contribute to better decision making not only to increase economic income, but also to protect natural resources (e.g. attaining appropriate visitor distribution across a territory, keeping visitors away from environmentally sensitive areas, and communicating minimum-impact behavior).

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