Potentials Of Chilghoza Nuts (*Pinus gerardiana*) in the Economic Uplifts of Mountainous Rural Communities

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ABSTRACT

Non-woody forest products play a vital role in the economic uplifts of the local communities living in forest areas. This study was conducted in the Shishikoh Valley, district Chital to identify the economic importance of the Chilghoza nuts. The study was based on interviews and questionnaires, and a total of 50 questionnaires were collected from the whole valley. The results showed that before 2003, the people were unaware of the high economic value of the Chilghoza nuts, they used to sell the Chilghoza nuts at a very low price (US$ 1.7 to 2.4 per bag: approximately 5 Kg) and harvest it for fuelwood purposes. After the IPRP interventions, training and awareness, the local people started conservation of Chilghoza trees and sustainable cone harvesting. The total collection and sell out of Chilghoza nuts in the Shishikoh valley jumped to 87.9 tons and US$ 7.64/kg in 2005 from 32.7 tons and US$ 0.34-0.48/kg, respectively. This study concludes that IPRP interventions improved the economic values of Chilghoza nuts as well as the living standards of the local people.

Keywords: Pine nuts, Neja nuts, NTFPs, Non-timber forest products, Socio-economic importance, Public awareness.

1. INTRODUCTION

The Chilghoza pine (*Pinus gerardiana*) is one of the important sources of livelihood and has a great potential to alleviate the poverty in rural communities in mountainous areas where the people are mostly dependent on forest resources (Khan, 2009). It is one of the most useful Himalayan trees, prefers the innermost folds of high mountains and consist of silvery bark which shines from a long distance (Kumar et al. 2013). It produces edible seeds/nuts (17-23 mm long and 3-5 mm thick) which are very expensive dry fruit and have a high market value (Peltier and Dauffy, 2009; Kumar et al. 2016). The seeds also contain various kinds of oils, which make them very tasty even in raw form (Bhattacharyya et al. 2013) and the confectionery industry prefers the Chilghoza nuts because they are easier to insert into cakes and sweets (Mirov and Hasbrouck, 1976). The tree is

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native to dry temperate zones at 2700-3400 m elevation from mean sea levels such as some parts of Afghanistan, Pakistan, Jammu-Kashmir, India and Tibet (eFlora of China, 2019) and occurs in association with *Cedrus deodara*, *Quercus ilex* and *Juniperus excelsa* subsp. *polycarpos* (Bhattacharyya et al. 1988; Richardson and Rundel, 1998). In Pakistan, the tree is found in Kohistan, Swat, Chitral, Chilas, and Suliman ranges in Balochistan and Waziristan. (Khan, 2009). Apart from socio-economic values, the Chilghoza forest has the potential to reduce soil erosion (ecological benefits) (Sehgal and Khosla, 1986).

Due to the high economic value of the Chilghoza nuts, its population is ruthlessly exploited and mostly 100% of the cones are harvested by local people (Richardson and Rundel, 1998). Pakistan is one of the most Chilghoza nuts producing countries and every year, about 13000 local people in the Suleiman Mountain range of Pakistan obtain their income from nuts harvest. Consequently, a very small percentage (about 5%) of natural regeneration occurs only in inaccessible areas (Singh and Chaudhary, 1993). The government and non-government organizations put efforts to cultivate it and increase its economic utilization.

In 2015, the estimated production of Pine nuts in different countries is shown in the following Table 1 (INC, 2016).

Table1: Chilghoza nuts production in different countries.

S. No	Country	Production (Metric Tons)	Percentage
1	China	5000	26
2	Russia	4050	21
3	Korea	3000	15
4	Afghanistan	3000	15
5	Pakistan	3000	15
6	Others	1525	8
Total		19600	100

Source: INC, (2016)

Livelihood improvement can be obtained by improving the human social, natural, political, physical and financial situations of the people. This study examines that the Chilghoza nuts could improve the economic conditions of the local people living in a mountainous area in Pakistan particularly in the Shishi Koh Valley, District Chital (study area) which is the only major source of their income. Chilghoza nuts were only used for domestic consumption and their economical potentials were first identified by a non-government organization (Innovation for Poverty Reduction Project: IPRP) in 2003. They discovered that

this natural resource is exploited by intermediaries (middlemen) from down the country who used to visit the Shishi Koh Valley every year before 2003 and buy Chilghoza pine at a very low price (about 0.5 cents per 5 kg). Consequently, the demand, as well as the price, increased which led to the unsustainable harvesting of the Chilghoza cones, branches and even trees. The IPRP started an awareness and training campaign in the valley about the economic and ecological importance of the Chilghoza pine and they built the capabilities of the local communities in improved harvesting, processing and marketing (IUCN, 2007). This study focuses on the importance of Chilghoza nuts in the economic uplifts and livelihood improvement of the local communities in the Shishikoh Valley, District Chital, Pakistan, particularly the pre- and post-IPRP interventions in 2003.

2. MATERIAL AND METHODS

2.1 Study Area Description

District Chitral is the northernmost district of Khyber Pakhtunkhwa. It is also known as Chitrar or Qashar. Rugged mountains and narrow valleys are the main features of Chitral. It is situated at a distance of 322 km from the provincial capital (Peshawar) and globally between 71°12′ and 73° 53′ east longitude and 35°13′ and 36°55′ north latitude. It is bounded on the northwest by Afghanistan and on the south by district by Dir (upper) and Kunnar province of Afghanistan, on the east by Ghizer district of Northern Areas and Swat district of Khyber Pakhtunkhwa. The total area of Chitral is about 14850 km2, out of which only 3% is cultivated and 6.4% have a forest or shrubby vegetation. The glaciers, lakes and houses cover 24.39%, 0.02% and 0.13% of the total area, respectively. A major portion consists of pastures (62%). In Chitral, the forest ranges from temperate to alpine and alpine pastures. In the temperate region, mostly *Pinus wallichiana*, *Pinus gerardiana* (Chilghoza pine/nut), *Cedrus deodara*, and *Quercus incana* while in the alpine zone, *Cedrus deodara*, *Picea smithiana*, *Abies pindro*, *Taxus buccata* are present. The alpine pastures consisting of shrubby vegetations such as *Juniper communis* (DCR Chitral, 1999).

The Shishi Koh valley is situated in the south of Chitral in Tehsil Droash (Figure 1). The valley is 39 km away from Drosh and 2000 to 7000 m above sea level. The total area of Shishikoh valley is 565 km2. Out of which, 64%, 26% and 8% of the total area is pasture, forest and glaciers, respectively. Only 2% of the area can be cultivated. The Valley falls in a dry temperate zone where the summer is pleasant, and winter is cold. The precipitation ranges 35 to 90 cm per year mostly in the form of snow. The major crops grown in Shishi Koh Valley are wheat and maize whereas the areas with high altitude such as Matalglasht is monocrop where mainly potato and some off-season vegetables are grown. This production hardly feeds them for 3 to 4 months, while for the remaining 8 months

they are dependent on wheat supply from the government stores (DCR Chitral, 1999).

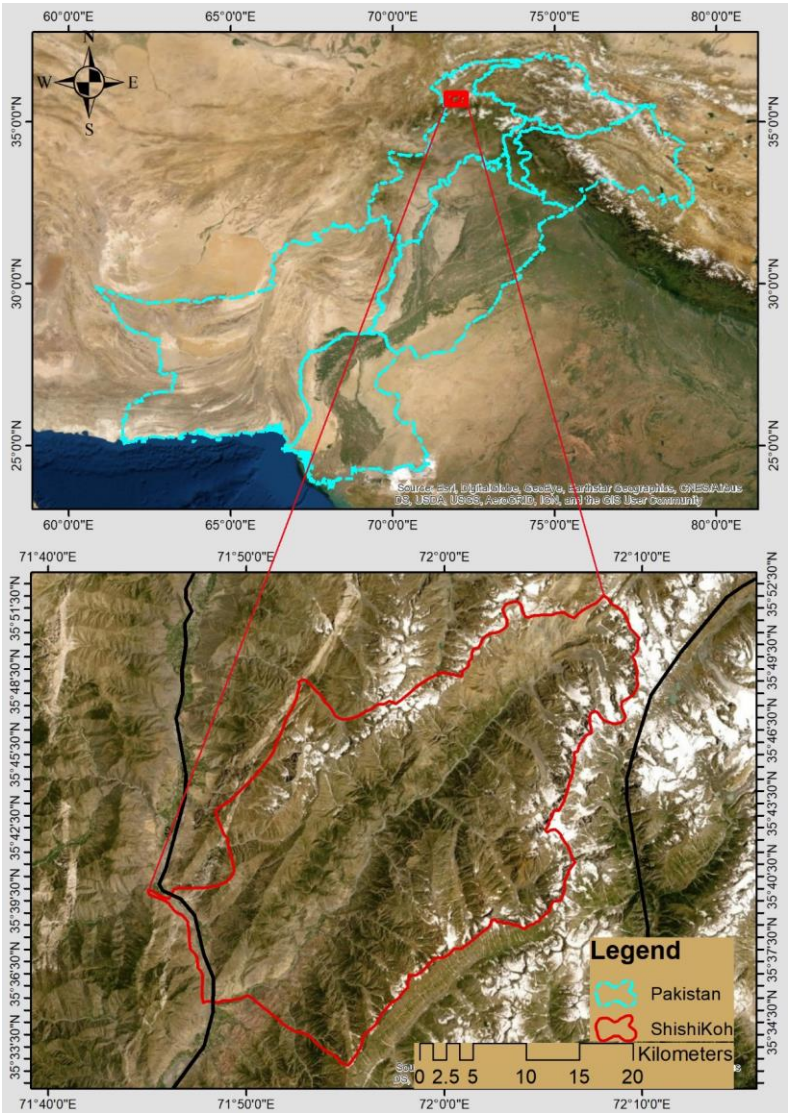

Figure 1. Map of the Study Area (Shishi Koh Valley, Chitral)

The total population of Shishikoh valley is 18,500 in 60 villages. Where the total households are 323. The population of Shishi Koh valley makes only 5% of the total district population. Opportunities for income generation is quite insufficient and the main source of income is through employment in government sectors (school teachers, Chitral militia and forest) and remittances in private sectors from other parts of the country (DCR Chitral, 1999).

 doi:10.20944/pre

2.2 Methodology

A field survey was conducted to collect the primary data. Community meetings were arranged at various locations to get in-depth knowledge of the present and past situation of the Chilghoza pines harvesting, production and economic values. During the meetings, respondents were randomly picked and interviewed using a questionnaire form. The data were then analyzed, and results were obtained. The randomly selected villages, households and their proportionate sampling is given in the following Table 2 and were calculated as:

$$\text{Sample households in a village} = \frac{\text{Total households in a Village}}{\text{Total households in all sampled villages}} \times \text{Total numbers of sample households}$$

Table 2: Proportionate sampling allocation

	Villages	Total Households	Household samples (68/454) *50
1	Dam	68	7
2	Kalas	84	9
3	Kashindale	116	13
4	Bela	99	11
5	Balpanj	33	4
6	Kotik	27	3
7	Bayak	27	3
	Total	454	50

3. RESULTS AND DISCUSSION

3.1 Average collection of Chilghoza nuts per household in different years

Chilghoza nuts was the traditional food of the nomadic tribes living in the area and the people only used to collect the nuts for edible purposes on a minor scale (Ciesla, 1998). In 2003, after the IPRP interventions and awareness, the local people started a collection for economic purposes. Table 3 shows the Chilghoza nuts collection from 2004 to 2008. The average collection has increased from 2004 to 2006, however, in 2007, the collection was less as compared to the previous years while in 2008, there was no collection. According

to the local communities, the Chilghoza nuts were eaten by a bird which has different names in different areas, for example, Warznind lo in Daam area, Angar Kaie in Kashindale area, Goshaari or Lowari in Bayyak area, and Totoka or Angar Kaie in Bela area.

In the year 2004, the peoples were not fully aware of the high economic value of Chilghoza nuts, some of them collected the nuts but they sold them at a very low price, about US$ 1.7 per Kg. The years 2005 and 2006 were the years of maximum production. In these years, people collected maximum pine nuts with an average of 43 and 42 kg per household, respectively. The maximum collections in these years were because of IPRP interventions, through creating awareness, giving them training about collection and harvesting, and establishing linkage with other market players. As a result, the price of the Chilghoza nuts per kg as well as the total sell-out of the valley dramatically jumped from US$ 1.7 to 7.64 and 0.051 to 0.61 million US$.

3.2 Price changes in the Chilghoza nuts

Before 2003 when people were unaware of the high importance of the Chilghoza nuts, they have sold out the Chilghoza nuts for only US$ 1.7 to 2.4 per bag (approximately 5 Kg) to some contractors/Beopari who used to come from the southern parts of the country (Khan, 2009). These contractors would make purchase agreements with the local shopkeepers and pay some advance money to them on their behalf. The local shopkeeper would then purchase the Chilghoza nuts from the local community at such a low price.

This issue was first identified by the IPRP in 2003, and they started to aware the local community of the Shishikoh Valley through workshops, training, and market linkages and promotion. As a result, the price of the Chilghoza nuts increased from US$ 0.34-0.48/kg (US$ 1.7-2.4 per 5 kg (1 bag)) to US$ 7.64/kg in 2005 (Khan, 2009).

Table 3: Chilghoza nuts collection, the corresponding price and total sell out per year

Collection year	Total Households	Average collection(kg)/household	Average Price/Kg (US$)	Total Collection (tons)	Total selling (Million US$)
2008	1855	-	-	-	-
2007		21	5.98	42.9	0.24
2006		42	6.94	85.8	0.55
2005		43	7.64	87.9	0.61
2004		16	1.7	32.7	0.051

3.3 Impacts of IPRP on the local community

Innovation for poverty reduction project (IPRP) played an important role in realizing the true value of Chilghoza nuts to the local community. The local people became protectors from the destructors of the Chilghoza trees. The following Table 4 shows various impacts of the IPRP on local communities.

1. Before IPRP the community had no reasons for conserving Chilghoza nut trees, and they used to harvest the whole branches because they were unaware of the high importance of the nuts. They were even cutting the tree for fuelwood purposes. After IPRP intervention, 100% of the community started collective conservation of the Chilghoza trees and even they made their own community-level punishment rule for cutting the Chilghoza tree, for example, slaughtering of a goat or fine of US$ 100-200.

2. Before IPRP, the nuts had no value and the price was only US$ 0.34-0.48/kg and after the IPRP awareness, 100% community agreed that the price jumped to as high as US$ 7.64/kg. This ultimately increased their income and improved their living standards. This price increase can also be seen in Table 3.

3. IPRP trained the local community in different fields, for example, climbing the tree, cone harvesting, grading and roasting. About 82 % of the people have got the training and they were experts in different fields such as climbing, cone harvesting and grading and roasting while the remaining 18% people answered that they need it (Table 4).

4. Before IPRP, the people used to climb up to the tree and harvest the cones through their hands, but after the IPRP intervention, they have been given proper instruments such as sticks, stickles and belts. 66% of the respondents started to use these instruments for cone harvesting. The remaining 34% of people said that they need these instruments for proper and sustainable cone harvesting.

5. The most important impact of the IPRP interventions was to ensure the cone harvest/collection at the proper time. Before IPRP, the people used to harvest in August or early September, at this stage nuts, are not fully mature and have no economic value. After the IPRP, they have started harvesting the cones after September 20 each year, which is a proper cone harvesting time. 100% of the respondents accepted that due to IPRP, we came to know the proper timing of the cone harvesting.

6. The IPRP made linkage of the local community to different markets and taught various marketing techniques. About 75% of the people have benefited from training on marketing techniques.

7. The IPRP trained the local people that how to roast the nut. The roasting not only improves the taste of the nuts but also increases the price of the nuts. IPRP has provided the roasting machines but 38% of the community said that the roasting machines are not enough, and they need more roasting machines at various locations/villages.

Table 4. Impacts of IPRP on local community

S. No	Impacts of IPRP	No. of respondent	Percentage
1	Conservation	50	100
2	Income jumps, extra money, proper rate, Nuts become valuable	50	100
3	Training, expertise, Safety, feasibility, low risk in climbing and harvesting	41	82
4	Instruments	33	66
5	Proper time harvesting, time saving	50	100
6	Learn Marketing techniques, direct linkage with markets & business	35	75
7	Roasting and grading techniques and machines	31	62

4. CONCLUSIONS

Innovation for poverty reduction project (IPRP) interventions has visible impacts in realizing the economic importance of Chilghza nuts to the poor and marginalized communities of Shishikoh Valley Chitral and how it uplifts the economic condition of the local people. IPRP training was very important, and it ensured sustainable cone harvesting, improved the nuts quality by roasting and established linkages of the local community to different markets. Chilghoza nuts which were considered useless before turned to a good source of income for local communities and improved the living standard of the local communities.

ACKNOWLEDGEMENTS

This study was supported by Livelihood Program North Region (Intercooperation), Pakistan. The authors would like to convey their sincere thanks to the Mr. Fayyaz Muhammad, Regional Process coordinator Livelihood Program North Region (Intercooperation), Pakistan for providing financial assistance to visit the study area and Mr. Muhammad Saleem, president, “Chitral Innovative Development Organization (CIDO)”, and Mr. Asfandiyar, president’ “Young Star Organization Chitral”, for arranging the field visit.

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