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# Revealing the role of livelihood assets in livelihood strategies: Towards enhancing conservation and livelihood development in the Hara Biosphere Reserve, Iran

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ABSTRACT

Livelihood in Iran's rural areas, as elsewhere in the developing world, is highly intertwined with the harvesting of environmental resources, leading to severe environmental degradation. To shed light on possible solutions, this study employs the conceptual framework of sustainable livelihood and the multinomial logit model. This reveals the intra-household determinants of each livelihood strategy that significantly contribute to designing better livelihoods and socio-economic development programs. Such factors alleviate environmental resource demand, and thus degradation. By employing a two-step cluster analysis with seven indicators related to households' livelihood activity, three distinctive livelihood strategies were identified, including commercial, mixed, and fishery/livestock strategies. Livelihood assets that encompass human, physical, social, natural, and financial assets are considered as dependent variables, while household livelihood strategies are independent variables. Data was collected through both qualitative and quantitative methods, including household surveys, direct observation, and unstructured interviews with local informants and administrators. The results show that enhancing financial, social, and human assets have facilitated adopting commercial and mixed strategies, while physical assets have enhanced the propensity toward the fishery/livestock strategy. Moreover, although financial assets are the most significant assets in facilitating adoption of non-environmental strategies, enhancing environmental pursuer's access to financial resources alone, without improving their human and social assets, may lead to higher harvesting efforts. Therefore, the study concludes that interventions aimed at enhancing both conservation and livelihoods should improve the human, social, and financial assets of resource users, to facilitate the adoption of less environmentally reliant and profitable strategies.

## 1. Introduction

The term "livelihood" has been defined by various authors, and many frameworks have been designed by a variety of international institutions including Food and Agriculture Organization (FAO), United Nations Development Program (UNDP) and Department for International Development (DFID) to elaborate its concepts, elements, and boundaries. This provides a common definition that "a livelihood comprises the capabilities, assets and activities required for a means of living" (Chambers and Conway, 1992). People engage in different livelihood strategies as specified by their access to livelihood assets, indicating the significance of the assets in enabling households to engage in a variety of livelihood strategies. A livelihood strategy is defined as an activity that people choose to achieve their livelihood goals. However, people tend to choose a combination of strategies to attain their livelihood goals, according to their possession of livelihood assets (DfID, 1999). Livelihood assets refer to the resource base of different households, and are classified into five categories: human, social, financial, natural, and physical (DfID, 1999). Livelihood assets are internal influential factors which have a crucial role in the mechanism of household decision-making to engage in livelihood strategies (Fang et al., 2014; Scoones, 1998; Wu et al., 2017). According to Chambers and Conway (1992), a livelihood is sustainable "when it can cope with and recover from stresses and shocks, maintaining or enhancing its capabilities and assets, while not undermining the natural resource base".

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The concept of livelihood has been central in sustainable environment management debates in recent decades (Allison and Ellis, 2001; Berhanu et al., 2007; Kusiluka et al., 2011; Ohlsson, 2000; Pomeroy et al., 2017; Rigg, 2006; Scoones, 2009; Thuo, 2013). The relationship between the two concepts seem to be causal, and thus sustainable environment management cannot be understood without considering livelihood development. For instance, enhancing local livelihood provides positive outcomes to the environment through reducing environmental dependency and alleviating poverty. Moreover, the environment supports livelihood and welfare by providing various ecosystem services, especially in rural areas that are closely located in natural resources such as forests. Today, the livelihood of millions of rural households worldwide is closely related to the environment. From a sustainability perspective, a livelihood must not threaten the natural resource base (Chambers and Conway, 1992). Thus, livelihood development interventions should alleviate major dependency on the environment, as this undermines the natural resource base.

However, dependency of rural communities on natural resources in general, and forest resources in particular, has been a major obstacle in implementing forest protection programs (Gunatilake, 1998; Masozera and Alavalapati, 2004). The current level of livelihood dependency on environmental income is reported as high in many developing countries. For instance, in Ethiopia, Melaku et al. (2014) found that 47% of the total annual income of local people is derived from forest products. In Bolivia, the share of forest income to annual income is reported as 20% on average (Uberhuaga et al., 2012). Other studies also report a high level of dependency on environmental income in developing countries, including Zambia (43.9%) (Kalaba et al., 2013), Bangladesh (11.59%) (Misbahuzzaman and Smith-Hall, 2015), southern China (31.5%) (Hogarth et al., 2013), Malawi (15%) (Kamanga et al., 2009), and Iran (24%) (Dehghani Pour et al., 2017). Therefore, dependency of local livelihood on environmental income is considerable in developing countries.

This has been considered as one of the main drivers of environmental degradation and depletion, especially in developing countries. For example, agriculture is estimated to be responsible for around 80% of deforestation worldwide (Kissinger et al., 2012). Subsistence activities including fuel-wood collection, charcoal production, and livestock grazing are the most important drivers of forest degradation in Africa (Kissinger et al., 2012). As a result of forest loss in Myanmar, local economic activities including agriculture expansion, fuel-wood consumption, and charcoal production are among the main direct drivers, followed by commercial logging and plantation development (Leimgruber et al., 2005). Moreover, mangrove ecosystems are largely being threatened by the various economic activities of local dwellers, especially in Asia. In the Philippines, mangrove decline from 1994 to 1995 was associated with overexploitation by coastal dwellers, conversion to agriculture, salt ponds, industry, and settlement. However, aquaculture expansion was reported as the major driver (Primavera, 2000). The major causes of mangrove deforestation in tsunami affected areas of Asia were found as agricultural expansion (81%), aquaculture (12%) and urban development (2%) (Giri et al., 2008).

As shown above, the economic activities of local people to respond to their livelihood needs (both cash and subsistence) is causing severe environmental degradation and depletion, especially in developing countries such as Iran. Environmental degradation as a result of large livelihood dependency is a common feature among various Iranian ecosystems. For instance, the Zagros mountains, which account for almost 40% of the country's forest, have experienced severe degradation mainly because of local economic activities and high reliance on natural resources (Fattahi et al., 2000; Jazirehi and Ebrahimi Rostaghi, 2003; Sagheb-Talebi et al., 2004). Forest management authorities in the country have considered the Zagros and its biodiversity as a severely degraded ecosystem and claim that the majority of the pressure is rooted in local livelihood activities (Fattahi et al., 2000). Livelihood strategies pursued by local communities, including animal husbandry and forestry products collection, have caused severe overgrazing and overharvesting. According to the Conservation of Biodiversity in Central Zagros Project, 96,000 ha of forest in the Zagros mountains have been destroyed over the last thirty two years, mainly by local community economic activities (wood collection, overgrazing) and natural factors (fire, and disease) (mentioned in Tahbaz, 2016). The same story holds true for the Caspian Forest in the northern part of the country, which is being threatened by overgrazing caused by animal husbandry activities (Sagheb-Talebi et al., 2004). Currently, the grazing areas in the country are being used at three times their carrying capacity, leading to severe soil erosion and land degradation (Tahbaz, 2016). Croitoru and Sarraf (2010) estimated that over the past 57 years, deforestation for agriculture, firewood, and charcoal have contributed to the reduction of Iran's forest area from 19.5 to 12.4 million hectares.

As mentioned above, local livelihoods have been placing undue strain on the environment in the country. Therefore, understanding and analysing local livelihood strategies can be the first step in limiting environmental degradation. Moreover, failure to understand local livelihood strategies may result in designing inappropriate conservation programs, which will eventually lead to unsustainable outcomes, such as the overuse of resources, illegal activities, and poverty. In sum, livelihood analysis seems to be the first step in reducing pressure on the environment through its contribution to the design of more effective conservation and livelihood development programs. In this line, the study attempts to reveal the role of livelihood assets, as intra-household determinants of livelihood adoption, in influencing various livelihood strategies. This will provide valuable knowledge to policy-makers for designing better livelihood development and environmental conservation interventions, facilitating livelihood change, and designing better targeted poverty alleviation policies. In this study, the Hara Biosphere Reserve (HBR), that is being threatened by severe livelihood pressure, is considered as the study case. The intertwined relationship between local livelihood and the Hara Biosphere Reserve is elaborated in the next section.

### 1.1. Local livelihood and the Hara Biosphere Reserve environment

The Hara Biosphere Reserve is primarily surrounded by low and middle-income rural communities, many of them located in remote areas far from cities. There are limited livelihood options in such remote rural communities. Because of this marginality, the majority of local people are less-capacitated, undermining their ability to engage in cities' labor markets. For instance, according to Dehghani Pour et al. (2017) the mean year of education of household members is less than seven, a number that decreases among poor households. Thus, a less-capacitated rural population with scarcity of alternative livelihood options, makes the HBR a vital source of income for rural households.

The HBR contributes to local livelihood and welfare in a variety of ways. Firstly, it supports fishery in the area. Fishery is a prevalent livelihood strategy in the region and nearly 63% of local people depend on a fishing income. However, the share of fishery differentiates according to income class. According to Dehghani Pour et al. (2017), fishing income contributes to 21% of the total average income of local households. Fishery in the HBR is a profitable activity, as the necessary equipment for fishing is lower than fishing in the sea, and the density of fish is higher. This could be an explanation for why households derive almost all their fishing income from the HBR. Secondly, the reserve supports livestock husbandry in the area by providing a year-long source of feed for livestock. Local people harvest twigs and the branches of mangrove trees to feed their livestock. Moreover, in some parts, camels graze on mangrove trees that sit on the landside. Thirdly, the HBR is a tourism destination and thus provides a tourism income for rural communities. However, only a small portion of the population (15%) has a tourism-dependent income, as the majority of the HBR incomes depend on resource-use activities such as fishery and forestry (Dehghani Pour et al., 2017). The HBR plays such a crucial role in