



Assessing the sustainability of community forest management: A case study from Iran



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ABSTRACT

The development of sustainability criteria and indicators is necessary to assess the current management and to recognize appropriate management approaches towards sustainable forest management (SFM). The aim of this study is to assess the sustainability of current management in the Dopolan community forest and assess alternative management scenarios towards SFM. To this end, we applied multi criteria analysis which consists of three steps: a) developing a primary set of criteria and indicators (C&Is) on focus groups discussions, b) finalizing and weighing the set of C&Is, applying a pair wise comparison as well as ranking method, and c) assessing the current forest management regimes and alternative scenarios against a set of C&Is. As a result, 8 criteria and 40 indicators were selected. Our results indicated that to achieve SFM, the criteria including forest protection against natural and human factors, the establishment of appropriate legal and institutional requirements and socioeconomic functions of forests, are the most important criteria (weighted 14.60%, 14.28% and 13.96%, respectively). Assessing the current management regimes revealed that the criteria consisting of biodiversity conservation and local communities' awareness have the maximum distance to SFM (weighted 7.75% and 9.18%, respectively). Among the alternative forest management scenarios, the sixth scenario namely conservation and rehabilitation, local investment attraction in forest conservation and rehabilitation, enabling and capacity building of forest inhabitants were realized as the best scenarios (weighted 26.20%) to achieve SFM. A joint effort of the concerned government forestry officials and local people is needed to enhance the sustainability of all community based forestry models.

1. Introduction

Since the end of the 1980s, the concept of sustainable development has gained general acceptance. The philosopher Mencius (Legge, 1893) stated “Refraining from overfishing will ensure fishing lasts forever; cutting wood according to the season ensures healthier forests”. This is the simplest explanation of harmony and sustainable development. The roots of such ideas can also be found among the influential Chinese philosophies such as Confucianism, Daoism and Buddhism (Xinhong, 2007). In forestry, the concept of sustainable forest management (SFM) has been an accepted principle since the 18th century (Wiersum, 1995). SFM has been recognized as forestry's contribution to sustainable development and participatory forest is an approach to achieve

sustainability (Higman et al., 2005). Thus, a simple explanation of SFM is that forest management is based on sustainable development concepts. Accordingly, SFM embraces a wide range of forest management issues including economic, environmental, and social aspects (Mendoza et al., 2003). To date, several hierarchical frameworks have been developed for the SFM concept. Van Bueren and Blom (1997) suggested a standard framework including principles, criteria and indicators (C&Is). Indeed, the hierarchical frameworks provide a base for sustainable forestry monitoring and assessment of the quality of forest management. The criteria are key elements of sustainability, which introduce general conditions and do not have the ability of measurement, but they usually introduce some indicators, which are measurable. The indicators define different quantitative characteristics and situations in

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forest including ecological, social and economic, which are useful for detecting changes and monitoring trends in the forest (Van Bueren and Blom, 1997; Mendoza and Prabhu, 2000a; Mendoza and Prabhu, 2000b; Mendoza and Prabhu, 2003; Velázquez et al., 2010; Li et al., 2011; Singh et al., 2011; Abebaw et al., 2012; Zenteno et al., 2013; Martire et al., 2015).

The FAO in collaboration with partner institutions including the United Nations Environment Programme (UNEP), the Center for International Forestry Research (CIFOR) and the International Union of Forestry Research Organizations (IUFRO) has catalyzed and supported the initiation of C&Is processes in a number of developing regions that did not earlier participate in the debate. These include African (Nairobi, Kenya, 1995), Pan-European (Lisbon, Portugal, 1998), Montreal (Santiago, Chile, 1995), Amazon (Tarapoto, Peru, 1995), Central America (Tegucigalpa, Honduras, 1997), Asia/South Asia (Bhopal, India, 1999), Near East forest region (Cairo, Egypt, 1996) and Iran (Castaneda, 2000). Each region had to consider a district or forest management unit in which in addition to forest type and topography, social and economic characteristics are considered. Many developing countries participated in the debates, but in later stage, in particular after 2000, SFM C&I were confused because UN could not come up with a consensus on forests internationally. Since all the C&Is were made at international level and customizing them was essential for each country, it was difficult to nationalize the C&Is and customize them in local condition. Maryudi et al. (2012) reviewed the practical considerations in evaluating the outcomes of community forestry. According to them, the core concept of community forestry lays on its attempt to build the active participation of the locals, with the external involvement having a supportive rather than managerial nature. The concept is founded on the recognition of interdependency and intimate synergies between rural people and forests. The C&I or forest indicator certifications are adapted for a different user group and specific purpose. Participants emphasized the key role of forest certification to use C&I at local level in forest management practice and the wealth of knowledge and experiences of forest certification schemes to engage with forest management decision makers, both large and small holders. Participants also emphasized the use of C&I, a reference framework for developing and applying forest certification standards (FAO, 2015).

Achieving policy goals that are not clearly backed up by formal regulation or availability of finance is a difficult task (Lidskog and Löfmarck, 2016). For instance, Widman (2015) found that Swedish forest owners with large properties and/or with environmental or heritage-oriented goals are more likely to enter into nature conservation agreements (i.e. to preserve, develop or create areas with high values). Using contrasting empirical data from two Swedish municipalities that have different preconditions for forest related activities, Eggers et al. (2017) invited selected experts to assess the consequences of various management options. Their results indicate that current management practices are favorable for economic aspects (wood production), while a number of scenarios would be better suited to fulfill the Swedish co-equal forest policy goal of production and consideration of environmental issues, such as scenarios with longer rotation periods, a larger share of set-asides and a higher share of continuous cover forestry. The result of the study conducted by Lindahl et al. (2017) also suggests that production values generally have a higher weight in management decisions compared to environmental values.

Socially relevant C&I reflect the range of forest attributes valued by public. In a recent research on indicators for forest management in Victoria (Australia) by Ford et al. (2017), seven broad valued attributes of forests were identified: Natural; Experiential; Productive; Setting; Social/Economic; Learning; and Cultural. According to Arts and Buizer (2009), since fostering flexible forests is a priority for many nations around the world, some features of the shift “from government to governance” can be traced worldwide, including decentralization, an increased importance of commercial actors, and an increased reliance on market-driven certification schemes.

Multidimensional analysis is a decision-making method, which is suitable for solving complex problems which include qualitative and quantitative aspects. The SFM is considered as complex problems due to a variety of ecological, social and economical circumstances as well as stakeholder's interests and benefits which are involved in it. In order to achieve SFM, the interest and insights of all stakeholders must be taken into account (Mendoza and Prabhu, 2000a; Mendoza and Prabhu, 2000b). Accordingly, multidimensional analysis could provide a framework for taking into account and adjusting different interests and insights of stakeholders.

Several authors have applied the multidimensional approach using analytical hierarchical process (AHP), analytical network process (ANP), rating and scoring methods to assess the sustainability of forest (Wolfslehner and Vacick, 2008; Tajbar et al., 2008; Balana et al., 2010; Islam et al., 2010). In a study conducted in Iran, Goushegir et al. (2009) used AHP and developed a set of 8 criteria and 28 indicators for timber production and forest conservation in the Kheiroud-Kenar forest. Zandebasiri and Parvin (2012) used the framework of Pressure-State-Response (PSR) to determine key C&Is of sustainable forestry in Tang-e Soolak forest in Kohgiluyeh and Boir-Ahmad province. Khazaei et al. (2009) investigated the role of policy, planning and institutional frameworks in achieving SFM in Pichit villages and the forests around, using rating and scoring methods.

Zagros mountains' forests management (known as one of the five main vegetative regions in Iran) has experienced massive challenges. The challenges include high dependency of local communities on forest resources, lack of economic and social development in parallel with population growth (Fattahi et al., 2000; Soltani et al., 2009), agricultural land conversion, overexploitation and cutting trees for fuel wood, overgrazing, unsuitable land use, exogenous effects like Arabian dust storm and current periodic drought (Jafari et al., 2012). On the other hand, the fulfillment of forest management plans has faced deficits including weak financial support, lack of public perceptions, inappropriate spatial organizing and unreliable data on forest characteristics (Ebrahimi-Rostaghi, 2005; Zandebasiri et al., 2010). Thus, the development of sustainability criteria and indicators seems to be necessary to assess the current management and to recognize appropriate management approaches towards SFM, in which the sustainability of the region should be provided. This study addresses this approach in the Dopolan community forest as a case study for the central Zagros forest, Iran.

2. Material and methods

2.1. Study area

The study area, Dopolan community forest, is a part of Zagros vegetation region which covers 5 million ha from Northwest to South of Iran. The study area is located geographically at 31° 56' 24" to 31° 45' 8" N latitude and 50° 36' 52" to 50° 43' 40" E longitude (Fig. 1) covering an area of approximately 2570 ha. The average altitude of this area is 1530 m above sea level. Dopolan has a semi wet climate in which, the average yearly rainfall fluctuates between 500 and 800 mm and the average yearly air temperature is 14.2 °C. Soil types vary from Clay-Loam to Silty-Loam and soil erosion is very clear in steep slopes. Dominant vegetation type in this area is *Quercus brantii* and other types such as *Quercus brantii*- *Fraxinus excelsior*, *Quercus brantii*- *Pistacia mutica* and *Quercus brantii*- *Cratagus* spp. are in the next frequency. There are 12 villages with approximately 4193 people in the study area, which are usually farmer (barley, wheat, rice and fruit trees like pomegranate, peach, apricot) and/or animal husbandry (sheep, goat, cow and bee).

The overall goal of forest management in this area is forest protection and conservation, however in 300 ha of the forest development area (*Quercus brantii*) and in 100 ha forest enrichment with endemic species such as *Cratagus* sp., *Amygdalus* sp. and *Pistacia* sp. are under

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