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ABSTRACT

This study examines local communities’ incentive programs in order to forest conservation in three forested village in Baneh city, Kurdistan province west of Iran in northern Zagros forest. Topographical, climatic and edaphic conditions have created several ecosystems and habitats in the 6.07 million ha of the area have been covered with forests which are called Zagros Oak Forests. The Zagros forests have biologically supported a rich variety of plant and animal diversity. Changes in local communities’ social and economic systems and inefficiency of forest traditional management caused critical situation in the stability of forest in recent decades. Lack of productive and arable lands and consequently, unemployment and poverty have made people to overexploit the nature especially forest lands in Zagros forests. Severe intervention of people in traditional forest management creates some conflicts between people and forest management organizations. To reach the sustainable resource management including, forest resources conservation and improvement of natural resources based livelihoods of the communities, applying a set of Forestry Incentive Programs which consider the important functions of forests are desirable. In order to investigate forestry incentive programs, data obtained from a survey of local communities, using Questionnaire, interview and observation. In this research 276 households in three villages were studied and 76 questionnaires were completed by household’s holder in the quantitative analysis. Sampling was performed using simple random sampling (SRS). Using the DPSIR analysis and interaction analysis, Driving forces, Pressures, State, Impact and Responses in order to imply forestry incentive program were identified. Also evaluation of local community benefits from forest, in order to clarify financial value of incentive programs was done.

KEYWORDS: Zagros forests, Traditional management, Conflict, Forestry Incentive Programs, DPSIR analysis

INTRODUCTION

The forests of Iran cover about 14.2 million ha and constitute 9% of the total area of the country. The Zagros forests, with an area of around 6.07 million hectares, account for almost 45% of the country’s forests. The forests provide a home and livelihood for approximately 10% of Iran’s population (Doe/Goiri 2004). Zagros forest for over 1100 km from the north to south, along the Mountain Zagros – through southeast of Turkey, Iraq, and western Iran – stretches the belt of the primarily deciduous oak forests (Figure 2) occupying the elevation from 700 to 2300 m above sea level (Menitsky et al., 2005). These forests consist mainly of degraded natural stands of oak and pistachia species. Some figures suppose that the Zagros deciduous forests cover 5.5 million ha and occupied 12 million ha 40 years ago. The biomass accumulation level is thought to have been greatly reduced from 125 tons/ha five decades ago, to a mere 8 tons/ha nowadays. In recent decades, a gradual transition from such a lifestyle to permanent settlement and year-round grazing has taken place, which has resulted in a heavy pressure on the vegetation cover in this region (Jazirehi and Ebrahimi 2003). Studies indicate that the increasing population, the low level of development, and the high dependency of local communities on the forests for their primary livelihoods appear to be the main reasons for this decline (Ghazanfari et al., 2004). Zagros forests are currently considered as degraded forests. The lack of regeneration in these forests because of increased browsing pressure on regenerating trees is a major concern and there are no commercial-sized trees left in Zagros (Jazirehi and Ebrahimi 2003; Ghazanfari et al., 2004; Pourhashemi et al., 2004; Sagheb-Talebi et al., 2004).

Forests and rangelands in Iran are under the governmental authority and supervision of the Forest, Range, and Watershed Management Organization (FRWO). Since forests and rangelands belong all together to nobody and to everybody (forests are public property in Iran), they are recklessly overexploited. The “first come, first serve” concept became a predominant method of natural resources’ utilization and misuse and mismanagement have resulted in even deeper socio-economic problems, giving rise to more poverty in rural areas. The government and its administrative authorities
are investing massively to rehabilitate, protect and manage forest, in other hand in most of the forests of Iran there are some kinds of conventional ownerships. In some parts, this kind of ownerships and the relations that have been shaped on the basis of social accepted low are very strong but in the other parts are not. In Zagros, especially in northern parts, where is the territory of Kurdish people, this kind of conventional ownerships and conventional relationships between the man and nature are extremely strong (Ghazanfari et al., 2004). The aim of traditional forest management by the conventional forest owners is to collect fodder for domestic animals, fuel wood and timber and under canopy farming (Figure 1).

Forest management regimes of public forests are important in determining the outcome of forest use (Kant, 2000). A management regime may take the form of centralized management (where state agencies coordinate regulation), decentralized management (where local people are more actively involved) or quasi-private/private. Management regimes are responsible for assigning property rights to the various stakeholders and guiding use and consequently the outcomes (Meinzen-Dick and D. Gregorio, 2004). Therefore; it becomes necessary to understand the incentive structures that govern forest use by local communities so as to determine the optimal management regime that would address the people’s need without jeopardizing the conservation efforts. Under this management local people are not allowed to harvest any timber or non-timber products from this part of the forest. Local people are allowed to use the forest in a limited way through grazing, collection of dead timber for fuel, mushrooms, fruits and collection of medicinal plants. The new approach of the incentive-induced conservation has two distinct elements: first, it allows people in the vicinity of the protected area or others with property rights to participate in the conservation process and second, to link the objectives of conservation with the local development needs of the people (Hutton and Leader-Williams, 2003).

Researchers have pointed out the centrality of the local communities in the process of natural resource management. The local people obtain substantial financial benefits in the form of products they extract from the forest (Guthiga & Mburu, 2006). However, the propensity of owners to take up any incentive is not driven primarily by financial goals. Rather, ability to deploy access incentives to longer-term stewardship goals may be sufficient to bring them into the forest conservation scheme (Church & Ravenscroft, 2007). Public acceptance is of utmost importance to every management decision that public agencies make concerning natural resources (Bruce et al., 2002). Forest conservation may negatively impact on the livelihoods of the local communities and this may reduce the effectiveness of the intended policies. Research on local communities’ perceptions and participation with forest management in Zagros region is limited (Fattahi, 1995). The current study has been done, in order to applying a set of Forestry Incentives Programs which consider the important
functions of forests are desirable and to encourage local people to get along with sustainable management of forests.

1. Materials and Methods

2.1 Study area

The study was carried out in three forest villages (Kochar, Belaka, Kandasura) in Armardeh, Baneh, Kurdistan province. Armardeh located 17 km southwest of the city of Baneh and northwest of Kurdistan province in northwest of Iran (Figure 2). Each case study includes a village and the land utilized by the village community of that respective village (Customary village unit). In all three villages, in general husbandry is most important with regard to income and employment. There is customary ownership in custom units in these villages. The forest land of every village and family were fixed by customs, For instance, every villager knows where “his” forests are.

Table 1 shows some structures of the selected villages. The vegetation types in study area are mainly oak trees and shrubs-bushes extend between 1200 and 2300 meter above sea level and are differentiated and mixed in different parts of the area depending on ecological factors. From measurements over a 15-year period (1986-2001), average annual precipitation in Baneh city is approximately 760 mm.

<table>
<thead>
<tr>
<th>Village</th>
<th>Family number</th>
<th>Average Family size</th>
<th>Average Customary forest Unit size (ha)</th>
<th>Total years of formal education of Household Head (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kochar</td>
<td>52</td>
<td>6.04</td>
<td>4.13</td>
<td>2.66</td>
</tr>
<tr>
<td>Belaka</td>
<td>143</td>
<td>5.62</td>
<td>4.98</td>
<td>3.17</td>
</tr>
<tr>
<td>Kandasura</td>
<td>81</td>
<td>5.34</td>
<td>6.07</td>
<td>3.19</td>
</tr>
</tbody>
</table>

2.2 Sampling and Data Collection Procedures

The study covered 276 villager families in three villages that All data collection was done in summer 2010. Qualitative and quantitative methods were used to collect data. These methods comprise the use of information and documents, observations, interviews and questionnaires. In this research 76 questionnaires were completed by household’s holder in the quantitative analysis. 10 households were dropped in the process of data cleaning. The sampled households we randomly interspersed in the study area and Sampling was performed using simple random sampling (SRS). The questionnaires elicited information on household socio-economic characteristics, farming information, type of products and quantities they extract from the forest and costs they incur in the process and their perception of the forest management approaches. Detailed information about traditional forest management and management challenges were complemented by interviews with local stakeholders.
and also Focus group discussions were performed in each of the three selected villages separately to explain to the participating villagers the goal of the discussion and the analysis (forest management) as well as to listen to their opinion about different issues related to management challenges in the case study regions. Additional data such as prices of forest products collected from local markets in Armarde and Baneh city.

2.3 Methods

Local people living in study area have relations at various degrees with forests and their products. So in order to identifying current relation with forest ecosystems and people, statistical analyses were done. Financial benefits of local community that they obtain from the forest, evaluated. The needs of people whose livelihoods depend on the forest incorporated. The approach taken for developing a set of Conservation incentive on the base of the cause-effect approach was a systematic approach including top-down, bottom-up, DPSIR and interaction analysis of forest-people relations. The DPSIR forms a framework in this study, which allows assessing and classifying the findings in a systematic way (Vacik, 2006). DPSIR stands for Driving forces – Pressures – State – Impact – Responses. Financial evaluation of Incentive Programs and evaluation of local community benefits from forest, in order to clarify financial value of incentive programs was taken into consideration to adjust people relations with Forest.

3. Results

The main socio-economic variables of the sampled households are summarized in Figure 3 below and table 1. Following traditional ownership rules, each household owns a section of the forest to provide for its needs. The area of a village is divided between its families. Harvesting fodder, poles and fuel wood are within the conventional owner’s authority. Gathering forest fruit and dead wood as fuel is a public right. Each family manages his owned forests as a “management unit” (Jamshidiyan, 2003). The size of customary unit of forest in the study area is small (Table 1). Also the main method of acquisition of land in the study area is through inheritance from the parents (90%) and ownership is transferred trough generations (figure 3). Therefore, land sizes are bound to continue declining in the foreseen future, and then it can be argued that there will be increased pressure on land to meet food needs of the people.

The average number of years of education for the households head in the area is relatively (Table 1). Low level of formal education means that most farmers do not have any education beyond the elementary level. Therefore they have limited opportunities to get employed in the non-farm sector or to successfully run commercial enterprises. This is clearly supported by the observation that most of the respondents are involved in farming and livestock husbandry as their main occupation. There is low level of conflict at customary forest management unit boundary between local peoples and the ownership of villagers regarding their forests has been formally recognized but on the other hand there
are a lot of conflicts (70% of the respondents) between local peoples and the government because of illegal conversion of range and forests to farm land, pollarding of Oak trees and illegal timber felling and other wood products’ harvesting.

Goat husbandry is the most important activity for providing villagers’ income. Dry farming is more developed than other agricultural forms in this area because of insufficient aqueduct networks and inclined land. Wheat and barley are main crop species of dry farming and both of them are used to feed livestock during winter and made subsistence economy of families in study area.

Peoples who are living in these villages are poor people and this increases the pressure on natural resources. Fuel wood, kerosene and gas are energy sources in study area, which Kerosene is offered to villagers free of transport cost by the forestry administration service. However, the kerosene supply cannot cover all of villager’s energy demand. Thus, they are dependent also on fuel wood and Villagers are cutting branches or stems of trees in the forests, cutting trees and gathering dry wood for cooking, heating and bathing (personal communication with villagers). Results showed that 100% of rural households in study area use firewood for cooking bread and 36% of households use firewood for cooking and heating. The study observed that 1.43 tonne fuel wood were consumed per family per year. As a substitute for their energy supply it is possible to develop Kerosene and gas consumption provided by governmental subsidies.

Results show other forest products are either consumed directly or marketed locally without assessment in study area. In many areas of the Zagros region utilization of non-wood forest products (NWFPs) have higher value than utilization of timber (Sagheb-Talebi et al., 2004). Main strengths of NWFPs harvesting are that this activities provide income for local people without notable costs (only labour costs) and making low damages on natural resources. The actual utilization of forest products are for three sample villages summarized in table 2.

Table 2: Average quantity of NWFPs utilization in year

<table>
<thead>
<tr>
<th>Forest Products (Local unit of ‘Luye Gala’)</th>
<th>Vanguard</th>
<th>Total</th>
<th>Average for household</th>
<th>Total</th>
<th>Average for household</th>
<th>Total</th>
<th>Average for household</th>
<th>Total</th>
<th>Average for household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oak leaf fodder</td>
<td>Kochar</td>
<td>30</td>
<td>18500</td>
<td>1233</td>
<td>500</td>
<td>200</td>
<td>13</td>
<td>220</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Belake</td>
<td>342</td>
<td>50100</td>
<td>1431</td>
<td>1400</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Kandasura</td>
<td>115</td>
<td>36200</td>
<td>1392</td>
<td>970</td>
<td>37</td>
<td>15/4</td>
<td>850</td>
<td>32</td>
</tr>
</tbody>
</table>

Correlation analyses (using Pearson’s correlation coefficient, Table 3) between the variables in the three villages indicate that correlation between the variables of households head’s age and livestock husbandry (as the main occupation) show significantly positive correlation at the 5% level; this means that young aged people are less engaged in the livestock husbandry as their main and first occupation than adults. There is a positive and significant correlation between age of household heads and size of customary forest unit at the 1% level, which means older respondents own big customary units. Also results show that there is a significantly positive correlation between livestock husbandry and pollarding at 1% level, which shows livestock husbandry completely depended on forest resources.

Table 3: ANOVA test for subsistence variables that studied in the three villages are

<table>
<thead>
<tr>
<th></th>
<th>Other (Occupation)</th>
<th>Proletarian (Occupation)</th>
<th>Size of customary forest</th>
<th>Pollarding</th>
<th>Livestock husbandry</th>
<th>Household head’s age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household head’s age</td>
<td>* -0.257</td>
<td>** -0.407</td>
<td>** 0.490</td>
<td>0.221</td>
<td>* 0.236</td>
<td>1</td>
</tr>
<tr>
<td>Livestock husbandry</td>
<td>* -0.09</td>
<td>** -0.253</td>
<td>** 0.366</td>
<td>** 0.729</td>
<td>1</td>
<td>* 0.236</td>
</tr>
<tr>
<td>Pollarding</td>
<td>0.194</td>
<td>* -0.287</td>
<td>* 0.429</td>
<td>1</td>
<td>** 0.729</td>
<td>0.221</td>
</tr>
<tr>
<td>Size of customary forest</td>
<td>-0.143</td>
<td>** -0.415</td>
<td>1</td>
<td>** 0.429</td>
<td>** 0.366</td>
<td>** 0.490</td>
</tr>
<tr>
<td>Proletarian (Occupation)</td>
<td>-0.241</td>
<td>1</td>
<td>** -0.415</td>
<td>* -0.287</td>
<td>* -0.253</td>
<td>** -0.407</td>
</tr>
<tr>
<td>Other (Occupation)</td>
<td>1</td>
<td>-0.241</td>
<td>-0.143</td>
<td>0.194</td>
<td>* -0.09</td>
<td>* -0.257</td>
</tr>
</tbody>
</table>

* Significant at 5%, ** significant at 1%
ANOVA for the studied subsistence variables show that the income from livestock husbandry and income from other occupation (any activity, except farming, NWFPs and livestock husbandry) in the three villages are significantly different at 1% level (Table 4), which depicts dependency of inhabitant’s livelihoods on the woodland resources by characterizing their forest-based activities variance in studied villages. The forest based incomes in study area are obtained through performing livestock husbandry (grazing and Oak tree fodder), dry farming in forest lands, collection of NWFPs and income from proletarian work and other income sources. Livelihood dependency on the woodland is reduced by income diversification. Projects exploring options like further processing of seeds and increased recreational use would seem motivated. Engaging people in harvesting could also add to the diversification of income sources (Salehi. A, 2009)

Table 4: ANOVA test for subsistence variables that studied in the three villages are

<table>
<thead>
<tr>
<th>Change source</th>
<th>d.f.</th>
<th>Mean Square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Income from livestock husbandry</td>
</tr>
<tr>
<td>Village</td>
<td>2</td>
<td>108×6527</td>
</tr>
<tr>
<td>Error</td>
<td>73</td>
<td>108×1184</td>
</tr>
</tbody>
</table>

*K* significant at 5%, **significant at 1%

Kruskal-Wallis nonparametric analysis (Table 5) for the variables of main occupation and conflict with the government (FRWO administration) show that people declared livestock husbandry as their main job have the highest significant (lowest average rank) for conflict with government, and then there are respondents who declared NWFPs as their main livelihood resource. Other, farmer and proletarian come afterward, respectively.

Table 5: Kruskal-Wallis nonparametric test for the variables of main occupation and conflict with government

<table>
<thead>
<tr>
<th>Main Occupation of household heads</th>
<th>Conflict with government</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livestock husbandry</td>
<td>12.50</td>
</tr>
<tr>
<td>NWFPs</td>
<td>25.17</td>
</tr>
<tr>
<td>Other</td>
<td>39.94</td>
</tr>
<tr>
<td>farmer</td>
<td>40.50</td>
</tr>
<tr>
<td>proletarian</td>
<td>45.54</td>
</tr>
<tr>
<td>Significant level</td>
<td>0.006</td>
</tr>
</tbody>
</table>

In this study by using the DPSIR analysis and interaction analysis, Driving forces, Pressures, State, Impact and Responses in order to identify local communities incentive programs for forest conservation which subscribes to the logic of indicators denoting various causes and effects (WWAP, 2003). The approach taken for developing a set of incentive program for the study region was a systematic approach including top-down, bottom-up, DPSIR and interaction analysis of problems. For this first, a framework is required to illustrate the main factors which are acting in study regions as well as their interactions. The DPSIR approach was chosen to provide this framework. Table 5 shows the result of this explorative analysis in the case study villages.

Table 5: DPSIR elements and identified related issues as guideline for developing incentives

**Driving force**
1. Poverty
2. Insufficient employment opportunities
3. Undeveloped villages

**Pressure**
1. Over grazing and forest regeneration grazing by livestock
2. Over wood harvesting (fuel wood and timber)
3. Under canopy farming and conversion of forests to farms particularly dry farms and

**State**
1. Disorder in forest regeneration and low number of seed origin trees
2. Decrease in forest canopy cover
3. Decrease of biodiversity in forest
4. Erosion types and quantity of erosion due to over grazing
5. Contribution of forests to income and energy of resident
6. Adaptability of indigenous knowledge of forestry and animal husbandry

**Impact**

1. Insufficient fuel wood and timber for subsistence use
2. Changes in forest pattern and structure
3. Low productivity of livestock husbandry and Insufficient income
4. Soil erosion
5. Aging of forests without regeneration

**Response**

1. Providing of fodder for villagers and husbandry related facilities
2. Classifying ownership situation regarding customary rights
3. Providing of kerosene and gas for villagers and its related facilities as cooker, heater, etc.
4. Changing pattern of husbandry
5. Development of NWFPs and medical plants
6. Developing the irrigation farming
7. Offering some seedlings as Walnut
8. Constructing schools and health centers in villages
9. Development of local industry for production of NWFPs
10. Increase in income of resident, out of forest, decrease in dependency to forest

Based on the information collected and the issues mapped into the DPSIR framework local communities incentive programs identified as a response in above table. As next step evaluation of local community benefits from forest, in order to clarify financial value of incentive programs was done. As mentioned, northern Zagros forests are affected by different degradation factors of which fuel wood harvesting and livestock grazing by pollarding (Galazani) are more important than the others.

The hedonic pricing method is used to estimate economic values of fodder collected from forests and rangeland (Kim et al, 1998). Based on Total Digestible Nutrient content (TDN) and using hedonic pricing method the average value of Oak leaf fodder for each household in study are is about 287 US$. The main source of wood fuel was homestead forests (85%). Also results of the study indicate that the average value of firewood harvested by the households was (32 US $) per year per household. Fuel wood has a direct market in study area. So we estimate that fore prevent pollarding and firewood collecting as main reasons of forest degradation needs 319 dollars per year for each family as incentive programs in 2010.

**DISCUSSION**

Land degradation is a social, economic, political, and technical problem requiring multi- and interdisciplinary solutions. Effective management of natural resources needs a clear, well-structured, workable and transparent framework of goals, objectives and indicators. Many programs have encouraged owners’ participation by offering direct incentives. The results clearly indicate that the local communities enjoy substantial economic benefits from northern Zagros forests. Therefore, for continued realization of these benefits, there is need to balance the current levels of extraction with future conservation interests. There is a big challenge for the management regimes to ensure that extraction does not lead to overexploitation. We find that government programs for more than 40 years to stop deforestation and manage the Zagros forests reviewed are generally less adaptive to socio economical pattern in study area. The main reason of this mismanagement is because of weakness of plans in social acceptance (Ebrahimi, 2000). For conversation of forest program to be socially accepted and cost effective for both of government and local communities, the heterogeneity in local communities’ preferences and goals should be taken into account. In many forested areas, in Zagros forests there are communities which are dependent on the forest for a range of goods and services. The needs of people whose livelihoods depend on the forest must be incorporated into sustainable forest management (Colfer et al., 1999). The incentive programs also affect structures for other actors.
(Wintrobe, 1997) argue that bureaucrats in FRWO are seeking to maximize budget and trying to shape policy. Ownership size is one ownership characteristic identified in this study that affected landowner willingness to participate in incentive programs. As ownership size increases by comprehensive management, the probability of local peoples participating in the program also increases. Awareness of other incentive and assistance programs is also a determinant of landowner participation. Future research on land use policy, How do we evaluate the effect of policies if the impacts are difficult to measure?, How do customary landowners express their demand to program officers? need to be investigated in Zagros mountain forest.

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