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Ethnic and locational differences in ecosystem service values: Insights from the communities in forest islands in the desert

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ABSTRACT

Understanding cultural preferences toward different ecosystem services is of great importance for conservation and development planning. While cultural preferences toward plant species have been long studied in the field of plant utilisation, the effects of ethnicity on ecosystem services identification and valuation has received little attention.

We assessed the effects of ethnicity toward different ecosystem services at three similar forest islands in northern Kenya inhabited by Samburu and Boran pastoralists. Twelve focus groups were organised in each mountain, to evaluate the ecosystem services provided by the forest, and assess which plant species are most important for provisioning different ecosystem services.

While water was always identified as the most important ecosystem service, the second most important differed; and some were only mentioned by one ethnic group or in one location. Preferred plant species for food, fodder, medicine resources, poles and firewood followed the same pattern.

Our results showed that ethnicity and location affect ecosystem services' identification and importance ranking. This should be taken into account by decision-makers, e.g. as restricted access and regulated extraction is likely to affect people differently. Conservation and development projects would be more effective if they were initiated with an understanding of how people already use and value their forests.

1. Introduction

There has been an increasing interest in ecosystem services (ES), in the research, policy and practitioner communities (Costanza and Kubiszewski, 2012). Since the publication of the Millennium Ecosystem Assessment (MEA) by the United Nations in 2005, and the Economics of Ecosystems and Biodiversity (TEEB) report in 2010, the concept of ecosystem services not only gained broader attention, but it also entered the consciousness of mainstream media and business (Costanza et al., 2014). According to most researchers, the assessment of ES demands an integrative approach that considers ecological, economic and social evaluation criteria (Burkhard et al., 2010). However, most state-of-the art ES research has taken either an ecological or economic approach, or a combination of the two (Raymond et al., 2013), with limited studies using a social approach. Social approaches to ES assessment are those which apply research methods from the social sciences (e.g. interviews), value ES in non-monetary terms (e.g. perceptions) and explicitly make stakeholders the focal point of the research (Orenstein and Groner, 2014). These social ES assessment approaches can complement and increase the value of traditional economic and ecological approaches, as they have the advantages that they can help: (a) value cultural services, (b) understand complex socio-ecological systems, (c) assure social relevance of the ES assessment process and (d) strengthen the policy relevance of the assessment (see Orenstein and Groner, 2014 and references therein). Moreover, they also help ensuring that subsequent management interventions are embedded and work with the local culture(s).

It has been argued that geographic, socio-economic and cultural factors, life experiences, and the use and non-use of particular areas of the landscape shape how individuals value ES (e.g. Allendorf and Yang, 2013; Alassaf et al., 2014; Muhamad et al., 2014). For instance, in several countries in Southeast Asia poor people, educated people and communities in close vicinity to forests tend to identify more ecosystem services (Sodhi et al., 2010). In southwest China, male, older age groups and people with higher level of education are more likely to identify more ES (Allendorf and Yang, 2013). Among the factors which affect ES identification and ranking, cultural factors such as ethnicity have received little attention. One recent study in the

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southern Arabah Valley including Jordanians and Israelis reported significant differences in ES ranking between different cultural groups (Orenstein and Groner, 2014). In southwest China and Hawaii ethnicity is also found to affect the identification of ES (Allendorf and Yang, 2013; Gould et al., 2014).

Interestingly, cultural preferences (related to ethnicity) toward plant species have been long studied in the field of wild plant utilisation (ethnobotany, ethnomedicine, wild edible fruits and vegetables) (e.g. Mnzava et al., 1999; Wickens and Lowe, 2008). For example, useful plant species and even plant parts of the same species are known to differ geographically and in relation to ethnic group (Assogbadjo et al., 2012; Sop et al., 2012). Plant use by local communities is also affected by the abundance of a species, the availability of alternative species and local taste preferences (e.g. Jusu and Cuni Sanchez , 2014). These three factors are also likely to affect preferences towards ES.

Understanding cultural preferences toward ES is of great importance, especially for conservation purposes and for local development planning; including sustainable ES dependent livelihoods (Hartter et al., 2012). For instance, such information can be used to anticipate possible changes in the future, because typically there are trade-offs between different ecosystem services (Foley et al., 2005). For example, the enhancement of provisioning services (timber or firewood extraction) typically causes the decline in many other ecosystem services (water quality, soil conservation) (Foley et al., 2005).

The main objectives of this study were: (i) to determine if ethnicity and location (defined as spatially separated mountains) affect ES identification and ranking, and (ii) to assess if ethnicity and location affect the selection of most important plant species for different ecosystem services. As study area we selected three forest islands in the arid lands of northern Kenya. These forest islands are seasonal and dry-spell cattle grazing stations, and their conservation is a challenge. As already reported in 1961, 'the problem [of protecting northern Kenya forests] is not a small one; short of employing an army of forest guards, it would be impossible to protect these forests from damage or destruction by an unwilling population' (KNA, 1961). For example, in one of the forest studied, which is an important elephant habitat in northern Kenya (Ngene et al., 2009), ten plant species are red listed by IUCN and deforestation and forest degradation are major problems, mainly linked to firewood harvesting and increased demand for agricultural land for food production (Shibia, 2010; Githae et al., 2008). Through this case study in northern Kenya, we aim at highlighting gaps in current ES research and show how one could address these gaps, not only in northern Kenya, but elsewhere in the world.

2. Materials and methods

2.1. The case study area

This study focused on the communities living adjacent three forested mountains in northern Kenya: Mt Nyiro (2752 m), Mt Kulal (2285 m) and Mt Marsabit (1707 m) (Fig. 1). Most of northern Kenya, which are lowlands, is classified as a very-arid area with annual rainfall between 150 and 350 mm (zone VII, Sombroek et al., 1982). However, the mountains we studied are much wetter and cooler, with annual rainfall between 800 and 1400 mm (semi-humid area, zone III, Sombroek et al., 1982). Rainfall is concentrated in two wet seasons, from March to May and from October to December, but great inter-annual variation occurs, with some years having one or no rainy season.

In northern Kenya, closed forests are always restricted to mountain areas and hilltops, where mist condensation leads to more humid conditions (Bussmann, 2002). Although the three forests studied have similar forest types, there are some differences in observed plant communities and the altitudes where these are located (Table 1A,

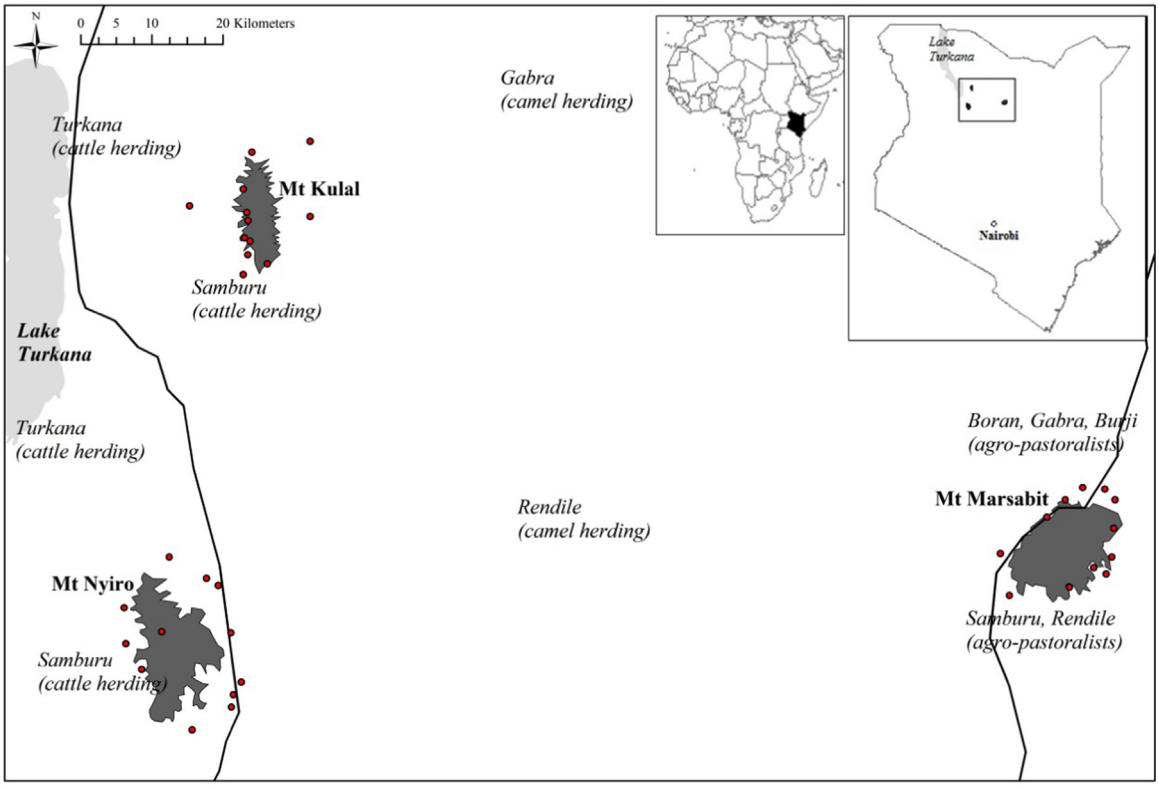

Fig. 1. Selected mountains in northern Kenya and villages where focus-group discussions were organised with regard to main ethnic groups in the area. Black lines refer to major roads, dark grey areas to forests and red dots to villages studied. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)