

Juniper (*Juniperus excelsa* M. BIEB) Forest of Ziarat in Danger of Vanishing: A Review

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Abstract: Pakistan largest juniper reserves are located in Ziarat district, Balochistan and referred as the second largest reserves in the world. These forests are characterized by the presence of the world oldest trees being regarded as "living fossils". These natural resources are of great ecological significance not only at local and regional level but also at global level. Moreover, these natural resources have been facilitating indigenous people by providing resources for shelter, fuel and food. This area was once the center of recreational activities for local people as well as for tourist throughout the country. Additionally, this area has historical importance too, as the founder of Pakistan has spent his last days at this place so it is regarded as symbol of national heritage. In the present scenario, due to human population explosion these chunks of forests are under serious threats of danger both from natural factors as well as from anthropogenic activities. The major threats identified are illegal cutting for fuel wood and timber, deforestation, overgrazing, climate change induced changes like low rainfall and intermittent drought. If present rate of decline continued at the same rate then it is expected that there will not be enough natural resources for future generations. Even though considerable conservative efforts has been under- taken by Government, NGOs and other international organizations such as, WWF and UNSCO. But these efforts seem to be insufficient regarding conservation and restoration of Juniper forest. So, it is greatly recommended that prompt and essential steps are required for the sake of future generations and conservation of valuable biodiversity. These goals can be achieved by the involvement of indigenous people in conservation projects and also by providing energy alternative options to people plus protection of forest under law- enforcement.

Key words: Ziarat • Living Fossils • Organizations • Indigenous people. Ecological

INTRODUCTION

Geographical Distribution: Ziarat is custodian of the world second largest reserves of Juniper where as California juniper being the first largest reserves. These reserves are referred as living fossils due to the longevity of trees, where the age of some mature trees is estimated to be 4,000 to 5,000 years [1, 2]. These forests are always remained as source of recreational activities not only for aristocratic people but also for local tourists. The key constituent of these forests is *Juniperus excelsa* M. Bieb [3]. The major sub species of which are *Polycarpus* and *Marcopodia*. This species belongs to family Cupressaceae. Juniper is one of the most prominent and diverse group of conifers consisting of about 67 main species out of which only five are reported from Pakistan [4]. This species is

listed in IUCN Red List under the category of least concern [5]. It has worldwide distribution and common in most part of the world, ranging from America to Europe, Africa, Central Asia, Middle East and South Asia to Himalayan regions of Pakistan, China and India [6]. In Pakistan it is widely distributed in Hilly regions of the country (Kashmir, Gilgit Baltistan, Balochistan). In Balochistan it is found in Ziarat, Kalat, Zarghoon Ghar and Harboi [7]. Whereas, the largest block of juniper forests lies near Ziarat, spread on large area covering approximately 2800km². It is believed to be one of the largest, unique and oldest Juniper forest in the world [8].

Habitat *Juniperus excelsa* M. Bieb is evergreen shrub, with an open canopy and can attain a maximum height up to 20m long [9]. It leafs in January, while flower ripened in October [10]. The flowers are dioecious i.e. the

flower will be either male or female, only one sex is found on individual plants. For the production of seed both male and female plant should be grown in order to make fertilization possible. Pollination is carried out through wind. The most suitable conditions required for its proper plant growth are, proper light, loamy to clay soil, well drained soil and wide range of pH (acidic to alkaline). It can also tolerate dry and drought conditions, thereby it prefers to grow on hilly and mountainous region of the world and usually it grows at high altitudes [11]. *Juniperus excelsa* (M. Bieb) is a slow growing tree, as one of the dominant species of these forests, providing habitat and support to the growth of numerous endangered wildlife ground flora including Berberis, Prunus, wild almond and Ephedra. Beside this, it also provides habitat to various associated animal species such as habitat to Jackal, Suleiman Markhor, Asiatic wolf, hedgehog and many other related species. Apart from this, it also provides a wintering ground to Black Throated thrush. Juniper forest and the associated diversity of plants and animals form a complex and distinctive ecosystem in the harsh and arid climate of Balochistan [12].

Economic Importance: Juniper forests are of great ecological and economical importance, by providing benefits at the local and global level [13]. These unique and significant ecosystems, fulfill the need of local communities by providing multi services such as fodder for livestock, fuel wood, fencing materials, barks for thatching of huts, preventing soil erosion and maintaining the underground water table by sufficiently recharging the aquifers [14, 15, 16]. The wood of *Juniperus excelsa* (M. Bieb) is mostly hard and durable, commonly utilized by local communities as fuel wood and sometime as timber [17]. However, juniper trees grow slowly and take more time to attain a harvestable size and somehow taking more than two centuries, thereby its harvesting for timber is considered as unsustainable if it is used continuously on a commercial basis. The wood of this forest also serves as firewood for those migratory people, who live temporarily in the mountains. It is also reported that its, wood is sometimes used for furniture and carpentry purposes on a low scale. The chief importance of the species also lies in suitability of its wood for making pencil [18]. Furthermore, it is most common at high altitudes and medicinally important, used a remedy for stomach cramps and Asthma [19, 20, 21]. Fruits are used for a wide variety of medical treatments, i.e. diuretic, stimulant, carminative and for

some other cutaneous diseases [22, 18, 23]. Twigs and barriers are usually used for flavor such as “Gin”. The burnt ash of Juniper is mixed with tobacco in local “Naswar” for enhancement of taste [24].

Major Threats: Juniper forests acts as source for various goods and services ranging from fuel wood and timber to ecotourism and recreational activities. Legally this forest is designated to state and therefore treated as state forests. Due to high population explosion of human and livestock these forest face many degradation threats both from natural agents as well as from anthropogenic activities [25]. The most important natural threats include, climate change, drought, disease dieback and insect attacks while the anthropogenic threats includes deforestation for fuel and timber, grazing and change of land use pattern [26, 27]. Various studies have been conducted to explore the population structure of these forests in Balochistan [28-30]. Ecology and dynamics of Juniper have widely been studied by Sarangzai *et al.*, [5] and Ahmed *et al.*, [31]. In their studies they have greatly emphasized on the fact that anthropogenic and natural pressures such as illegal cutting, over grazing, debarking of juniper tree trunks, low rainfall and intermittent drought are the major reasons responsible for decline and reduced forest cover in the area (Fig. 1-6). The changing temperature and ongoing drought since 1994 are the other reasons that had greatly affected juniper forest. Meanwhile they had also highlighted that anthropogenic activities such as grazing, over collection of resources and forest cutting has drastically changed the composition of vegetation [28]. Many plant species which were once associated with this unique forest are now completely removed and didn't exist further more [29]. *Juniperus excelsa* (M. Bieb) usually occurs in open and un-stratified stands. The variability in density of forest varied with altitude and primarily linked with various anthropogenic activities and environmental conditions. Site to site variations in the density has been found which were attributed to change in edaphic and topographical conditions [31]. Some natural disaster induced phenomenon's have also posed great pressure on the diversity of forest, as like in 2008 earth quake (6.4 magnitude) hit Ziarat valley and other nearby surrounding areas. After the disastrous distraction of earthquake the local people started the high use of juniper trees for numerous purposes, resultantly imposing great pressure on forest. The reason behind the high pressure on juniper forest from local people is that they are not provided with



Fig. 1: Overgrazing in juniper forest



Fig. 2: Illegal cutting of forest strand



Fig. 3: Recreational activities in Juniper forest



Fig. 4: A Juniper tree with Dwarf mistletoe



Fig. 5: Traditional practice of fencing houses with tree trunks



Fig. 6: Cavities in the tree trunks to store water for animals (Source: 9, 39)

basic need of life, so they exploited these resources to attain shelter, fuel and food [32]. The cutting of forest for fuel, timber and hedges of agricultural land has resultantly changed the environment for various endangered wild life. The other unrecognized and hidden serious threats are the smuggling of juniper seed by local people and attacks by plants parasite such as mistletoe, which acts like cancer to juniper forest and produced devastating effects in very short period of time [33-35]. The juniper forest area is exhibiting wide spread decline, now the situation is more worse, due to the lack of substantial and alternative remedial measures in order to minimize the risk or pressure on these valuable centuries old natural resources specific to this area [36-38].

The following figures illustrate major threats responsible for decline of juniper forest.

Conservative Measures: While, focusing on the major problem [40] responsible for the degradation of juniper forests a number of practical steps regarding restoration purpose have been under taken by Government, NGO sectors and other concerned departments [33,36, 41]. Although these efforts are very impressive regarding conservation point of view but lacking one major element

of human participation. In any environment a co-relationship exists between human and biodiversity. It is clear fact, that conservation of biological diversity would be impossible without taking into account the cultural diversity of that community [42]. Neglect in any aspect will be resulting in reduction and loss of biological diversity as well as loss in the worth of human heritage. Considering the social aspect, the IUCN Pakistan has launched a Project that facilitated the local communities to modify the current existing ecosystem into biodiversity friendly and sustainable way that resulted into increased productivity of ecosystem. While following the concept of IUCN Project the government of Pakistan has also launched a mega Project focusing on restoration and amelioration of forest [43].

As Juniper forests are one of the oldest remains of retrospective time, representing one of the most important ecosystems in the arid and harsh climatic conditions of Baluchistan. It is the need of the hour to take crucial steps for conservation of these valuable chunks of forests. The man and biosphere program provide one of such opportunity whereby forest can be brought back into its original condition. The Man and Biosphere program has declared juniper forest of Ziarat as the biosphere reserves. The decision was made on 25th session of the MAB UNSECO headquarter in Paris making Juniper forest as the second largest reserves after Lal_Suhanra, Cholistan desert of Punjab, Pakistan [12]. The man and biosphere program will help in bringing juniper forest back in limelight not only at regional level but also at national level, thereby attracting the attention of people, towards its rich biodiversity and as well as culture heritage of Ziarat [44].

Recommendations: The following steps are considered crucial, while taking conservative measures i.e.

Forest Rehabilitation: Forest rehabilitation is taken as key management strategy in case of degraded forest that aims restoring the capacity of forest to produce goods and services. The main steps necessary for forests rehabilitation are

- Identification of independent authority which is solely responsible for monitoring, planning and supervision of forest in Baluchistan.
- Raising awareness among the local community about the benefits of rehabilitation of forests that significantly tailors the needs of local people and also recognizes the concerns and conflicts of stakeholder regarding the rehabilitation projects.

- The setting of any objective of the projects must be done with the involvement of all concerned parties (Stakeholders, local communities and management authorities).
- Support research related to forests, forest land and their conservation and rehabilitation
- Eliminate the cause of degradation of forests (prevent intensive grazing, illegal cutting, hunting and reduce the access of local people to the forest).
- Providing alternative means for forest dependent communities to attain a sustainable livelihood.
- Use of native species in afforestation of degraded land
- Need of study of socio economic impacts of land and vegetation degradation on environment and lives of local communities.
- Establishment of a network of protected areas like parks and buffer, core and transition zones in juniper forest are immediate need of management strategy.

CONCLUSION

The crux of the whole discussion is that Juniper forest (*Juniperus excelsa* M. Bieb) of Ziarat provides habitat for a number of endangered wildlife due to its rich biodiversity. It is a source of different resources for local communities by providing fuel wood, timber, while some part of *Juniperus excelsa* (M. Bieb) are being used in different medicines. Valuable species are associated with unique ecosystem such as Ephedra (from which ephedrine is extracted). Owing to high explosion of human population and livestock it is under threats not only due to natural conditions but also due anthropogenic activities. The natural factors include, low rainfall, drought while the anthropogenic threats include illegal cutting of timber, fuel wood, grazing and fencing of agriculture land, etc. The rate of degradation of this natural resource is seeping up by increased poverty of local people due to lack of basic necessities of life. They are solely dependent upon juniper forest to fulfill their basic needs like shelter, fuel and food. The trend of change in land use has also enhanced the rate of degradation. The land is being cleared for agricultural activities such as clearing of land for cultivation of horticulture crop (Apple and Cherry). So the rapid rate of degradation of floral and heritage diversity coupled with high rates of poverty makes it very imperative to take convenient steps to sustain these natural resources for future. It is recommended that the prevailing problems could be reduced by creating awareness among the common masses about the importance of natural resources,

involvement of indigenous knowledge and their experiences in the conservation. In order to, conserve these valuable blocks of forest it would be more better by providing aboriginal people with energy alternative options i.e. natural gas and incentives.

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