

2017

**Pakistan Museum of Natural History,
Islamabad**

Dr. Syed Aneel Ahmad Gilani



**BASE LINE STUDIES OF THE
SHAHRAN (MANCHI) FOREST,
KAGHAN (SFM-PROJECT)-2017**

Field Report

Locality: Shahrān (Kaghan)

Project: SFM (Sustainable Forest Management)



Sept. 2017

*Submitted by: Dr. Syed Aneel Ahmad Gilani
Associate Curator*

**Department: Botanical Sciences Division
Organization: Pakistan Museum of Natural History, Islamabad**

1. Summary

Sustainable Forest Management (SFM) Project" is a joint venture of the Government of Pakistan, UNDP, and GEF. SFM aims at promoting sustainable forest management in Pakistan's forests for mitigating climate change and securing ecosystem services. This report is an outcome of the field expedition carried out in September 2017 to explore the amphibians and reptilian diversity in the Kaghan Temperate Coniferous Forest Landscape.

The reported plant species from the study area has a great importance in terms of the conservation and sustainable management. The local people around the study area directly or indirectly involved in the over exploitation of the precious floral diversity specially the medicinal plants. They have their needs of food, medicine, fuelwood and fodder for their livelihood. The study has revealed the fact that the local people must be educated and create awareness among them by the forest and wild life people about the importance of the important floral diversity.

The one species *Trillium govianum* (Family Trilliaceae) is being harvested extensively from the moist temperate forest zones in Pakistan for its medicinal value. Such endangered plants must be conserved with the joint effort of the locals and forest and wild life staff in future.

Since the available time for present studies was extremely for the detailed study of the vegetation, so in future more time must be given for the detailed studies.

2. Project Brief

Project Title:	Sustainable forest management to secure multiple benefits in Pakistan's high conservation value forestss
Duration:	Five years (January 2017 to December 2021)
Project Areas:	i). Khyber Pakhtunkhwa (Temperate forest) ii). Sind (Riverine forest) iii). Punjab (Scrub forest and Riverine forest)
Project objective:	The objective of the proposed project is to promote sustainable forest management in Pakistan's Western Himalayan Temperate coniferous, Sub-tropical broadleaved evergreen thorn (Scrub) and Riverine forests for biodiversity conservation, mitigation of climate change and securing of forest ecosystem services. In particular, it aims at implementation of three inter-related and mutually complementary components that are focussed at addressing the barriers of inadequate planning, regulatory and institutional frameworks to integrated forest resource management, and enhancing the limited experience among key government and civil society stakeholders in developing and implementing SFM practices on the ground.
Project outcomes:	Outcome 1: Embedded sustainable forest management into landscape spatial planning; Component/Outcome 2: Biodiversity conservation strengthened in and around High Value Conservation Forests; and Component/Outcome 3: Enhanced carbon sequestration in

Base line Studies of the Shahran (Manchi) forest, Kaghan

	and around HCVF in target forested landscapes
Description	<p>The objective of the proposed project is to promote sustainable forest management in Pakistan's Western Himalayan Temperate Coniferous, Sub-tropical broadleaved evergreen thorn (Scrub) and Riverine forests for biodiversity conservation, mitigation of climate change and securing of forest ecosystem services. In particular, it aims at implementation of three inter-related and mutually complementary components that are focussed at addressing the barriers of inadequate planning, regulatory and institutional frameworks to integrated forest resource management, and the limited experience among key government and civil society stakeholders in developing and implementing SFM practices on the ground.</p> <p>Component 1 will support the incorporation of sustainable forest management objectives and safeguards in forest management planning, forestland allocation and compliance of monitoring systems at the local level.</p> <p>Component 2 will identify, demarcate and implement on-the-ground approaches to improving management of high conservation value forests within seven landscapes covering an area of 67,861 ha with the aim of meeting the life requisites of the target species, and habitats such as breeding areas, feeding areas, water sources, dispersal and connectivity corridors, etc.</p> <p>Component 3 will develop practical approaches to enhancing carbon sequestration through restoring degraded and former forested areas (LULUCF activities) by a combination of restoration and reforestation of 10,005 ha of degraded conifer forests; 3,400 ha of degraded scrub forests, and reforestation of 13,099 ha of Riverine forests with native species.</p> <p>The project is funded by GEF and UNDP and implemented by jointly by UNDP Pakistan and Ministry of Climate Change in Khyber Pakhtunkhwa, Sind, and</p>

Base line Studies of the Shahran (Manchi) forest, Kaghan

	Punjab.
Project Outputs	<p>1.1 Forest resources and ecosystem services inventory and mapping informs forest management planning, implementation and monitoring at the landscape level</p> <p>1.2 Updated guidelines, planning tools and regulations facilitate harmonization and mainstreaming ecosystem, climate risk mitigation and biodiversity considerations into forest management planning</p> <p>Output 1.3. Landscape level forest plans integrates considerations of biodiversity, ecosystem services, climate mitigation and community resource use</p> <p>Output 1.4 Stakeholders’ benefits of current unsustainable and sustainable forest practices and status of forest resources assessed</p> <p>Output 1.5 System for effective monitoring and enforcement of forest management plans, including clear delineation of roles and responsibilities of key partners and management of participatory processes informs forest management and development</p> <p>Output 1.6 Forest resource use conflict management and resolution processes established in multiple use zones</p> <p>Output 1.7 Capacity building for provincial and district level forest agencies, local communities and other stakeholders, including (i) training workshops and courses (ii) vocational training modules (iii) on-the-ground demonstration and training and (iv) patrolling skills and forest fire controlling training enhances capacity for</p>

	<p>sustainable land and forest management within key agencies and communities.</p> <p>1.8 Recommendations for facilitating adoption (institutionalising), scaling up and replication of sustainable forest management practices promoted</p> <p>Output 2.1 Avoided deforestation of High Conservation Value Forests with forest use regime change from unsustainable use to biodiversity conservation and non-exhaustive community forest management instituted</p> <p>Output 2.2 Community-Managed Conservation Area model of community governance and management system operational</p> <p>Output 2.3 Biodiversity conservation and capacities in and around high conservation value forests reinforced through training, enhanced enforcement, guidelines and strengthening with community managed conservation forests and involvement of communities in state managed forests</p> <p>Output 3.1 Restoration of degraded Temperate Conifer forests and Sub-tropical Broadleaved Evergreen Thorny forests with indigenous species, realizing carbon benefits</p> <p>Output 3.2 Reforestation of degraded Riverine forests with indigenous species, realizing carbon benefits and biodiversity conservation</p> <p>Output 3.3 Best practice silvicultural approaches to forest restoration and reforestation documented, and capacities enhanced through training and local language guidelines.</p>
--	--

Base line Studies of the Shahrān (Manchi) forest, Kāghan

	<p>Output 3.4 On-the-ground application of Nationally-tailored methodology for measuring carbon stocks (to be developed under a parallel REDD Readiness Preparation Project) applied, demonstrated and validated for the target areas.</p>
--	--

The state forests include Nagan Reserve Forest (1,637 ha), Manshi Reserve Forest, also a wildlife sanctuary (2,368 ha), Kamal Bann Reserve Forest (2,212 ha), Malakandi Reserve Forest (1,923 ha) and NuriBichla Reserve Forest (1,787 ha); and Guzara forests include GanilaGuzaraForesy (114 ha), BageerGuzara Forest (2,896 ha), HungraiGuzara Forest (415 ha), BelasachaGuzara Forest (364 ha), SuanGuzara Forest (554 ha), ShukraGuzara Forest (67 ha), PhagnaGuzara Forest (871 ha), ChushaalGuzara Forest (258 ha), Jared Guzara Forest (526 ha), Kamal Bann Guzara Forest (84 ha), BhoonjaGuzara Forest (2,208 ha) and NuriGuzara Forest (57 ha).

The area of above five state forests is 9,927 ha and the area of twelve Guzara (communal) forests is 8,414 ha, the total forested area in the landscape is 18,341 ha. The total area of the landscape is 22,000 ha.

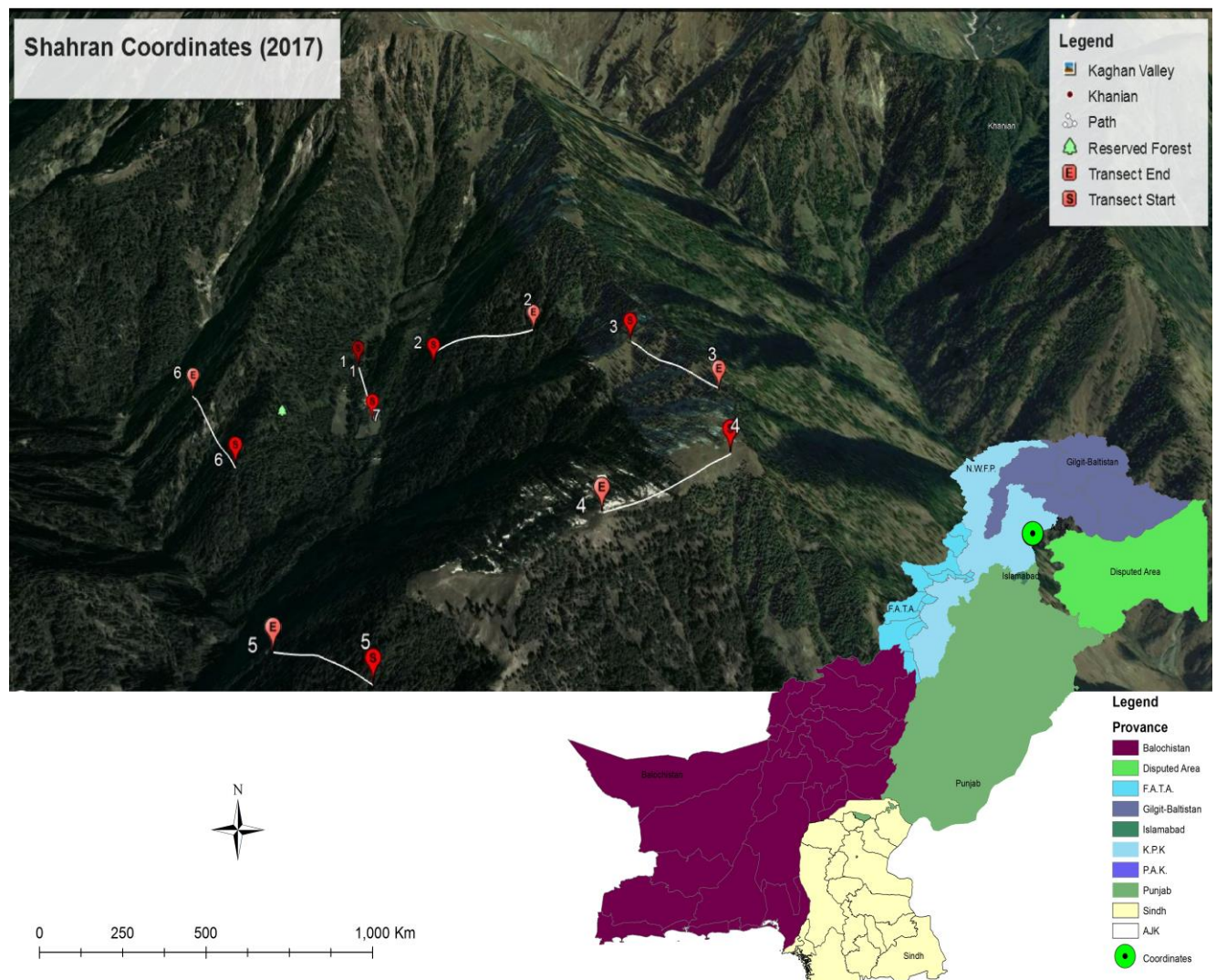
There are about 80 villages and hamlets situated in and around these forests which consist of approximately 54,000 households and 9,000 forest dependent local persons. Ecosystem goods and services provided by the landscapes include timber, fire wood, fodder, grazing, fish, NTFPs, water, clean air, carbon sequestration, soil conservation, biodiversity conservation, aesthetic landscapes, countryside recreation and ecotourism. The land uses in the landscapes are forestry, grazing, agriculture, wetlands, and communication infrastructure and human settlements. The communities in these two landscapes are poor and mostly depend on marginal agriculture, non-farm jobs, and goods and services from communal as well as state forests such as timber, firewood, fodder, grazing, NTFPs.

The planned project activities include protection of stocked and under-stocked forests for enhancement of carbon stock, avoidance of deforestation and forest degradation, biodiversity conservation; restoration of under-stocked areas with less than 25 % cover and reforestation in larger blanks by planting saplings and seedlings raised in local nurseries; involvement of communities, awareness raising; forest fire management including early warning system, sustainable harvesting, processing and marketing of NTFPs, preparation and implementation of

Base line Studies of the Shahrān (Manchi) forest, Kaghan

ecosystem based landscape management plans; and assessment of carbon stocks and promoting trading of carbon credits.

3. Map showing the Shahrān (Manchi) forest



4. Introduction.

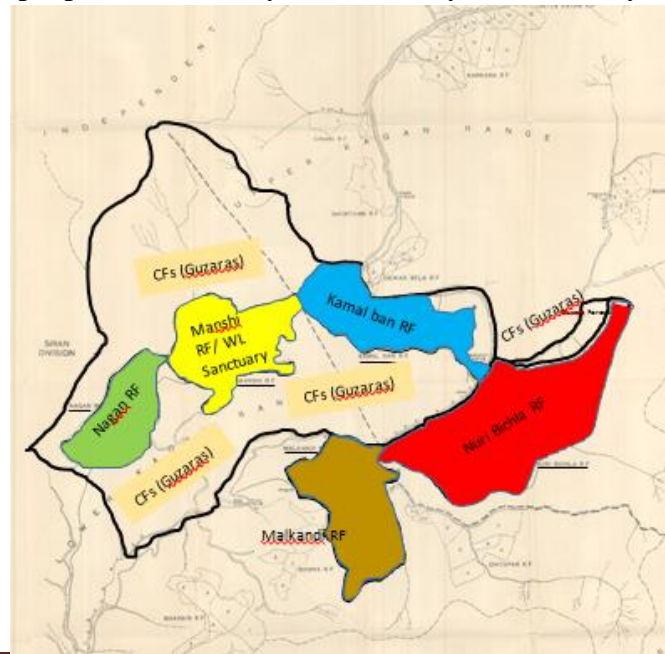
4.1. Scope of the study

Kaghan Temperate Coniferous Forest Landscape is situated in the Himalayan Moist Temperate zone of Pakistan in the district of Mansehra in Khyber Pakhtunkhwa Province (KP). The project document outlines the various features of the project as under:

The documented flora of the area consists of coniferous trees including *Cedrus deodara*, *Pinus wallichiana*, *Abies pindrow*, *Taxus wallichiana*, *Picea smithiana*, and broad-leaved trees such as *Juglans regia*, *Aesculus indica*, *Prunus padus*, *Fraxinus excelsior*, *Ailanthus glandulosa*, *Diospyrus lotus*, *Morus alba* and *Ficus indica* are found in these landscapes. *Taxus wallichiana* and *Fraxinus excelsior* are endangered, the former is included in IUCN Red Data Book, and the latter is endangered nationally due to excessive utilization and poor regeneration because of long gestation period of eighteen months for germination of seed, during which it is liable to be washed or blown away or suffers decay. *Parrotia jacquemontiana* amongst shrubs, *Saussurea alappa* (listed in Appendix-I of CITES) and *Trillium guavaninum* amongst herbs are mentioned here due to the threatened status nationally because of over exploitation. There are many NTFPs in the area and the area has great potential for local employment from co-tourism.

The vegetation of the area includes many important species that were utilized for medicine and have a great economic value. The tree species include *Prunus padus*, *Pinus wallichiana*, *Picea smithiana*, *Taxus wallichiana*, *Juglans regia*, the important shrubs are e.g. *Viburnum foetens* and the important herbs include *Fragaria nubicola*, *Dryopteris*, *Euphorbia wallichii*, *Viola*, *Cynodon*, *Swertia*, *Veronica laxa* and *Plantago* sp. The people in the study area directly or indirectly dependent on these natural resources.

4.2 General Map of the study area



5. Objectives of the present studies

This study was envisaged to provide for the first time, a comprehensive ecological and systematic account of the plant diversity of the Kaghan Temperate and moist temperate Coniferous Forest Landscape. The prime objectives of the study were to:

- Collect and review secondary data on the plant species of the study area using the available literature and local inhabitants.
- Prepare a taxonomical checklist of all the available plant species.
- Collect data from the field on vegetation and plant species on their occurrence, abundance and diversity in the study areas.
- To provide photographs, where possible, of the available plant species.

6. Methodology (Vegetation Analysis)

Collection: Flowering plants should be collected when they are in the flowering or fruiting stage, it is better if both flowers and fruits are present. Entire plants of herbs and grasses are to be collected. In case of shrubs and trees, take cuttings of the flowering and fruiting shoots. Put the collected specimens in a large polythene bag to prevent drying and put a tag inside the bag giving the name of the locality. Note the date of collection, field number, habit of the plant, flower colour, etc. in a field notebook. Press the plants in the field between newspaper sheets and blotters. Change the blotters daily till the plants are completely dry. Use extra blotters for fleshy plants and change blotters twice a day. Some heat may be applied to facilitate drying. Some plants turn black if they are not dried quickly. Trim large flowers, rhizomes, etc. to make them thin; cut away the thicker branches.

Preservation: For preservation, soak the dried specimens in a solution of ethyl alcohol containing 3% mercuric chloride. Then dry them again. When fully dry, mount each specimen on a herbarium sheet. Use some glue to fix the plant on the sheet. Use scotch tape to fix thick fruit or floral parts. Seeds can be kept in a paper-pocket and pasted on the sheet. Preserve large and fleshy fruits in F.A.A. (90 ml alcohol + 5 ml acetic acid + 5 ml formalin) in glass jars.

Herbarium sheet size: 11.5 x 16.5 inches (PMNH Herbarium)

Mounting and Storage: Put a label on the lower right side of the sheet. Write down the name of the plant, family, locality, collectors name, identifiers name and field numbers on the label. After giving an accession number to each sheet put the specimens family-wise in steel Almirahs arranging them genus and species-wise alphabetically.

Vegetation Analysis

Phytosociological survey, an important tool of ecology for vegetation assessment to be conducted in Sept. 2017 at Kaghan and Siran valley.

On the basis of Importance Value Index (IVI.), sampled vegetation shall be described into different plant communities. The community within each stand was named with the first three of the species having highest Importance Value Index irrespective of its habit. When two or more species closely approached each other in order of Importance Value, the community shared the names of these dominants. The name of the species with highest I.V appeared first followed by other dominant species. The generic names of the dominant species were used for naming the community. (Ahmed & Shaukat 2012).

Base line Studies of the Shahran (Manchi) forest, Kaghan

Quadrat Analysis

For vegetational investigations the quadrat method is the important method if we are studying vegetation structure in a particular habitat.

Bryophytes & Lichens

0.5 × 0.5 meters

Herbaceous flora

1 to 2 × 2 meters

Shrubs

5-10 × 10 meters

Trees

10-20 × 20 meters

Density.

Number of individuals of a species in a unit area is called density. (Mass per unit volume). Density should not be compared with the similar types of plants. The relative density is referred to as percentage of the individuals of each species that contribute to the total individuals in a community or the area.

Density of a species = $\frac{\text{Total number of individuals of a species in all the quadrates (plots)}}{\text{Total area of the sample quadrates}}$

e.g. sample area = 10 × 10 m, five plots = 500 m²

Relative Density = $\frac{\text{Number of individuals of a species}}{\text{Total number of individuals of all species}} \times 100$

Frequency

The percentage of the plot, point or quadrat in which a species occur is called the frequency (%). It only tells us the chance of finding a species in a sampling area. Relative frequency of a species is a percentage frequency of the total frequency.

Frequency (%) = $\frac{\text{No. of quadrates in which a species occur}}{\text{Total No. Of plots taken}} \times 100$

Cover

Cover is one of the most important attribute in Phytosociological studies. It is a ground area occupied by herb, shrub, or tree. Canopy cover is a total ground surface under a canopy of a plant and could be a larger than the actual area sampled due to the overlapping branches of different trees, especially in the stratified forest.

For DBH (diameter at breast height) of tree species, diameter measuring tape is used to measure stem girth at 4.5 feet above the ground surface. Each measurement is individually converted into the basal area using the following formula.

Basal area of the tree = πr^2

For example DBH of tree is 25 cm

Radius will be 25/2 = 12.5 cm

Base line Studies of the Shahran (Manchi) forest, Kaghan

Now basal area of the tree will be $12.5 \times 12.5 \times 3.1415 = 490.86 \text{ cm}^2$
For $\text{m}^2 = 490.85/10000 = 0.049 \text{ m}^2$

Average cover of a species = $\frac{\text{Total basal area of a species}}{\text{No. Of plants of that particular species}} \times 100$

Relative cover of species = $\frac{\text{Total cover of all individual of a species}}{\text{Total cover of all the species}} \times 100$

IVI (Importance Value Index)

Density indicates the number of individuals of a species while, frequency shows how these individuals are distributed (pattern of distribution) in a community. If a species is regularly distributed, the frequency value will be high, otherwise, low frequency value be recorded, a species with irregular distribution in a community. Cover tells how much area is occupied by a species. Ecologists use to recognize dominant species of the community on the basis of frequency or density alone. Now scientists give equal weight to all the 3 attributes.

$IVI = RF + RD + RC = IVI$

RF= Relative frequency

RD=Relative Density

RB/RC= Relative basal area/Relative Cover

Dominance

If a group of species has a capacity to control the community due to its high number, large volume or some specific activity is called dominant species. Dominance is considered as a biological structure of community too.

Dominance = $\frac{\text{basal area or area coverage of a species}}{\text{Area samples}}$

Area samples

Relative Dominance = $\frac{\text{Dominance of species A}}{\text{Dominance of all species}} \times 100$

Base line Studies of the Shahrān (Manchi) forest, Kaghan

7. Results & Discussion

Transect: 01

GPS Data: 34 42 21.5'N
73 26 14.7' E
Alt. 2477 Meters

Vegetation with the Importance Index Value

S/No.	Plant Species	IVI
1.	<i>Pinus wallichiana</i>	71.1
2.	<i>Juglans regia</i>	15.87
3.	<i>Prunus padus</i>	17.77
4.	<i>Abies pindrow</i>	31.54
5.	<i>Viburnum foetens</i>	24.7
6.	<i>Fragaria nubicola</i>	26.48
7.	<i>Euphorbia wallichii</i>	7.26
8.	<i>Dryopteris</i>	7.49
9.	<i>Viola canescens</i>	10.92
10.	<i>Cynadon dactylon</i>	32.74
11.	<i>Veronica laxa</i>	8.1
12.	<i>Swertia sp</i>	2.78
13.	<i>Salvia sp</i>	7.51
14.	<i>Hedera helix</i>	7.24
15.	<i>Rumex dentatus</i>	10.42
16.	<i>Galium aparine</i>	17.9

Pinus wallichiana , *Cynadon dactylon*, *Abies pindrow* Community

Forest Name: Shahrān

Forest Type: Moist Temperate Forest

The community comprises of total 16 species having mainly 4 tree species, 2 shrubs and 10 herbs species. In the community *Pinus wallichiana* has the highest IVI (71.1) with second species *Cynadon dactylon* having 2nd highest IVI (32.74) and *Abies pindrow* being the third highest IVI (31.54). The species with the lowest IVI is *Swertia sp* with IVI (2.78).

Base line Studies of the Shahran (Manchi) forest, Kaghan

Transect: 02

GPS Data: 34 42 11.9' N
73 26 27.2' E
Alt. 2640 Meters

Vegetation with the Importance Index Value

S/No.	Plant Species	IVI
1.	<i>Pinus wallichiana</i>	35.38
2.	<i>Cedrus deodara</i>	19.74
3.	<i>Cornus macrophylla</i>	14.51
4.	<i>Abies pindrow</i>	42.31
5.	<i>Picea smithiana</i>	55.62
6.	<i>Viburnum foetens</i>	15.06
7.	<i>Onychium japonicum</i>	12.21
8.	<i>Fragaria nubicola</i>	11.72
9.	<i>Dryopteris</i>	20.40
10.	<i>Viola canescens</i>	14.68
11.	<i>Bistorta amplexicaule</i>	6.99
12.	<i>Cynadon dactylon</i>	14.58
13.	<i>Galium aparine</i>	20.40
14.	<i>Valeriana</i>	11.62
15.	<i>Peonia emodi</i>	4.62

Picea smithiana, *Abies pindrow*, *Pinus wallichiana* Community

Forest Name: Shahran

Forest Type: Moist Temperate Forest

The community comprises of total 16 species having mainly 5 tree species, 1 shrubs and 9 herbs species. In the community *Picea smithiana* has the highest IVI (55.62) with second species *Abies pindrow* having 2nd highest IVI (42.31) and *Pinus wallichiana* being the third highest IVI (35.38). The species with the lowest IVI is *Peonia emodi* with IVI (4.62).

Base line Studies of the Shahran (Manchi) forest, Kaghan

Transect: 03 (On way to Manchi Top)

GPS Data: 34 41 38.7 N
73 27 05.9 E Alt. 2856 M

Vegetation with the Importance Index Value

S/No.	Plant Species	IVI
1.	<i>Pinus wallichiana</i>	35.77
2.	<i>Cedrus deodara</i>	19.94
3.	<i>Cornus macrophylla</i>	13.61
4.	<i>Abies pindrow</i>	40.77
5.	<i>Picea smithiana</i>	44.78
6.	<i>Viburnum foetens</i>	21.92
7.	<i>Duchesnea indica</i>	12.12
8.	<i>Fragaria nubicola</i>	11.64
9.	<i>Dryopteris</i>	20.19
10.	<i>Viola canescens</i>	14.53
11.	<i>Pteris sp</i>	7.01
12.	<i>Cynadon dactylon</i>	20.28
13.	<i>Galium aparine</i>	20.61
14.	<i>Valeriana</i>	11.97
15.	<i>Thymus sp</i>	4.7

Picea smithiana, *Abies pindrow*, *Pinus wallichiana* Community

Forest Name: Shahran

Forest Type: Moist Temperate Forest

The community comprises of total 16 species having mainly 5 tree species, 1 shrubs and 9 herbs species. In the community *Picea smithiana* has the highest IVI (44.78) with second species *Abies pindrow* having 2nd highest IVI (40.77) and *Pinus wallichiana* being the third highest IVI (35.77). The species with the lowest IVI is *Thymus sp* with IVI (4.7).

Base line Studies of the Shahran (Manchi) forest, Kaghan

Transect: 04 (Manchi Top)

GPS Data: 34 69 061 N
073 45 087 E Alt. 9449 Feet

Vegetation with the Importance Index Value

S/No.	Plant Species	IVI
1.	<i>Pinus wallichiana</i>	55.38
2.	<i>Picea smithiana</i>	56.18
3.	<i>Viburnum foetens</i>	24.26
4.	<i>Cotoneaster horizontalis</i>	37.65
1.	<i>Berberis lycium</i>	3.98
2.	<i>Cynadon dactylon</i>	21.61
3.	<i>Thymus sp</i>	25.00
4.	<i>Nepeta sp</i>	9.39
5.	<i>Fragaria nubicola</i>	22.92
6.	<i>Galium sp</i>	9.41
7.	<i>Salvia sp</i>	5.17
8.	<i>Adiantum sp</i>	8.82
9.	<i>Rumex dentatus</i>	3.46
10.	<i>Plantago sp</i>	10.14
11.	<i>Urtica dioica</i>	4.69
12.	<i>Convolvulus sp</i>	1.73

Picea smithiana, *Pinus wallichiana*, *Cotoneaster horizontalis* Community

Forest Name: Shahran

Forest Type: Moist Temperate Forest

The community comprises of total 12 species having mainly 2 tree species, 3 shrubs and 11 herbs species. In the community *Picea smithiana* has the highest IVI (56.18) with second species *Pinus wallichiana* having 2nd highest IVI (55.38) and *Cotoneaster horizontalis* being the third highest IVI (37.65). The species with the lowest IVI is *Convolvulus sp* with IVI (1.73).

Base line Studies of the Shahran (Manchi) forest, Kaghan

Transect: 05 (Agror valley / Shahran)

GPS Data: 34 42 16.0 N

073 25 48.1 E Alt. 8099 Feet

Vegetation with the Importance Index Value

S/No.	Plant Species	IVI
1.	<i>Pinus wallichiana</i>	51.95
2.	<i>Picea smithiana</i>	35.75
3.	<i>Abies pindrow</i>	18.96
4.	<i>Prunus padus</i>	6.78
5.	<i>Taxus wallichiana</i>	22.39
6.	<i>Juglans regia</i>	6.2
7.	<i>Rosa brunonii</i>	6.94
8.	<i>Viburnum foetens</i>	9.54
9.	<i>Indigofera heterantha</i>	11.80
10.	<i>Sorbaria tomentosa</i>	20.85
11.	<i>Rubus fruticosus</i>	5.6
12.	<i>Fragaria nubicola</i>	13.57
13.	<i>Sonchus asper</i>	1.94
14.	<i>Impatiens sp.</i>	5.95
15.	<i>Dryopteris sp</i>	14.29
16.	<i>Adiantum sp</i>	6.58
17.	<i>Polygonatum</i>	5.97
18.	<i>Rumex dentatus</i>	18.12
19.	<i>Geranium wallichianum</i>	10.55
20.	<i>Nepeta sp</i>	4.55
21.	<i>Verbascum thapsus</i>	2.94
22.	<i>Echinops echinatus</i>	2.63
23.	<i>Onychium japonicum</i>	13.72
24.	<i>Solanum nigrum</i>	2.01

Pinus wallichiana, Picea smithiana, Taxus wallichiana Community

Forest Name: Shahran

Forest Type: Moist Temperate Forest

The community comprises of total 24 species having mainly 6 tree species, 6 shrubs and 13 herbs species. In the community *Pinus wallichiana* has the highest IVI (51.95) with second species *Picea smithiana* having 2nd highest IVI (35.75) and *Taxus wallichiana* being the third highest IVI (22.39). The species with the lowest IVI is *Solanum nigrum* with IVI (2.01).

8. Conclusion.

The vegetation of the area is quite conserved and the loss of the floral diversity and habitat is not very severe. The local community around the forest area is somehow dependent on the natural resources for their needs of firewood, fruits, or fodder from the forest and plants. The main threat is the presence of the coal mines in the forest area. The coal mines is a threat to the forest plant species in both ways i.e. directly or indirectly.

The tree species e.g. *Pinus wallichiana*, *Picea smithiana*, *Taxus wallichiana*, *Abies pindrow* and *Juglans regia* are seriously damaged for the needs of the fuelwood and timber purposes by the local inhabitants.

The foliage of the many tree and shrubs species is used as fodder for the cattle that causes a serious threat to their population. The shrubs including the *Berberis lycium*, *Rubus fruticosus*, *Sorbaria tomentosa* and *Phytolacca sp* are also harvested for the needs of medicine and fodder for the cattle. The awareness must be created among the locals not to overexploit the natural resources. The herbaceous flora including the grass species mainly are used for the fodder and fuel. The cattle normally utilize the grasses and shrubs for their food and sometimes also utilize the *Olea* foliage. The forests must be conserved and the illicit cutting of the species for the fuelwood or illegal harvesting for the fodder must be checked for the sustainable management of the forest.

9. Recommendations

- The selected sites must be studied more extensively and thoroughly as the time for the said work was short and the area was very large
- The local people must be given awareness by the forest and wildlife staff about the importance of the floral diversity and specially the importance of the medicinal plants.
- The habit of illicit cutting and illegal grazing in the area must be checked so that the important species might not get endangered.

10. Acknowledgements.

I am grateful to the management of Sustainable Forest Management program to Mr. Muhammad Ayaz Khan (National Project Manager) and Najam-ul-Huda (Manager, SFM) who provided support and resources to finalize these studies. I am also much thankful to my whole PMNH team and the all members of the project team for providing support of any kind in the field in gathering the required information.

11. References

Ahmed M and Shaukat S.S. 2012. A text book of Vegetation Ecology. Abrar Sons. Robson Road Karachi. Pakistan.

Base line Studies of the Shahrān (Manchi) forest, Kaghan

Annexure-01

Vegetation of Shahrān (Kaghan)

S.No	Plant species	Family
Herbs		
1.	<i>Ainsliaea aptera</i>	Asteraceae
2.	<i>Amaranthus viridis</i>	Amaranthaceae
3.	<i>Anagalis arvensis</i>	Primulaceae
4.	<i>Andrachne cordifolia</i>	Euphorbiaceae
5.	<i>Argemone mexicana</i>	Papaveraceae
6.	<i>Arisaema flavum</i>	Araceae
7.	<i>Artemisia vulgaris</i>	Asteraceae
8.	<i>Anemone sp</i>	Ranunculaceae
9.	<i>Capsella bursa pastoris</i>	Brassicaceae
10.	<i>Caltha alba</i>	Ranunculaceae
11.	<i>Cannabis sativa</i>	Cannabaceae
12.	<i>Fragaria nubicola</i>	Rosaceae
13.	<i>Duschesnia indica</i>	Rosaceae
14.	<i>Bistorta apmlexicaule</i>	Polygonaceae
15.	<i>Polygonum plebium</i>	Polygonaceae
16.	<i>Malvastrum coromendalianum</i>	Malvaceae
17.	<i>Oxalis corniculata</i>	Oxalidaceae
18.	<i>Rumex dentatus</i>	Polygonaceae
19.	<i>Rumex nepalensis</i>	Polygonaceae
20.	<i>Urtica dioica</i>	Urticaceae
21.	<i>Plantago ovata</i>	Plantaginaceae
22.	<i>Veronica laxa</i>	Scrophulariaceae
Shrubs		
23.	<i>Phytolacca latbenia</i>	Phytolaccaceae
24.	<i>Viburnum foetens</i>	Caprifoliaceae
25.	<i>Berberis lycium</i>	Berberidaceae
26.	<i>Rosa webbiana</i>	Rosaceae
27.	<i>Rosa brononai</i>	Rosaceae
28.	<i>Rubus fruiticosus</i>	Rosaceae
29.	<i>Sorbaria tomentosa</i>	Rosaceae
30.	<i>Debregeasia salicifolia</i>	Urticaceae
31.	<i>Desmodium sp</i>	Papilionaceae
32.	<i>Cotoneaster horizontalis</i>	Rosaceae
Trees		
33.	<i>Taxus wallichiana</i>	Taxaceae
34.	<i>Cedrus deodara</i>	Pinaceae
35.	<i>Pinus wallichiana</i>	Pinaceae
36.	<i>Cornus macrophylla</i>	Cornaceae
37.	<i>Prunus padus</i>	Rosaceae

Base line Studies of the Shahrān (Manchi) forest, Kaghan

38.	<i>Abies pindrow</i>	Pinaceae
39.	<i>Aesculus indica</i>	Hippocastanaceae
40.	<i>Robinia pseudo-acacia</i>	Papilionaceae
41.	<i>Grewia sp</i>	Tiliaceae
42.	<i>Picea smithiana</i>	Pinaceae
43.	<i>Quercus sp</i>	Fagaceae
44.	<i>Juglans regia</i>	Juglandaceae
45.	<i>Ailanthus sp</i>	Simaroubaceae
46.	<i>Fraxinus sp</i>	Oleaceae
47.	<i>Platanus orientalis</i>	Platanaceae

Base line Studies of the Shahrān (Manchi) forest, Kaghan

Annexure-2: Sampling sites/Line transects selected for the baseline studies of Kaghan Temperate Coniferous Forest

S. No.	Sampling Transect	Start point (SP)	End Point (EP)	Habitat Type
1	T-1	34 42 21.5 N 73 26 14.7 E	34 42 21.5 N 73 26 14.7 E	Himalayan Moist Temperate Forest
2	T-2	34 42 11.9 N 73 26 27.2 E	34 42 08.7 N 73 26 45.8 E	Himalayan Moist Temperate Forest
3	T-3	34 41 54.9 N 73 26 58.4 E	34 41 38.7 N 73 27 05.9 E	Himalayan Moist Temperate Forest
4	T-4	34 41 26.3 N 73 27 00.2 E	34 41 24.1 N 73 27 38.3 E	Himalayan Moist Temperate Forest
5	T-5	34 41 17.1 N 73 26 02.9 E	34 41 31.0 N 73 25 51.1 E	Himalayan Moist Temperate Forest
6	T-6	34 42 06.1 N 73 25 49.8 E	34 42 24.1 N 73 25 44.3 E	Himalayan Moist Temperate Forest



Fig. 01. *Phytolacca sp*



Fig. 02. *Viburnum foetens*



Fig. 03. *Pteris sp*



Fig. 04. *Geranium wallichianum*



Fig. 05. Pasture land at Manchi peak (Shahran)



Fig. 06. *Potentilla sp*



Fig. 07. *Impatiens sp*



Fig. 08. Author during the technical session at Shahrān



Fig. 09. Author taking the data from the field