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LIVING FOSSILS AND LIVELIHOODS: EXPLORING THE SOCIO-ECONOMIC IMPACT OF *JUNIPERUS EXCELSA* POLYCARPOS FORESTS ON RURAL COMMUNITIES IN ZIARAT DISTRICT, BALUCHISTAN

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ABSTRACT

Forests are indispensable to human well-being, providing not only ecological services but also vital socio-economic support especially in resource-scarce rural settings. This study explores the socio-economic significance of Juniperus excelsa polycarpos *forests for forest-dependent communities in Village Manna, District Ziarat, Balochistan. A total of 99 household heads were surveyed to assess the extent to which livelihoods are sustained by the juniper ecosystem. Findings reveal that in the absence of alternative income sources, natural forests serve as a primary means of subsistence offering fuelwood, timber, medicinal plants, and grazing resources that directly contribute to household income and survival. The research concludes that natural forests, particularly ancient juniper woodlands, are not only ecological treasures but also economic lifelines for surrounding communities. However, this heavy dependence exacerbates deforestation risks. Therefore, the study underscores the urgent need for government bodies and stakeholders to provide essential services, promote sustainable livelihood alternatives, and implement inclusive forest management strategies. Such efforts are critical to preserving the ecological integrity of one of the world's oldest juniper forests while enhancing the socio-economic resilience of its custodial communities.*

Keywords: *Juniperus Excelsa Polycarpos, Livelihood, Socio-economic Well-being, non-Timber Forest products & Natural Resources Management,*

1. Introduction

Forests are indispensable to the socio-economic fabric of rural communities worldwide, serving as a primary source of sustenance, income, and ecological balance. Forests provide timber, firewood, medicinal plants, and non-timber forest products (NTFPs) that support local economies (Ranjit,2012). Forest resources are beneficial for rural communities that live around the forest. On the other hand, deforestation causes a loss of the ecosystem. Therefore, there is an international effort to move towards a more sustainable state for forest management (Bowles, et al.,2010). This paper investigates the role of forest natural resources in shaping the socio-economic development of rural communities in Ziarat. It further explores how sustainable management strategies can enhance the economic and social well-being of local populations. Pakistan's various types of forests have very low cover, but these forests are very diverse and of significant importance for the livelihood security of millions of rural people. Pakistan has about 4.2 million ha covered by forest, which is very low compared with 30 percent for the world (Shahbaz, Ali & Suleri,2007). Balochistan has around 141,000 ha of Juniperus excelsa forest, with approximately 86,000 ha in Ziarat and Loralai districts. These forests are among the oldest in the world, with a unique type of tree; the trees are too slow-growing and long-lived (>3,000 years). Ziarat, known for its juniper forests, represents a unique

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ecological and economic landscape in Pakistan (Islam, Ahmad & Jasra, n.d.). The natural vegetation has a profound influence on the social lives and economic well-being of rural communities. Several million people derive their main source of income from forest-based micro-enterprises (Oksanen & Mersmann, 2003). Historically, people's participation in forest protection was very common. There are diverse types of native and cultural forest management activities undertaken in perceptible and imperceptible ways (Ranjit, 2012). This paper seeks to highlight best practices that can be adapted to the local context of Ziarat. Sustainable forest management strategies can play a pivotal role in fostering socio-economic resilience while preserving ecological integrity. This research underscores the importance of a community-centric approach to forestry governance, ensuring that local populations become stakeholders in conservation efforts rather than passive beneficiaries.

1.1 Objectives of the Study

I) To find out the socio-economic characteristics of the household.
II) To examine the dependency of the local community on natural forests.
III) To suggest the role of the local community in conserving natural forests.

2. Literature Review

Studies from multiple regions have confirmed that forest resources are a keystone of rural economic activities. Rural areas of third world countries using fuel wood such as poorer nations of Africa and South Asia. Fuel wood accounts for more than 75 % of the energy used in countries such as Nepal, Bangladesh, Ethiopia, Burkins Faso, and even oil-rich Nigeria. These fuels are gathered spontaneously from the home-grown forest (Demurger & Fournier,2001). Fuel wood is the major energy consumption in Tanzania, about 88%, charcoal 4%, petroleum 7%, and 1% electricity from hydropower. Major fuel wood consumers are used for domestic purposes and insignificant scale for industries related to agriculture (Malimbwi & Zahabu, 2008). Poor households of Terai community of Napal were highly dependent on the forest for fuel wood (average annual extraction = 4561.3kg/household) to sustain their day- to -day livelihood. A huge population of the poor will possibly cause degradation in the future. Therefore, policy must be reducing the dependency of poor households by lifting their economic status (Sapkota & oden, 2008).

A) Non-Timber Forest products (NTFP)

Rural people in the developing world derive a significant part of their livelihoods from various forest products, mostly non-timber forest products (Bradbear,2009). The present study shows that most NTFPs are collected and used locally, but forest coffee and honey are also marketed their income represents almost 50% of total household income (Chilalo & Wiersum, 2011). South African rural households use several NTFPs for different needs, such as more than half the households surveyed also make use of edible insects, wood for construction, bush meat, wild honey, and reeds for weaving (Shackleton & Shackleton,2004).

B) Fodder and Forage

Livestock rearing is one of the major occupations in India and is making a significant contribution to the country's GDP. The large number of resource-poor households dependent upon grazing for their livestock (Planning Commission, 2015). Fodder trees and shrubs are used in Nepal as protein supplements in ruminant diets during the long dry period (October – May). In some areas of the hills, up to 90% of the feed comes from the forest (Joshi, 1992).

C) Forest products and services

Products derived from forests are sold on the local, national, and international markets are an important source of cash income and employment for rural people. An estimated 15 million people in Sub-Saharan Africa earn cash income from forest-related activities (Oksanen

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& Mersmann,2003). The livelihood of the households depends on forest products. Our results illustrate that forest products continue to play an important role in household livelihoods in rural areas where other income opportunities are limited (Moe & Liu, n.d.)

D) Honey

Bees are a vital part of the forest ecosystem, which makes different products such as honey. These products can be used to create an income source and a valuable food for people who live in and around the forest (Bradbear, 2009).

E) Medicinal plant

It is stated that 80% of the world's population depends on traditional medicine for its primary health care. There has been a rapid extension of allopathic medicinal treatment in India, but still now the use of natural products as medicine, especially plant products, is widely used among various tribal people, particularly in remote areas of West Bengal (Sinhababu & Banerjee, 2013).

F) Housing

Ninety-seven percent (97%) of houses in Uganda are directly constructed from forest products or are made of wood-fired bricks. Only 3% are made of concrete or other modern materials. Building materials from the forest currently have a value of over $ one billion annually (Agrawal, et all, 2013).

G) Deforestation

Loss of productivity, Soil erosion, nutrient reduction, and soil compaction are among the most obvious impacts of deforestation. Continuous inputs of lime, manure, and nutrients can counter degradation, but economic and physical resources limitations render this ineffective for large areas from urban markets (Fearnside, 2005). Forest loss in Southeast Asia has remained at high levels also during the period from the year 2000 to 2005, accumulating to an annual deforestation rate of about 2.76 million ha or 1.3% of the region's forest area (Pandey, 2011). It must be recognized that existing forests occupy a small area in Pakistan and are under heavy pressure of degradation, land-use change, grazing, erosion, and so forth, due to increasing human and cattle population. As in the past, forest areas have been affected more by changes in land use than by climate change (Siddiqui, Muhammad & Ayaz, 1999).

H) Strategies

People should be allowed to continue to practice all land uses, but should be encouraged to do so in a scientific manner. Further, policies and practices should be developed that reduce social pressures driving land conversion (Siddiqui, Muhammad & Ayaz, 1999). Only the government-funded schemes will not bring sustainable changes. The involvement of local people, their vision, and implementation under proactive, dynamic, and result-oriented leadership will bring real socio-economic changes (Dongre, 2011).

3. Research Methodology

Methodology gives a rule and guidelines to the research while guiding the examination, furthermore assisting as an apparatus for the evaluation of new information. Researchers follow the sophisticated methodological tools, steps, and techniques of methodology to collect relevant data for their study. The two most important research designs in social sciences are quantitative and qualitative. The study used a quantitative research design. The data were presented in tabular format, including frequencies and percentages. In statistics, the term universe refers to the aggregate of individuals or things that are under investigation. The universe is a hypothetical and theoretical combination of all components as explained for a specified study. The universe of the present study was District Ziarat, Balochistan.

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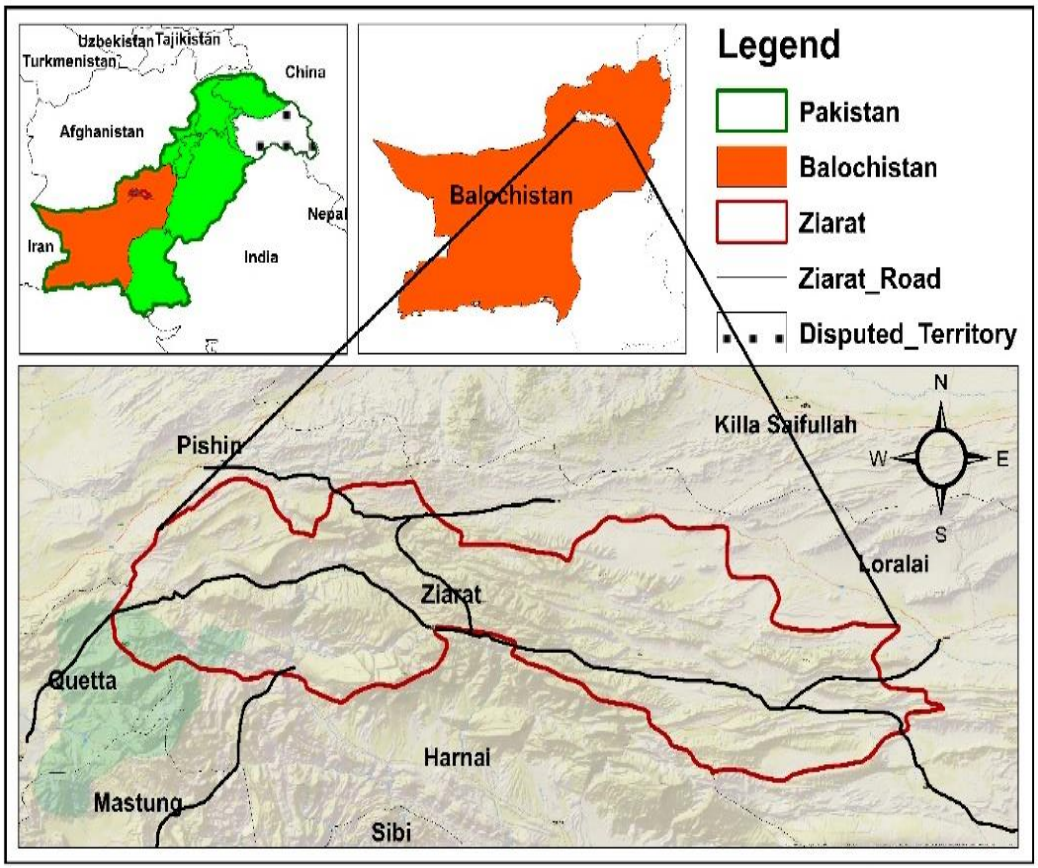

Sampling refers to the process of selecting of true representation of objects or individuals from the population. The current research has been conducted in district Ziarat, Balochistan, which has the most beautiful and ancient juniper forest in the world. Ziarat consists of two tehsils, Ziarat and Sanjawi. The research has randomly selected Tehsil Ziarat, which has seven union councils, and from that union council, Manna has been selected randomly. The total population of Gharat Manna is 157 Households. The unit of analysis was households, as the impact of the forest can be excellently found out at the household level due to collective benefits. Household heads, males, were preferred (due to a male-dominated culture) for interviews as they are directly involved in the economic details of their household. A sample is a subset of a statistical population that is used to study the problems and gain information about the whole population. A total of 99 respondents were randomly selected from the sample size of 157 targeted population. Seventy-six respondents of the sample size were interviewed; the same selected respondents were interviewed, but 23 respondents were

The current research was quantitative, and data for this study were collected through a structured interview schedule. Statistical Package for Social Sciences (SPSS 19.0) was used to analyze the data. Univariate analysis was used, and presentation of data has been done through tabulation (Pallant,2013).

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES
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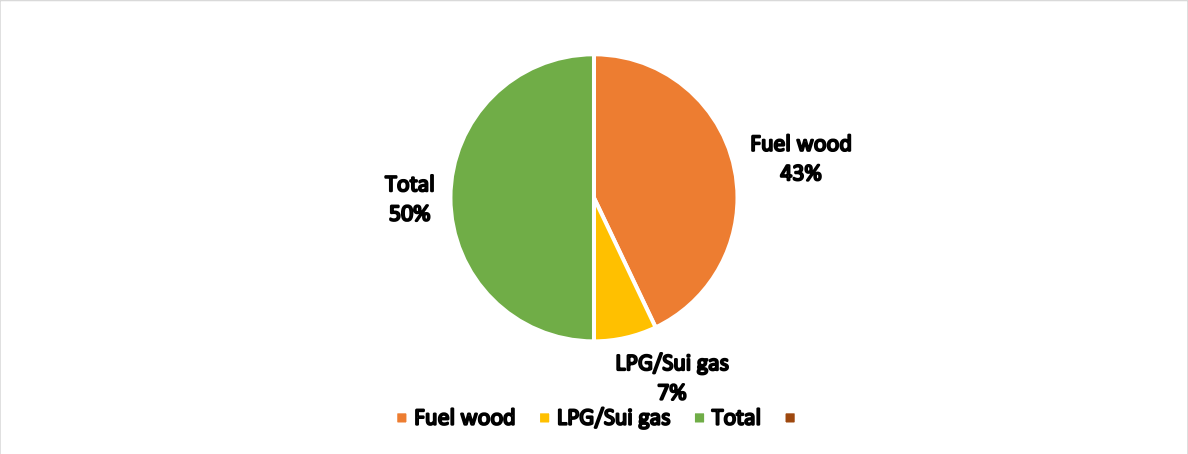
Volume No: 02 Issue No: 03 (2025)

4. Results and Discussion

This section comprises tables and charts with explanation of the numerical results in the tables. More than one-third (35.5%) of the respondents belong to the age category of 40-49 years. The respondents were males having farming as their major occupation, and one-fourth (25.3%) of the respondents were illiterate. The family system was a mix of nuclear (18.2%), Joint (45.4%), and Extended (36.4%). The joint family system is socio-economically more influenced by the natural resources due to their high dependency on agriculture and livestock (Sapkota & Oden, 2008). For the identification of the household size, different categories were formed. The large portion (44.5%) of the respondents had family size 10-19 members, followed by 20-29 members (26.3%) Furthermore, 1-9 members (13.1%), 30-39 members (10.1%) and 6% belong to the group of 40-49 members. Agriculture was a major occupation (79.8% of respondents). The business, livestock, and govt jobs found 12.1%, 5.1%, and 3% one-to-one.

The majority (80.8%) of the respondents had livestock, of which 41.1% relied on both natural vegetation and cultivated fodder. Moreover, 36.4% relied entirely on natural vegetation, and 2% used cultivated fodder and forage; in addition, only 1% purchased, while 19.2% of the respondents did not use any source. Grazing is the characteristic feature of hilly areas of Pakistan (Israr & Khan 2010). Fuel wood was recognized as a major (85.9%) source of energy, followed by LPG/ Sui gas (14.1%). Little more than half (52.5%) of the respondents used the source of fuel, wood natural vegetation. Moreover, one fourth (27.3%) used both natural vegetation and purchased, and 14.1% did not use fuel wood, while 6.1% of respondents purchased fuel wood (Figure 1).

Figure 1. Source of fuel wood for domestic energy



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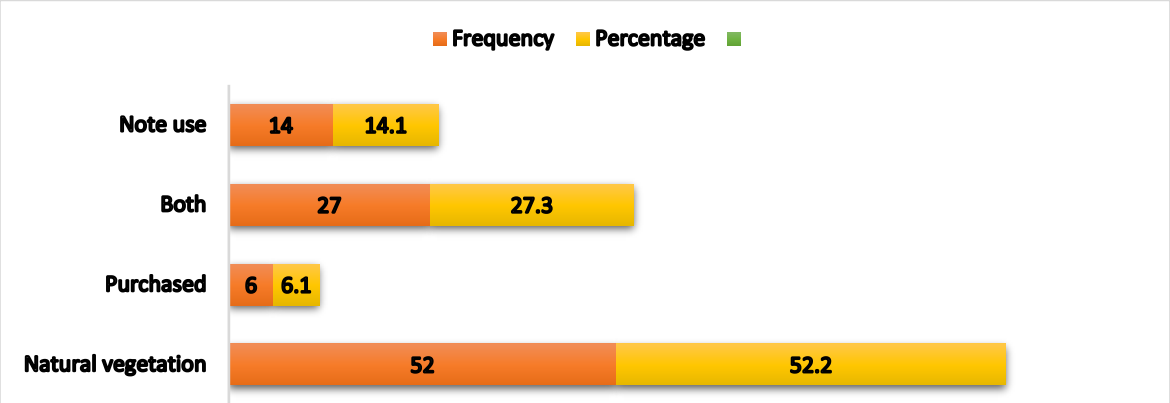
Volume No: 02 Issue No: 03 (2025)

Figure 2. Source of Fuel Wood



Express the data on the distribution of the respondents regarding the source of fuel wood for domestic energy. In this respect, almost the absolute majority (85.9%) of the respondents used fuel wood for domestic energy, while 14.1% of the respondents used LPG/Sui gas for domestic energy.

Data of F gives information regarding the source of fuel wood for the respondents. In this respect, a little more than half (52.5%) of the respondents used the source of fuel wood, natural vegetation. Moreover, a little more than one-fourth (27.3%) of the respondents used both natural vegetation and purchased. Furthermore, 14.1% of the respondents did not use fuel wood, while only 6.1% of the respondents purchased fuel wood.

The table 1 states the data on the distribution of respondents regarding the status of their houses. In this respect, one-fifth (20.2%) of the respondents had a paved residence. Moreover, more than one-fourth (27.3%) of the respondents had a residence, and only two percent of the respondents had livestock shed semi paved. Furthermore, more than half (52.5%) of the respondents had a residence, and an absolute majority (98%) of the respondents had an unpaved livestock shed.

The table 2 indicates the data on the distribution of the respondents regarding the use of juniper forests for various purposes. In this regard, fuel wood, timber, medication, and domestic products are considered to be used from juniper forests. In this way, almost absolute majority (84.8%) 0f the respondents of fuel wood, almost absolute majority (83.8%) of the respondents of timber, less than one third (28.3%) of the respondents of the medication and less than half (44.4%) of the respondents of domestic products used juniper forest for mention purpose. Furthermore, 15.2% of the respondents of the fuel wood, less than one fifth (16.2%) of the respondents of timber, almost absolute majority (71.7%) of the respondents of medication and more than half (55.6%) of the respondents of domestic products did not used juniper forest for mentioned purpose.

The table 3 highlights the data on the distribution of the respondents regarding the dependence of rural communities on natural vegetation. In this regard, fodder and forage, fuel wood, timber, hedges, and medicinal plants are considered as the dependency of rural communities on natural forests. In this way, majority (72.7%) of the respondents of fodder and forage, almost absolute majority (83.8%) of the respondents of fuel wood, almost absolute majority (80.8%) of the respondents of timber, more than one third (39.4%) of the respondent's hedges and little more than one fourth (26.3%) of the respondents of medicinal plants were dependent on natural forest. Furthermore, more than one fourth (27.3%) of the respondents of

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES
ISSN Online: 3006-4686, ISSN Print: 3006-4678
Volume No: 02 Issue No: 03 (2025)

Table 1: House Status

Categories	Frequency	Percentage
Paved	20	20.2
Sami- paved	27	27.3
Unpaved	52	52.5
Total	**99**	**100.0**
Livestock Shed		
Categories	**Frequency**	**Percentage**
Sami- paved	2	2.0
Unpaved	97	98.0
Total	**99**	**100.0**

Table 2: Use of Juniper for Various Purposes

Fuel Wood		
Categories	**Frequency**	**Percentage**
Yes	84	84.8
No	15	15.2
Total	**99**	**100.0**
Timber		
Yes	83	83.8
No	16	16.8
Total	**99**	**100.0**
Medication		
Yes	**28**	**28.3**
No	**71**	**71.7**
Total	**99**	**100.0**
Domestic products		
Yes	44	44.4
No	55	55.6
Total	**99**	**100.0**

Table 3: Dependency of Rural Communities on Forest Natural Resources

Fodder and forage		
Categories	**Frequency**	**Percentage**
Yes	72	72.7
No	27	27.3
Total	**99**	**100.0**
Fuel wood		
Yes	83	83.8
No	16	16.2
Total	**99**	**100.0**
Timber		
Yes	80	80.8
No	19	19.2
Total	**99**	**100.0**
Hedges		
Yes	39	39.4
No	60	60.6
Total	**99**	**100.0**
Medicinal plants		
Yes	26	26.3
No	73	73.7
Total	**99**	**100.0**

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES
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Volume No: 02 Issue No: 03 (2025)

fodder and forage, 16.2% of the respondents of fuel wood, little less than one fifth (19.2%) other respondents of timber, majority (60.6%) of the respondents of hedges and almost absolute majority (73.7%) of the respondents of medicinal plants were not dependent on natural forest.

5. Major Findings

- The research showed that seventy-nine percent of the respondents were involved in farming as a major source of household income.
- The research specified that eighty percent of the respondents had livestock.
- The research believed that forty-one percent of the respondents used natural vegetation and cultivated fodder and forage for livestock.
- The research determined that eighty-five percent of the respondents used fuel wood for domestic energy.
- The research exposed those eighty-three percent of the respondents used juniper forest for timber.
- The research revealed that fifty-one percent of the respondents used hedges for natural forest.
- The research expressed those fifty-four percent of the respondents used the source of medicinal plant natural vegetation.
- The research examined those ninety-one percent of the respondents used natural fruit/vegetables.
- The research shows that fifty percent of the respondents used the source of honey from natural forests.
- The research believed that seventy-two percent of the respondents' fodder and forage were dependent on forest resources.
- The research determined that eighty-three percent of the respondents of fuel were dependent on natural forests.
- The research exposed that eighty percent of the respondents of the timber dependent on natural forests.

6. Conclusion

The current study indicates that natural forests have a crucial role in the socio-economic upgrading of rural communities living around the natural forest. The livelihood of household and dependences of rural communities on natural vegetation products such as fodder and forage for livestock rearing, farm implements for agriculture, timber for building construction, fuel wood for domestic energy, medicinal plants for health care, wild fruits/vegetables for cooking, hedges for animal correlation and crop protection, honey, etc. The products driven out of natural forests and fulfilling the local people's basic needs are the income of households. In other words, the latest research concluded that natural forests have socio-economic impacts on local people living near the forests. This study suggests that the government and stockholders should provide the basic needs to the local people living around the natural forests to reduce the dependence on the natural forests, and also focus on future guidelines for proper planning and management to cope with deforestation of this beautiful, popular, and ancient juniper forest of the world.

7. Recommendations

Ziarat juniper forest is one of the ancient forests on the globe. Tourism is one of the emerging industries in the world. Researcher suggests that the government identify this forest as a Natural Park and develop a tourist spot. This will generate the income for the country and uplift the socio-economic conditions of local communities. Tourism will generate more

economic opportunities for local communities. Secondly, this forest is one of the unique ones due to its age and cultural values, but local communities are exploiting this treasure through massive deforestation practices. This is suggested to the private sector that projects for environmental education should be started to promote the capacity of conservation capacity of the local community. This will also result from the sustainable development of the resources.

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