

# Status, distribution and dynamics of Chilgoza Pine (*Pinus gerardiana* Wall) Forest in Suleiman Mountain Range, Pakistan

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## Abstract

The Suleiman Mountain range has many economically and environmentally valuable forest species, including *Pinus gerardiana*, *Pinus wallichiana* and *Olea ferruginea*. In district Sherani, pure stands of *Pinus gerardiana* Wall. ex D. Don. exist in the forest, covering 261 Km<sup>2</sup> area. This valuable source is facing higher threats from illegal and unsustainable harvesting, lack of income generation for livelihood and social conflicts between the communities. Lack of proper monitoring by governmental sectors and social checks along with people's greed to earn more to meet their requirements by cutting and selling trees, have triggered the deforestation of *Pinus gerardiana* forest.

**Key words:** Chilgoza, Distribution, Economic valuation

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## Introduction



Suleiman Mountain Range (SMR) also famous for its highest peak known as Solomon's Throne (Takht-I-Sulaiman) is an extension of the Hindu Kush. SMR lies between 31° – 36° North and from 69°- 59° East at an elevation ranging from 500 to 3441 meters (Khan, 2015). SMR lies at the junction of three provincial borders of Punjab, North West Frontier Province (NWFP) and Balochistan.

A world's pure stand of Chilgoza (*Pinus gerardiana*) forest exists in Suleiman Range and straddles the border of southeastern Balochistan and NWFP provinces. Arid ecology of Steep mountainous terrain provides the most suitable climatic conditions for the growth of Chilgoza forests. Approximate mean day temperatures range from 37°C in June to 13°C in January. Rainfall is scanty, around 320mm per year, which usually varies with altitude and is more frequent during the winter season (WWF-P, 2014).

*Pinus gerardiana* belongs to family Pinaceae, and is known as Chilgoza pine which means 40 nuts in one cone. The Chilgoza tree is usually 10-25 m tall with erect branches. The tree bark is very flaky similar to the lacebark pine (*Pinus bungeana*). The leaves are needle-like and cones are 10-18 cm long, 9-11 cm wide in opening condition. Whereas nuts are 17-23 mm long and 5-7 mm broad with a thin shell and rudimentary wing.

Chilgoza pine is listed as near threatened (NT) species according to IUCN red list (IUCN, 2018).

There are many threats to the Chilgoza forest, i.e. unsustainable harvesting, social conflicts, lack of effective organization of resources and income generation. The property rights of Chilgoza forest existing in SMR have been distributed between the Sherani tribe living on both sides of borders known as Largha Sherani in NWFP and Bargha Sherani in Balochistan, based upon social stratification. There is no written record of land settlement. According to tradition every person living in the tribe has equal ownership right over all the resources available in the area. There are three further tribes under the Sherani tribal system (Urooj, 2015). Hassan Khel and Oba Khel are the major owners of Chilgoza forests in Suleiman Range while the Chual khel has a smaller portion of Chilgoza forests. Local people have memorized the ownership record of each sub tribe. The tribe of Bargha has a total 97 Km<sup>2</sup> area of Chilgoza forest which has been distributed between its sub-tribes Oba khel, Chual khel and Hassan khel each with nearly 85, 5 and 7 km<sup>2</sup> of forest area. Whereas, the Largha Sherani tribe has a larger forest area, about 164 Km<sup>2</sup> in the district. Out of the total area, sub-tribes Hassan Khel and Oba Khel have occupied 69 Km<sup>2</sup> and 95 Km<sup>2</sup> of forest area.

Being tribal area forests in SMR especially Chilgoza is threatened by unsustainable and illegal harvesting although, Chilgoza forest is protected under the Balochistan Forest Act. Until the early 1970s, the local tribal system provided a reasonably good protection to the Chilgoza Forest but subsequently, the same system has not remained effective due to erosion of traditional social institutions. The lack of a legal or social checks, greed of contractors to earn more, along with the needs of the growing population mainly to meet their daily requirements, and to fulfill certain social obligations, have triggered the deforestation process.

There are multiple natural and anthropogenic sources which are threatening Chilgoza forest Such as natural causes of injuries to Chilgoza trees which include snow, lightning, wind damage, insects and fungus attack.

Heavy snow damages the tree branches. Though, damage by snow is insignificant in the lower forest area and is only happening in the uppermost area. Damage by fast blowing winds is very rare, but do cause damage in some areas. Trees and branches that have fallen down due to wind are brought by owners to the village for personal use or for sale. Fungi and insect borers (*Dioryctria abietella*) attack and damage the Chilgoza cones and feed on the seed pulp resulting in the reduction in fruit production, whereas bark of the branches and trunk become infested by insect borers. Thus sap flow gets hindered which ultimately causes death of the tree after the dryness of branches and trunk. In the Chilgoza forest at the mountain top, trees are often damaged by frequently occurring lightning. Sometime this lightning causes a fire in the forest. Many trees can be seen with broken tops as a result of lightning. According to a local community, incident of forest burning in Kunday Qaisa due to fire happened in the year 1999. Animal grazing is also causing degradation at many

points where the forest needs to regenerate. Besides cutting and selling of Chilgoza trees and its branches as timber it is also threatening the status of Chilgoza percentage Land cover (LC) over an area where the harvesting level is seven times greater than regrowth level. That's why Chilgoza forest cover has been reduced and production has been decreased with the passage of time. The underlying cause of all these threats is poverty of the local community.

### Economic evaluation of Chilgoza Nut

Chilgoza nut has more economic value than timber and it is a main marketable product of SMR. Pakistan produced 3500 metric tons of Chilgoza nuts in the year 2017 which is much more than last year's production. The current market price is 3850 rupees per kilogram in Pakistan. Pakistan produced 18% of the Global production. Chilgoza's natural cycle gives a good crop every alternate year.

Price of Chilgoza nut varies due to market supply and demand pressure. With fluctuation in the market, Chilgoza cultivation is an unstable source of income for local communities. Prices have increased dramatically in the last few years, which have made a contribution in increasing the total income of the local community.

Chilgoza nuts harvest is by forest land owners as well as by contract harvesters. Some harvesters do not have land in the Chilgoza forest area so they get a contract from the land owner before harvesting season who get 50% profit from product (nuts) selling in the market. However the contractor manages and bears the labor cost to harvest Chilgoza in the harvesting season. After harvesting, nuts get transported to the local village. Zhob wholesalers bear all the cost of transportation of Chilgoza nuts from village to Zhob city. From Zhob all raw products get transported through small vehicles to Dera Ismail Khan. Then from there, nuts are loaded into big vehicles and transported to a wholesaler operating in Akbari Mandi, Lahore. Wholesale dealers bear the overall cost of transportation from Zhob to Lahore. In Pakistan Akbari Mandi is the largest dry fruit market from where Chilgoza and other nuts transport to local markets of other cities and are also exported to other countries. The market price for selling Chilgoza gets fixed in Lahore on the basis of demand and supply. In Pakistan, Chilgoza nuts are valuable selling items for wholesalers. Retailers buy roasted or raw nuts from wholesalers in Lahore and sell to consumers in different urban cities by charging their retail margin. The biggest exporter of Chilgoza nuts is Dubai, which has the world's largest dry fruit market.

One tree can produce an average 12ft log having a 1.5 ft diameter. Based upon this calculation, estimated total volume of logs could be 17.7 ft<sup>3</sup>. If it is assumed that 60% of logs incur a loss, then the net volume would be 7.1 ft<sup>3</sup> (Iqbal, 1999). The net revenue obtained in the timber market is 370 Rupees which comes to 3337 Rupees per tree. Comparatively, revenue generation from nut selling is greater than timber selling.

## Conservation and Management

In the past conservation of the Chilgoza forest in Sherani District was a remarkable question and its management was a great challenge for government and non-governmental organization. This valuable forest has never been managed under a formal management system because of tribal ownership of so many sub-tribes and different social conflicts. But since 1991, World Wide Fund Pakistan started working to promote awareness among local communities to conserve Chilgoza forest reserves by controlling commercial logging (Urooj, 2015). In 1998 the federal ministry also took an initiative to sponsor the project based on the integration of conservation and development program for the Chilgoza forest ecosystem and the Dependent Community in the Suleiman Range. Later on, World Wide Fund conducted two projects on: Chilgoza Conservation in selected villages of Tehsil Sherani, and on Conservation of Chilgoza forest ecosystem through natural resource based livelihood improvement in Suleiman range (WWF-P Factsheet, 2014). The aim of these projects was to build awareness among people and develop a community based organization for Chilgoza forest protection and conservation.

## Conclusion

Chilgoza nuts have significantly higher economical market value compared to its timber. If a local community manages its harvesting properly and conserves this resource then this would generate significant income for local communities. This sustainable income would be greater than the existing unsustainable income, generated from timber harvesting. Though WWF-P and federal ministry has worked to some extent, proper legal enforcement is still required for conservation of this unique biological resource.

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