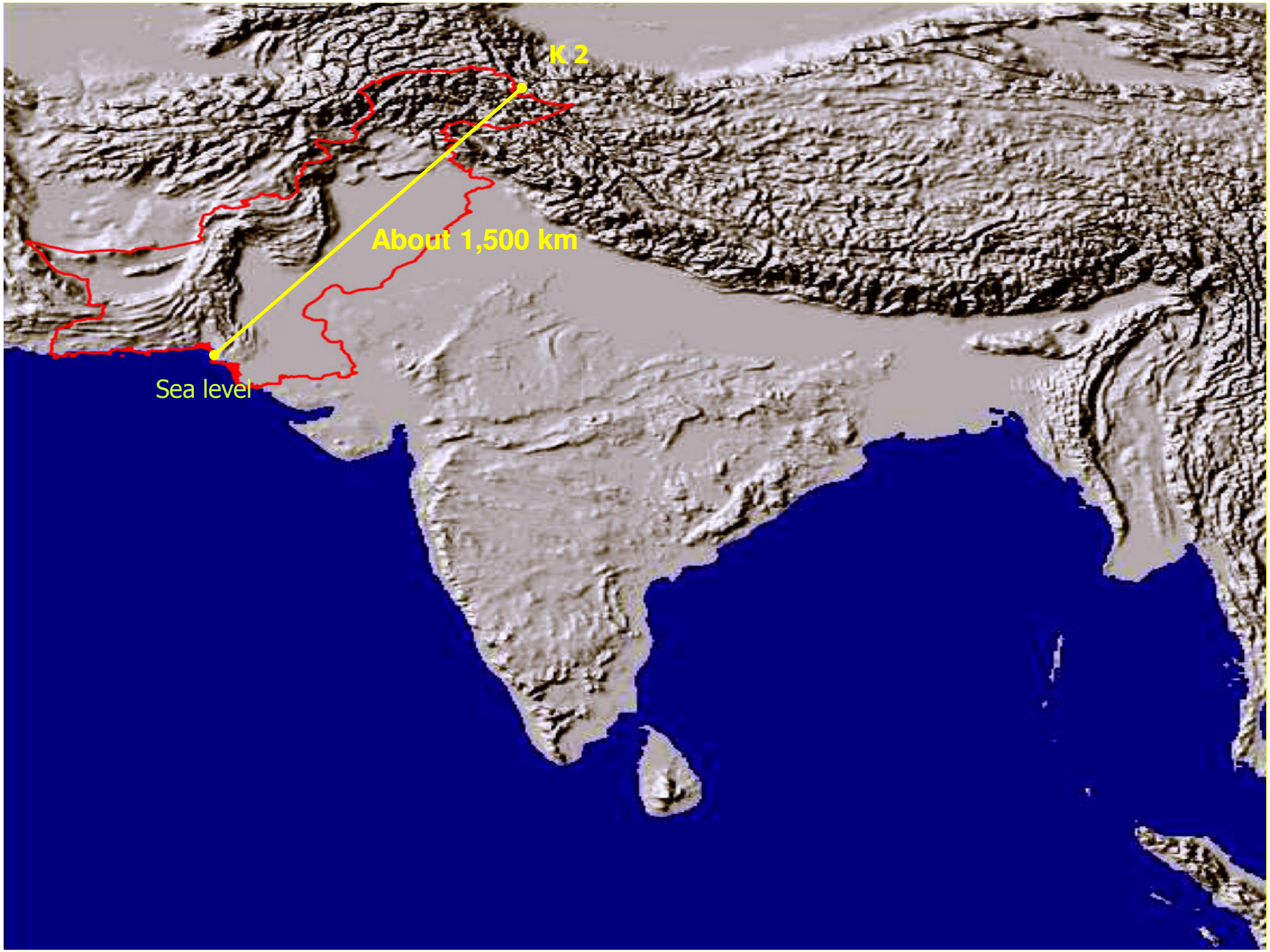
GENERAL OVERVIEW OF PAKISTAN WITH FOCUS ON MEDICINAL PLANTS RESOURCES

Muhammad Adnan

Affiliations:

(1) Tropical Silviculture and Forest Ecology, Burckhardt Institute, Georg-August-Universität Göttingen

(2) Kohat University of Science and Technology, Pakistan


K 2
About 1,500 km
Sea level

HIGH ALTITUDE

"Mountain Tops"

LOW ALTITUDE

"Mangroves Forest"

PHYTOGEOGRAPHICAL DISTRIBUTION

Source: Sial I, 2006.

MAJOR MOUNTAIN RANGES OF PAKISTAN

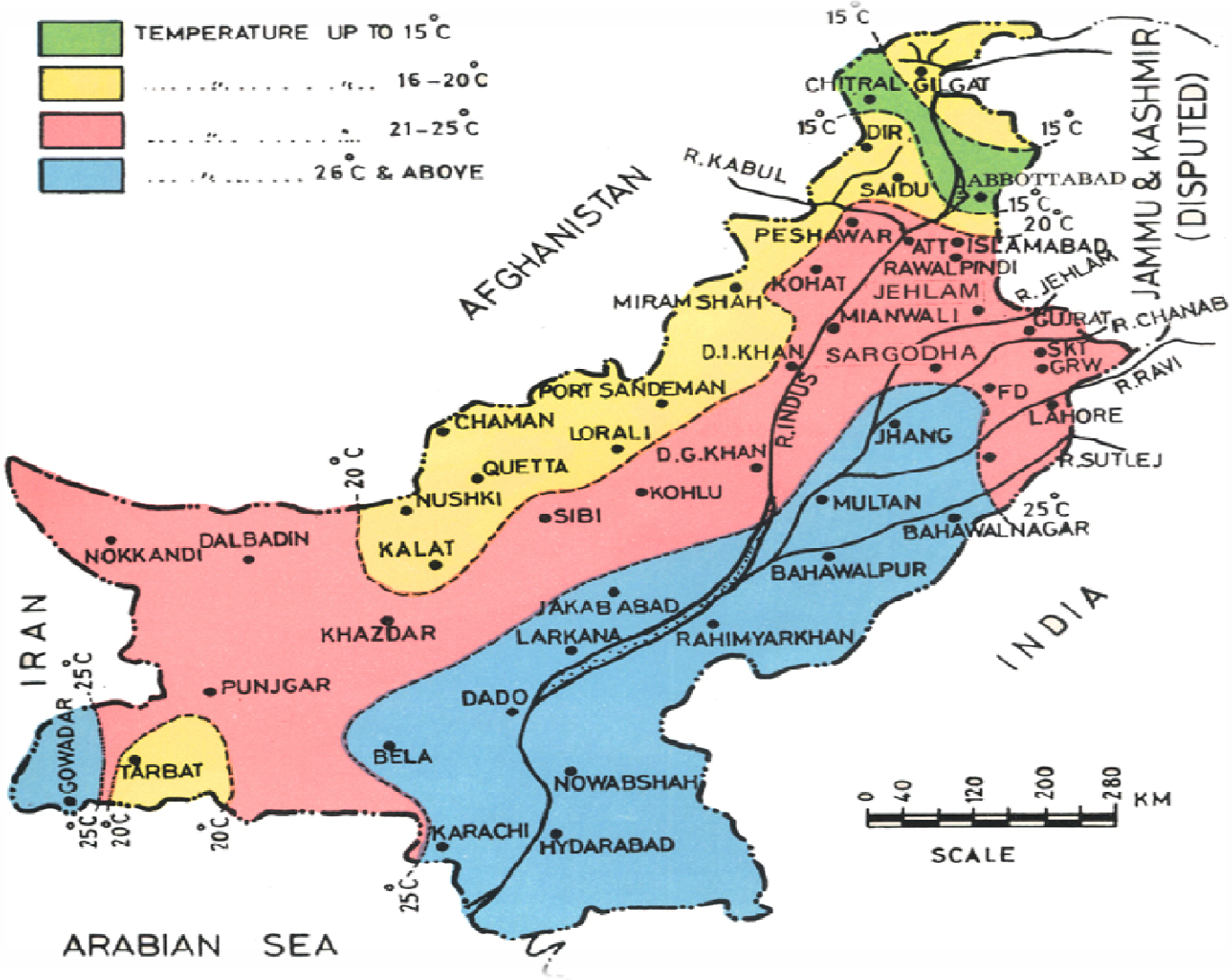
- **Karakoram Mountain Range:** Pakistan, China and India. Stretched about 500 km in length. **World 2nd highest peak K2 (8,611 m)** just 237 m smaller than the 8,848 m tall Mount Everest.

- **Hindukush Mountain Range:** Northwest Pakistan and Afghanistan. Stretched about 966 Km in length. **Highest peak in Pakistan Tirch Mir (7,690 m) world 41st highest**.

- **Suleman Mountain Range:** Southern western Pakistan and Afghanistan. Stretched about 400 km in length. The **highest peak in Pakistan Takhte-e-Sulaimon (3,487 m)**

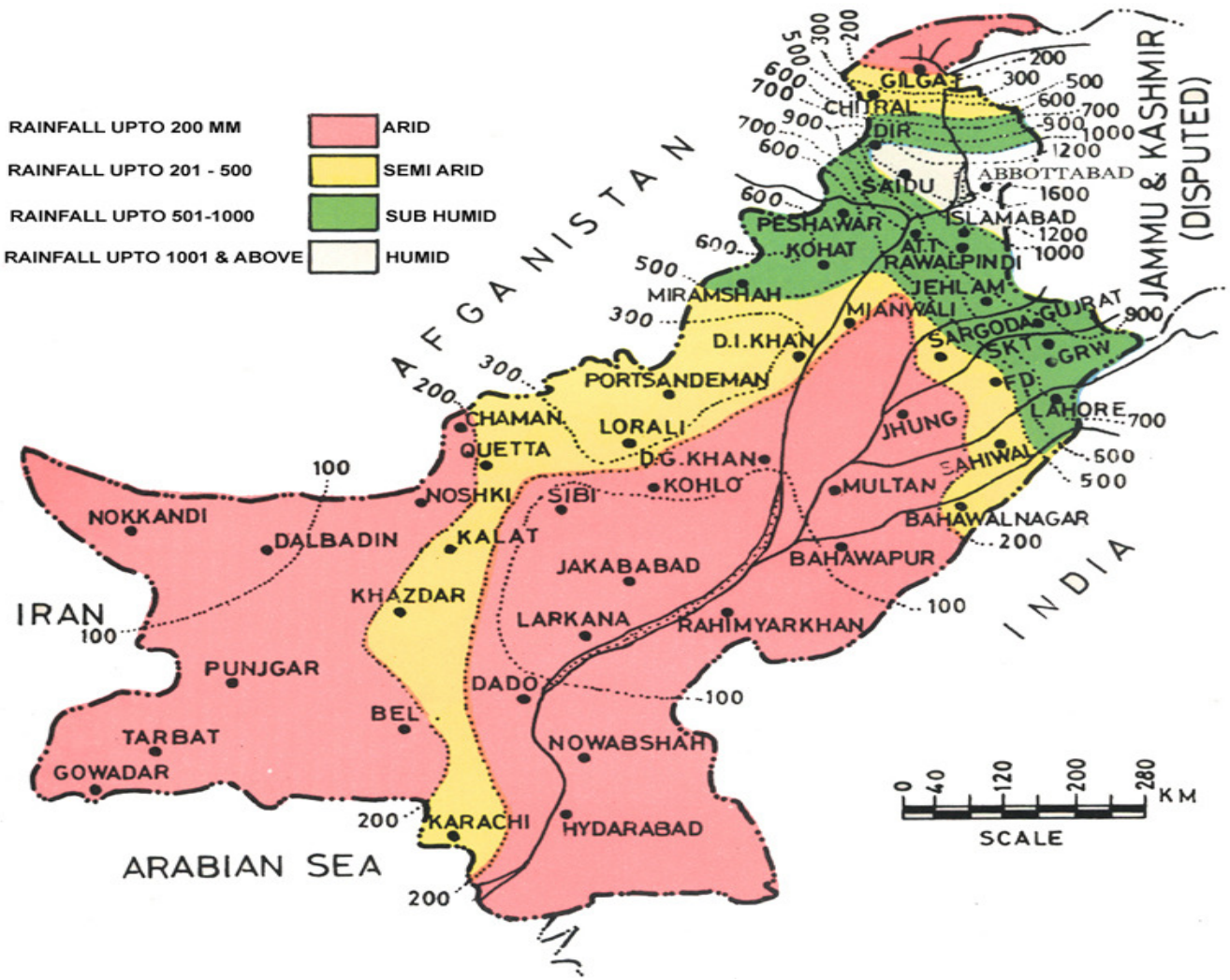
- **Himalayan Mountain Range:** Afghanistan, Bhutan, China, India, Nepal and Pakistan. Stretched about over 2000 km in length. **Highest Peak in Pakistan Nanga Parbat (8,126m) world 9th highest.** The Himalayas is one of the youngest mountain ranges in the world about 80 million years old.

TEMPERATURE

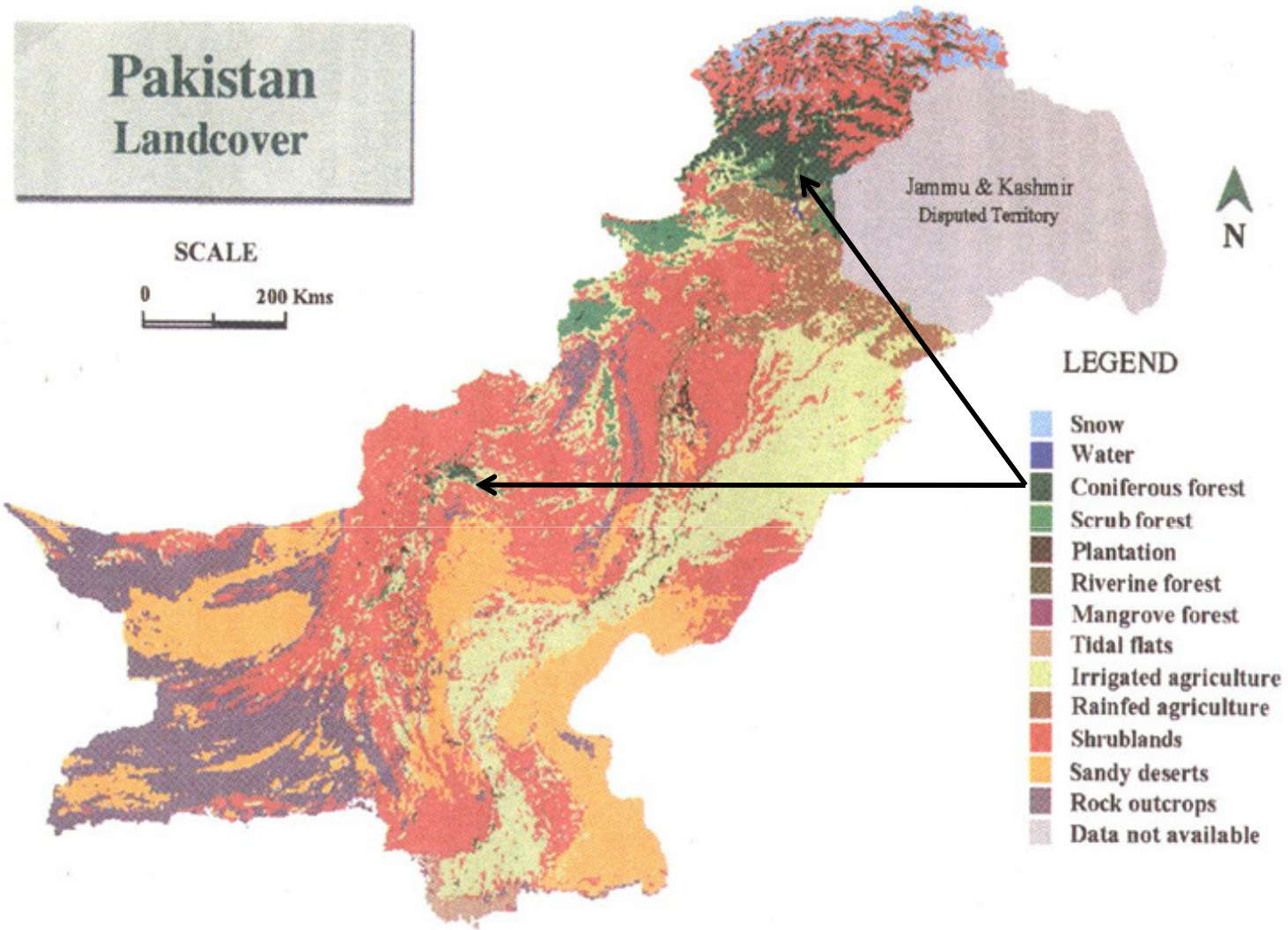


Source: Sial I, 2006.

RAINFALL

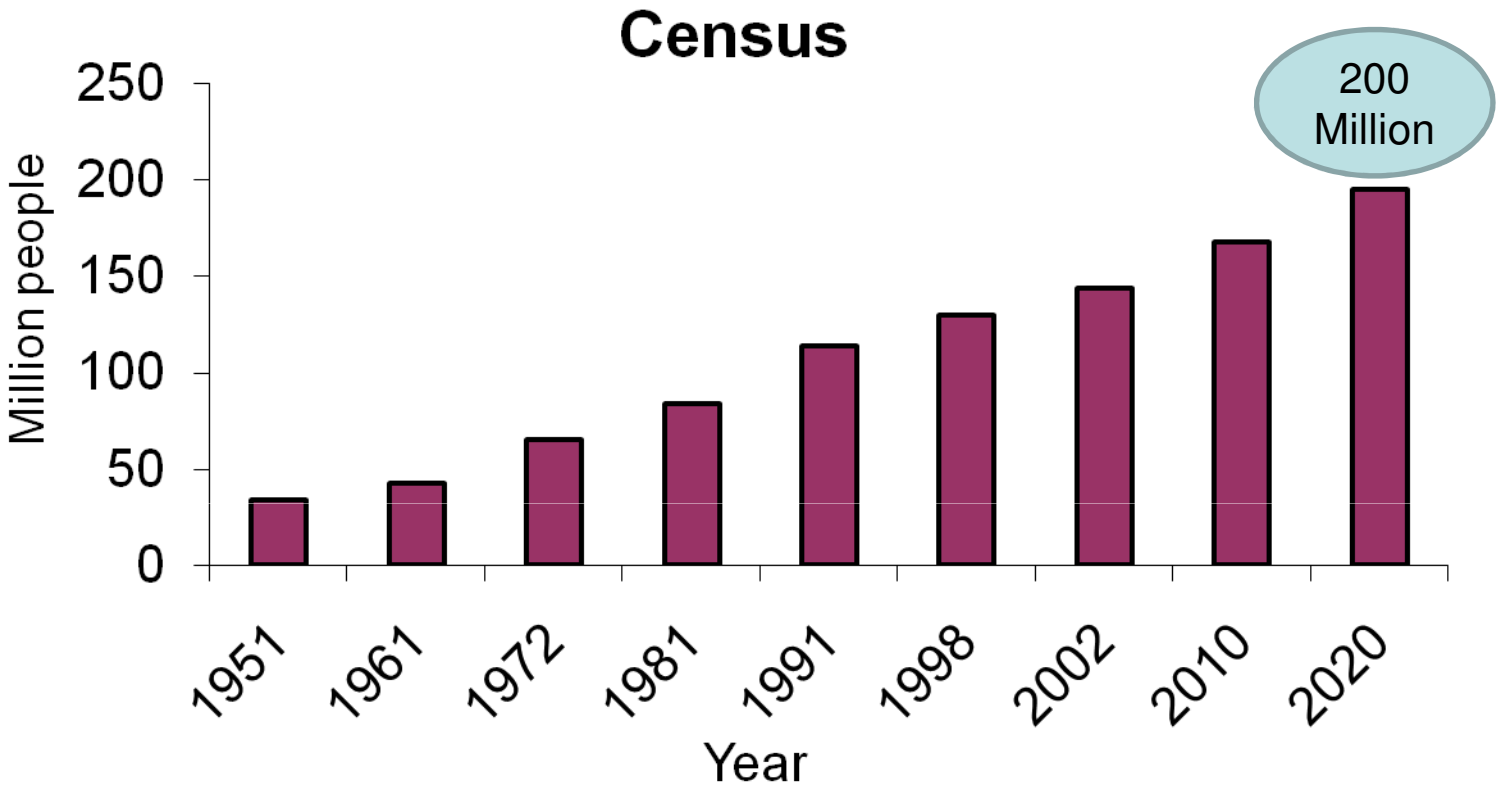


Source: Sial I, 2006.



Source: Sial I, 2006.

POPULATION ESTIMATES OF PAKISTAN



- Population growth rate: 2.1%
- %age area in the World: 0.6%
- World's population: 2.6%

MAJOR CHALLENGES TO PAKISTAN

- Poverty Reduction
- Population Control
- Employment Generation
- Biodiversity Conservation
- And also now a days a real hot issue of PEACE!!!!!!!!!!!!!!!

BIODIVERSITY OF PAKISTAN

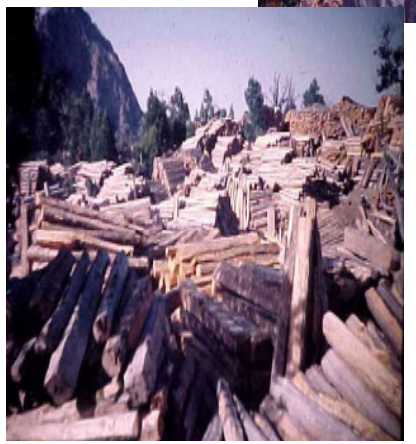
S#	Species	types
1	Mammals	174
2	Birds	660
3	Reptiles	177
4	Terrestrial animals	22
5	Fishes	986
6	Insects	1683
7	**Plant species**	**> 10,000**
8	**Medicinal plants**	**> 1,000**
9	Endemic Plant Species	400

Mountainous areas: **78%**

Other regions: **22%**

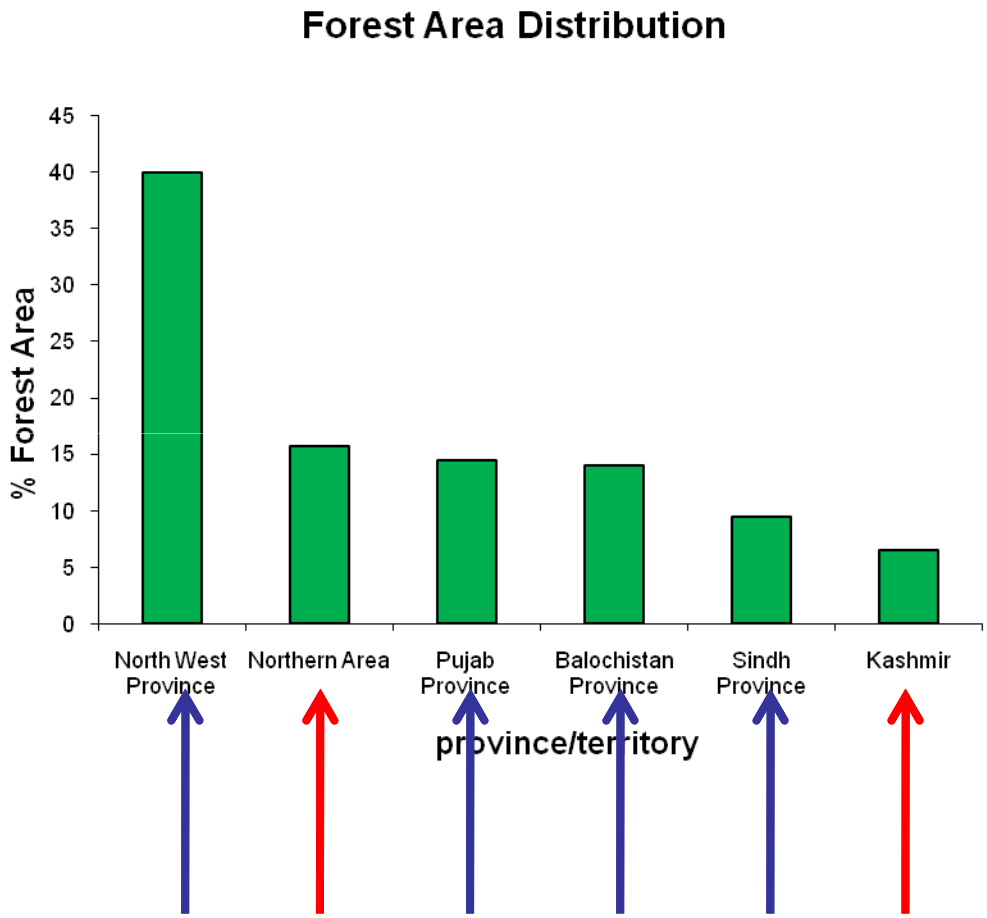
POTENTIAL THREATS TO BIODIVERSITY

- Increase population
- Heavy deforestation
- Shrinkage of habitat of wildlife
- Excessive Hunting
- Excessive use of pesticides and fertilizers
- Overgrazing of pastures
- Air pollution
- Water pollution
- Lack of awareness



FOREST AREA OF PAKISTAN

- Forest Area 4.8% of the country's land
- 4.2 Million ha
- High rates of deforestation of 1.5 percent have been indicated (FAO, 2005).



FOREST TYPES OF PAKISTAN

- Littoral and Swamp : *Avicennia marina*
- Tropical dry deciduous: *Lannea, Bombax ceiba*
- Tropical thorn: *Prosopis cineraria*, *Capparis decidua*
- Sub-tropical broad-leaved evergreen: *Olea cuspidata, Acacia*
- Sub-tropical pine: *Pinus roxburghii*
- Moist temperate: Pinus wallichiana,*Cedrus deodara*, *Pinus roxbirgi*, *Picea smithiana, Abies pindrow*
- Dry temperate: *Pinus gerardiana, Quercus ilex, Juniperus*
- Sub-alpine: *Abies spectabilis* and *Betula utilis*
- Alpine scrub: *Salix and Lonicera*

FOREST MANAGEMENT

Reserved Forests: local people have no rights at all and even fuelwood collection is prohibited. Moreover, all types of human use including livestock grazing are prohibited, unless specifically permitted by the government (Jan 1993:3).

Protected Forest: this principle is reversed and with the exception of commercial timber harvesting, both grazing and firewood collection are allowed unless explicitly banned by the government.

Guzara Forests: are private forests and can be owned either individually or jointly (families, communities). Management in the Guzara forests is the joint responsibility of both state and community.

Communal Forests: are also private and constituting joint village property (Jan 1993:5). Management of the communal forest is the responsibility of community.

National Parks: is a reserve of land, usually declared and owned by a national govt., protected from most human development and pollution.

Deforestation

- Soil erosion

Over Grazing/ Fodder collection

- Population growth

Unsustainable Harvest of Non Timber Forest Flora

NON TIMBER FOREST FLORA

A) Medicinal Plants

B) Food Products

- Morels (Guji)
- Honey
- Wild fruits and nuts
- Wild vegetables
- Condiments and Spices

C) Animal Products

- Silk cocoons etc

D) Industrial products

- Resin

E) Fibers

- Thatching plants

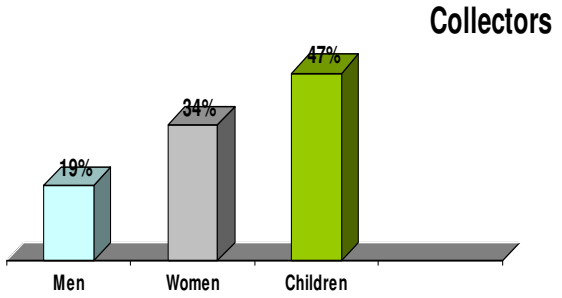
F) Handicrafts

G) Miscellaneous products

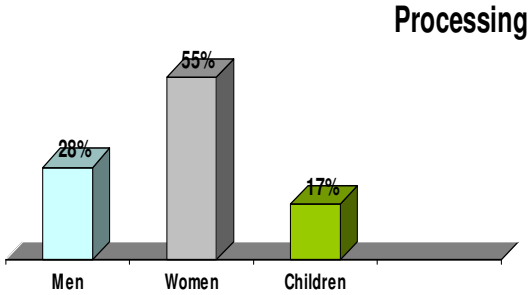
- Walnut bark
- Ornamental plants and flowers
- Agricultural Crops Support

LOCAL COLLECTORS OF MEDICINAL PLANTS IN NORTH WEST PAKISTAN

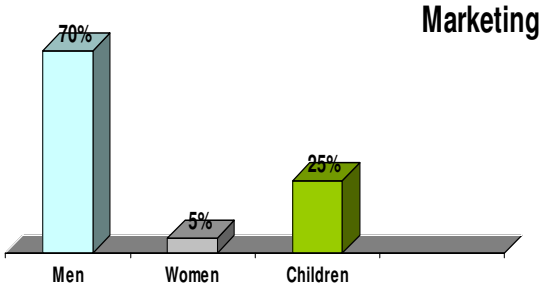
- **Involved in collection**
  - Children = 47%
  - Women = 34%
  - Males = 19%



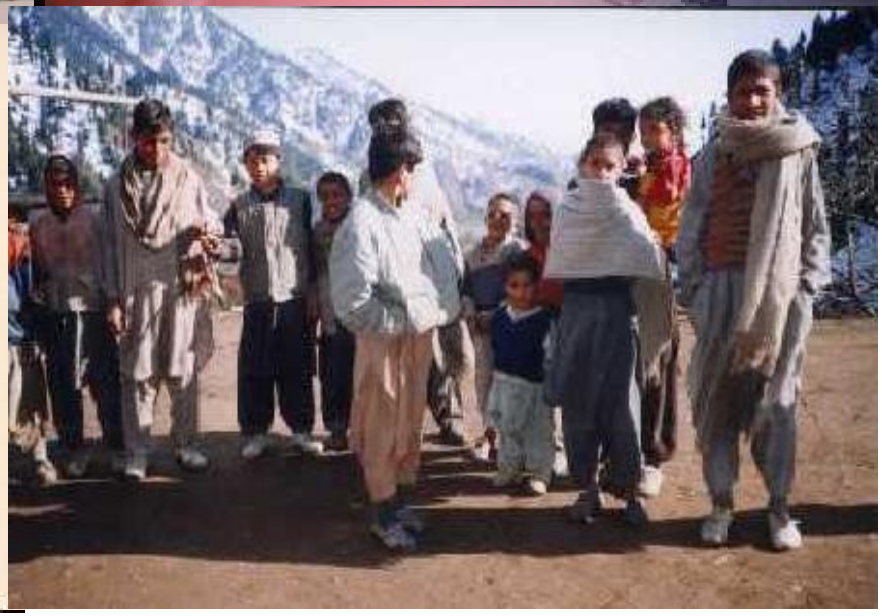
- **Involved in Processing**
  - Women = 55%
  - Men = 28%
  - Children = 17%



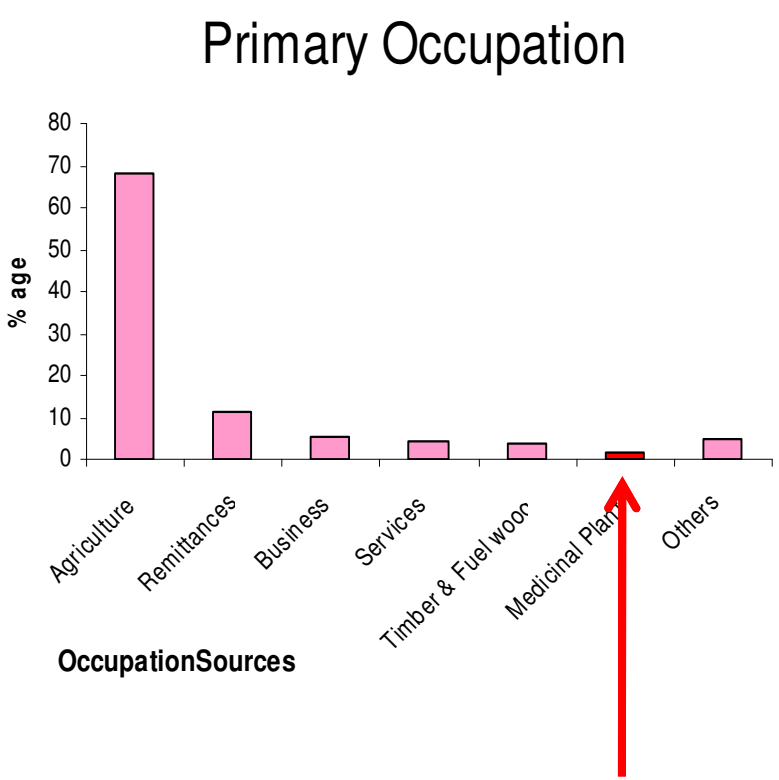
- **Involved in Marketing**
  - Men = 70%
  - Children = 25%
  - Women = 5%

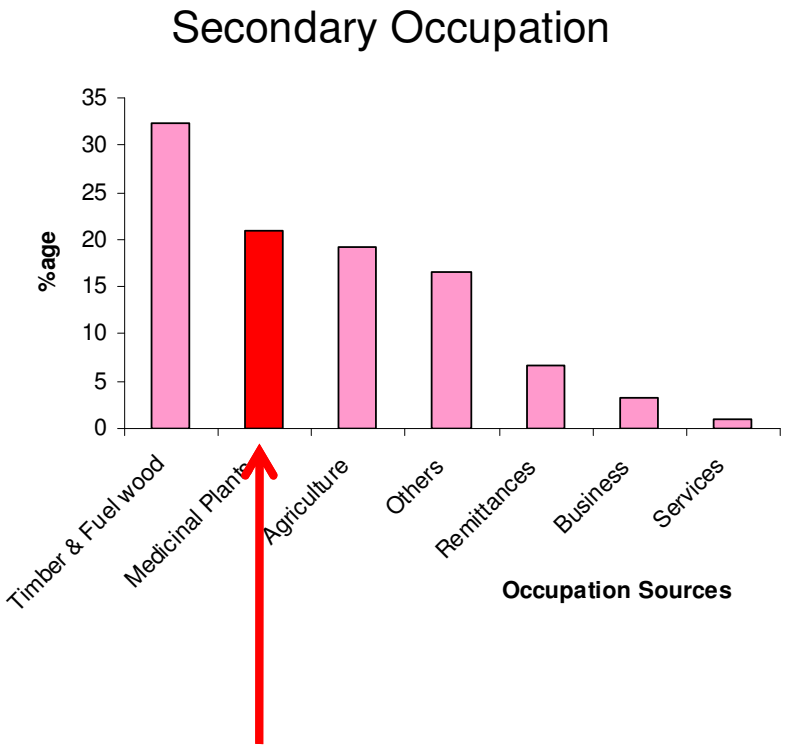


Contd….



MEDICINAL PLANTS AND LIVELIHOOD





- **Share of income from Medicinal Plants as Primary occupation: 51.6%**
- **Share of income from Medicinal Plants as Secondary Occupation: 9.7%**

THREATS TO MEDICINAL PLANTS

(1) DEFORESTATION

- **Reasons Behind Deforestation**

– Domestic Consumption of Fuel wood & Timber
– Commercial Harvesting of Forest Trees

(2) OVER AND IMPROPER COLLECTION

(3) OVER GRAZING

(4) CONVERSION OF FOREST LAND INTO AGRICULTURE LAND

CASE STUDY

2nd Part

MEDICINAL PLANT ABUNDANCE ON DEGRADED AND REFORESTED SITES IN NORTHWEST PAKISTAN

Muhammad Adnan and Dirk Hölscher

Reference: Journal of Mountain Research and Development

HISTORY

- Ayubia National Park (ANP) : Study region of my PhD
  - Area (3312 ha)
  - Elevation (1220m – 2865m)
  - Surrounded by 12 villages, 50,000 people, 8333 households, HH size 6

- Forest Uses: Excessive collection of timber, fuelwood, fodder, medicinal plants.

- Few decades: Resulted in heavy deforestation and land degradation.

REFORESTATION OF DEGRADED AREA

Role of World Wide Fund of Nature-Pakistan (WWF)

Reforestation (1999-2005)

Villages "*Mallach*" and "*Passala*"

Four native tree species planted

- *Robinia pseud-acacia* L.,
- *Aesculus indica* Colebr,
- *Populus ciliata* Wall. ex Royle
- *Salix tetrasperma* Roxb)

Trees age: 3 to 8 years (data collection time).

OBJECTIVES

- To compare the abundance of medicinal plants between reforested and degraded sites

- To assess the influence of reforestation stand characteristics on the abundance of medicinal plants.

Methods

TARGET MEDICINAL PLANTS SPECIES

Criteria of selection

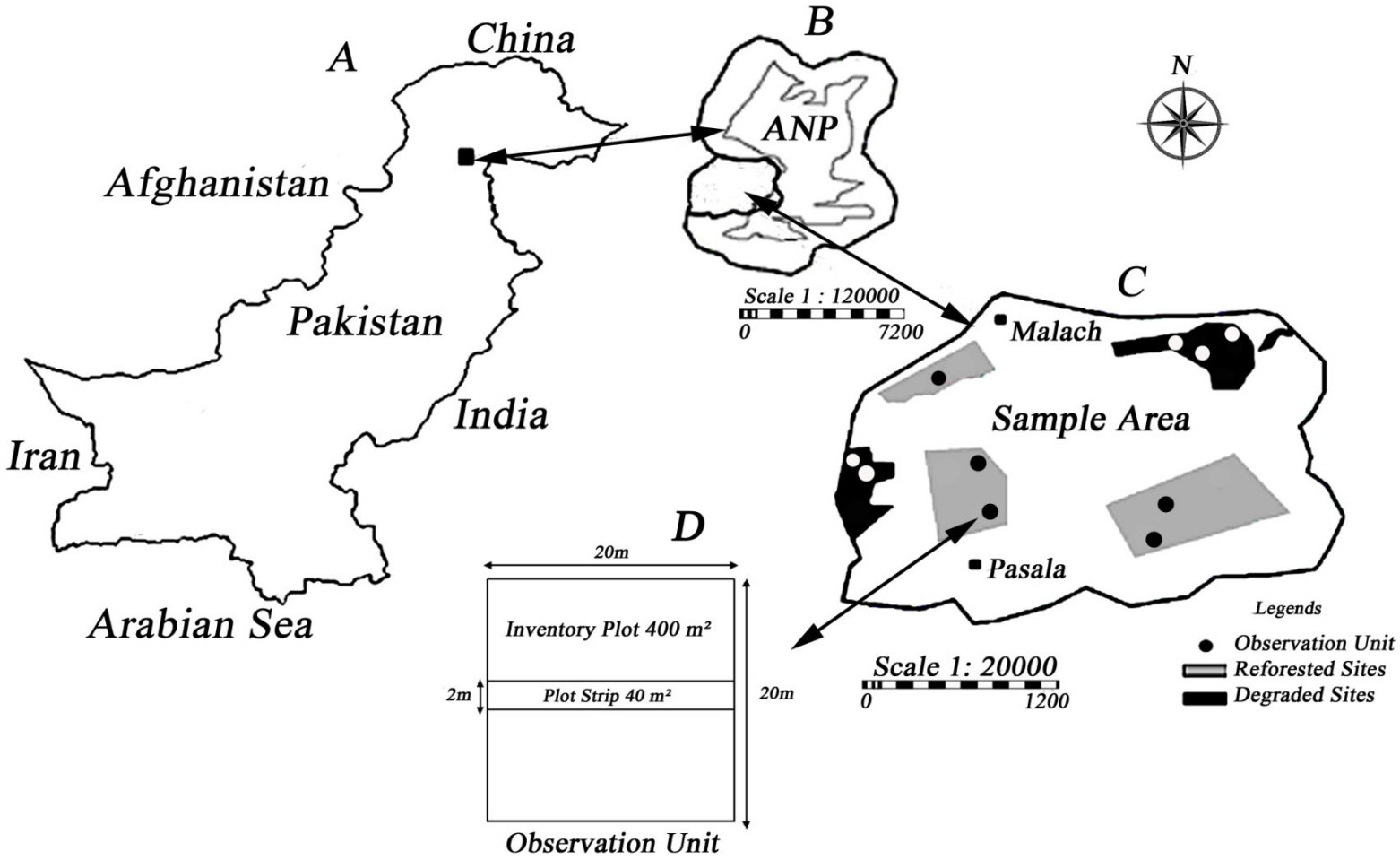
- High market value both nationally and internationally
- Can be found between altitudes (>1500m to <2200 m)

Botanical Name	Local Name	Family Name	Habit	Part Used	Vulnerability Status*	USES* *
***Bergenia ciliate* (Haw) Stermb**	Gat Panra	Saxifragaceae	Herb	Rhizome	Moderately Vulnerable	1, 3, 5
***Bistorta amplexicaulis* (D.Don) Green**	Anjabar	Polygonaceae	Herb	Rhizome	Moderately Vulnerable	1, 3, 4, 5
***Podophyllum emodi* Wall.**	Kakora	Berberidaseae	Herb	Fruit	Moderately Vulnerable	1
***Geranium Wallichianum* D. Don,**	Sra Zela	Geraniaceae	Herb	Rhizome	Moderately Vulnerable	1, 5
***Paeonia emodi* Wall.**	Mamekh	Ranunculaceae	Herb	Rhizome	Moderately Vulnerable	1, 5
***Plantago lanceolata* L.**	Jabai	Plantaginaceae	Herb	Rhizome	Less Vulnerable	1
Swertia chiraita	Cherat botay	Gentianaceae	Herb	Rhizome	Moderately Vulnerable	1, 5
***Gallium aparine* L.**	Gaya	Rubiaceae	Herb	Whole plant	Moderately Vulnerable	1, 5
***Valeriana jatamansi* Jones**	Mushkebala	Valerianaceae	Herb	Rhizome	Moderately Vulnerable	1
***Viola canescens* Wall ex Roxb**	Banafsha	Violaceae	Herb	Flower	Highly Vulnerable	1

*WWF-P Technical Report

**Keys for Major Uses: Medicinal (1), Vegetable (2), Fodder (3), Thatching (4), Ethno-veterinary (5), Narcotic/mental disorder (6)

MAP OF THE STUDY AREA, ITS GEOGRAPHICAL LOCATION AND PLOT DESIGN



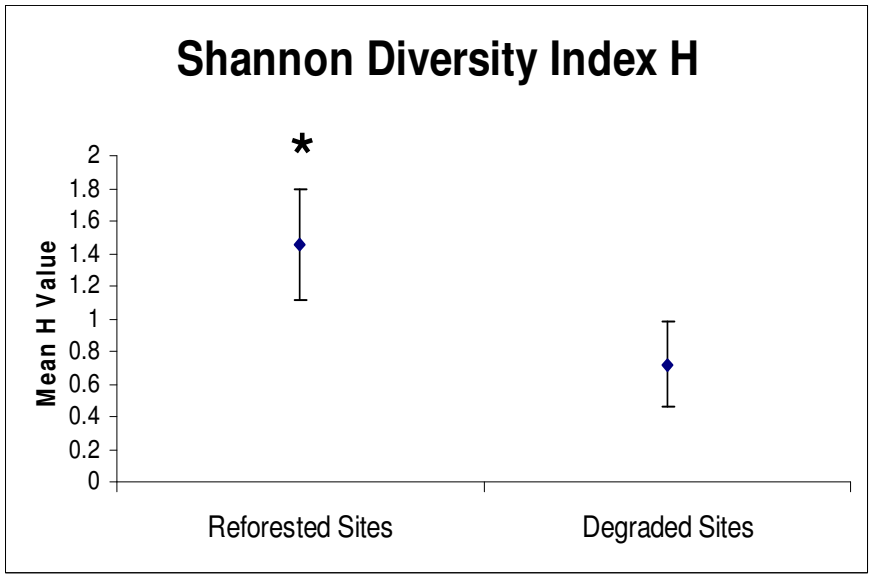
Results

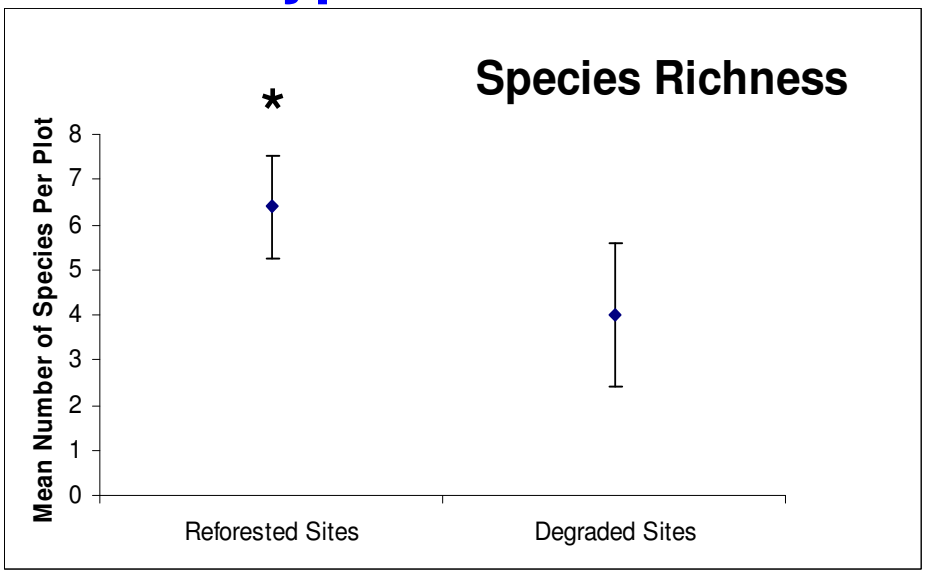
TREE INVENTORY: A comparison b/w reforested sites and degraded sites

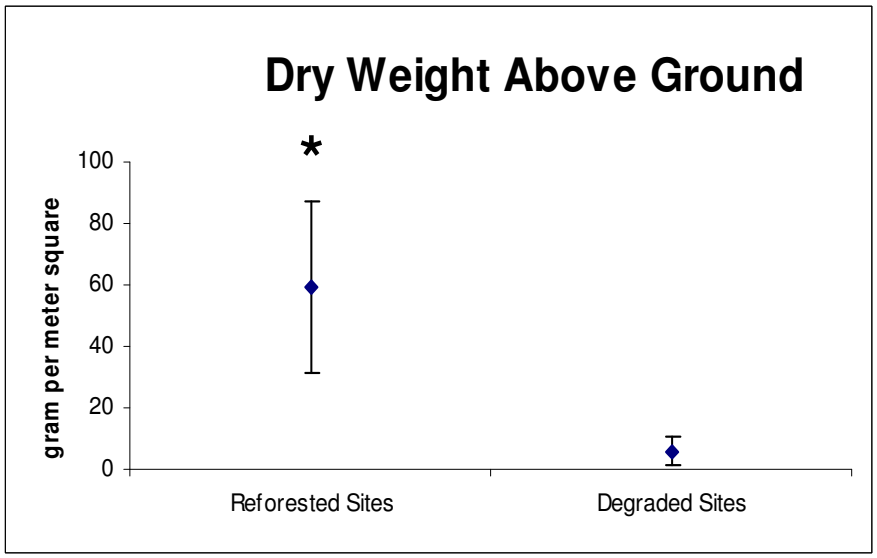
- Basal Area: 2.5 times higher in reforested.
- Tree $H^{/}$ (Shannon index): 1.2 was observed for reforested area.
- Mean Tree canopy cover: 9 times higher.
- Mean stem density: 13 times more.

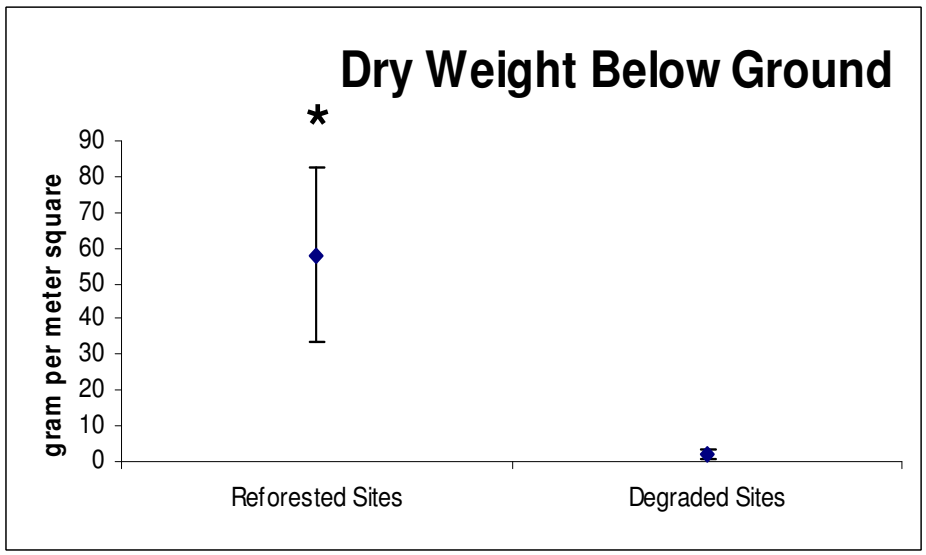
Results

MEDICINAL PLANTS (as a whole): under both land use types









Mann-Whitney test, n = 5 plots per land use type, * indicate significant differences at $p<0.05$

Results

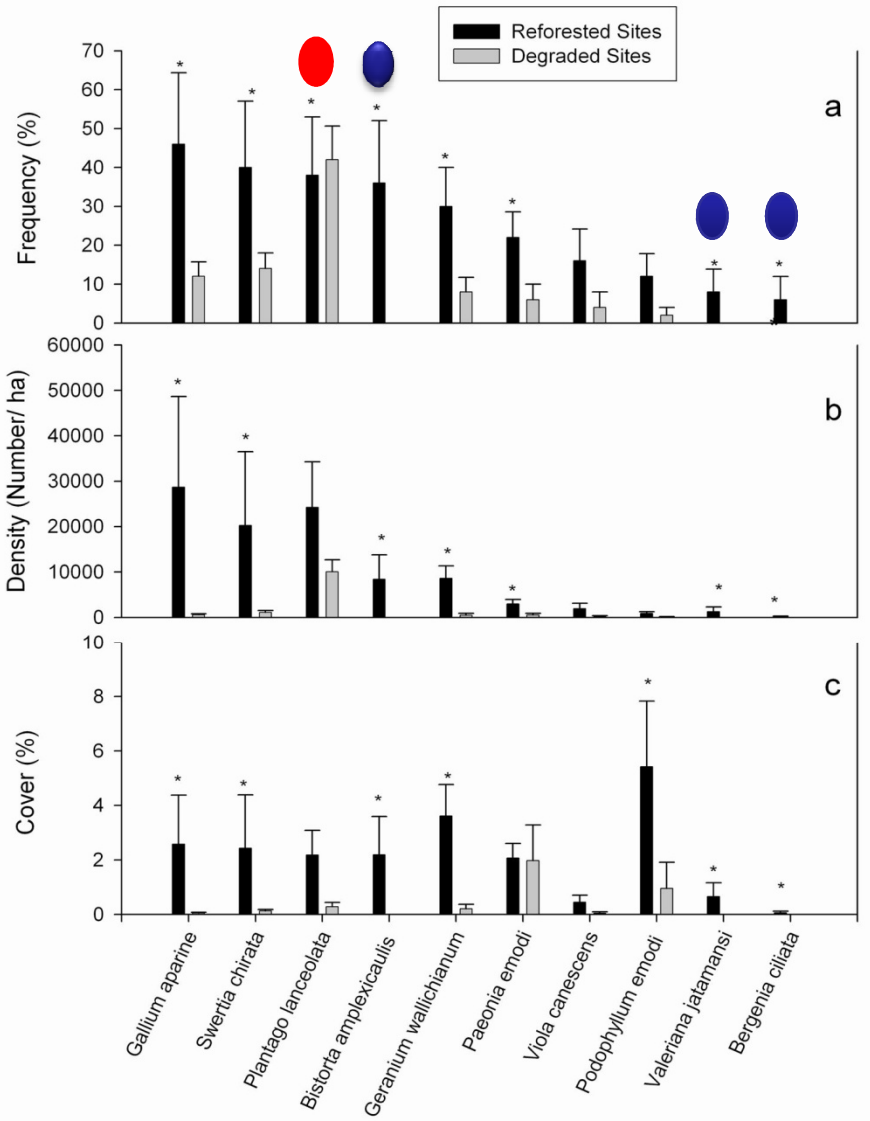
MEDICINAL PLANTS INDIVIDUALLY

Mann-Whitney test).

n = 5 plots per land use type

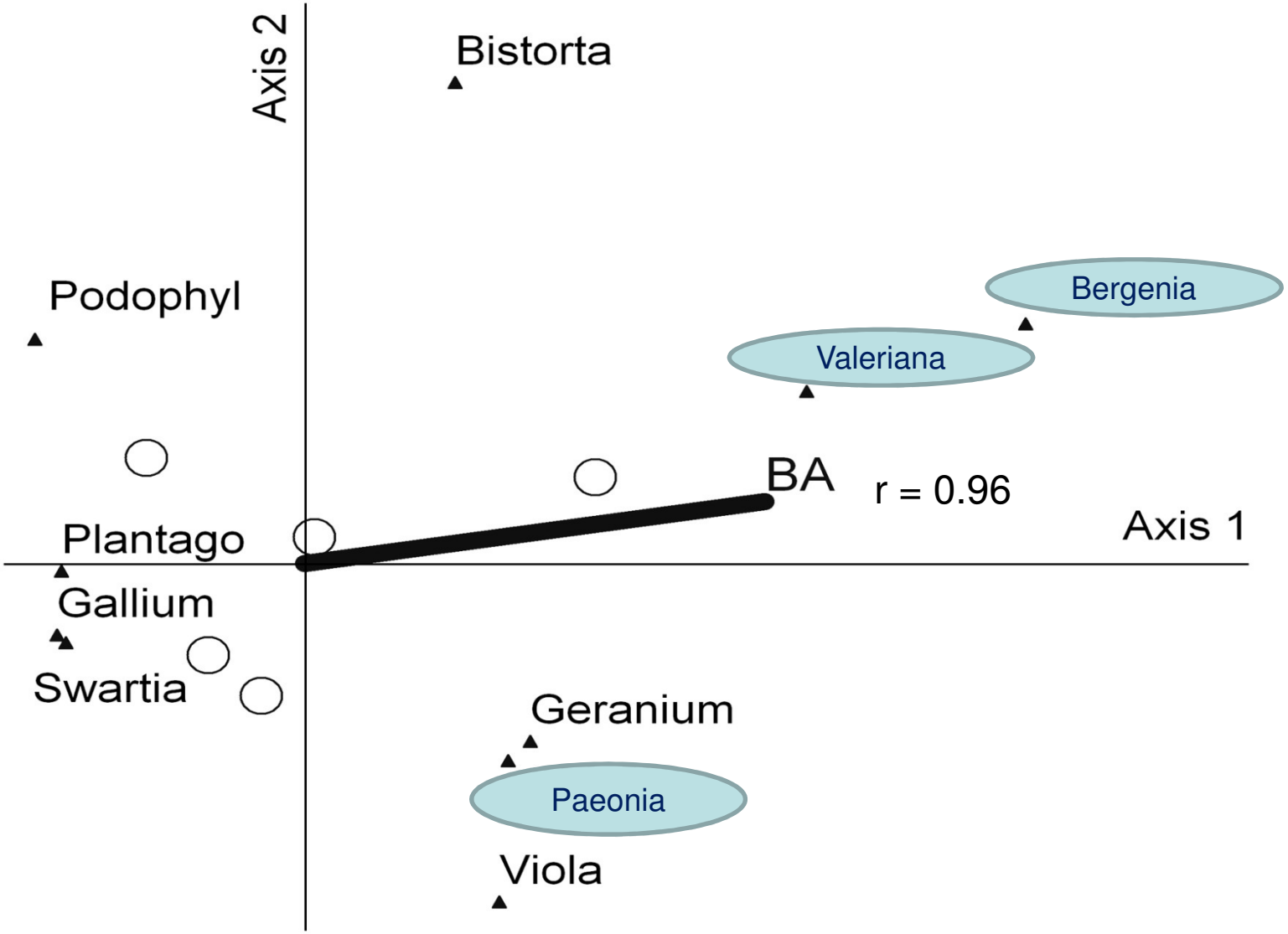
*indicate significant differences at p<0.05

Indicate regeneration



Results

DCA FOR REFORESTED SITES



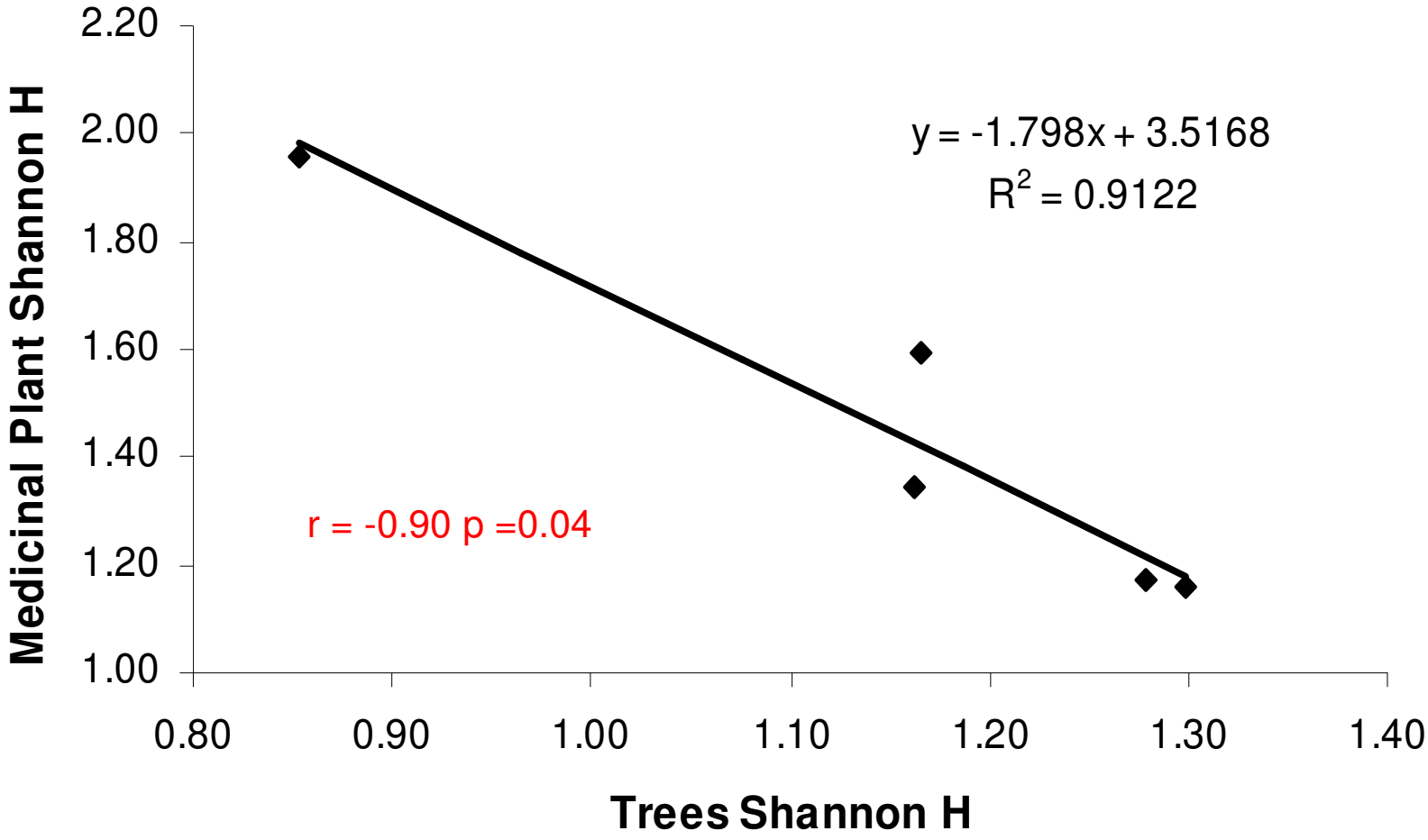
Axis 1: Eigen = 0.35, explained variance = 48%

Axis 2: Eigen = 0.13, explained variance 30%

- **n = 5 plots**
- **Pearson at $p < 0.05$**

Results

EFFECT OF TREE DIVERSITY ON MEDICINAL PLANTS DIVERSITY



n = 5 plots per land use type

Spearman Rank Correlation

CONCLUSIONS OF THIS STUDY

- Young reforestation stands increase the abundance of medicinal plants when compared with deforested and degraded lands.

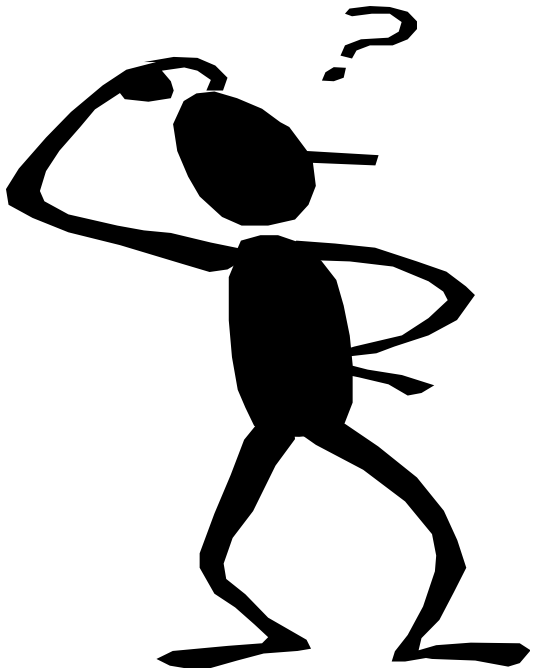
- *Bergenia ciliata, Valeriana jatamansi* and *Paeonia emodi* are the three species can contribute up to 60$/ ha to local collectors.

- Reforestation might be replicated in other areas with the same ecological conditions

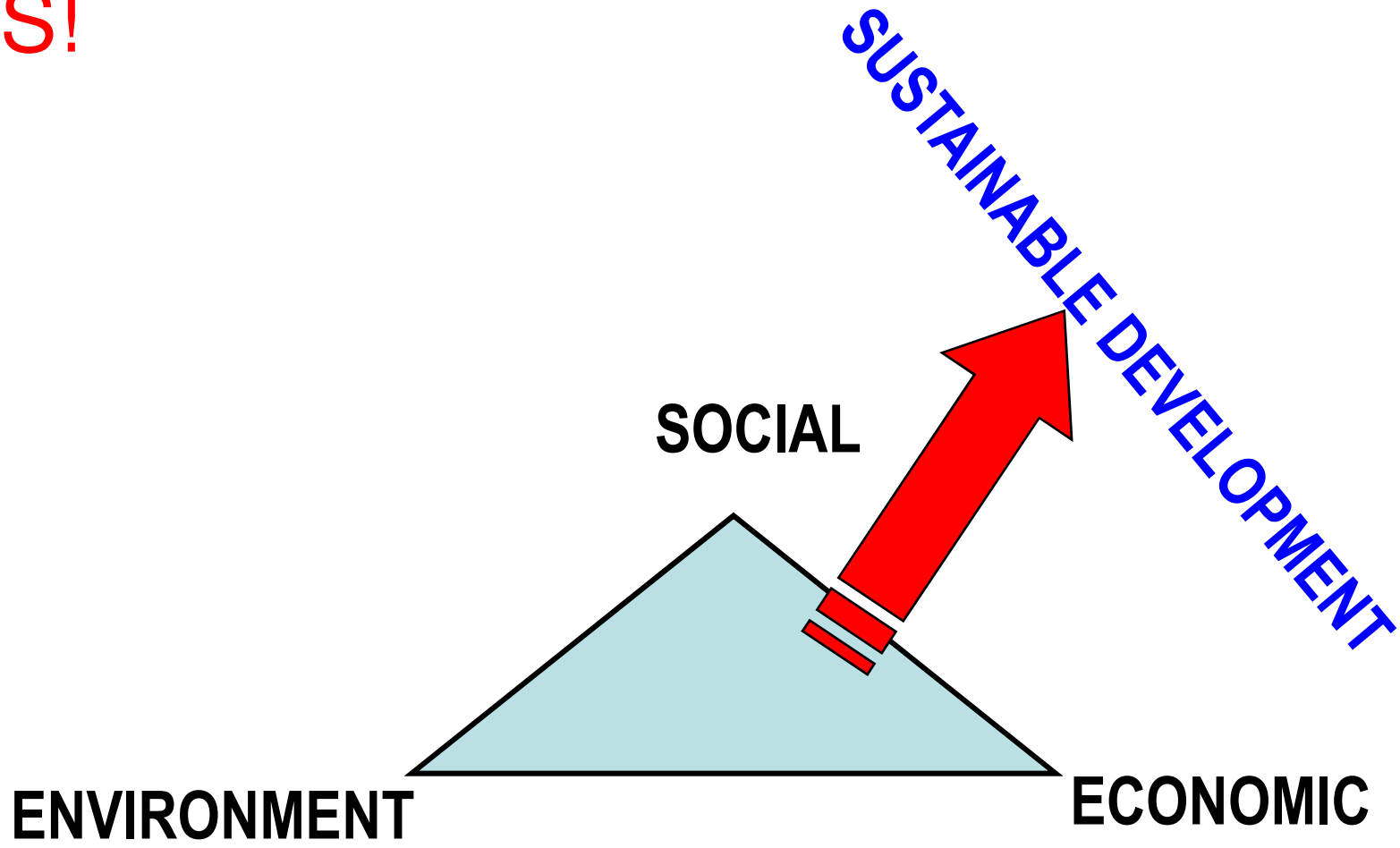
WHAT MEASURES CAN BE DONE FOR THE CONSERVATION OF MEDICINAL PLANTS????

- Law Enforcement to Protect The Forest
- Reforestation
- Rangeland Management
- Land Reforms
- Awareness Raising
- Capacity building of local people
  - Collection, Cultivation, Processing and Marketing of Medicinal Plants
- Linkage of collectors with Market
  - Industries (Pharmaceutical and Herbal)
  - Dealers

CAN WE REALLY MAKE A DIFFERENCE ?



YES!

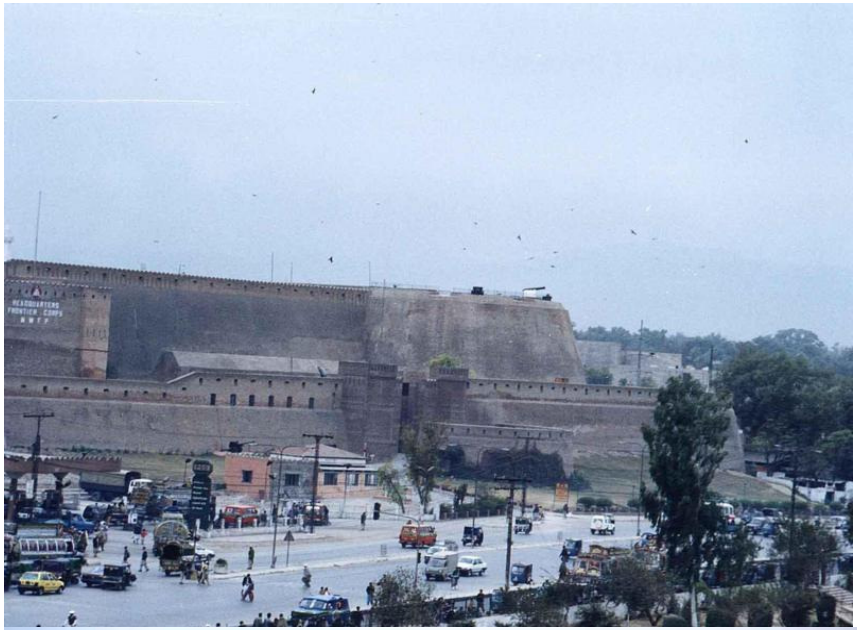


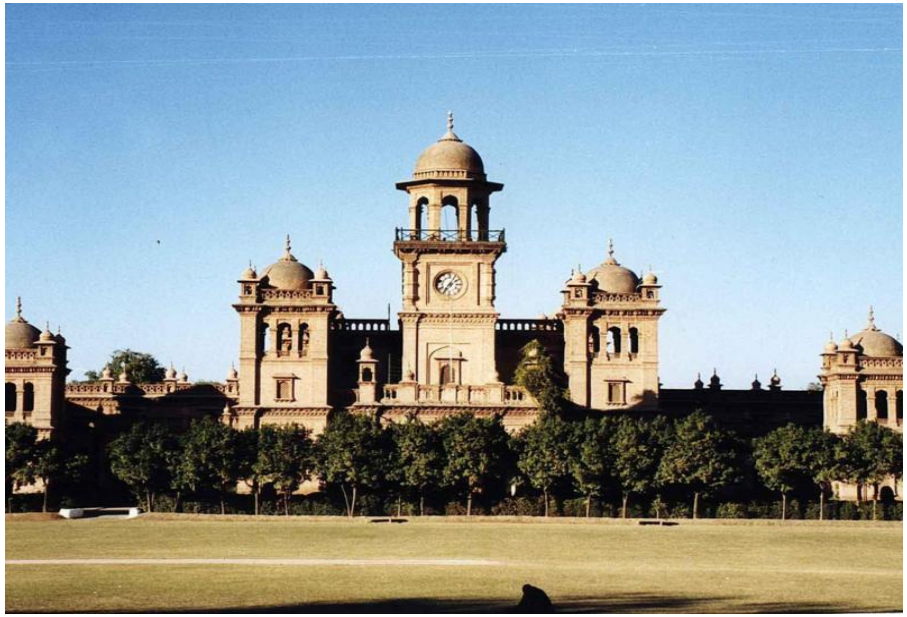

CULTIVATION OF MEDICINAL
PLANTS

North West Frontier Province-Pakistan

North West Frontier Province-Pakistan

Peshawar, Capital of North West Frontier Province






THANK YOU FOR YOUR ATTENTION !