

**AN ANALYSIS OF SOCIO-ECONOMIC FACTORS
AFFECTING FOREST AREA IN PAKISTAN
WITH SPECIAL REFERENCE TO NWFP
(1972-2000)**



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**DEPARTMENT OF ECONOMICS
UNIVERSITY OF PESHAWAR**

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ABSTRACT

This study was an attempt to analyze the socio-economic factors affecting forest area in Pakistan. Every year different areas are afforested and regenerated. Policies and programs are prepared to increase the forest area up to national requirements but there is no significant increase in the area rather fast deforestation is taking place. Forest communities play a significant role in the use and depletion of these resources.

The study highlighted the assumptions about some macro economic variables, which are generally considered as key socio-economic factors that cause deforestation and depletion of forests and tested the hypothesis in order to show the impact of these factors on forest area in Pakistan.

In order to achieve the objectives of the study and to test the hypotheses the followed methodology has two aspects; one, consulting the forest communities in forest rich areas of the province and second, analyzing the macro economic data of different socio economic factors that have impacts on the forest area of the country.

For the first aspect two forest rich areas in NWFP; District Abbottabad and District Mansehra have been selected. The socio economic conditions of these areas have been discussed and analyzed. The priorities and practices of forest communities in the use of different resources have been checked.

For the second aspect the study analyzed time series data of some of the socio-economic factors of Pakistan for example agriculture production, cultivated area, livestock and human population, the consumption of fuel wood substitutes etc. Taking the forest area of NWFP and forest area of Pakistan as a whole then checked the results of these socio-economic factors. For the analysis multiple regression technique was applied on the time series data from 1972-2000. The results of the econometric models were then compared with the primary information collected from the two districts of NWFP; District Abbottabad and District Mansehra. These results were further analyzed by comparing them with earlier studies conducted in the same field.

The results of the primary data showed that most of the firewood and timber is extracted illegally and there is no official record or even a rough estimation of the total quantity illegally extracted. The most responsible figure as mentioned by the locals also includes Forest Department, which is a part of timber mafia. Forest department has no arrangement for forest fires; it is the locals who extinguish it by using local practices. The study area has not received real benefit of gas provision by the government in the country because these facilities are not yet extended to their areas and alternate sources are not enough. Both the study areas are suffering from some problems, which are contributing to deforestation, for example common property, lack of interest and cooperation of Forest Department with locals, lack of follow up of forestry programs especially started by foreign agencies etc. In both the areas there is no increase in animals so livestock population is not the prime threat. Human population has increased but they are either migrating to other areas or opting for service sector. In both the areas people have very little knowledge about government policies and programs. The results of the primary information showed some valuable facts about forest land conversion for other purposes, about Forest Department, the role of government and non-government organizations, about forest fires and about timber mafia in the study area.

The results of the regression models obtained from the time series macro economic data showed that some of the socio-economic factors of the country that are generally considered as the most responsible factors for the depletion of forests such as increase in human and livestock population are not the important factors contributing towards deforestation in Pakistan but some others like cultivation, construction, consumption of timber and agriculture production are playing their due role towards deforestation. The study further showed that increase in the consumption of firewood substitutes could not significantly improve the situation. The analysis further showed the extent of effect of different variables on the forest areas.

The recommendations of the study have given more emphasis to control the land use practices especially controlling land conversion for other purposes, proper demarcation of

forest boundaries in Abbottabad and Mansehra districts to save from conversion and misuse, on regular basis the involvement of locals in plantation and giving incentives in cash and kind for plantation, provision of alternate energy resources in the study area especially to hill side forest communities, and proper follow up of the programs already launched in forestry sector to maintain the confidence of the locals. Further, since cultivation and construction activities are the main threat found in the study so more focused attention is needed in this regard and the general policy for addressing these problems would not work. To build up forestry data base is the prime requirement. The macro economic time series data of Pakistan is not accommodating illegal timber. So constructing an estimated time series data for actual fire wood and timber consumption including illegal extraction in Pakistan would be the future task based on the results of the present study that would give more robust results out of the present research.

LIST OF ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
ADP	Annual Development Program
CBO	Community –based Organization
CIDA	Canadian International Development Agency
CNG	Compressed Natural Gas
EPA	Environmental Protection Agency
EPO 83	Environmental Protection Ordinance 1983
EUAD	Environment and Urban Affairs Division
FAO	Food and Agriculture Organization
FD	Forest Department
FDC	Forest Development Corporation
FSMP	Forestry Sector Master Plan
GDP	Gross Domestic Product
GNP	Gross National Product
GOP	Government of Pakistan
HA	Hectares
IGF	Inspector General of Forests
IUCN	The World Conservation Union
JFM	Joint Forest Management
JFS	Joint Forest System
KG	Kilograms
KIDP	Kalam Integrated Development project
MACP	Mountain Areas Conservancy Projects
MAF	Million Acre-feet
MTR	Mid Term Review
NCS	National Conservation Strategy
NGO	Non-governmental Organization
NIPA	National Institute of Public Administration
NWFP	North West Frontier Province (Sarhad)
PARC	Pakistan Agriculture Research Council
PE&D	Planning, Environment and Development Department
PFI	Pakistan Forest Institute
PFM	Participatory Forest Management
R&D	Research and Development
SPCS	Sarhad Provincial Conservation Strategy
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
VDC	Village Development Committee
VLUP	Village Land Use Planning
WO	Women Organization

GLOSSARY

- Afforestation:** It is usually defined as the establishment of forest on land that has been without forest for a period of time (e.g., 20-50 years or more) and was previously under a different land use.
- Deforestation:** Deforestation is a decrease in the area covered by forest. It is defined as the removal of the forests and its replacement by another land use class. An alternative definition of deforestation might be based on a decrease in the canopy cover or carbon density by a given amount or crossing one of a sequence of thresholds. Similarly, afforestation and reforestation could be defined in terms of an increase in canopy cover or carbon density.
- Degradation:** Degradation does not involve a reduction of the forest area, but rather a quality decrease in its condition.
- Regeneration:** The natural or artificial process of re-establishing tree covers on forest land. *Artificial Regeneration* is renewal of a tree crop by direct seeding (sowing), or by planting seedlings or cuttings. *Natural Regeneration* is renewal by natural seeding (self-sown seed), sprouting, suckering or layering.
- Forest:** A forest is defined as an ecosystem or an assemblage of ecosystems dominated by trees and other woody vegetation. Forests consist of trees with overlapping crowns forming 60% to 100% cover. There are more than 250 definitions of the term "forest." All definitions stress the importance of trees in the system and include places where tree cover ranges from 5% to as high as 100%. Most definitions of forest are based in part on a single threshold of minimum canopy cover. If a low threshold is set (e.g., 10% canopy cover), then dense forest could be heavily degraded and significant amounts of carbon released, without the actions being designated as deforestation. Definitions of forests based on carbon-density thresholds have similar issues with respect to thresholds as canopy cover-based definitions.
- Natural forest area** It is the total area of forest composed primarily of indigenous (native) tree species. Natural forests include closed forest, where trees cover a high proportion of the ground and where grass does not form a continuous layer on the forest floor (e.g., broadleaved forests, coniferous forests, and bamboo forests), and open forest, Tree height at maturity should exceed 5 meters.

Natural forests	These are those where most of the principal characteristics and key elements of the native ecosystems, such as complexity, structure and diversity are present.
Parts of Forests:	Its parts include trees, shrubs, grasses and other herbaceous i.e. non-woody plants, algae, fungi, insects, mammals, birds, reptiles, amphibians, and microorganisms living on the plants and animals and in the soil.
Plantations	These are areas which result from the human activities of planting, sowing or intensive silvicultural treatments, and lack most of the principal characteristics and key elements of native ecosystems.
Plantations area	It describes forest stands established artificially by afforestation and reforestation for industrial and non-industrial usage.
Reafforestation:	The establishment of a tree crop on an area from which it has always been absent. Where such establishment fails and is repeated.
Reforestation:	Reforestation and afforestation can be defined as the conversion of non-forested lands to forests with the only difference being the length of time during which the land was without forest. Some commonly used definitions of reforestation include the activity of regenerating trees. Reforestation does not include regeneration of old tree crops, although some countries may report regeneration as reforestation. Many trees are also planted for non-industrial uses, such as village wood lots. Non-industrial plantations include those established for fuelwood production, soil protection, amenity or other purposes. They do not include plantations of agro-forestry crops, such as rubber and oil palm.
Savannas:	That having widely spaced trees with anywhere from a minimum of 5 - 10 % cover to a maximum of 25 - 20% cover.
Shrublands	It includes lands dominated by woody vegetation less than 2 meters tall and with shrub canopy cover greater than 10%. It can be either evergreen or deciduous. These lands may have a tree or shrub cover of less than 60%.
Silviculture	The care and cultivation of forest trees. Silviculture is the art and science of controlling the establishment, growth, composition, and quality of forest vegetation for the full range of forest resource objectives.

- Total forest area** It includes both natural forests and plantations. Total Forest is defined as land with tree crown cover of more than 10 percent of the ground and area of more than 0.5 hectares. Tree height at maturity should exceed 5 meters.
- Wetlands** Permanent wetlands are lands with a permanent mixture of water and herbaceous or woody vegetation that cover extensive areas.
- Woodlands:** These are more open, usually with 25% to 60% tree cover.

CHAPTER 1

INTRODUCTION

1.1. INTRODUCTION

Forests as a renewable resource play an important role in the economy, ecology and social system of the country. The economics of forestry is to solve the question of resource management that also involves forests. Natural forest originates from the original forest cover, i.e. a forest reproduced naturally. A legal definition is different from an ecological definition. The perspective of the economist differs from that of a geographer. All definitions stress the importance of trees in the system and include places where tree cover ranges from 5% to as high as 100%. According to Mehmood (2003) a forest is best defined as an ecosystem or assemblage of ecosystems dominated by trees and other woody vegetation. The general public is an important part in the use and management of forest resources. Pakistan is mainly a dry country. Only 10% of Pakistan (16% if Azad Kashmir is added) is sub-humid. This area is located in the Himalayas, Karrakurum and Hindu Kush mountain ranges. Most of the area in the country is preferred for rain fed agriculture than for the growth of forest (Jan, 1993 a). Pakistan has low forest area and is ranked 113 among 140 countries (GOP, 2005 b). According to Wani, Shah and Khan (2004) world forests are fast depleting. This case is worse in Pakistan where already forest resources are very low because for ecological balance the country should have one-third of its area under forests. In Pakistan only 5.2% of area is under forests, which was 4.28% in 1996-97. According to Mehmood (2003) in 1947 the position was even worse, with forest coverage at only 1.7 percent of the land area. In East Pakistan (Bangladesh) forest lands accounts 2.52 m hectares. The share of forest land in total national area during 1970s remained around 15% and fell to about 14% during 1980's (FAO, 2000). Forest area of Pakistan (West Pakistan) in 1972 was 2.1 million hectare that increased to 3.77 m. hectares. Forest area of NWFP in 1972 was 658.1 thousand hectares.

Table: 1.1 Forest Shares of Different Areas in Pakistan

Area	Northern areas	N.W.F.P	Sindh	Punjab	Balochistan
Percentage shares	17.3	31.8	24.4	17.8	8.7
Per capita forest area	1.131	.054	.021	.007	.139

Source: Deforestation in NWFP by Iqbal Mehmood, 2003 and Agriculture Statistics of Pakistan, 1999-2000

According to FAO (2005) each year about 13 million hectares of the world's forests are lost due to deforestation, but the rate of net forest loss is slowing down due to new planting and natural expansion of existing forests. The annual net loss of forest area between 2000 and 2005 was 7.3 million hectares/year -- down from an estimated 8.9 million ha/yr between 1990 and 2000. This is equivalent to a net loss of 0.18 percent of the world's forests annually. Forests now cover nearly 4 billion hectares or 30 percent of the world's land area, however 10 countries account for two-thirds of all forest area: Australia, Brazil, Canada, China, the Democratic Republic of the Congo, India, Indonesia, Peru, the Russian Federation and the United States of America. South America suffered the largest net loss of forests between 2000 and 2005 - around 4.3 million hectares per year - followed by Africa, which lost 4.0 million hectares annually. Asia moved from a net loss of around 800 000 ha per year in the 1990s to a net gain of one million hectares per year between 2000 and 2005, primarily because of large-scale afforestation only in China. Forest areas in Europe continued to expand but the rate is slow. It has been found that 11 percent are designated for the conservation of biological diversity -- and such areas have increased by an estimated 96 million hectares since 1990. One-third of the world's forests are mainly used for production of wood, fibre and non-wood products. Forests as carbon sinks are playing important part. The amount of carbon stored in forest biomass alone is about 283 Gigatonnes (Gt) of carbon, though it decreased globally by 1.1 Gt annually between 1990 and 2005. According to Mehmood (2003) the world has about 3870 million ha of forests, of which 95% are natural forests and 5% are forest plantation. Asia has by far the largest forest plantation estate of any region, accounting for 62% of the world's forest plantation.

Table: 1.2 Share of Regions in World Forests

Region	Forests as % Of land area	Forests as % Of world's forests	Plantation as % of the regions' total forest
Africa	22	17	1
Asia	18	14	21
Europe including Russia	46	27	3
North and Central America	26	14	3
Oceania	23	5	2
South America	51	23	1
World	30	100	5

Source: Deforestation in NWFP by Iqbal Mehmood, 2003

Government of Pakistan has prepared a number of policies and plans for forestry sector but despite the forest area has not increased significantly. With growing population more

area is cultivated for food and non-food crops. Forests are cut down to meet energy requirements of the country. There is a need for more houses, construction and other facilities that has further increased the demand for wood. Villagers in Pakistan had free rights to collect timber and firewood and to graze livestock on public and private lands. Annual rates of decline in forest area for various parts of Hazara Division NWFP, a forest rich area, are between 1.4 % and 8.8%. If these rates would continue, the forest area in this region would disappear within 10-50 years (Dijk & M. Hussein, 1994).

The forest area in Pakistan has decreased from 141530 square km in 1880 to 67310 in 1980; a decrease of 52 percent in one hundred years. During 1970's, there is an annual decrease of 1.5 percent per year (Dijk and Maliha, 1994). Pakistan experienced deforestation at a rate of 1.1 percent (55000 ha) annually (Hasan, 2001).

Fuel wood is an important component of household economies in Pakistan. It covers about 53% of total annual domestic energy needs. It has also been estimated that 70-79% of Pakistani households use fuel wood as a main source of energy (Jawad and Benjaminsen, 2004). Pakistan consumes about 50 million m³ of firewood and timber each year, whereas the growth of fuel wood and timber in forests and plantations is 8.8 million m³ per year. If the current rate of planting (about 92 million seedlings on about 46000 ha per year) on private and community lands continues, the annual growth will increase by the year 2018 to about 22.5 million m³ that is still less than the demand. Some 3.5 million m³ of industrial wood were required in 1993 is expected to rise to 9.9 million m³ by 2018 of which the greatest demand is for construction timber that comes from the coniferous forests of NWFP, AJK and Northern Areas. About Rs. 3 billion worth of pulp and paper products are imported every year. Domestic fuel wood consumption amounted to about 46 million m³ in 1993 and rising to about 76 million m³ in 2018 (GOP., 1992 a). According to FAO (2005) employment in forestry in Pakistan during 1990 was 33000 persons per year that decreased to 30000 persons per year. Forests are cut down to construct roads and other constructions. Road length was 97 thousand Km. in 1981 that increased by 164% to 256 thousand in 2003-04 so growing at an average growth of 4.4% (GOP, 2005 b).

The limited availability of reliable data on forest resources in Pakistan is a major issue that affects the planning of appropriate actions to achieve these targets. There have

been land reforms in Pakistan for agricultural land, but not for forests. After 1947, the government took over large chunks of land, and uncultivable land was transferred to the provincial forest departments through the Federal Land Commission. These transfers of land are reversible because no tenure arrangements are defined.

The factors, that cause forest depletion and result in the decrease of forest area, are not properly analyzed in government policies according to their intensity of affect. This leads to wrong priorities and allocation to various segments of the socio-economic structure related to forest sector. The present research focuses on the identification of some of the socio-economic factors and on the ranking of these factors with respect to their intensities so that priorities of the government should be properly specified and focused policy measures would be taken in national forest policies and working plans. Socio-economics is the study of the relationship between economic activity and social life. The field is mutidisciplinatory using theories and methods from sociology, economics, history and many others. Socioeconomics typically analyze both the social impacts of economic activity and economic impacts of social activity. In many cases, however, socioeconomists focus on the social impact of some sort of economic change¹.

The topic of the study has been selected on the basis of new policy directions, which are taking place in forestry sector of NWFP. Forestry is a provincial subject in Pakistan. In Pakistan forestry planning in the past was tree based planning. Forest management plans were oriented to grow trees to their physical maturity, single tree making and natural regeneration. Since the preparation of the first working plan in NWFP for Kaghan Reserved Forests in 1901, the working plan format remained almost same till 1997 when NWFP Forest Department with the support of SWISS project Forest Management Centre (FMC) developed the “Standardized Methodology for Resource Inventory and Planning” in 1999. This methodology introduced the new concepts of:

- Planning for all land uses i.e. forests, agriculture and range lands;
- Conducting growing stock inventories for forest and non-forest lands;
- Socio-economic surveys for preparation of strategic plans and operational plans;
- Use of Geographic Information System and satellite images for land use planning

¹ En.wikipedia.org/wiki/socioeconomics downloaded on January12th, 2007.

On the basis of the above concepts three levels of planning were finally agreed for forest management plans in NWFP²:

1. Strategic level
2. Operational level
3. Village Land Use Planning/ Joint Forest Management level

The analysis of socio-economic factors that effect forest area is key to determine the above three levels in planning and management. Keeping in view the above planning directions, the area for present study has been selected. Further, the topic of the research has been derived out of the concepts used in “Standardized Methodology for Resource Inventory and Planning” in NWFP that emphasized planning not for tree based but now tree for people.

1.2 OBJECTIVES OF THE STUDY

The purpose of this dissertation is to assess and analyze some socio economic factors that deplete forest area in Pakistan. In this context the study covers the following objectives:

1. Review the forest management structure, policies and legislation in Pakistan.
2. In the light of available information, to assess some of the socio- economic factors that hinder the growth of forest area in the country.
3. To analyze econometrically the selected socio-economic factors that affect forest area in the country, like population growth, cultivated area in the country, out-turn of timber and firewood, growth in livestock population, consumption of gas and electricity and per capita income, etc.
4. To recommend policy measures for the growth in forest area in the country.

1.3 HYPOTHESES

In order to analyze the effects of some factors affecting forest area and to develop the policy measures to offer recommendations, the following hypotheses will be tested:

1. Area under cultivation for meeting growing agriculture products demand has contributed to the reduction of forest area in Pakistan.

² So far only 16 Strategic Plans, 16 Operational Plans and 3 Joint Forest Management Plans have been developed by FMC (information are collected by the researcher from the officials of FMC, June 2007)

2. Increase in the production of oil, coal and gas have positively affected forest area in the country.
3. Expenditure under Annual Development Plan (ADP) for Physical Planning and Housing and real growth of construction to the national income affects forest area in the country.
4. Growth in human and livestock population has severely depleted forest area.
5. Increase in the national income has impacts on the consumption of wood and wood products.
6. Forest policies prepared in the country in the past have not significantly contributed towards increase in forest area in the country.

1.4 ORGANIZATION OF THE STUDY

The study is organized into seven chapters. After discussing the introduction, the first chapter has covered the objectives of the study, hypotheses and organization of the study.

Review of the literature is given in the second chapter. This review covers both theoretical debate on the subject of forestry and problems of forestry sector and empirical work of economists, zoologists and geographers and policy makers that is related to the present study. The main areas of their work included in the literature review are forest types, forest policies, forest contribution, factors affecting on forestry growth, role of stakeholders, analysis of empirical work etc. The experiences of different countries are also discussed.

Third chapter has described the methodology of the research. This chapter has incorporated the method of data collection and the techniques used for data analysis.

Chapter four has highlighted the main features of the forestry sector, forest administration and management in the country.

Chapter five has covered the main features of forests and forest policies in NWFP. The potential resources and past initiatives in forestry sector have also been discussed.

Sixth chapter is divided into two parts. Part I deals with the presentation of primary data. Part II presents the analyses of primary data. Results of econometric analysis of the socio-economic factors are also included in this chapter.

Policy suggestions will be given on the basis of findings of the study. These findings, conclusions and recommendation are given in chapter seven.

CHAPTER 2

LITERATURE REVIEW

Following studies have been reviewed about the history and types of forests, management and policies, about the reasons of forest depletion, about the role of different institutions for forest management and about the analytical techniques used to assess the value of forest resources.

2.1 Studies on Forest Resources, Policies and Management

Schlich (1922) described the history of forest growth and management in the Indian sub-continent and in some other parts of the world. In the British Empire, the import of forest products mainly timber steadily increased since 1884. So a separate forest policy was suggested for each part of the Empire. The suggestions were given to work on forestry Bureau, education and research, transportation and planning. The forestry Act 1919 was then passed. In the beginning of nineteenth century, conservancy attracted the attention. The forest law was passed in 1865 and a new Forest Act in 1878 declaring certain areas to be “State Forests”. Policy focus even in the later years was afforestation of new areas, protection against fire closing of areas for grazing, construction of roads to access forests, and education and research. Policy focus in South Africa was also to increase the population of indigenous species particularly yellowwoods. Forestry in Australia required protection against fire, freeing it from political conservancy and need for state forests. Apart from these, in New Zealand decentralization of staff was also a policy suggestion. Artificial re-forestation was the practice in Cyprus. Kenya colony received attention including railway haulage of 400 miles. Fees and royalties were also fixed under some cases (especially in Nigeria). In case of Gold Coast Colony, rules for export of timber were made. Jamaica rich in forest had no department of forestry, imported building material from America at cheaper rates since deforestation affects water flow in rivers so prevention was important. The author used time series data from secondary sources for analysis. A diagram taking yield percent and prices per acre presented cost-value of the soil.

Greeley (1953) described the main trends in forest policies of different countries. Forest policy originated from population pressure on natural resources. The earliest and most general attempts at forest conservation in the Middle Ages were royals but

the concern was hunting than of forest growing stocks. The concept of Laissez faire economy then relaxed many of the rigid forest controls followed by industrial revolution of the 19th century, which increased the demand for forest products as a raw material. War was another element that compelled the nations to think about forest policies. Forest policies have shifted the rights and interests from individuals to public and national aims in the beginning. Forest practices and principles were imposed on the people of central Europe to protect the landed privileges of ruling class. But during 19th century capitalism, expanding world trade and high living standard affected on forest policies of different nations. Germany was ahead in forestry education, scientific education, France and Switzerland in protection of watershed, Scandinavia in community system practices, Canada in democratic institutions and United States used the capitalistic system in forest exploitation, thus making a more advanced and destructive form. Europe focused on reforestation through loans and subsidies to cover forest losses from war. Russian policy was under the control and will of all-powerful central authority and Japan having low area for forest went for public aid in forest plantation. Japan followed the idea “plant a tree for every tree cut”.

Champion, Seth and Khattak (1965) being the silviculturists have had the experience and practical knowledge in forestry. From the pre-independence era to post independence time the three have spent in forestry. By utilizing their knowledge they made a great contribution by classifying different types of forests in Pakistan. The criteria for the classification of forest types depend on the purpose and each purpose has its own different requirements and approaches. It may be classified by breaking down bigger or complex into smaller categories. The first breakdown is mostly to geographical subdivision. The possible basis of subdivision are at least seven i.e. physiognomy, structure, function, floristic, dynamics, environment and on the basis of history. Collection of data for the classification of types includes a variety of variables; temperature, locality, height etc. Climatic and soil characteristics are the major factors to determine forest type. The dynamics (plant succession, climax type, and grasslands), floristic composition (floral region, endemism, migration, invasion, prehistory), morphological characteristics (leaf, stem, root characteristics, flowering, seeding), structural characteristics (stratification, climbers) and biotic (history, fire, grazing and shifting cultivation) all are the factors influencing forest types. Three

types of criterion i.e. botanical, climatic or ecological have been taken for classifying forests.

Sheikh and Mohammad (1977) gave a review of forest history, features and management of forestry sector in Pakistan. From early invaders in the sub-continent of India to the British, forests remained vulnerable to the vested interests of the ruler till 1852 and 1865 when Timber Agency and Indian Forest Act respectively had been prepared. With the passage of time, many other efforts had been made to prepare and implement various policies and acts. The forests have been classified in to a number of categories on the basis of their geographical distribution like tropical, dry temperate, Alpine, irrigated, and Himalayan forests as major categories. The management of forestry sector remained mostly in government hands under its different programs such as watershed management, afforestation, regeneration under five years plans, farm forestry, range management and wildlife management. They mentioned that these programs and policies were a partial success. Forests insects and timber diseases play a role but major reasons were the use of timber as firewood, fodder and local consumption for construction.

IUCN (1996) examined the efforts for preparing provincial conservation strategy. Sarhad Provincial Conservation Strategy, prepared in 1996, is a principal plan for implementing the National Conservation Strategy in NWFP. For the preparation of SPCS, public consultation meetings were held at district and village levels and issues at each level were identified. Besides, sector-specific consultations were also arranged. The role of armed forces especially in forestation and NGOs role in sustainable development was also realized. The SPCS has identified certain priority areas for action like community participation, sustainable industrial development, sustainable tourism etc. Some other areas of concern are policy, programs and law reforms, environmental education, privatization, incentives and partnership, state of environment reporting etc. Major environmental problems of the province are deforestation, grazing land depletion, water logging and salinity, population growth and poverty, urban and rural pollution and many others.

Ayaz and Wani (2000) provided some forestry statistics. Forests in Pakistan cover 4.227 million ha, making only 4.8% of total land area of 87.98 million ha. However, forest percentage in different provinces and territories is different. The Azad state of

Jammu and Kashmir (AJ&K) has the maximum forest area of 20.7%, followed by North West Frontier Province (NWFP) and Northern Areas (NA) having 16.6 and 9.5 percent of forest area, respectively. The province of Punjab and Sindh have almost similar forests area of round 2.8%. Forest area of Balochistan is the least, representing a minimum figure of 1.7% only. About 32% of the existing forests are managed for production to supply timber and fuel wood and the rest 68% are meant for protection to fragile mountain ecosystems. In 1995-1996, the state controlled forest supplied 0.250 million m of timber (7.3%), import of wood products was 1.494 million m (43.9%), costing about Rs.6,660 million. The major contributors in the national wood supply were farmlands, making up the balance of 1.663 million m (48.8%).

Dasgupta et al. (1986) edited the papers on issues related to forests and forests' management in India. Bahuguna (1986) in his paper described the needs of the Tribals and forest management. Forests have a number of uses. One of the sages while giving the outlines for forest management said, "a tree is equal to 10 sons" (oxygen, water, soil, food, fodder, energy, shelter, clothing, medicine and shade). He mentioned that an ideal tree farm should consist of different species of food and other products along with plants on ground floor. Tropical rain forests are disappearing at a rate of 32 hectares a minute. The demand of tropical hardwood in three industrial regions- America, Japan and Europe, has increased by 1500% with in the last thirty years. The World Conservation Strategy prepared by 700 scientists holds that the remaining natural forests should be conserved as oxygen banks, the sinks of carbon dioxide that is the source of water and soil fertility. In the tribal context, There should be developed a worshipful attitude towards Nature. This inspired Amrita Devi and 362 people in Khegadli (Jodhpur, Rajasthan) to sacrifice their lives for the protection of trees. This message of Aranya culture led to grass root environmental movement like Chipko was born in India. Chipko is a movement demanding complete ban on tree felling resulting in a serious conflict with scientific forest tenancy.

Dasgupta (1986) in his paper described the problems and management policies in Darjeeling Hill area. British purchased this area from the Sikkim Raj. The area was suffering from extensive fires, conversion of these forests into cultivated lands and demand for railway sleepers. The first reservation was notified in 1865 according to the provision of Act VII of 1865 the area as reserved. In 1871-72 all forests in British

Sikkim were notified as reserved forests and government forests in Bhutan Duars as open government forests. More forests were vested to the state under Estate Acquisition Act of 1953. Some forests were notified as protected forests under Indian Forest Act XVI of 1927. The paper highlighted that after Forest Conservancy in 1864 no systematic attempt could be made for management due to insufficient staff and technical know how. The permit system resulted in felling of best trees leaving only defective trees. The selective felling system was then practiced. The post independent era showed some changes; changes in objective of forest management to production oriented forestry, changing the exploitation method that avoided the upper layer of forests which are vital for ecological balance and introduction of social forestry. The findings show that there is a huge gap between felling of trees and replantation and large communication gap between hilly area people and the government, land is not available in plenty, the productive land would be saturated soon in hilly area. The nexus between political leaders and local merchants is strong leading to more corruption. So the nature of the forest management cannot be understood without considering the role of the parallel economy.

Dutta (1986) in his paper mentioned the conflicts between traditional and modern forestry planning. The National Forest Policy of 1952 prescribes 60% of the total geographical area as forests in hill areas of North East. There is no definite idea about the area under different categories of forests. In the area the communities have religious and traditional attitude towards forests (sanctity and honor). But the forest management was left to nature. The ownership were either individual or village ownership. This category of the forests is called Sacred Groves. The second category is Restricted Forests The third category is Forest Cared For, where one person can grow on another's land and both parties take the benefits according to the agreement. Village Forests that are managed and owned by members of the village on the basis of equal share where the share can be given to any other in return of money by any member. One or more clans own Clan Forests. Those who do not contribute in the expenditure have no share in the revenue. Community Forests are owned by Sirdarship or Durbar Hima (The Darbars are bodies which enforce customary legislation and administrative matters). All unclassified forests come under District Council ownership. All forests other than Govt. Reserved Forests are within its jurisdiction. There is no direct relation between state Forest Department and District

Council except grants-in-aid program and for sharing of royalty. There is a case and an experience of overlapping of authorities as far as the legislative measures are concerned. In the absence of organized knowledge about forest and forest management and a formal specialized agency to implement forest policies, the lessons could be passed on through religious commands and traditional institutions. The main hurdle to scientific management of forests appears to be the lack of control over the forest-land by the government (with just 3% Reserved Forests in the state). Social forestry, farm forestry has a special appeal in a tribal setting. The study further suggested that scientific management of forests calls for forest-based industrialization to support and sustain the healthy growth of forests.

Thakurta (1986) in his paper mentioned ecological problems and policies in India. At one extreme, the opinion is not to touch nature and return to social organization. On the other end, is the neo-classical economic approach that views ecological disequilibrium as a problem of negative externalities and therefore as a social cost. There is no market mechanism to compensate the victims of degradation. So for forest planners, the basic issue is how to use its resources rationally. Ecological problem cannot be sorted out without adequate understanding of social, economic and political organizations. Marx considers "Labor" as both man and Nature that participates together. Thus a scientific approach to ecological problems lie in the analysis of social factors particularly the production relations. He expressed that the ecological crisis of today is an important manifestation of the general crisis of capitalism but it does not mean that there is no ecological problem in socialist countries. According to Indian Forest Act 1927, forests are divided in three classes: reserved, protected and village forests. Forest Bill of 1980 gives a wide definition of forestry, which even includes grass. The govt. recommended an aggressive program of man-made forestry towards industrial requirements. Growth and development of social forestry is possible when these people are part of the policy and action plan. According to the Forest Bill of 1980, no order of the govt. can be questioned in any court of law. So those who rely on forests are subject to the mercy of the forest officials.

Saikia and Goswami (1986) in their paper stated that as compare to early fifties, now there is a decline in the area under forests in India. The actual tree covered area in the state may be lower than the official statistics. The authors used secondary data. 74%

of the forests in the hills are unclassed forests managed by the District Councils in which there is no proper survey. The unclassed forests in the plains are not managed by the Forest Department. Several factors contributed to the decline of forest area in the state; reservation of reserved forests for settlement of landless and erosion affected people and for refugees, unauthorized encroachment of forest land, Jhum cultivation in the hills, establishment of new township and industries, use of forest land for defense purposes, illegal occupation of some reserved forests and lack of proper drainage and water logging due to floods affected productivity. Social forestry program is expected to help the local people to get involved in forest management and to earn income.

GOP. (1986 a) has prepared Environmental Impact Assessment (EIA) Guidelines for development projects in different sectors. EIA is being practiced in many countries of the world. Forestry is considered in projects under different sectors for which EIA is necessary to be prepared. For example, in agriculture sector's project loss of natural resources is considered that includes forests and aquatic ecosystem, economic plants and watershed protection. Silvicultural and forestry projects have beneficial environmental impacts but it is taken into consideration that how much area would be affected by the project, the degree to which the project displaces natural ecosystem or enhance ecosystem. Under afforestation and reforestation, projects are judged on the basis of their effects on the environment, for example single species plantations (monocultures) are often more vulnerable to pest and diseases, deplete soil nutrients than mixed species plantations. Projects of social forestry may be directed on critical watershed than under any ordinary area. Environmental considerations in civiculture and forestry projects are; site selection, planting schemes, species composition, erosion control, indigenous population, water (surface and ground), sanitation system, energy requirements and operation and maintenance. Many other projects in areas like housing schemes, ports and harbors, roads, mining, dams and reservoirs, energy, fertilizers, industrial irrigation and many others do consider forest cutting, land clearing and restoration of the disturbed areas etc. It is mentioned that all these issues are addressed and checked under Environmental Impact Assessment of the projects.

Lodha (1991) mentioned some policy suggestions for the management and utilization of land for plantation. He mentioned mining that is a source of employment and

income for the country but dumping of waste rocks is a problem and should be used for refilling if there is no further extraction. Mining lease should not be allotted near canals and lakes. For the lease, tree plantation should be more compulsory. The author suggested being more careful in the settlement of population, which always prefers to green and fertile places, which could otherwise be used for plantation. The writer has written different essays on environmental issues including some case studies but the information on forestry are descriptive in nature. He described advantages of forests and quoted Jain Philosophy i.e. “vegetation is full of life and basic ethics of the religion is not to kill any living being”. He further suggested that vegetarianism can play an important role in environmental preservation by conservation of energy resources and by preventing soil erosion.

Indurkar (1992) has elaborated the contribution of forest to the economy on micro level. The writer used secondary data for his analysis. He mentioned two forest policies; National Forest Policy of 1952 and Forest policy 1988 which were an attempt to solve forestry problems in India where as the first five- year plan started in 1951. Forestry occupies 22.7% of the total geographical area in India. Per capita forest area is 0.1 ha. (where as the world average is 1.0 ha.). Even after partition forestry sector is considered one of the main revenue earning sectors. The main forest areas are Himalayas, Kashmir, Uttar and Himachal Pradesh, Madhya Pradesh, Karnataka, Kerala, and Tamil Nadu. In all these areas most of the forests are managed by Forest Departments established about 100 years ago. Although the claim is for 22.7% area under forest cover but in fact only 10% is under good forest cover. Public support, tenure issues and conflict over forest community rights were not considered in the national policy considerations. The main focus was on regulations of felling and transport of timber. Although Forest Policy 1952 recommended classification of forests in to protective forests (national parks and ecological control), national forests to meet country's need, and village forests to meet local consumption. But this classification could not be achieved and no area was assign to villages. National Commission on Agriculture (1976) also worked on similar lines but there has been little success because of lack of communication with village communities. He suggested “a tree for a man” approach could restore country's valuable wealth.

Jan (1993 a) used descriptive method and has reviewed and analyzed forest policies. Policy efforts were started during nineteenth century in Pakistan but the focus was just to manage the forest. But from 1955 and onwards, other issues like watersheds, rangelands, import substitution had been considered. Some of the events positively affected forestry like Indus Water Treaty 1960, merger of Erstwhile States into NWFP in 1970 and land reforms in 1958, 1972 and 1977. The main problems in forest policies prepared in 1955, 1962, and 1980 were inadequate funds, partial implementation, inadequate water, priority to non-tree land uses, organizational problems, non-cooperation among departments and low community participation. Forest Policy 1991 covers most of the previous policy loopholes but has not addressed the question of land tenure. Goats Restriction Ordinance 1962 was not implemented. He criticized that the government should not mandate what it cannot implement. Tables and graphs given by the author were taken from the secondary sources.

Jan (1993 b) discussed the responsibility of the government to promote socio-economic infrastructure that is required for the development of forestry sector in Pakistan. In this context he has gone through a number of different aspects of forestry i.e. from its physical features, management and administration to education, research, training and policies. The author as an Inspector General of Forest has the experience and information about the development processes and programs in forestry sector. This experience and information have been well incorporated in the form of tables and sub-sections. The author emphasized the need of modifying government legislation and framework with new priorities and management practices. During this process political commitment and community involvement are the important pillars for the development of forestry sector.

Knudsen (1995) described the early history of forest management in British India, which started during 1850's but the law was prepared in 1878. India and Nepal both followed nationalization in forestry. Forestry sector was primarily managed by Forest Act 1927 in Pakistan. There were different forests categorized under the Act. Most common depletion was free grazing, growing population, land use for cash crop production and lack of expertise in forest nurseries. Mismanagements have been identified in many areas; in royalty system, in forest legislation, and in forest contracts. High demand for timber resulted in smuggling from Afghanistan.

Government of Pakistan, in order to solve environmental law problems prepared National Conservation Strategy in 1992 and Sarhad Provincial Conservation Strategy in 1996 and Forestry Sector Master Plan in 1992. These are covering some other areas, which were not addressed in the past for example, public participation and women role in forestry conservation.

Ewing and Tarasofsky (1996) while discussing the work program of the WTO committee on trade and environment, mentioned TRIPS Agreement i.e. Trade Related Aspects of Property Rights agreements. Regarding plant varieties, analysts suggested to develop a system to allow indigenous and local communities to control and protect locally developed plant varieties, to modify IPRs (Intellectual Property Rights) in general so that traditional and local communities gain greater control over use of their knowledge to improve genetic resources and to ensure more fair benefit sharing. Proposals also included the creation of a multilateral system of exchange for plant genetic resources among a pool of providers and users, which may have an impact on IPRs. Several other issues were discussed under WTO, which were related to international trade. The world has realized the importance of forests as a great biodiversity, sinks for atmospheric carbon, potential source for new medicinal and chemicals, as raw material for construction and industrial purposes. Early efforts focused on tropical forests such as International Tropical Timber Agreement (ITTA) (1983). International Tropical Timber Organization (ITTO) agreed that all tropical timber in international trade be harvested from sustainably managed forests by the year 2000. They mentioned the tension between Northern and Southern states because Southern states viewed it as “co- imperialism” and wanted to extent the agreement to temporal and boreal forests in Northern states. UN conference on Environment and Development (UNCED) in 1992 and International Panel on Forests (IPF) 1950 were other efforts for developing forests related reforms and trade and environment. But the central question remained that how to measure sustainable forest management (SFM)? Several attempts have been made to define Criteria and Indicators (C&I) of SFM but as yet there is no commonly agreed definition of SFM. Neither all the efforts have been coordinated, nor is the entire world involved. Despite the lack of C&I, eco-labeling for forest product is being used particularly under ISO (International Standard Organization), which is considered as a strong mechanism to force the adoption of sustainable forests management techniques. The writers expressed the

fear of some analysts that lowering trade barriers on forest products will promote deforestation.

Ali et al. (1997) mentioned some policy efforts. According to him Forest Policy of NWFP 1997 was drafted with the goal of creating a forestry commission, revising forestry laws, creating forestry development funds and supporting of local economy. Forestry Commission was established with the aim of protecting the department from political interference. Focus Green Sarhad are the other programs. Under the Forestry Sector Master Plan, the forest area in NWFP is expected to increase up to 32% of the total area. None of the forest laws extended to Federally Administered Tribal Area in NWFP. The first afforestation initiative in FATA was undertaken in 1975-76.

Shahid (1997) identified the factors that affect forestry and highlighted the history of forest management. He pointed out some of the methods that are used to measure the forest growth and productivity. The structure of a forest as a community is both qualitative i.e. physiognomy, sociability, vitality, stratification and quantitative i.e. density, cover, frequency and the number of individuals. The practical application of forest ecology is conservation of natural resources. The history of forest management is as old as 1100BC. Forests were the property of feudal lords in Europe and they protected them for game purposes. From protecting to management it took a long time till in 13th century Europe started sustained development of forestry. In America and Indo-Pakistan, these efforts were started in 18th century. The forests are providing tangible and intangible services. The organization of forests is divided in legal classification, administrative division and management and silvicultural division. The forest management depends on the objective whether these are for monetary returns or for services. Forestry contributes 0.3% to the GNP, 3.5 million m³. of industrial wood, 32% of the total energy needs, 90% of the rural and 60% urban household fuel wood needs, and 9% of the total exports earnings. There are different types of forests in Pakistan; coniferous, scrub, riverain, mangrove, irrigated farmland trees, and linear plantation. Watershed management is also essential because 26% of the GDP depends on irrigation system. Main threats to biodiversity are deforestation, desertification, erosion, water logging, and salinity. He criticized forest policies that with 2% of its land under forests in 1947, Forest Policy 1894 was used for the management of forests that lacked dynamic approach and sustainable development. So National

Forest policy 1956 was prepared but the policy ignored the problems of hill forest rather the main focus was on linear plantation and agro-forestry. National Forest Policy 1962 was formulated to use unconventional methods. But the demand for forest products increased. National Forest policy on Forestry and Wildlife 1980 and Pakistan Forest Policy 1991 were prepared. These were the part of National Agriculture policies. The main aim of the former was to meet the growing demand and the latter aimed to increase forest area, incentives, research and cooperation. The policy of 1991 aimed to increase the forest area from 5.4% to 10% but did not prove practical because of the low allocation in the development plans of the country. The Forest Act 1927 was adopted in 1947. Punjab Land Preservation (Chos) Act, 1900 was also enforced where ever applicable. Some other legislations were also implemented some of them were the amendments of 1927 Forest Act. Different institutions were also setup.

SUNGI (1998) in its annual report accounted the progress made by the SUNGI Foundation during 1998. A vast majority of projects and programs in Pakistan are operating under growth maximizing theory. These approaches are often purely income enhancing and livelihood strategies, the rural communities are engaged with the Sustainable Livelihood program of SUNGI Foundation instead attempts to utilize market forces with in a broader strategy for improving livelihood standards in rural communities. The Natural Resource Management (NRM) program's primary objective is to improve the skills of local people to effectively manage natural resources in four primary sectors; forestry, agriculture, livestock and bio-diversity. Cost-effective local arrangements in areas where the government departments have left the vacuum include training of local livestock workers, establishment of demonstration plots and forestry. During 1998, the program has gained substantive returns in forestry. Partner men and women planted over 228171 fruit and non-fruit saplings. The saplings were planted in block arrangements as a social regeneration and anti-erosion strategies. Under another program Productive Village Infrastructure (PVI) schemes include irrigation channels, check dams, street pavements, drainage systems, water supply, footbridges and soil conservation structures. On policy front it led a forestry sector reform campaign to decentralize the policy development process and facilitated formation of local forestry networks. It led to the incorporation of

certain recommendations into the draft Forestry Act 1998. These include rights of non-owner and deprived group, establishment of regional forestry round tables etc.

IUCN and LEAD-Pakistan (1999) while discussing the National Conservation Strategy and Sarhad Provincial Conservation Strategy mentioned that National Conservation Strategy (NCS) has 14 core areas and it was launched in 1992. Sarhad Provincial Conservation Strategy (SPCS) for NWFP was becoming one of the few provinces in the world to develop a strategy for sustainable development for itself. There were two ways of formulating this strategy: one to hire the consultant and second was to involve local people. Latter was adopted, 10,000 people were sought and 4000 villages were contacted. SPCS was formally launched in 1997. The document is an attempt to analyze the conservation strategies prepared in Pakistan.

Heering et al. (1999) have edited the papers. Sadeque (1999) in his paper presented lessons and experiences dealing with the communities of regional South Asian Highlands particularly 140 million people of Hindu Kush Himalayan areas. In the mountain areas, complex engineering feats like terracing, irrigation channels construction and maintenance, trail construction are often locally done without external support. Efforts of external agencies cannot guarantee the continuity and survival of programs unless there is trust and cooperation within the community. Best practices are usually socially inspired not designed by external experts. Technologies to deal with problems are often available but institutions are either lacking or at sub-optimal level. Land ownership is a problem in the regional countries. There are conflicts between private forest owners and the Forest Department over management plans. For community participation there are different projects like Community Forestry, Social Forestry, Joint Forest Management, Participatory Forestry and Leasehold Forestry in Pakistan, Nepal, India, Bangladesh, Bhutan and other regional countries. A project of ICIMOD for research in watershed management has been launched Between China, India, Nepal and Pakistan. Private-Public divide over use rights, management and property rights insecurity, is considerably narrowed down under new community/ joint forest regimes in Nepal and India. Communities should be given the guarantee of benefits and confidence of the government. In all forest policies increasing globalization of environmental policies has also been felt. The Indian Forest Act 1927 still dominates the policies of these countries, amendments are

made from time to time, and slight shifts are made than major reorientation. For sharing experiences Hindu Kush Himalayan Forum for Forest Conservation and management by Pakistan, India, Bhutan, Nepal, Bangladesh, and Myanmar is a step towards Participatory Forest Management (PFM).

Marjan (1999) in his paper expressed that the experience of natural resource management before 1980 shows that the management of natural resources and forests began in 1855 when ruthless firing and cutting of forests was realized. A land settlement was arranged in Hazara (NWFP) demarcating some forests as Govt. Reserved Forests and Guzara Forests. The first forest management plan was written for Haripur Reserved Forests in 1879, followed by a series of plans for the rest of government forests in Hazara district. Management plans were then prepared for Guzara Forests and for forests of Princely States of Dir, Swat and Chitral during 1960's. By 1980's all forests, private or government were brought under the regular management plans by having proper inventories, mapping and silvicultural systems. These plans have a number of flaws dealt with the forest- belt only and ignored the other natural resources. During period 1980-96 a number of projects for example, Kaghan Valley Intensive Forest Management project, Siran Valley Forestry Project, Kalam Integrated Development project (KIDP), Social Forestry Project Malakand – Dir, and Environmental Rehabilitation Project Malakand Division (ERP) have been prepared. NWFP Forest Management Centre was started with the help of foreign assistance. In 1998 Institutional Transformation Cell (ITC) has been established.

Fisher and Shrestha (1999) in their paper presented some case studies about the role of various actors like local organizations, NGOs, forest departments and donor's funded projects in community- based forest management. The nature of community participation can be conceived in different ways. In the classical approach, communities are not involved in forest planning. In the modified classical approach, the community role is limited. A more radical approach, more genuine collaboration of the community in forestry management is Participatory Forestry. In the modified classified approach, it is assumed that in forest management the objectives of forest agencies are shared by communities, so there is a need of institutional arrangements to consider divergent interests and to solve competing interests. There are three factors for effective institutional framework for Collaborative Forest Management (CFM).

One; different actors have different views about the objectives of forest management (for protection, for income etc.). There is no single correct objective for forest management and the approaches to CFM that do not take into account the diversity of the objectives are not likely to be successful. Second; forest policies inadequately reflect this diversity and changes are beyond the powers of the policy makers and beyond the scope of planned changes. Third; the best chances for success is in developing more pluralistic forest policies i.e. they must take account of the variety of interest/ objectives involved in forest management.

The paper discussed some case studies. Kyrgyz Republic in Central Asia in its new policy has made strong commitment to implement CFM in many forest areas by making lease arrangements usually to individual people. Under these leases, tenants are allowed to harvest forest products from the forest area in return for carrying out tree planting and protection activities on non forested plots. This sort of shift from collective ownership to individuals has been seen in other states in transition from state ownership to other forms for example in China and Vietnam.

In Philippines the NGO movement is very strong. There is an independent court system that keeps some checks on bureaucratic decision- making and its conformity to the law. Sometimes the govt. emphasis on foreign investment and macro economic development rather than on micro level i.e. changes in the national economic policy has negatively affected CFM and ancestral domain policies. In Thailand, the case of forest policy contributes a more confusing and contradictory picture. Despite the strength of civil society, policy is dominated by politics and bureaucracy. In late 80's a logging ban was declared followed by conversion of areas in to "protective areas (equal to 13% of Thailand's land area)" banning this area for locals.

Nepal is often perceived as community forestry's showcase (some say it a birth place). Over 7000 user groups are managing 1 million hectares of forests supported by very capable foresters. It has a clearly articulated policy, legislation and administrative guidance. But there are two main factors for which Nepal's community forestry experience limits the relevance to other countries. One, forest resources are mainly in the middle hills that are not readily accessible for large-scale commercial exploitation. Second is most of the development budget comes from donors and donors have influence on its forestry sector.

Ali (1999) in his paper showed that the process of devolution of management authority from govt. to local people started in NWFP with start of Social Forestry project in 1987. Earlier Promotional forestry projects were started in mid- sixties. Under this new system all partners are facing many challenges to adjust to their new roles and responsibilities. The Malakand Social Forestry Project (1987-1992) as one of the pioneer projects developed an extension approach called Village Land Use Planning (VLUP). Under this local communities are assisted to manage hillsides and farmlands through formation of Village Development Committees (VDC). The role of the Forest Department is to provide extension, technical assistance and monitoring.

Murtland (1999) in his paper described the history and policy reforms in forest sector and expressed that prior to the establishment of formal forestry management in the Indian Sub-Continent some 150 years ago indigenous systems of control did exist. The founder and the first Inspector General of Indian Forest Service and even holding the post of IG for nineteen years, Dietrich Brandis failed to convince the establishment of the wisdom of allowing villagers to manage their own natural resources (He was in favor of the collaborative management between locals and the government). The 1878 Forest Act was passed to protect and further extent state control over forests through India on about 35% of the land surface. This act with modification is still the basis of forest legislation in countries under British rule for example Pakistan Forest Act 1927. This act however, contains certain relevant clauses for village forests and the setting aside of wasteland for villagers and private owners to devote to forestry recognized as Guzara forest system. With forest legislation, came the system of working plans. The first working plan came on the scene in 1905. In the late 1970's and early 80's the concept of social forestry and similar approaches materialized.

Siddiqui (1999) in his paper discussed and criticized the Forestry Sector Master Plan in Pakistan that is prepared for a period of 25 years (1993-2018). It has proposed five groups of development programs; soil conservation and watershed management, forest management, wood production and industrial development, eco-system and bio-diversity and institutional strengthening at a cost of Rs. 48.781 billion. These programs are not community oriented and mostly carried out through government forest departments on state-own lands. At the time of preparation the currently

popular concepts like community and women participation were not understood but at the time of review of progress in 1999 it was realized that this program lagged behind social and economic changes and many forestry projects in the country are not following the plan's approach. The concept and practice of forestry management all over the world remained the same during the past many decades up to early fifties but this practice led to the hostility of people towards forests. Later on, in sixties the role of forests was expanded to multipurpose management of natural resources for production of wood, wildlife, and recreation. But still it has low priority in development plans. But during seventies energy crisis it gained importance. Later on global warming and ozone layer and other related problems led to the international conventions. Community participation in resource management was not an issue in early nineties when FSMP was prepared but now an integrated approach is suggested.

Sheikh (2000) prepared a profile of description of trees with background material on Pakistan's landscape, climate and soils. Trees of the country fall under different types of forests. The diversity of forests types depends on climatic and edaphic factors. The forests that range from 3350 to 3800 meters are called Coniferous Sub-alpine Forests. The second category is of Coniferous Dry Temperate Forests that occur at 1525 to 3350 elevation. The other two types are Coniferous Himalayan Moist Temperate Forests and Coniferous Sub-Tropical Pine Forests that occur at 1373 to 3050 elevation. Scrub- dry Sub- tropical broad-leaved Forests, Scrub Dry Tropical Thorn Forests, Irrigated Plantation, Riverain Forests, Farm Forests, Mangrove Forests and Linear Plantation are the types of forests in the country. The author also described 120 different trees.

SUNGI (2000) in its annual report highlighted the progress of forest development in NWFP. For NWFP Forestry Sector Reforms (FSR), SUNGI Foundation decided to influence the government initiated Forestry Sector Reforms process to ensure security of the deprived and marginalized social groups with regard to forestry tenure subsistence rights and to promote equitable forest management. SUNGI facilitated communities to organize a network from village to provincial level called Sarhad Awami Forestry Ittehad. This network is engaged in the protection of forests and rights of royalty holders through networking and developing linkages with other civil society organizations, private media and relevant government agencies. Many of the

Foundation's demands have been partially accepted, for example rights of the participation of deprived social group in policy making process, recommendations related to joint forest management system. In one of the cases, a handful of people with vested interests executed agreement for the sale of forest royalty in favor of some influential ex-forest contractors, who then colluded with the local administration to deprive local inhabitants from their legitimate right to forest royalty. Now 10,000 residents of Dir- Kohistan are facing non-payment of legal forestry royalty. SUNGI supported the community to have their due rights of Rs. 200 million forest royalty and ensure full implementation of the recommendations of Khattak Inquiry Committee appointed by the government of NWFP to link Dir-Kohistan problems with the on going forestry sector reforms. The Foundation also advocated for the rights of the displaced communities affected by the large dams and other mega projects. It also established community-based nurseries.

SUNGI (2001) has highlighted some observations that have been seen during 2001 with the follow up of those cases of previous years. Under NWFP Forestry Sector Reforms (FSR) campaign, the campaign focus remained on forest legislation and the establishment of a credible and impartial forestry commission. The campaign included consultation with ministries, Forestry Donor Co-ordination Group and stakeholders. The campaign sought to make the Asian Development Bank, a major donor of FSR process accountable and responsible for implementing policies favoring the disadvantage groups in the project planning and implementation. In the Gomal Zam Dam project, the project was approved without conducting social and environmental studies, the issue of resettlement and environmental mitigation were not addressed in planning documents. The Foundation had taken serious notice of the affectees. SUNGI has played a key role in strengthening the NGOs coalition; the Sarhad NGOs Ittehad (SNI), Hazara NGOs Ittehad (HNI), Coalition of Rawalpindi-Islamabad NGO's (CORIN) and Pakistan NGOs Forum (PNF) were the major forums working together in different fields including natural resource management, flood relief activities, advocacy role in policy etc.

GOP. (2002) in its country assessment report highlighted the environmental problems of Pakistan. From domestic efforts to international assistance and cooperation, at policy front still a lot is needed to be done. Protection of atmosphere, water resources,

toxic chemicals, sustainable rural development, human health, demographic, conservation of biological diversity, soil wastes, all areas need careful management. The role of local community and NGOs, farmers and trade unions could be enhanced through their participation. International cooperation and institutional strengthening along with financial support and technological transfer are the tools that help to better implement the management plans. Deforestation is one of the environmental problems where the government is taking initiative by introducing different plans to combat drought affected areas, desertification and deforestation. Out of the total area surveyed, about 2.4% of the land has potential for forestry and about 62% of the land lack or have low potential for crop/ forestry production. Only 4.2 m. ha. of the total area in Pakistan is under forest. The report highlighted National Land Use Planning Program (1998), Forestry Sector Master Plan (1993-2018), Mountain Areas Conservancy Projects (MACP) in Northern Areas, as some of the govt. efforts. The forest policy efforts during different periods of time, is another milestone towards sustainable development. The first Forest Policy was drafted in 1955 with subsequent efforts in 1962, 1975, 1980, 1991 and 2001. It is suggested that sectoral approach to mountain development has to be replaced by an integrated natural resource management approach with multi-stakeholder participation.

2.2 Studies Related to Socio- Economic Causes of Forest Depletion

Schlich (1922) mentioned that British India was rich in forests but destroyed by nomadic tribes (Arians) particularly in Himalayans. For firewood, for cultivation and for railway the forest area was used.

Agarwal (1986) in his paper described the tribal people and their needs from the forest resources. The tribesmen enjoyed unrestricted rights of exploitation. The government amended the forest act in 1955 and recognized the rights of local tribesmen. The govt. established Forest Corporation to have a productive use of forests. In Arunachal, since large tracts of land are under community ownership so the govt. should involve people in the management and economic use of forests. Same observations have been found in the work prepared by Banerjee, A., Dasgupta, M. and P. Prasad, (1986) with the conclusion that future development of the tribal areas of Tripura must be based on development of forest economy itself. The observation and findings are based on a

survey conducted for a study on shifting cultivation in Tripura. The author has classified the forests of Arunachal Pradesh.

The research by McNeely (1987) is based on the fact that Asia is densely populated and major investment is going on in water resources to increase area under irrigated agriculture to increase agriculture production. The paper focuses on local, national and international level experiences. It is further aimed to control deforestation in watershed areas of water development projects in Indonesia and Sri Lanka, The paper focuses on how ecological science helps irrigation projects to give maximum results. Thailand, Vietnam, Laos all were involved in the project of construction of canal, irrigation and dams during 1960s. Population of the region was increasing. The results showed that if current trend of developing water courses would continue without building dams wildlife would perish. The project aimed to cultivate lowlands through irrigation thus reducing pressure of agriculture on marginal lands thus reverting uplands for forestry and wildlife conservation. Construction of dams was suggested to reduce pressure on fossil fuel. Although the project was not so successful because of political factors but the principles of the projects were highly acceptable. Linkage between ecological science and management was too weak. Public pressures had been there both in donor country, World Bank and on the Indonesian government to consider national park development in an irrigation loan.

Ledec (1987) analyzed Bura irrigation project in Kenya funded by national and international donors that faced many failures because it ignored environmental and conservation concerns. The main aim of the project was to settle landless farmers to grow irrigated cotton. The project threatened the survival of the riverine forests nearby owing to the acute shortage of fuel wood. Kenya's Tana River forests have been degraded. Large scale irrigation or land settlement projects in populated areas will not be most desirable agriculture development strategies. Bura project was not sited on riverine forest land; it generated high pressures for fuel wood. Failure of the fuel wood plantation was one of the main causes.

Nadkarni, Ajmal and Prabhakar (1989) prepared a study that focuses on Karnataka forests and has wider interests applicable to the whole country. The main feature of the study is its contribution to the analysis of the political economy of forest use and management. A problem in the political economy of resource use is the struggle

between vested interest groups. The study presented an analytical account of the struggle at various stages of forest resource utilization beginning from the pre-commercial stage. The political economy of forest use cannot be restricted to the struggle between interested parties; local interests, larger economic interests and the state but also by the different interest groups within the local economy. The rationale of this study is based on the contention that the problem of reconciling diverse ends with scarce means is not resolved in neoclassical economic terms but through a political struggle between interest groups thus constitute a problem in political economy. This problem is studied at two levels; one is focusing on the three interested parties covering the period from 1800 to 1980's, secondly on the local economy itself. The study has shown that the prescription "Give forests back to local people and every thing will be alright" could lead to disaster. The study has taken the information through a survey of households in selected villages. The deterioration of the forests had started with the British entry into the forest region. It continued at an accelerating pace during Second World War. The study mentioned that not the droughts or technical problems, but the problem actually lies in the political economy. Among the three interested parties, the first one is the locals. Second is commercial and industrial interests that used forests as a source of raw material. Their stress and focus on the larger economy conflicted with the local interests. The third interested party is the government. The modern state has to increase the growth rate. From the locals there was no political pressure to conserve the forests. It was argued that there was some community management before the British took over forests but the findings of the study counter this claim. Four historical stages can be made in forest management. During the pre-capitalist/ pre-commercial stage forest use was local and with in a non-market framework. During the initial stage of commercialization, the demand was mainly for timber or hardwood. With the entry of industrial capitalism demand was for softwood as a raw material for paper and pulp industry. Locals were not politically weak and could exercise sufficient pressure through prolong struggle against Forest Department. Locals themselves degraded forests by deliberately putting them on fire to promote grass cover and to keep away wild animals and mosquitoes. Politicians pretended to protect local interest in regeneration either as they could get their raw material from the government at nominal prices, which were far below the costs of regeneration. Thus the state failed in its task because it developed a purely

bureaucratic attitude, and failed to develop a proper data -base about forests. The rise of voluntary movement is one of the encouraging developments in recent years.

In his paper Ahmad (1994) highlighted the reasons of environmental depletion particularly forests. Among the main factors that pollute the environment is population explosion, which increases at geometric progression causing more unemployment, consumption, illiteracy and poverty. Forest cutting is wide spread. One tree, on average is planted and ten trees are cut down. Total tree covered land in Pakistan was 4.7 % in 1947 and has become 5.1% in 1994 showing a minor increase of 0.4% during 44 years. Forest cutting has caused a number of problems. He said that the solution lies in the better legislation and its effective implementation at all levels including its education, awareness, community participation, preparing of Red Data Book, planting trees at least five per family as an obligation under the law and provision of training and awards for staff in the concerned areas.

IUCN, Pakistan (1998) has prepared a report for the government of Pakistan and proposed a strategy for the management of natural resources in Dir-Kohistan, Galiyat and Muree- Kahuta-Kotli- Sattian (MKKS). Tree cutting in these areas is for local use and for commercial purposes. So the local population is the prime threat to forests. Government imposed more and more restrictions, virtually suspended the rights of the people in these forests so they lost interest in the welfare of these forests. Free grazing is common in these areas thus deteriorating pastures. Main constraints are outdated legal framework, inadequate research, no inter sectoral coordination and community participation, inadequate budgetary allocation, outdated technology and no recognition for women role. The policy measures include participation of NGOs, local community and privatization of nurseries. In the area, specific issues are; faulty system of royalty distribution, disease to walnut trees and declining yield of chilgoza pine. Joint Forest System (JFS) is gaining importance in neighbouring countries and has been started in Hazara under the Siran Forest Development Project. It is suggested that grazing plans should be prepared for which planting of fodder trees, rotational grazing and reseedling of grasses are the important measures. Royalty distribution system should be done properly which is 40:60 ratios between government and the local people. Delay in disbursement and disputes in clans and village boundaries result in selling the share to forest contractors for ready cash. Identification for

Productive Physical Infrastructure (PPI), which contributes to rehabilitate the natural resources, is necessary.

Nizami (1999) in her paper highlighted the experience of a social forestry project that is called Village Land Use Planning (VLUP) that resulted in the formation of Village Development Committee (VCD) and Women Organization (WO). VCDs have many examples of resolving disputes on land boundaries, water distribution, distribution of hillside produce and other conflicts. WO has the problems of women mobility in the area. Also women are having more inclination towards income generating activities at home. Cost sharing by the VCDs is the most challenging issue confronted by the management plans. There is a need to give women a permanent position in the Forest Department.

Payr (1999) mentioned that in Siran valley the population has doubled and its needs for fuel, fodder has increased. This has resulted in loss of forest resources amounting to 50% of forest stock between 1967 and 1992. In forest management the Forest Department has mostly neglected the local users. Only the new concept in management can be helpful that is if the local community is involved. In this context under the Joint Forest Management (JFM), the Forest Department shares its powers with the local people who are now allowed to legally use forest products in state forests but also responsible for its protection under Joint Forest Management agreements and rules. JFM could not as yet be started in Guzara Forests mainly due to lack of policies approved and the reluctance of the Guzara owners to join hands with communities not being right holders in Guzara forests. These forests are already over exploited and mismanaged by the forest cooperatives (1980-1992). The existence of many illegal sawmills in Mansehra District depending mostly on illicit timber is a major underlying cause of forest damage. The attitude of the Forest Department towards JFM is that many foresters do not favor the transfer of forest management responsibilities to the local communities for fear of loss of authority and status.

Ali (1999) expressed that villagers in Pakistan had free right to collect timber and fuel wood and to graze livestock on public and private lands. But between 1970 and 1980, however social and political circumstances led to conflicts between landowners and land users that resulted in the collapse of local governing system and institutions. The lack of widespread participation by community members affects ownership and

sustainability of the project. A lack of legal support for the new approach also threatens the long-term sustainability of the project. The project policy requires village communities to contribute in cash and kind for the management activities. Many staff members of the Forest Department opposed the project for the fear of losing control over financial inputs into projects. Another problem is that the direct benefits from natural resource management are insufficient to motivate them to invest in community based resource management that also limits the sustainability of the new system. Local people are more willing to contribute in the form of labor than cash. Once the ownership rights are given and boundaries are known to the villagers, they are then willing to invest and negotiate the conflicts. These are the problems of the sustainability of the project when the donors leave the project.

Staab (1999) in his paper presented the progress that aims at full involvement of the local population where European Union (25.2 million Euro), Govt. of Pakistan (2.6 million Euro) and the communities are expected to contribute (in kind or cash). The community has very high expectations of the project but the self-organizing spirit of the community is very low. Traditions and cultures are the hindrances in the way of proper involvement and the govt. does not deliver what has been promised. Most of the people are willing to contribute in cash and kind. So these problems affect the synergistic effects and outcomes of all the participants.

Ali et al. (2006) attempted to analyze reasons for deforestation in NWFP, the province covering 40% of the productive forests of the country. Two districts Mansehra and Swat were selected with 400 respondents in total. The results showed that people cut trees for heating and cooking because of non-availability of gas and other affordable energy sources. The general assumption that most of the forests are destroyed by the locals is not true. 79% respondents blamed Forest Department for illegal cutting. Wood for construction is another reason of deforestation. 90% of the respondents were using wood for cooking and heating.

Some suggestions are given by Chakarvati, Garg and Shedha (1992) for the development of Darjeeling Himalaya and Doon valley. Himalayan belt has witnessed an unprecedented growth of population and unplanned forestry practices. Gully erosion, landslides, fire, felling of trees, droughts, ground water table, and recession are the main problems. Energy and power resources are inadequate, low land

productivity and low agriculture outputs are the common features of the area. Poor implementation of the land reforms, lack of publicity and environmental education, lack of involvement of the people aggravated the already existing problems. Large-scale infiltration of Nepalese people from across the border has also added to the problems. The effective policy measures need appraisal of resource base, preparation of resource inventory, evaluation of the effectiveness of the strategies, new farming techniques in order to check environmental decay, social and community forestry, scientific forest management, alternative sources of energy, forest based cottage industries and proper time bound phasing for policy implementation.

Dijk and Maliha (1994) compiled the environmental profile of NWFP. Forest types have been described. Reasons of deforestation and natural resource destructions have been mentioned like population growth especially the influx of Afghan refugees. Wood and agricultural wastes is contributing 98% in household fuel requirements. Watershed in the province covers 3 million hectares of which 1.3 million hectares are under forest. As compare to other provinces NWFP is rich in biodiversity but deforestation for example in Hazara Division is estimated at 1.4% to 8.8%. Total protected area in the province is about 0.6 % of the total land area but its effective coverage is inadequate. Pakistan has signed Ramsar Convention in 1976. Under different reforestation programs from 1982 to 1991, the forest area has increased. However the past data i.e. between 1979-85 and 1985-88 show the forest area declined at 1.8% and 12.8% respectively. The area under rangelands and common lands has declined in favor of agriculture. Water logged area is 0.4% of the gross area (.04 million hectares). Mining results in deforestation, deterioration of slopes and stream recharge and of watersheds. Like other parts of the country, most of the legislation of NWFP in environment and natural resource field is of colonial times for example; the Forest Act 1927, the Hazara Forest Act 1930. Later on Pakistan Environmental Protection Act 1997. There is no separate Agency for rangeland and pasture development.

Ali, et al. (1997) described the features of forestry and reasons of deforestation in NWFP. The forest covers only 5.4% of the country's area with only 3% commercially productive. Fuel wood consumption is 95% of the annual wood production. The per capita fire wood consumption in Pakistan is only 7 cubic feet per year, lowest among

all the developing countries in South Asia. The majority of the production comes from the scattered trees privately grown on farm lands. Remaining timber demand is met by imports. In the province the population is growing. Country's most and best forests grow in NWFP but its share in wood based industry and associated employment is only 5%. Most of the timber is exported unprocessed to other provinces. Forestry is employing about 70,000 people in the province. There are five legal categories of forests that are recognized in the province.

2.3 Studies on Forest Resource Analysis

Duerr (1960) discussed the main fundamentals of forestry economics. He provided the in depth material about market and market forces and about the operation, and planning of the forest economy. Forest economics deals with long period of timber production, timber as a capital and as a finished product and forest value measurement. He suggested that forest economy must be studied in relation to the whole economy. Resources are not material objects but rather functions performed by tangible and intangible things to satisfy want and these are not single assets but cluster of assets, not static but living and changing. Knowledge among them is one that is not subject to diminishing returns. It is necessary to use relative rather than absolute measures to appraise resources. For the firm the best combination in production is where marginal costs equal to marginal revenue per unit of output or per unit of input. Compound rates of interest are essential to measure the rate of return of capital. The alternative rate of return is a principal index in management but since the benefits of the forest investment are spread over the business as a whole and extent into the distant future so this rate of return is difficult to find directly. Intensive management is that combining large quantity of variable inputs with fixed input while in case of extensive management the ratio of variable to fixed inputs is low. In forestry management vertical integration (combining enterprises at successive stages in production) play a significant role. The alternative rate of return is a key determinant of supply. The process of planning for the firm takes seven steps; the objectives, the subject of the plan, the alternatives to be weighed, getting input output data, getting value data, putting the plan together to compare alternatives, and replacing (rearrangement and adjustment with time passage). Three types of planning may take place; enterprise planning, organizational planning and operational planning. Three

methods of planning are identified; budget, marginal and break-even methods. In the first revenue and costs of the firm's alternatives are compared. In second, alternatives, marginal costs and revenues are taken. In third two alternatives procedures are weighed. It determines the size or point at which the two methods are equally good. Marketing risks are attached by insurance, counter cyclical measures, credit and planning. There are four approaches of forestry appraisal. Direct approach i.e. appraising the market value of a thing, the capitalization approach i.e. the probable not revenue of the agents of production, Cost approach (not in costs of production but costs of replacement if any damage occur) and Conversion approach (the appraised value of a commodity at stage A is equal to its directly estimated sales value at stage B minus the costs of converting it from stage A to B). Unmarketable things are appraised by social opportunity costs of a good determined by public decisions. Taxes on forests particularly ad-valorem tax remains in practice. Other taxes include exemptions, tax ceilings, rebates, differentials timber tax etc. The federal income tax generally encourages forest conservation. Forest credit and insurance have slow to come into being because of slow progress in forest protection.

Youngquist (1977) evaluated the numerous resources in terms of economic realities within the existing social and political framework. His analysis is limited to the resources available in USA and Canada. He covered many items like water, air, metals, energy resources and trees. USA. and Canada have some of the great forests of the world along the specific coasts. Three quarters of the land was forested when Columbus entered. Individual own 28% and forest industries companies have 13%. There are two principle routes for investment- investing in companies having timber resources or becoming a timber owner. The important aspect of the investment is to achieve a sustained yield and produce more wood from the same acreage. The timber companies are performing other jobs as well like recreational, residential and commercial services. They also have mineral rights. Some areas are made locations for development of year around condominiums. Timber companies with substantial land holdings should be a part of investment portfolio. Tree farming for individual needs patience. Suggestion is given to invest in trees having maturity time up to 20 years. Crop trees like nut and fruits should be included.

Sedjo (1985) edited the work of the environmentalists. The volume examines four general sets of issues; the market for natural resources in general and for forest resources in particular, competing uses of land and their interactions, assessment of strategies that various forest investors adopt and the problems they face, and the alternative policy mixes upon the level and type of forestry investments. For the first issue, Rostow (1985) and Bingham (1985) made the comments. They anticipated higher natural resource prices, investment in research and development in resource area, and new investment in resource industries. They mentioned advantages in forestry investment in USA including favorable biological conditions, timber accessibility and private forest- land ownership. Side by side they realized uncertainties in forestry investment. Rostow suggested North-South partnership in resource sector. He anticipated the world energy situation to be more worse and forest as a more potentially cost- effective energy source. He suggested to the USA government to fully exploit the technologies and empirical lessons developed over the past two centuries. There is a need to change the public attitude towards the forests. Bingham suggested that investment should be site-specific and concentrated first on more productive land having economic importance. Federal government should commit itself for maintaining world trade in forest products, commercial forest -land and taxes.

For the second issue Waggener (1985) pointed out that reallocation of land from existing uses to alternative is desirable. Difference of opinion will exist leading to political pressure to do land allocation by extra market mechanism. Economic incentives and disincentives, zoning, tax policy are some regulations. Also public procedures, changes in the allocation of land will effect on markets and on opportunity costs. For the same issue Miller and Robert (1985) addressed the changes in the Urban Land Base. They pointed out a decrease in forest area since 1960. The loss of forest land for residential use should be stopped by land use controls. For the third issue, Yoho (1985) and Clawson (1985) participated to investigate the strategies of various investors, prices, buying of stocks and bonds of forest industry, equity investment of insurance companies, pension funds available for investment in forestry, consolidation and land holdings among larger holders, shareholders free of corporate income tax to facilitate forestry investments, public management reforms by the introduction of more economics in the management process, public private

corporations, effects of federal policies on investment, private sector motivation on the ground of charity for future generations, are some conclusions drawn by them. For the fourth issue, the effects of public policy on forestry investments were examined. Market imperfection, low economic returns, high risks and lack of capital are reasons of low investment in forestry. Policies may be alternative institutional arrangements like privatization, leasing scheme and independent public corporation and subsidies for reforestation. All the four issues are discussed by descriptive analysis method.

Fernie and Alan (1985) discussed events, which led to the realization of environmental resource conservation and suggested some policy options. Environmentalists highlighted resource problems during 1960s and 1970s. The scenario showed a number of factors during these decades which led them to think about resource conservation; oil/ energy crisis, mounting debts, growing need for basic resources, food water, firewood, production of cash crops rather than food crops for home consumption, capitalists development etc. Developing countries are more occupied with their national problems like poverty, unemployment than environmental issues. Institutional framework is poorly developed, there is limited mechanism for policy or project review and environmental management is confronted with corporate imperialism. Resource management is about power and a political activity. They gave the example of USA, Liberal Freedom of Information Act. in resource management that is for participatory decision-making.

Ganguly (1986) in his paper suggested that since forest is a renewable source so it should be planned in such a way that its stock is maintained even using it. He presented the explanation in the form of an equation i.e. $Q-E=Q_n$ where Q is the stock of forests, E is also decided by the planners how much area of the natural forests should be kept apart as gene pool stock. Where for the data is not available, visual signs of degradation is counted. Why prices are not acting as an incentive to grow more fuel wood trees? The answer is that village people collected forest products from forests. Secondly agriculture has higher returns. In India, forests occupy 23% of the total area but provide employment to 3 million people. Agriculture accounts 50% of the land area but providing employment to 126 million people. Generally, there are four categories of forests, reserved, protected, village or district council and unclassified forests. Q_n allowing for the growth of forest resources for the household,

for the firms and reducing depletion level due to diseases, fire and burn/ slash agriculture. To control shifting cultivation is an approach to forestry development including protection of identified areas of natural forests and to fillip to production forestry.

PARD (1994) compiled research papers on rural issues and rural resources. Rauf (1994) in his paper emphasized the need of agro forestry. He divided environmental problems into three categories; global (biosphere), regional (biophysical linkages) and local. In developing countries environmental problems are because of the effects of poverty and effects of economic development. These problems need immediate solutions otherwise costs would be high in the future. Agro forestry, a sustainable land management system, combining production of crops and animals with forest plants simultaneously or sequentially on the same unit of land meets the needs of rural community especially in five Fs i.e. fuel, fiber, fruit, fodder and fertilizer. Farm forestry gives lower return than short-term crops. It is advantageous only on poor pastures but if practice gives employment, productivity of forest crops, conservation of watercourses and boundaries. There is a need to solve its obstacles like risks, investment, complexity and productivity. Thus agro forestry serves as a cheapest source of increasing forest production.

Bookbinder (1998) assessed ecotourism's effect on the income of villagers living near Royal Chitwan National Park, Nepal, one of the most heavily visited parks in Asia. The study randomly surveyed 996 households in seven of the thirty six Village Development Committees adjacent to the park. The economic impact of ecotourism on household income was minimal and limited to villages closest to the main park's entrance. New policy changes, coupled with alternative approaches to the privately owned ecotourism industry, however, have the potential for improvement. Conservation biologists working in other areas ensure that well-defined mechanisms for profit sharing with local communities are in place before advocating ecotourism development. Where ecotourism programs already exist without such profit-sharing mechanisms, conservationists are urged to press for legislation that permits a percentage of profits to be spent on local community development. Two conditions must be met for successful integration of biodiversity conservation and local economic development: one the identification of economic incentives that provide immediate benefits to local people and second the

identification of economic incentives that are appropriate in space and time to the scale of threats to biodiversity. One such strategy is ecotourism. Since the early 1980s, the number of privately owned ecotourist hotels has steadily increased. Important lessons can be learned from the Chitwan experience by conservationists in other developing countries who consider ecotourism a powerful incentive for conservation. First, privately based ecotourism, with a structure similar to that found in the park prior to 1996, is essentially exploitative and unlikely to put enough money into local communities to effect a change in local attitudes toward conservation unless it is operating in areas with extremely low population densities. Second, 25 years of experience in the buffer zones of the park showed that local support for biodiversity conservation requires a combination of co-ownership, co management, and policy change. Recent policy reforms in Nepal have changed the exclusive character of the industry by linking biodiversity conservation with community development through the 1996 recycled revenue bylaw. Finally, ecotourism in the park is a tourists' market: tourists pay only a few rupees for their jungle experience, the low-budget hotels capture only a small proportion of potential profits, and, ultimately, local economic conditions do not improve. There are no restrictions on hotel construction outside the park, no limitations on visitation numbers in the park, and minimal tourism planning and management both within and along the periphery of the park by the Hotel Association or the Nepalese government. Few hotels ever run at full capacity, there is no minimum prices set for tourism activities (except park entry fees), and the majority of hotels offer highly discounted package tours.

Wilkie et al. (2000) used correlation and identified that road density is linked with market accessibility and economic growth that also results in deforestation and disappearance of wildlife. The research was based in Congo where road established led to intensified hunting provided hunters greater access. It lowers hunter costs to transport bushmeat to markets. The paper showed positive relationship between road density and land degradation in eighteen nations in Africa. In USA congress is considering imposing a moratorium on new road construction in roadless sanctuaries but logging industries has lobbied to prevent it from happening. The paper showed positive relationship between road density and GNP per capita i.e. as road increases GNP increases. Higher road densities are correlated with higher GNP with higher percentage of landscapes being converted to other land uses. GIS tools have been

used by the researchers. They suggested that policy makers and donors should consider the environmental effects of road construction.

Haskell (2000) discussed road effects on the function and diversity of forests. Soil samples were taken. Roads have negative consequences for the function of forest ecosystem. T-test, median and inter quartile range have been used. The data suggested that the roads serve as a corridor for wind and may break the canopy layer; solar energy would also come on the ground thus drying litter. Wind reduces leaf litter that results in reduction in leaf litter of fauna. If roads are confined to small areas of forests, effects might be negligible. If roads are spread to the entire forest region the cumulative result of small effects may be large. Forest managers should consider road density (in this study 17% of the forest was within 100 m of a road).

Burgi et al. (2000) compared human impacts on forest ecosystem across geographical regions. For the comparison four study areas in the north-eastern USA were selected. For the assessment of the similarity of the four regions with respect to species composition, Euclidean Distances (ED) was calculated between the colonial and modern forest composition for each of the four regions. Information about the history of human impacts in the study regions was used to interpret the changes. The results show that the general changes in forest composition through the historical period include decline in some species and increase in some other species. The results suggested that human activities do not necessarily lead to more similar species composition between regions. Improved transportation facilities for example the extension of the railroad in mid-19th century has lessened the impact of local industries on local forest resources. Therefore some activities lost their direct impact in the second half of 19th century. Similarly, the increase of transportation of goods and movement of people weakened the link between total population and impact on the local forests.

Hill and Curran (2003) by using REGRESSION checked the influences of forest area, shape and isolation on tree species diversity and to compare their significance with the influences of climate and disturbance like fire, logging, and agriculture. The study is conducted in GHUNA. BIVARIATE and MULTIVARIATE REGRESSION techniques were used. Forest geometry (area, shape, isolation), forest climate and forest disturbance (fire, logging, agriculture) were independent variables whereas tree

species number and composition were taken as dependent variables. Minitab and SPSS packages were used. The results showed that tree species number was positively related to forest area for regeneration of trees (logarithms were taken). Forest area accounted for 92% of the variation in tree species. Regenerating trees were rose with increasing irregularity of forest shape ($r = 0.57$, $p = .005$). Area of fire burn increased within forest fragments. No significant relationships were recorded between tree species numbers and logging or agricultural activity. Significant relationships were found between logarithms of regenerating and mature tree species and all seven variables taken in the study. The beta weights from multiple regression indicated that of all seven variables only three are significant.

Eiser and D. Roberts (2002) analyzed out put and employment effects of the shift in forest expansion from coniferous to broad leaf species in Scotland and U.K. They used INPUT OUT PUT ANALYSIS by using four types; naturally regenerated wood lands, new native wood lands, commercial coniferous and farm wood lands. The study considered both direct and indirect effects. The results show that agriculture production is not superior to any of the four wood lands. Types are taken in terms of out put generation. Under demand driven model farm wood lands generate greater out put across the entire country than an equivalent area of agriculture products. In supply driven model the total out put from farm wood land is slightly less than that of agriculture. In both the models commercial and natural regenerating wood lands generate considerably more out put. The results further show that the planting have been established on lands not use for agriculture. Almost all of the increase in forest area in Scotland between 1975 and 1990 occurred on land previously used as grazing and on land of low agriculture value. Despite using sheep grazing areas for plantation sheep number increased and arable farm land remained constant though there was 40% increase in forest area. Plantation does not result in decrease in agriculture out put if land that has been set aside is used. New farm wood land planting generates greater employment effects than naturally regenerated and commercial coniferous planting. In supply driven model total employment effect from planting on farm wood land is less than that from new native or commercial wood lands. Total out put effect is equal to new native farm wood lands that generate greater out put as compare to naturally regenerate or commercial coniferous.

Watkins et al. (2003) examined distribution of plants and their relationship with forest roads by incorporating species cover, canopy cover, litter depth and cover and base ground at eleven distances from the road edge at six different sites in USA. The results showed that roads affected interior forest conditions and species composition and abundance. However these effects are limited in managed forests. Roads cover 1% of the land area of USA with 10% of total road length within the national forests. Squared Euclidean Distance was calculated to compare dissimilarities among species composition. Also MEANS, ANOVA and MULTIPLE RANGE TESTS have been used. The results shows that road side has lower canopy cover. Those species are high using more light for growth. Lower litter cover and high amount of base ground favor those plants that could grow in disturbance. The growth of native and exotic species also varies with respect to the distance from roads. Exotic species richness increase near roads and native species richness decrease but total species richness did not change near the road.

Munroe and Abigail (2003) discussed forest cover and land use patterns. They highlighted the importance of residential land use patterns. The abandonment of agriculture land is leading to private forest re-growth. Urban growth is affecting housing and labor market. The extent of private forest cover was examined from 1967 to 1998. Econometric model has been used for land use share in 40 Indiana countries on the basis of net benefits to agriculture, forest land and urban uses. Results are; changing agriculture profitability is leading to private forest re-growth, population density alone is not enough to measure the ratio of urban to forest land uses but residential land value and industrial construction should also be used, declining agriculture revenue have led to the abandonment of formerly agriculture lands and led to residential conversion thus decrease in forest cover. Further the changes in regional labor markets have impacts on land use patterns. The area with low employment and low regional advantage has experienced more forest re-growth and areas with high employment and growth are experiencing deforestation. But there are some areas where employment increased and forest re-growth is also taking place depending on opportunity costs of agriculture and forest land. But the true impacts of urban growth depend on the nature of that growth. The study concluded that using aggregate national level data is a limiting factor to determine the overall impact of

land use change on Indiana's forests because country level data suffers from aggregation biases.

In his review article Cole (2003) provided a detailed examination of Bjorn Lomborg's controversial book *The Skeptical Environmentalist: Measuring the Real State of the World*. The book examines a range of environmental and social issues and concluded that many of these problems are not as bad as the media and environmental organizations claim. The former are concerned with providing headlines whilst the latter are concerned with increasing membership. The book gives the impression of being comprehensive and is extremely data intensive (515 pages, with 2930 endnotes, 173 figures). The paper concentrated on food and hunger, deforestation, air pollution and climate change and found that Lomborg's analysis suffers from several problems, including selective use of data, over-simplification of issues, posing the wrong questions and lack of objectivity in to show optimistic trends. Lomborg disproves claims of Malthus about food shortage and presents data showing the significant increase in production of rice, corn and wheat in developing countries over the period 1960–2000 because of the Green Revolution. Cole analyzed that if we consider the developing world as a whole, then progress has been made. However, there are still hundreds of millions of people for whom no progress has been made. Lomborg draws his conclusions from optimistic data of one of UN Food and Agriculture Organization (FAO) reports. He therefore concludes that a relative measure is preferable and does not report the absolute numbers of undernourished. Lomborg's point has some truth. There is some evidence of progress, particularly in Asia, which then influences the data for the developing world as a whole. Lomborg provides emissions and concentrations trends for the UK and the USA for some air pollutants and concludes that air quality in these countries has significantly improved. He then draws on the World Bank's World Development Report 1992 and argues that, although air pollution emissions are rising in many developing countries, but it is possible to grow out of environmental problems through technological advancement and environmental policy as that in developed world. As per capita incomes increase, the composition of a nation's economy changes that change the emphasis from manufacturing to services. If the pollution intensity of output has fallen in the North as a result of the migration of heavy industry to the South then it is unlikely that the South can expect to enjoy similar reductions in pollution intensity. The issue of deforestation has come to headlines throughout the last 20–30 years and is considered as one of the most pressing

environmental problems of current times. Cole expressed that Lomborg disagrees and, in fact, wrote only eight pages to this topic. Lomborg points out that, at a global level, forest cover has fallen only very slightly in recent years. Cole criticized that he concludes that our forests are not under threat. Given that tropical forests are typically located in relatively low income countries with rapid population growth, there may be a case for arguing that the socially optimal rate of deforestation is not zero. Lomborg is correct to point out that there is a trade-off between low abatement costs today and high damage costs tomorrow. His arguments are very simple and complications are mentioned in endnotes.

Soares et al. (2004) developed a land-cover change Simulation Model that is related to road paving and policy intervention for a highway in central Amazonia that connects important soybean production regions and population centers in the state with an international port but 1000 km of this road is still not paved. Brazilian government has prioritized the paving of this road to turn it into a major soybean exportation facility. They assessed the impacts of this road paving within four scenarios: two population scenarios i.e. high and moderate growth and two policy intervention scenarios, among which the rapid loss of tropical forest, is of great concern. Tropical forests are responsible for one-fourth of the world's primary productivity and more than half of the world's plant and animal species. GNP per capita, population and urbanization growth, and agrarian dynamics are quantitative variables internally modeled, while the other variables were set according to the local perceptions registered during field surveys. The governance effect is estimated qualitatively. DINAMICA has been used to simulate a variety of spatial phenomena, such as land-use change and urban growth. The results showed that landholders clear their forest less if they have legal titles on their property, they are provided with access to credit and technical assistance in support of sustainable intensive land-use systems, land-use regulations are enforced by the federal agency; they have access to basic social services; and if they are organized in cooperatives and associations. Forest conversion to pasture and agricultural fields is also suppressed locally by: protecting indigenous reserves and protected areas from invasion by ranchers and farmers; avoiding the settlement of small landholder colonists in forested landscapes; implementing deforestation and fire licensing systems; and reducing land speculation by nullifying illegal land titles. The model estimated that after 30 years the total area of forest in the region would decline to 34% for the business-as-usual scenario with high

population growth, and to 16% and 13% for the governance scenarios with high and moderate population growth, respectively. Therefore, governance could entail up to 60% reduction in the expected deforestation due to the paving of the road. The business-as-usual scenario with high population growth and the governance scenario with moderate population growth – were chosen to run the spatial simulations. The paving of the highway will stimulate forest conversion to cattle pasture and agriculture, but the magnitude of this effect is responsive to interventions by government and civil society that have begun to appear in recent years.

Coxhead (2002) mentioned the relationship between economic growth and environmental damage, but he expressed that the relationship is neither linear nor monotonic. The growth and environment link depends on the changing composition of production and on growth-related changes in techniques and environmental policies for example, the property rights, air and water quality etc. Among natural resource problems, deforestation and conversion of land to agricultural production are most important issues. The writer gave many examples of different countries. In Java, within a century of agricultural development 80 percent of forest area has been converted to agriculture. In the Philippines, forest cover diminished from over 70 per cent of land area in the early 20th century to less than 25 per cent by the end of the 1980s. Thailand's forest cover has diminished from 80 per cent a century ago to more than one quarter of land area of natural forest cover. Asian developing countries lost forest cover at average rates of 0.2 per cent in 1980–90 and 0.1 per cent in 1990–2000. The comparison with respect to time suggests that the declining deforestation rates is not the accuracy and measurement problem but because of changes in the definition of forest. The causes and consequences of the damages are both direct and indirect and difficult to identify. The study showed that agriculture area in developing Asian economies has increased substantially in 1997 from 1980.

Bennett and Adams (2004) measured the frequency of approaches, design and statistical issues, in assessments of harvesting effects on three response variables; tree regeneration, vertebrates and water in two major native forests of south-east Australia. The evaluation was based on 124 documents that contained field-based research and that represented the complete written record (published and unpublished) of relevant research prior to mid-2002. The review involved the identification of 292 core documents from more than

1000 potentially relevant documents. All documents were examined for statement of a clear research or null hypothesis, for definition of a critical effect size, for use of power analysis and for use of non-classical statistical approaches (likelihood methods, information–theoretic analyses, and Bayesian inference). The results showed that 59% of the 124 documents were published, among that 40% for tree regeneration. Clear fell harvesting was the most frequently assessed practice for each of the three response variables. Most of documents were relevant to tree regeneration and vertebrates contained data that spanned less than 3 years and were at the scale of individual sites. In contrast, studies of the effects of harvesting on water contained data that usually spanned more than 5 years. Water studies also encompassed broader scales, from catchments to regions i.e. in 92% of documents. Of the documents relevant to tree regeneration, 61% contained contrasts between sampling units within harvested stands. Of these, 15% did not include a within-site control treatment. Effects of within-site practices on water were not assessed, reflecting the broader scales at which most water data were collected. Models were rarely used to infer or predict effects of harvesting practices on tree regeneration i.e. in 5% of documents. Quantitative models were more frequent than descriptive models. Compliance with standards was assessed in half of the studies of tree regeneration and one-quarter of the studies of water, but found no documents in which standards for vertebrates were used to assess harvesting effects. The experimental design of contrasts between and within stands was not adequately described in more than half of studies of tree regeneration. Inadequate descriptions were common in both unpublished and published documents. Complete sample statistics (e.g. mean, standard deviation and sample size) were not there in the great majority of studies that contained contrasts between and within stands. Lack of reporting of experimental design and sample statistics meant that other design issues were often difficult to discern. Lack of treatment replication was widespread. Most incidences of lack of replication also involved either inappropriate use of inferential statistics or, more commonly, discussion of treatment effects without adequate acknowledgement of data limitations. Invalid interpretation of experimental designs was found in about half of all studies and was more prevalent in early than recent studies. Of the 124 documents only two contained statements of a research or null hypothesis. There was no evidence in any document of a definition of critical effect size, of use of power analysis, or of use of non-classical statistical approaches (likelihood methods, information–theoretic analyses and Bayesian inference). In 55% of the documents data spanned was less than 3 years. Longer time spans were in

studies of harvesting effects on water reflected the availability of automated sampling techniques and commitment of forest services world-wide to protect watersheds. Short studies of other variables are of the pattern of funding for research. Consequences are time lags and a difference between the duration of research and the time scales relevant to management. Different research objectives and approaches were indicated for the different response variables. Statement of a testable hypothesis was not evident in 122 of 124 documents. Statistical issues such as poor reporting of experimental designs and of sample statistics were common. Explicit hypotheses were rare.

White and Dean (2004) showed population, employment, and income changes in a region of eighteen non metropolitan counties of Maine, New Hampshire, Vermont, and New York. The changes are described using Bureau of Economic Analysis data covering 1970 to 2000. Changes at the county level are examined as net differences using pooled cross-section time series analysis. The focus of the paper is on the effect that environmental amenities have in population and economic change. Empirical results indicated that a county's relative endowment of environmental amenities have positive economic effects, but only when the county is relatively accessible as well. Further, even when accessibility is taken into account the environmental amenity effects vary in their consistency. In general, the results support that even relatively moderate environmental amenities can have positive effects for economic change. The writers mentioned that empirical studies find positive links between environmental amenities and economic and population growth. The supporting data is given in the form of some tables showing regional populations, increase in per capita income and income from selected sectors over a period of time. The writers used Ordinary Least Squares (OLS) and Spatial Autocorrelation in measures of aggregate regional changes by time period. The results from the first stage of analysis did not reveal any significant association between environmental amenities and change in population, employment, or income. Further, presence or absence of an interstate highway link has no real association with those three variables. The results of the paper indicate that the accessibility of places with relatively high natural amenity endowments is a necessary factor in those amenities' ability to contribute to positive change. This forest region has the characteristics of an economy with traditional comparative advantages in agriculture and primary sector-based and low wage

manufacturing. It has been undergoing shifts from primary and secondary sectors to the tertiary sector, and regional economic characteristics are changing.

Michoacán et al. (2004) focused on two communities Sevina and Pichataro that share a boundary and are ecologically similar, but differ in their settlement histories and use of forest products. The study examined their role in diminishing forest resources and in shaping their natural and cultural landscapes. The field sampling consisted of plots, with a variety of criteria including the frequency of stand type, area for each stand type, distribution of stand type, topographic factors and cultural variables including distance from communities and roads, forest products and practices, and tenure to ensure sampling the existing range of stand conditions. Interviews were conducted with woodworkers. Results showed dramatic changes in the forests and cultural landscapes of both communities during the past decade. Following high regional timber exports during the early 1990s, Sevina shifted from a self-sufficient to a timber importation community. Concern over deforestation in Mexico is widespread, but little is known about the causes and processes of deforestation at the local level. National level forestry policy and community level institutions both were not very effective. The result showed that current differences in forest compositions and structure are due largely to recent harvesting practices. Much of the regeneration in both forests is supplemented by planting. A consortium of governmental groups provides seedlings. Regeneration failure in Sevina is notable in areas of compacted soils following extensive grazing where grazing is not allowed. Recent forest resource use has, however, created a divergence from natural forest conditions as well as two different forest landscapes. These differences developed during the early 1990s when Sevina shifted from a self-sufficient to a timber importation community following high regional timber exports. In contrast, Pichátaro continued to provide wood for furniture-making wood shops by following a sustainable harvesting schedule based on communal forest property. Long-term, integrated analyses of cultural and ecological processes are important to the understanding of local and regional forest transition in Mexico and other parts of the highland tropics.

Kohlin and Gregory (2005) examined the effect of Orissa's social forestry project on collection time costs and welfare of rural poor who rely on forests for fuel. They examined labor-category-specific collection decisions, focusing on time allocation, location choice, and productivity of collection and to compute the welfare benefits of

access to community forests (CFs) measured in terms of the value of collection time saved. The study also considered the productivity of collection from CFs and government forests sites for different household labor categories by using household and remote sensing data to estimate welfare effects of community forest plantations, in terms of the value of decreased collection time plantations. A selection model, accounting for site location and productivity, has been used to estimate collection production functions for different household labor categories in natural and community forests. Opportunity costs of time have been used to determine welfare effects of time saved due to community forests. A dummy variable for those who used a cart for collection in the Natural Forests (NF) was used. It has been found out that access to community forests is important to marginal productivity of different labor categories. Overuse of free access government forests for fuel increases collection times required to gather forest products, thus decreasing time individuals can devote to other productive activities. All of these consequences impose welfare costs on individuals in terms of lower incomes and less time for domestic work. There was also a large variation in average consumption between the villages. Accessibility to the resource appears important to collection. In towns where wood is scarce and the distance to the NF is large, consumption tends to be lower. According to this study many households have more men involved in collection than women. The data showed that individuals in villages without a CF spend most time collecting fuel. Households in villages with a CF have a significantly lower collection time in the NF, and the reduction is almost solely due to less time spent collecting by women. Fuel collection decisions are expected to depend on household composition, like existence of a male head of household, family size, and age variations. Caste system is officially abolished in India, still plays an important role in rural life, including fuel collection behavior. The income variable is expected to affect the decision to collect. There were only a few households where both men and women were engaged in collection from a particular source, and child participation was higher in areas with a CF. Increased participation by children may explain the significant reduction in time spent by women. Caste affiliation is a significant factor affecting collection. Women from low caste were more likely to collect in the NF than women in higher castes. Men of low caste were less likely to collect in the CF than in the NF, while men from the highest castes were more likely to collect in the CF. Distance to the NF is negatively correlated with collection in the NF and positively correlated to collection in the CF. Collection time savings is an important component of welfare and adds to policies that encourage

sustainable wood use for rural poor. There is often a welfare cost of not having locally accessible CFs when government forests are distant. Villages with and without a CF differ with regard to their time allocation for fuel collection. It is important to recognize that the benefits of social forestry projects are more sensitive to location than previously thought. The largest benefits from plantations occur when accessibility increases. The study suggested that in the future, time-savings-based welfare estimates should be part of a larger benefit–cost assessment of community forestry, by combining them with opportunity costs of CF land.

Wannitikul (2005) examined the reasons of deforestation in Thailand for the period 1975-91. He employed a General Linear statistical model to examine the correlations between key socioeconomic variables and forest area in deforested northeast region, where the rate of deforestation after 1960 was severe, but where forest area remained stable in the decade of the 1990s. In examining the correlations, the study tested both population growth and neoclassical economic perspectives on deforestation. The study also considered the effects of the two bans falling within the study period, i.e. 1979-1983, and 1989-91. The study used pooled time-series and cross section multiple regression to examine the impact of selected socioeconomic variables on forest area. The model tested six independent socioeconomic variables – poverty (real per capita income), population, agricultural area, irrigated area, accessibility (levels, and distance from Bangkok, and agricultural credit. The logging ban policy, the seventh variable, was treated as a dummy variable. The study covered Thailand’s transition from an agricultural to an industrializing economy. A positive correlation means that the study expected increases in these variables to result in increased forest area.

After running Pearson’s correlation, a high correlation was found between agricultural area (AGA) and population density (POPA), indicated population density as the most important factor affecting forest cover in northeast Thailand, followed by agricultural credit, per capita income, the logging bans and the distance from Bangkok, ranking from high to low respectively. R square of the model was high meaning that the six independent variables in the general model explained 84 per cent of the change in forest covers in the area. However, no correlation was found between the area of irrigation systems (IRG) and forest cover. Distance from Bangkok was positively related to forest area means the further each province was from Bangkok, the more forest remained.

Forests in regions closer to Bangkok are more likely to be exploited heavily for industrial use, while those further away more easily remain pre-industrial. If farmers are provided water for their agriculture during the dry season they will not have to cut down. In this study result, increase in the number of farmers receiving agricultural credit resulted in a 0.8 per cent decrease in forest cover. Farmers might have spent their credit to clear and improve new farmland and farmers have cleared new forest land to repay their increasing credit debts. The result that the logging ban policy was negatively related with forest area showed that private logging companies, fearing an imminent cancellation of all their concession areas, cut down more timber than was allowed. Thus, due to legal and illegal logging, the forest area in the northeast region declined from 18 to 15 percent of total regional area during the ban period. There was an expectation of a negative correlation between real per capital income (GPPO) and forest area. The results of the model, however, showed otherwise, which suggested a leap from a pre industrial forest to the post-industrial forest use stage. Real income represents real purchasing power from off-farm income, means people have enough money for their basic needs and can afford to conserve forest and land resources. Viewed together with more recent data showing that rates of deforestation in the kingdom as a whole have slowed and appear to be stabilizing. These results also suggested the beginnings in the 1990s of a forest transition – from an industrial to a post-industrial stage in forest utilization.

He mentioned that other research in developing countries suggests that this perspective of blaming population growth alone for natural resource destruction in developing economies is an oversimplification of a complex social problem. At least one study on Thailand suggested that population growth is not directly related to the loss of forest area; instead, government policy on infrastructure development, including the forest clearances and a booming cash crop economy have been cited as likely causes. Neoclassical economic growth models, in contrast to population growth perspectives, explain the increase in the rate of deforestation due mainly to the expansion of export-oriented cash crop production. Rostow argued that economic growth proceeded in five universal stages as countries moved from traditional society (primary products) to achieve the pre-conditions of capital and labour mobilization for “take-off”, Thailand has depended on agricultural and natural resource exports, Local research, however, has underscored the limited and partial ability of neoclassical economic models to account for the impacts on deforestation of various government policy variables and the private

commercial interests such as policies on land tenure, property rights over public forests, policies on infrastructure development, agricultural development, oil subsidies and exchange rates in many developed countries. After a period of heavy exploitation and consequent contraction of forest resources, forest area stabilized then expanded. This forest transition was due to a slowing of population growth rates, a decline in demand for timber and forest products, and changes in attitudes towards natural resources on the part of individuals as well as governments. There is a three-stage model based on the experience of developed countries, in the late twentieth century. This identifies the transitions between a pre-industrial stage of forest use an industrial stage, where wood or timber is exploited as a primary product and post-industrial stage. In Thailand, the most recent data on forest areas would suggest a period of transition in 1989-91, after which rates of deforestation have slowed and appear to be stabilizing.

McConnell and Sean (2005) in their paper explored the size and effects of the challenge of forest governance in Madagascar in an era of decentralization especially the forest. Despite the investment of hundreds of millions of dollars, the goal of preservation of Madagascar's forest remains elusive. Recent legislation has given the government the authority to enter into contractual arrangements with communities for the management of the country's public forest. The success of a forest governance regime may be judged along both biophysical and social dimensions i.e. from preserving biodiversity to maximization of total revenue. Malagasy government, have thus been engaged in some form of co- management for centuries. The evidence from the six forests analyzed in the study provided some indications of the results of pursuing different forms of co-management. One approach to co- management is for the state to support private ownership of forests. From the standpoint of total production, the management regime may have been quite successful, but there was contest of community rights to access, marked by fines and imprisonment. The problems encountered when the state use central control without sufficient financial resources. The overall trend detected was a net loss of cover in both the natural and plantation areas. In terms of social dimensions, the effective neglect had enabled surrounding communities to continue gaining access to agricultural lands, but punishment of these communities for their perceived responsibility for forest fires creates problem. The informal arrangement with former plantation workers complicated the situation. Private individuals were reportedly seeking title to land in the forests. The remaining forests are cases in which more serious attempts had been made to

engage local communities in management state-owned forest resources. The recent declines in deforestation rates in some of these natural forests were encouraging. The main conclusion to be drawn from the examination of these forests is that there exist a huge variety of forest types, uses, users, and management regimes. Simply monitoring the dynamics of the forest canopy is a significant technical challenge, and despite considerable investment over the past half century, there remain considerable uncertainties in the actual quantities, locations, and rates of change. Long-term commitments on the part of international conservation and development agencies may well prove decisive in this process.

Hooper et al (2005) evaluated the importance of barriers to forest regeneration. In Panama, the exotic invasive grass invades abandoned agricultural lands that support tropical rain forest. Four barriers have been examined to natural regeneration: Grass competition, seed dispersal limitation, fires and soil nutrient deficiency. For each soil nutrient, a one-way analysis of variance (ANOVA) was computed to compare forest soils with those of experimental subplots in the grassland. A second ANOVA was computed to compare soils in burned and unburned grassland. They used linear regression analyses to determine the effect of proximity to remnant vegetation on total seedling density. The results suggested that facilitation of natural regeneration might be a feasible, low-cost management option for restoring native forest cover to large areas. Firebreaks must be established to promote biodiversity of forest regeneration. Cutting of grass is not recommended as site treatments. Shading effectively eliminates grass. Planting a variety of tree species in clumps throughout the grass area may overcome dispersal limitations. Degraded land once abandoned, forest regeneration is delayed. A number of factors may hamper tropical forest regeneration at deforested, abandoned sites. These include seed dispersal limitations, grass competition, fire, and drought and low soil nutrient availability. Insufficient seed dispersal is a major limitation to natural regeneration. The majority of tropical tree species have animal-dispersed fruits but most animals, don't enter far into these deforested areas. Wind-dispersed seeds may arrive in high numbers; however, they are often small-seeded. Deforested and abandoned sites in central Panama are often invaded by a tall non-native grass species. Grass invasion increases the likelihood of fire that further arrests natural forest regeneration and reduce seedling growth. Costly grass cutting is not recommended because they did not significantly

increase density, species richness or survival of forest regeneration but it did increase seedling growth, it may be suitable for small-scale intensive forest restoration.

Redeloff et al (2005) showed the relationship between housing growth and environmental effects. Both spatial and temporal patterns of housing growth across US from 1940 to 2000 have been taken. During this time housing grew by 146%. Suburban housing increased during post war decade. Growth also increased in rural sprawls where there are lakes and forests. Housing density was negatively correlated with the amount of inferior forests. Today rural sprawl would be high density housing areas. Suburban sprawl has major environmental impacts on comparatively small areas because of high housing density but it affects larger areas.

Cocu et al. (2005) explored the relationship between spatial patterns of an insect pest, the aphid *Myzus Persicae* and aspects of its environment mainly geographical, climatic and land use factors. The study was conducted in some European countries. Multiple Linear Regression was used to determine which variable was significantly related to *Persicae*. A forward stepwise regression is used to the best subset to identify the minimum number of significant variables and to avoid strong multicollinearity. The variables with low tolerance are not selected. The residuals were analyzed to detect the departure from the assumptions of regression. A variance partitioning method was used to estimate the part of variance explained by different elements, geography, climate and land. The results showed that 54% of variations in *Persicae* is explained by geographical variables. Climatic variables explained between 25% and 40% of the variance and 5% to land use. The significance and correlation of sub variables within each category is also tested.

Deckers et al. (2005) determined the factors affecting the presence of forest plant species in sunken roads and assessed the applications of these for the population of forest plant species in fragmented agricultural landscapes. The study tested the hypothesis that linear woody habitat patches surrounding small sunken rural roads are sustainable habitat for forest plants. The study was conducted in central Belgium and 389 sunken roads were taken. The effect of area, depth, age and isolation on sunken road species richness was analyzed taking linear regression and analysis of variance (ANOVA) and Analysis of covariance was employed to study the interaction between age and isolation. Prior to analysis the data was log transformed to avoid heterocedasticity and non-normality. The results showed that road age were strongly related to road area and depth. Significant

differences have been observed in road area and depth between classes. Sunken road isolation was not significantly linked with area and depth and no relationship between sunken road isolation and age species richness increased with the age of elements.

The research by Glasmeier and Tracey (2005) is about the experiences and outcomes of community forestry. The analysis involved the examination of case studies where the sample consisted of 250 cases covering more than 60 countries. The contribution from the United States was the greatest (18%) followed by developing countries where community forestry is the most extensive. Particular attention was paid to the style of reporting used by the researchers, the document, the form of data depiction, and the processes of monitoring and accountability presented in the discussion of the case. A meta-synthesis of the findings was undertaken for the analysis of the United States case for poverty alleviation. All analyses were conducted as a qualitative meta-study. In general, meta-study is a second-order analysis that seeks to not only synthesize the results of prior works, but also to reflect upon the processes within that and is used to compare and contrast findings of different studies in a substantive area of inquiry. Community forestry in the formal sense has emerged over the last decade in the US, following widespread growth in developing countries since the 1970s. The achievement of social forestry is an evolutionary process composed of three stages i.e. community participation in the decision-making process, governmental withdrawal of control of forest areas to communities so that they can be managed by the users themselves in order to meet their basic needs and engagement by communities in value-added activities.

The use of the meta-method revealed that community forestry is an understudied and under evaluated field of development. The literature suggested that community forestry is in a number of ways transformative. In developing countries it has emerged as a movement to give resource access to poor for subsistence purposes. In Latin America forest destruction has been shown to be linked mainly to public policy that promotes expansive use of the rainforest, while in Africa and South Asia forest destruction is seen as jointly caused by harvesting and poverty. The major challenge seen by community forestry groups in the US is the ability to achieve a transparent decision-making process. In other words, there is a direct challenge in balancing the desires of communities' individual goals and the broader concerns of environmental, government, and industry interest groups.

Write and Muller (2006) discussed the relationship between population and forest cover. Although in the past the relationship was inverse, but because of fast urbanization and slow growth of population has now positive and less destructive effects that lead to increase in forested area and forest regeneration. For example Guyana population is projected to decline by 8%. Initially 35% to 50% have been lost due to increase in population. They found that where area changes by 10, specie number changes by 2, i.e. change in area effect on total number of specie. Their analysis is based on the data of FAO Forest Resource for three continents; Africa, America and Asia. They mentioned the accuracy of estimates of percent forest remaining depends on the definition of potential forest cover and existing forest cover. On the basis of this they included and excluded some areas and countries from their study. The analysis and comparison is based on rural and urban population. Analysis of Covariance (ANCOVA) is applied. Global change and technology will have unforeseen effects and gives hope to decrease in deforestation. In Latin America percent forest remaining is relatively high situation is less good in Africa and South East Asia. Old growth tropical forests are likely to continue to disappear rapidly and to be replaced by secondary and logged forests. Policy suggestions include increase quality of life in urban areas but human cultural diversity is more threatening than tropical biodiversity. Second policy suggestion is that where the emphasis should be? In countries which are in crisis today or in country, which would be in crisis in future or where there is more potential. It should be on those areas where potential is today and increase in population in future.

Rudel (2006) has used descriptive analysis to compare the effects of five variables; road builders, corporate concession holders, community forest managers, park advocates and urban consumers with respect to large forests in remote areas and remnants forests in settled agriculture regions. The results showed that as forests decline in size new roads no longer destroy forests, corporate loggers left forests, community forest managers become more effective, parks become more feasible as conservation and urban consumers initiated tree plantation.

Semlitsch et al. (2007) have sampled data at current and abandoned road sites in Carolina to determine the road effect zone for an assemblage of wood land salamanders. The results show that the abundance reduced near the road. Road effects extended 35 meter on either sides. They used GIS analysis to estimate the total area of forests. ANOVA and

t-tests were applied. Results indicate that active forest roads and abandoned logging roads have negative effects on forest dependent species.

Chekeredza et al. (2007) highlighted the importance of live stock production that is a part of small holder farming system, which provide power, milk, manure and meat. It based on range grazing. The human population has increased that is leading to encroaching to grazing areas so livestock requires supplementation. In some African countries fodder tree technology is applied that gave some experiences that how fodder tree technology has impacted livestock production for example in Tanzania, Malawi and Zimbabwe. Tree and shrub forage can be integrated without compromising crop production. In these case studies it has been observed that lack of protein has been identified as a major limitation to livestock production. Key contributor to success in development is sustainable seed supply and distribution system for which NGOs and other agencies are helping.

2.4 Conclusion of the Literature Review

All the above studies thoroughly discussed the forest problems, management, policies, vested interests and the role of different players in the management process. It is concluded from the empirical studies related to forest resources and its management that management of forests depends on their type. Policies and programs had been prepared in nineteenth century in the region to conserve it for vested or specific interests but proper realization had been started very late. People had free rights to use forests but later on restricted to identified areas. After partition Pakistan got the legacy of Indian laws but then started preparing and managing its forests under the new policies. However, policy implementation remained a neglected area because of institutional development or of monetary allocation. So the forest area in Pakistan remained small as compare to other regional economies so has resulted in drop of its contribution to the national income.

Studies related to the relationship of socio economic activities with deforestation showed strong relationship of communities with the use of forests. Population growth, high consumption of fuel wood and timber, increase in construction and cultivated areas, timber smuggling etc. remained main causes. The studies however mentioned no proper record of data for fire burnt and smuggling. Illegal felling is a dominant part of the forest economy.

This chapter has also reviewed the work of economists and environmentalists who have used different techniques to assess and analyze the environmental resources particularly those that have impacts on forests. For example, road paving, population growth, urbanization, tree species, area under agriculture, low incomes and poverty, dummy variables etc. These techniques include Regression, Correlation, Input- Output, Cost-Benefit analysis ANOVA etc. Studies by Wannitikul (2005), Munroe and Abigail (2003), Soares et al. (2004), White and Dean (2004), Redeloff et al. (2005), Cocu et al. (2005), Deckers et al. (2005), Watkins et al. (2003), and Hill and Curran (2003) are important to understand the econometric techniques to analyze the variables considered towards the present research.

Most of the work related to Pakistan's forest is done on the basis of descriptive analysis. However while discussing the socio economic problems, these studies covered both primary and secondary data. The analysis of socio economic factors based on econometric techniques is found in research conducted in other countries. So the present study however, focuses on the socio-economic constraints that effect on forest area and their analysis based on econometric techniques for Pakistan's forests with special focus on Hazara Division forests. Since the study takes macroeconomic time series data to analyze and compare the situation with primary information so this method also provides level of intensity with respect to these factors thus providing more focused consideration for preparing forest policies and working plans. Further, the findings of the study will add to the literature of urban planning, energy substitutes and agriculture expansion.

CHAPTER 3

METHODOLOGY

This chapter describes the sources of data and discusses the analytical techniques that have been used to achieve the objectives of the study. Methodology has been developed for both; primary and secondary data. Analytical framework has been designed for both types of data. Since the analysis of socio-economic factors that effect forest area is a key to determine the severity of the problem so the area of the present study has been selected and a description of the universe is given. Descriptive analysis for primary data has been followed where as Regression Analysis has been used for the analysis of macro economic data.

3.1 SELECTION OF STUDY AREA, UNIVERSE OF THE STUDY AND SAMPLED DATA

The study is based on both primary and secondary data.

3.1.1 Primary Data

Primary data has been collected from Hazara Division; the forest rich area (55% of total forests of NWFP) but facing fast deforestation. This division is selected on the basis of its Guzara forests, which are meant for communities' subsistence. Two districts of Hazara have been selected; district Abbottabad and district Mansehra. These two districts account 12% and 46% of the division's forests. Both districts account 54% of Hazara Division's forests. These two districts are selected because district Abbottabad is rich in reserved forests and in district Mansehra there exist reserved forests, private forests and Guzara forests.

The respondents have been selected randomly from different areas of the districts because the whole area is hilly area and the population is scattered. Villages have been selected randomly but selection of forest communities was considered so the forest distance has been considered as an important factor in the selection of village.

In district Abbottabad, there is one Tehsil; Tehsil Abbottabad. In district Mansehra there are four Tehsils; Balakot, F.R. (Frontier Region) Kaladhaka, Mansehra, and Oghi. Hazara Forest Circle has eight Forest Divisions that spread from Haripur to Upper Kohistan. Forest Ranges in district Abbottabad include Thandiani, Birangali, Doongagali,

Bagnetar and proper Abbottabad Forest Ranges. These all areas fall in Gallis Forest Division. Questionnaires are distributed among these five ranges. In district Mansehra questionnaires are distributed in all forest ranges of Siran Forest Division namely proper Mansehra, Shinkiyari, Battal and Jabbori Forest Range.

The universe of the study is about 50 to 300 households in each village in district Mansehra with scattered population. Similarly in district Abbottabad the universe is between 100 to 400 households in different villages. The sample size has been proportionally distributed among the villages of the two districts.

Apart from the above data additional information have been collected and results of the two districts are discussed with the officials of Forest Department, Peshawar, Pakistan Forest Institute, Peshawar, Forest Management Centre and Forest Development Corporation, NWFP. Some tables have been constructed by using scattered data to compare and rank the forest area of divisions of NWFP and also for Hazara division. These tables are given in chapter 5. Similarly data and percentages are calculated for the two districts and for NWFP from the scattered information given in various statistical documents to use in comparisons for the socio-economic variables discussed in chapter 6.

3.1.2 Secondary Data

In order to incorporate the concepts of the “Standardized Methodology for Resource Inventory and Planning for NWFP” i.e. planning for all land uses i.e. forests, agriculture and range lands and conducting growing stock inventories for forest and non-forest lands, the present study has also focused on the analysis of macro economic data of Pakistan. This analysis is also important because now the government is making Integrated Natural Resource Management Plans³. For achieving this objective, time series data for the selected variables i.e. socio-economic factors that affect forest area like population, poverty, agriculture growth, construction, consumption of timber, out-turn of firewood, and firewood substitutes such as coal and gas etc. have been taken.

Secondary data is obtained from the following sources:

- Economic Survey of Pakistan (various issues)
- Pakistan Statistical Year Book (various issues)
- Foreign Trade Statistics of Pakistan (various issues)

³ Working plans based on just tree growth are now thing of the past (personal communication with the officials of FMC, dated June 2007)

- Fifty (50) Years of Pakistan in Statistics (Four volumes)
- Forestry Statistics of Pakistan (various issues)
- Pakistan Energy Year Book (various issues)
- Data for government financial allocation for forestry sector, follow up of Forestry Sector Master Plan, and for working plans for forestry sector has been taken from government published and unpublished reports.

3.1.3 Functional Form of the Model

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots \beta_k X_k + \varepsilon \dots \dots \dots (1)$$

where Y represents forest area of Pakistan and
 $X_1 \dots \dots X_k$ represent the explanatory variables taken from the macro economy of Pakistan.

The error term ε represents the collective unobservable omitted variables.

The estimated regression parameters, or regression coefficients, for the model denoted by \hat{Y} are given by

$$\hat{Y} = b_0 + b_1 X_1 + b_2 X_2 + \dots b_k X_k \dots \dots \dots (2)$$

Model A

- \hat{Y} = Forest area Pakistan (m hec.)
- X_1 = Real Agriculture value (m Rs.)
- X_2 = Real Manufacturing value m Rs.)
- X_3 = Real GDP (MP) (m. rupees)
- X_4 = Real construction (m. rupees)
- X_5 = Real Per capita income at MP (Rs.)
- X_6 = cultivated area (m hec)
- X_7 = irrigated area (m hec)
- X_8 = population (Mln.)
- X_9 = Household Gas Consumption (mm cft)
- X_{10} = Household electricity consumption (mm c)
- X_{11} = Household Coal Consumption (000 M tons)
- X_{12} = Out turn of firewood (000 cubic meter)

- X₁₃ = Livestock population (million no.)
- X₁₄ = Production of Paper and paperboard (tones)
- X₁₅ = Production of chipboard and hardboard (tones)
- X₁₆ = Total road length (kilometers)
- X₁₇ = Timber Consumption (cubic meter tones)

Model B

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots \beta_k X_k + \varepsilon \dots \dots \dots (1)$$

where Y represents forest area of NWFP and
 X₁ X_k represent the explanatory variables.

The error term ε represents the collective unobservable omitted variables.

The estimated regression parameters, or regression coefficients, for the model denoted by \hat{Y} are given by

$$\hat{Y} = b_0 + b_1 X_1 + b_2 X_2 + \dots b_k X_k \dots \dots \dots (2)$$

- \hat{Y} = Forest area NWFP (000 hec.)
- X₁ = Real Agriculture value (m Rs.)
- X₂ = Real Manufacturing value m Rs.)
- X₃ = Real GDP (MP) (m. rupees)
- X₄ = Real construction (m. rupees)
- X₅ = Real Per capita income at MP (Rs.)
- X₆ = Cultivated area (m hec)
- X₇ = Irrigated area (m hec)
- X₈ = Population (Mln.)
- X₉ = Household Gas Consumption (mm cft)
- X₁₀ = Household electricity consumption (mm c)
- X₁₁ = Household Coal Consumption (000 M tons)
- X₁₂ = Out turn of firewood (000 cubic meter)
- X₁₃ = Livestock population (million no.)
- X₁₄ = Production of Paper and paperboard (tones)
- X₁₅ = Production of chipboard and hardboard (tones)

X₁₆= Total road length (kilometers)

X₁₇ = Timber Consumption (cubic meter tones)

The above are the two models to be estimated with the help of linear multiple regression technique. In Model A, the dependent variable is forest area of Pakistan and in Model B the dependent variable is forest area of NWFP. In both the models the explanatory variables are taken from the macro economy of the country. These variables are selected on the basis of their linkages with the socio economic life of people which in turn effects on the forest areas. Since primary data is about different socio economic conditions so in the secondary data regression analysis most of the same variables are included. The purpose of the inclusion of these variables is not to take as many numbers of variables as one can but to make a comparison with primary information. However the best models taken from the step wise regression are the representatives of the study.

Economic theory says that if there is an increase in the real agriculture value this result in more economic gains and the production of agriculture commodities will increase. So the present study assumes that this increase will put a negative impact on forests by diverting the attention from plantation to agriculture out put⁴. Plantation, unlike other agriculture out put takes more time to give returns.

Similarly the expansion and increase in manufacturing activities lead to more usage of timber and forest products so people unsustainably use forest resources for their short term economic gains and since in developing countries investment in natural resources is already very low because of high level of poverty so in developing countries manufacturing may have effects on forests.

Increase in national income has both positive and negative impacts on forest areas. Its effects may be positive if accompany with investment in natural resources and negative if economic growth is unsustainable.

Another variable is construction sector productivity which may have increased at the cost of tree cutting. This variable is assumed destructive for forest resources if trees are not replaced with new plantations.

Per capita income is taken in the study to measure the effect of poverty on forest depletion. Theoretically poverty leads to destruction of natural resources.

⁴ The data of real agriculture value contains agriculture commodities excluding timber, firewood etc.

Cultivated area is another variable that is having impacts on forest areas. Cultivated area may be increased at the cost of forest area. Similarly increase in irrigated area may lead to positive contribution towards forests especially to enhance irrigated plantation.

Population growth is always seems to be a destructive element for natural resources including forests.

Increase in the consumption of wood substitutes like gas, coal and electricity may have positive contribution by saving forest resources. Whereas increase in the out turn of firewood, production of paper and paperboard, production of chipboard and hardboard, timber consumption result in more utilization of forests. These variables effect on deforestation although may vary in their effects and intensity of effects.

Grazing destroys the productive layer of soil necessary for tree growth. Add to this animals eat and destroy young tree crop. So increase in livestock population may be considered a threat to plantation especially if uncontrolled grazing practices are adopted.

Total road length measured in kilometers is another independent variable included in the model. Road construction in the way to development not only results in cutting trees but also providing easy access to locals to exploit the forest resources.

Table: 3.1 Characteristics of Variables

	Variables	Characteristics of Variable
1	Agriculture Production Value	Production in million of Pak.rupees, deflated by consumer price index at constant prices of 1972
2	Manufacturing Production Value	Production in million of Pak.rupees, deflated by consumer price index at constant prices of 1972
3	Gross Domestic Product	First At market prices, then deflated by consumer price index at constant prices of 1972
4	Construction value	In million Pak. Rupees, deflated by consumer price index at constant prices of 1972
5	Per capita Income	Market prices in Pak. Rupees, At current factor costs (Expenditure Approach)
6	Expenditure Under Annual Development Plan (ADP)	EUAD For Physical Planning & Housing And expressed in million rupees
7	Total Cultivated Area	In million Hectares [= Net area sown+ current follow]
8	Forest Area	Expressed in million Hectares
9	Area Irrigated	Irrigated by different sources (Canals, Tube wells, wells, Canal tube wells, tanks, others) Expressed in million hectares
10	Population	Expressed in million
11	Coal Production)	Expressed in thousand metric tones (MT)
12	Oil Production	Expressed in thousand Barrel
13	Natural gas Production)	Expressed in thousand billion Cubic Meters
14	Production of paper and paperboard	Expressed in Tonnes
15	Area afforested	In Thousand hectares including NWFP, Punjab, Sind, Baluchistan, Northern Areas, Azad Kashmir
16	Area Regenerated	In Thousand hectares including NWFP, Punjab, Sind, Baluchistan, Northern Areas, Azad Kashmir
17	Out-turn of firewood	From forests under the control of Forest Departments (Thousand cubic meters- solid) [NWFP, Punjab, Sind, Baluchistan, Northern Areas, Azad Kashmir]
18	Out-turn of Timber	From forests under the control of Forest Departments (Thousand cubic meters) NWFP, Punjab, Sind, Baluchistan, Northern Areas, Azad Kashmir
19	Timber Consumption	Expressed in million metric tones (tonnes/m3), it also includes imported timber (round wood)
20	Index Numbers of Wholesa prices by Commodities (Timber)	For the prices from 1971 to 1975 the base is 1969-70=100, From 1976 to 1980 the base is 1975-76=100, From 1981to 1990 the base

	Variables	Characteristics of Variable
		is 1980-81=100, and for the prices from 91 to 97 the base is 1990-91=100
21	Index Numbers of Wholesale prices by Commodities (Firewood)	For the prices from 1971 to 1975 the base is 1969-70=100, From 1976 to 1980 the base is 1975-76=100, From 1981 to 1990 the base is 1980-81=100, and for the prices from 91 to 97 the base is 1990-91=100
22	Average Annual Retail Prices of Firewood	(Rs. per 40 Kg.) (Average of prices from important markets: Karachi, Lahore, Sialkot, Peshawar, Quetta, Islamabad)
23	Electricity consumption	Consumption by household in Giga Watt (GWh)
24	Coal Consumption	Consumption by household expressed in thousand metric tones (000 M tones)
25	Gas Consumption	Expressed in million cubic metric
26	Livestock population	Expressed in million number from all provinces
27	Road Length	Expressed in Kilometers
28	Production of Chipboard and Hardboard	Expressed in Tonnes

3.1.4 Sample Size

The sample size for primary data collected from both the districts is 200 respondents, which has been equally divided between the two districts. Each respondent was in fact representing the point of view of the whole family. Time series data for the analysis of macro economic variables has been taken from 1972 to 2000.

3.1.5 Sampling and Analytical Techniques

The sample has been randomly selected but the age and experience of the respondent relevant to forestry has been considered. Questionnaire method has been used but guidance for filling the questionnaire was provided. The questionnaire has been written in Urdu including names of certain things in local language for their comprehension then their response is translated into English.

Linear Multiple Regression technique has been used to test the time series macro-economic data. Two models have been developed to analyze the effects of socio-economic variables of Pakistan on the forest areas of NWFP and on forest area of Pakistan respectively. The best of each model is then selected. Minitab statistical package has been used. Durbin Watson test and T-test are used for detecting Autocorrelation and Multicollinearity.

Data has been transformed to log to cease Multicollinearity and Autocorrelation. Further to cease autocorrelation, deflating the variables so that the real value is obtained so transformation method has been used. Following is the formula to deflate and to convert it in real value:

Step 1: Price Index of each year under study is taken (from Economic Surveys)

Step 2: Base Year is selected, each year price index value is divided by base year index value and then multiplying it with 100 i.e. Reindex value = $C2 / \text{base year index value} * 100$ where base year index value in the present study is C1. In this way, values for all years are calculated.

Step 3: Reindex value of each year divided by Reindex value of base year = Decimal value

Step 4: Nominal Value divided by Decimal value = Real Value

Step –Wise Regression is used to take the best model. A comparison has been made between the results obtained from primary data and time series analysis.

The following methodology has been used to achieve the objectives of the study and to test the hypothesis:

The history of forest management based on forest resources and policy efforts has been reviewed using the secondary sources.

In order to assess and analyze the socio economic causes of forest depletion, forest communities have been consulted and then descriptive analysis method has been used.

In order to analyze the effect of macro economic variables like human and livestock population, production of firewood and timber, effect of cultivated area etc. on forest area, multiple regression technique has been used.

Most of the variables mentioned in the hypotheses are among the socio economic variables that are analyzed in the econometric model, for example, human and livestock population, growth of construction, national income and area under cultivation etc. So, on the basis of the results of the model these hypotheses have been either rejected or accepted.

In order to check the effects of production of oil, coal and gas on forest area, the macro data of these wood substitutes have been compared and checked with primary information collected from forest rich areas of the said districts.

The macro data have been taken for the allocation under Annual Development Plan for Physical Planning and Housing and then compared with the growth of construction sector. These results are compared with the primary data of the study.

3.2 LIMITATIONS OF THE DATA

The time period for the analysis of macro economic data has been taken from 1972 i.e. after the fall of East Pakistan in 1971. The analysis is restricted to the year 2000 because of non-availability of data for some of the variables related to forestry sector of Pakistan. The government once during a decade time has made Forest policies and working plans. In order to overcome the problem of data non-availability, the government has established a cell in Pakistan Forest Institute, Peshawar in 2006 for data compilation for forest products. However, the progress after 2000 has also been incorporated in the present research. This is very much clear in the methodology of the present study, which is based on new policy directions.

CHAPTER 4

MAIN FEATURES OF FORESTRY SECTOR IN PAKISTAN

4.1 INTRODUCTION

Forests and forest management in Pakistan has a long history that starts before partition. The following chapter discusses the main features of forestry sector in Pakistan. The history of forests and forest management before partition is discussed in section 4.2 followed by section 4.3 that gives the description of the types of forests in Pakistan. In section 4.4, forest policies, administration and management is discussed. Forest legislation, land reforms and management of forests are mentioned in sections 4.5, 4.6 and 4.7 respectively followed by conclusion in section 4.8.

4.2 THE HISTORY OF FORESTS AND FOREST MANAGEMENT BEFORE PARTITION

The Indian Sub-continent was one of the rich forest areas in the World. With growing population and ignorance to take care of the nature, these forests remained exposed to depletion by its people. Not only the locals but also foreigners from distant lands have also contributed to strip off the original green cover. North West of Pakistan has been a gateway of invaders and immigrants; the army of Huns, Sakes, the Aryans, Greeks, Persians, Mughals and many others cleared their ways. Mughals were however interested to plant trees along roadsides, gardens, for hunting and recreation. But after Mughals the country was divided into a number of kingdoms. There was no management of forests, rulers as “Royal Trees” claimed only high value trees and royalty was collected. The British also did not take interest in forestry; rather shortage of oak trees in England resulted in massive cutting in Indo-Pakistan to meet their demand for construction. The early history of forest management in British India was started during 1850’s but the law was prepared in 1878. The early efforts were confined to the establishment of Timber Agency (1852-53) near Sialkot, an out-line for forest conservancy may be known as “Charter of Forests” in 1855 (under which concessions were liberally granted to local population resulted in ruthless cutting, rules were made for trees and brushwood in Rawalpindi in 1856 and rules for conservancy of forests in Hazara in 1857 (Sheikh & Hafeez, 1977 and Knudsen, 1995).

Schlich (1922) mentioned that Forest Department was started in 1864. Sir Dietrich Brandis was the first Inspector General of Forest. Young Englishmen were trained in Britain, France and Germany. Forestry schools were opened in India. The first legislation attempt by the British in India is Indian Forest Act of 1865. In 1869, they reorganized the forest services and forestry-training facilities were given in Europe. Sheikh (2000) further described that during 1870, Foundation of Forest Department was on its way. Scientific treatment of the forests was started during the period 1871-1900. Forest Survey Department was established in 1871 particularly to map the forest area (mostly on a scale of 4 inches to a mile).

Indian Forest Act 1865 was revised as Indian Forest Act VII in 1878. In 1878, Forest School was established in Dehra Dun, India and the probationer's forest service was started in 1891 for the recruitment of forest officers. When a new Forest Act was passed in 1878, in some areas of India, the Act was not enforced including the North West Frontier Province and British Balochistan (Assam, Burma etc) for which separate regulations had been passed.

During the early 19th century forest exploitation in British India was in hard woods (like Shorea Robusta) and later when it depleted then softwoods (like cedar), which was used for railway sleepers. The commercial exploitation started in 1850's but the first forest law was promulgated in 1878 describing two main legal categories "Reserved Forests and Protected Forests". In 1921 thousands of acres of forests were set ablaze. In 1923 New Forest Plan gave more control to local people and also they gave forest control to elected village councils (Knudsen, 1995). During 1894 and further in 1904, the work was done to classify the forests like the forests preservation for climatic purposes, for local consumption and pasture lands/grazing grounds but it was practically difficult to separate the forests. In 1920, total state forest area was equal to 250,949 square miles. During the First World War the importance of timber for war material was fully realized (Sheikh & Hafeez, 1977 and Schlich, 1922).

The next phase of forest history is the period 1927-1947. The Forest Act was again revised in 1927. Forest administration was decentralized to provincial governments. Second World War gave another realization for forest generation. After 1947 Pakistan had forests mostly in Northern hills, some irrigated plantation and riverain forests in plains. During colonial rule, rights were granted to local people. Later on for the

purpose of exercising rights, forests were divided into two sections; Reserved Forests and Guzara Forests. The British government retained a right to receive a seignorage fee at a fixed stampage rate for a tree felled in Guzara Forests. Area away from habitations towards the mountaintop was declared as Reserved Forests. This action was taken to check unlimited rights being exercised by the local people. After 1947, First five-year plan (1955-60) gave a small provision of Rs. 39.1 m to forestry. Forestry was emphasized for the first time in 1960 when Indus Water Treaty was signed with India. It was made mandatory for the government to earmark 105 acres of the irrigable area in the new barrage area for raising trees. Another event was the merger of Erstwhile States (Dir, Chitral, Swat and Amb into NWFP) in 1970's where an area of about one million ha. of forests land was added thus making forest area of Pakistan to 3 million hectares (Jan, 1993 a).

4.3 FORESTRY SECTOR IN PAKISTAN

Pakistan is bordered on the south by the Arabian Sea, to the north by the Himalayan Mountains and deserts of Afghanistan and Iran. The northern mountain systems are made up of the Karakurram range, the Himalayas and the Hindu Kush range. This area has 100 peaks of over 5400 m, including K- 2 (8563m.) the second highest mountain in the world. The western mountain ranges include the Sufed Koh and the Sulaiman. Agriculture sector contributes about 22% of the GDP and employing 44.8% of the labor force (Economic Survey, 2005-06). Six rivers, the Indus, the Jehlum, the Chenab, the Kabul, the Ravi and the Sutlej, drain the country. Government of Pakistan (1992 a) and Sheikh (2000) described that climate is varied. Precipitation ranges from 50 mm in western parts of the Balochistan highland to about 1500 mm in the Himalayan region. Temperature ranges from below 0 degree centigrade to as high as 52 degree centigrade (Jacobabad). The deserts of Siahn, Thar, Cholistan and Thal extended over an area of 12 million ha. The Siahn desert touches Iran and Afghanistan.

In Pakistan 4.72 million hectares or 5.36% of land mass is covered with forests, 85% of this is public forest. Over 40% of it is coniferous and scrub forests. Pakistan imports 400,000 tons of wood pulp, paper and paperboard products roughly at a cost of Rs. 4.1 billion (PFI, 2004). Forestry sector contributed only 0.3% to the GDP in 1981 that dropped to .07% in 1999-2000. It provides about 3.5 million metric cube of

industrial wood each year. Forests and related industries employ 500,000 workers. It contributes 32% of total energy needs as fuel wood. It is protecting catchment areas of Terbela, Mangla and other dams. Annual loss to the country because of flooding, siltation, and soil erosion is estimated at Rs. 2.3 billion. It provides forage to one-third of Pakistan's 138.5 million heads of livestock. Leather, wool and other livestock contributes 9% of the total export earnings. Forestry is a provincial responsibility, yet policy is a federal responsibility (Shahid, 1997).

The main aspects of forestry sector are types of forests, policies, programs, administration and management of forests.

4.3.1 Types of Forests in Pakistan

According to PFI. (2003) and Govt. of Pakistan (1992 b) Pakistan is a forest poor country and have only 5.36 % (4.72 million hectares). In Malaysia this ratio is 65.5 %, in Srilanka 42.4 %, in India 23.7%, in China 17.7% and in Bangladesh it is 15.3%. The per capita forest area in Pakistan is 0.0333 hectare where as it is one hectare for the world. The primary reason is that 70 % to 80 % of the land area of Pakistan falls in arid or semi arid zones where precipitation is too low to support tree growth.

In 2000, the forest area of Pakistan was as follows:

Table 4.1 Forest Area of Pakistan (000 ha)

Province	2000-01
Baluchistan	950
NWFP	1160
Punjab	950
Sind	650
Total	3710

Source: Forestry Statistics of Pakistan, by Wani et al 2004

**Table 4.2 Forest Area in Different Provinces /Territories of Pakistan
(Million Hectares)**

Province/Area	Total Land Area	Forest Area	Percentage
NWFP	10.17	1.16	11.4
Punjab	20.63	0.59	2.86
Sind	14.09	0.65	4.61
Balochistan	34.72	0.95	2.74
Northern Areas	7.04	0.95	13.49
Azad Kashmir	1.33	0.42	31.58
Total	87.98	4.72	5.36

Source: Forestry Statistics of Pakistan, by Wani, et al 2004

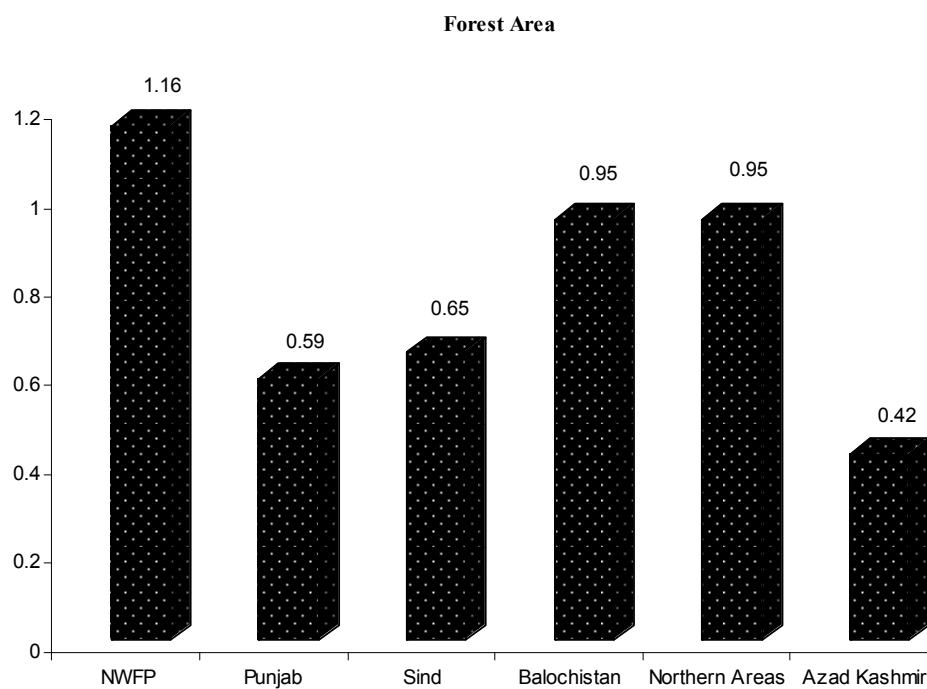
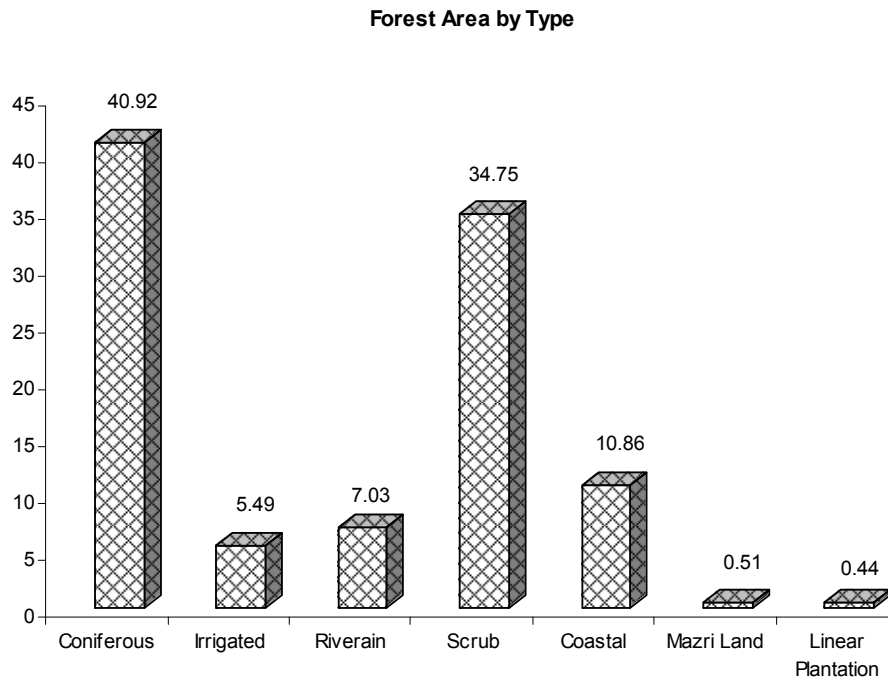


Table 4.3 Forest Area by Type (000ha.)

Forest Type	Total Area	Percentage
Coniferous	1930	40.92
Irrigated	259	5.49
Riverain	332	7.03
Scrub	1639	34.75
Coastal	512	10.86
Mazri Land	24	0.51
Linear Plantation	21	0.44
Total	4717	100

Source: Annual Progress Report 2002-2003, PFI., 2003



A forest type may be defined as a unit of vegetation, which possesses characteristics in physiognomy and structure sufficiently pronounced to permit of its differentiation from other such units. The possible bases for classification of forests are at least seven as described by Champion, et al (1965):

Physiognomy that provides a basis for rough differentiation of very broad categories such as evergreen (or deciduous habitat) and features such as are associated with very

dry (xenomorphic) or very wet (hydromorphic) sites. Others are Structure, Function, Floristic i.e. designation of subordinate units within a type, Dynamics, Environment and History.

Forests; private or public are classified in to either productive or protective forests. There are different factors that determine forest type. These factors are forest type on geographical basis, forest type on climate basis, on the basis of ownership, and on the basis of tenure ship.

The major groups of types are subdivided into types on a geographic basis. The units associated with a site factor and differ from the type of the surrounding area are referred to as edaphic type. That occurring in wet sites is treated as swamp type. Temperature is the most important factor of climate. On the basis of temperature there are four broad categories:

- | | | |
|---|-------------|--|
| 1 | Tropical | Very hot and winterless |
| 2 | Subtropical | Hot with a cold winter |
| 3 | Temperate | With a warm summer and pronounced winter |
| 4 | Arctic | With a short summer and long severe winter |

So Pakistan may be divided as:

Table 4.4 Zones and Mean Annual Temperature

Zone	Mean Annual Temperature
i. Tropical	Over 75 degree F
ii. Subtropical	65 degree F to 75 degree F
iii. Temperate	50 degree F to 65 degree F
iv. Alpine	Under 50 degree F

Source: Forest Types of Pakistan, 1965

Forests classified on the basis of climate have been given primary importance to moisture conditions. These are: Rain forests (rainfall exceeding 80 inches is as resulting in rain forest), Monsoon forests, Savannah forests, Thorn forests, Tropical grassland, and Tropical desert.

Forest Type On The Basis of Ownership

PFI (2002) and Sheikh & Hafeez (1977) discussed that on the basis of ownership, Pakistan's forests are divided into two categories:

- 1 State Owned Forests
- 2 Private Forests

State Owned Forests

State owned forests are further divided into four classes:

1. **Reserved forests:** Under section 4 to 26 of the Forest Act 1927, reserved forests were designated after settling the ownership and usage rights. These are free from rights unless permitted by the government. Cantonment and municipal forests also fall under this category.
2. **Protected forests:** These are also state-owned but these have not passed through lengthy process of admittance or extinction of rights of the local people and all acts are permitted in protected forests unless prohibited by the government.
3. **Unclassed forests:** These are those government owned forests that have not been notified as reserved or protected under the Pakistan Forest Act, 1927.
4. **Resumed lands:** These are private lands taken over by the Govt. under various land reforms and Martial Law Regulations and are managed by the Forest Departments.
5. **Private Owned Forests:** Private Forests are further divided into Guzara Forests, Communal Forests, Chos Act Area, Section 38 Area and Farm Forests.
6. **Guzara Forests:** These are either individual property or joint/ communal (Shamilaat) and are under the ownership of local people. When forests were reserved for government ownership and management, sizeable part of the forests were set aside to meet the bonafide domestic needs of the local population.
7. **Communal Forests:** It is the sub-category of Guzara forests but these are essentially owned by the entire village and not by the individual or small

community. These are mostly found in Rawalpindi and Punjab where as Guzara forests are in NWFP.

8. **Chos Act Areas:** The areas which are subject to erosion and are dangerous for public installations or structures are declared as Chos Act Area under the Chos Act 1900. These can be taken over by the govt. and may be returned to the original owners after their treatment.
9. **Section 38 Areas:** Under section 38 of the Forest Act 1927, the private owners can offer their lands to Forest Departments for afforestation and management for an agreed period from 10 to 20 years.
10. **Farm Forests:** These are linear or compact planting of trees on private farmlands. Farm forests, is not a recognized legal category nor it is taken into account while computing forest area in Pakistan.

Table 4.5 Area of Forests and Rangeland under the Control of Forest Departments by Legal Category

Category	Ownership	Management	(000) ha.
Reserved Forests	State	State	645
Protected Forests	State	State	4443
Unclassed Forests	State	State	114
Resumed lands	State	State	47
Guzara Forests	Private	State	316
Shamilaat (communal)	Private	Private	2983
Chos Act Area	Private	Private	1
Section 38 Area	Private	Private	46
Miscellaneous			692

* Resumed land is the land taken from landlords under Land Reforms Act 1959

*Chose Act Area is erosion prone private land, temporarily under govt. control (Chos Act 1900)

* Section 38 Area is private land offered for afforestation by the government

Source: Forestry Statistics of Pakistan, by Wani et al 2004

Forests can be classified by tenure:

Forest Types by Tenure

- 1 **Protected Forests:** The government owns these forests and the people living nearby have few legal rights, however grazing is permitted.

- 2 **Un-Protected Forests:** These are owned by the government but local people have substantial rights and a 60% share in the proceeds from the sale of produce. Declaring them to be “Protected Forests” in an interim device for extending immediate legal cover to forests until the process of “settlement” can occur. In this process the rights claimed by the local people to the forests are examined through a lengthy judicial process and either accepted, rejected or commuted on suitable payment.
- 3 **Guzara Forests:** These are owned by families. They are either managed by the Forest Department or (since 1981) by Forest Cooperatives.
- 4 **Afforestation Area:** It is privately owned lands being planted by the Forest Department under various projects.

Table 4.6 Forest Area by Legal Classes

(000 ha.)

Category	Punjab	Sind	NWFP	Baloch.	A.Kashmir/Northern A	Pakistan
a). State Owned	-	48	-	707	567	1322
i. Reserved	311	228	106	-	-	645
ii. Protected	2736	795	467	378	-/ 67	4443
iii. Unclassed	103	11	-	-	-	114
iv. Resumed lands	9	5	33	-	-	47
b). Private Owned						
i. Guzara Forests	68	--	248	--	--	316
ii. Chos Act areas	19	--	26	1	--	46
iii. Section 38 areas	--	--	--	--	-/2983	2983
iv. Communal Forests	21	--	432	239	--	629
v. Miscellaneous						
Total	3268	1087	1312	1325	567/3050	10609

Source: Forestry Statistics of Pakistan, by Wani et al 2004

Forest Types on the Basis of Geography

The forest types on the basis of geography (Location, Topography, Altitude, and Latitude) are; A) Coniferous Forests, B) Riverain Forests, C) Irrigated Plantations, D) Mangrove Forests, E) Linear Plantations, and F) Farm Land Trees

Coniferous Forests are of different types; Coniferous Sub-Alpine Forests, Coniferous Dry Temperate Forests, Coniferous Himalayan Moist Temperate Forests, Coniferous Sub-Tropical Pine Forests, Scrub- Dry Sub- Tropical Broad Leaved Forests and Scrub Dry, Mazri Palm, Tropical Thorn Forests.

According to PFI (2003) the major types of forests in Pakistan are the coniferous forests; dry or moist temperate, at an elevation of 1500-3000 meter above sea level consisting of species like deodar, fir, blue pine, chir pine, chestnut, bird, cherry, oak, poplar etc. These forests covered 40.9 % (1.93 m. hectares) of the total forest area. Coniferous forests make up 55 % of the natural forests in Pakistan. They are located along the lower ranges of Himalayas, Hindu Kush, AJK, Northern Areas and northern Punjab. Main uses are construction and industrial timber, fuel wood, fodder, mushrooms, and medicinal plants. Managing these forests is difficult because of inaccessibility. The detail of the above types is as follows:

- 1 **Alpine Scrub:** Forming a quite dense cover 0.6 to 1.8 m high, composed of a limited number of species, small leaves including evergreen juniper. These ascend to 150 m. or normally above the sub-alpine forests. Climate is more severe than sub-alpine forests and is adapted to snow pressure. Areas are Kashmir, Gilgit, Chitral and Hazara.
- 2 **Sub- alpine Forests/ Coniferous Sub-Alpine Forests:** This is the top most tree formation in the Himalayas located at an elevation of 3350 to 3800m. It occurs in Azad Kashmir, Dir, Swat, Chitral, Northern Areas and Hazara.
- 3 **Dry Temperate Forests/ Coniferous Dry Temperate Forests:** These forests are distributed throughout the inner mountain ranges, beyond the effective reach of the monsoon. They occur at an elevation of 1525 to 3350 m. and often higher. Free standing, widely spaced, low branching trees allow a considerable development of a shrub layer. Some are grayish and small leaved, many are thorny and the root system often extensive and woody. These forests are distributed through out the inner mountain ranges including Gilgit, parts of Chitral, Indus and its tributaries, Nilam and Kaghan valleys, higher parts of Sulaiman Range, Shingarh and Ziarat in Balochistan. Juniper forests around Ziarat and Chilgoza forests form a unique ecosystem growth in Balochistan.
- 4 **Himalayan Moist Temperate Forests/ Coniferous Himalayan Moist Temperate Forests:** The chief character of this type is coniferous forest. All

species are capable to attain a girth of 4.5 m. These mainly occur at an elevation of 1373 to 3050 m. in Murree, Galies, Kaghan and Azad Kashmir. Precipitation is between 630 to 1500 mm/year.

- 5 Sub- Tropical Pine Forests/ Coniferous Sub-Tropical Pine Forests:** These are found at an elevation of 925 m to 1675 m. Some are even higher than that. Individual trees heights up to 37.5 m. These are found in Hazara, Murree hills and Azad Kashmir.
- 6 Dry Sub-Tropical broad- leaved Forests/ Scrub Dry Sub-Tropical Broad-Leaved Forests:** These forests are classified as arid forests. These are low forests of branchy trees and varying in density from complete closure to scattered single or group trees on the dry sites with fair amount of shrubs. These are mostly thorny and often with small evergreen leaves. These forests grow in the foothills and lower slopes of the Himalayas, the Salt Range, Kala Chitta and the Sulaiman Range and may be seen through out the country merging downwards with the tropical thorn forests and upward with the sub-tropical pine and temperate forests. Scrub forests, broad leaved, evergreen type, at an elevation of 500-1500 meters mainly consist of olive and associates. They occupy 1.64 million hectares (PFI, 2003). They represent a transition between hill forests and thorn forests on the plains. Scrub forests are of two types; dry sub-tropical broad-leaved forest and tropical thorn forest. Trees are small, scattered, brandy and often with thorns usually grow on soil with less moisture.
- 7 Tropical Dry Deciduous forests:** The canopy of the trees does not normally exceed 25 meters. The common trees are the Sal, a variety of acacia, and bamboo.
- 8 Tropical Thorn Forests/ Scrub Dry Tropical Thorn Forests:** This forest is called the “Rukh” forests in the upper Indus Plain and the desert forest in the lower Indus plain. It merged into the sub- tropical broad- leaved forest of the lower hills. These are usually thorny, stunted and can survive and grow where the temperature is 45 degree centigrade. It comprises scattered, usually thorny trees and subject mostly to wind erosion and are uprooted by nomadic tribes.
- 9 Irrigated Forests/ Irrigated Plantation:** These are planted after the site has been cleared of the thorn forests. These are located in the plains of Punjab and Sind. Irrigated or man-made plantation comprises of species like shisham,

bakain, poplar, and mulberry. They occupy 0.259 million hectares. Mangrove forests categorized as coastal forests in Indus delta on the coast of the sea; cover 0.51 million hectares almost entirely owned by the state (PFI, 2003).

Irrigated Forests were first planted in 1800s and the main purpose then was fuel for railways. In Sind Riverain Forests are the most important forests whereas in Punjab irrigated forests have got the main importance in the forest economy. Main species are shisham, mulberry, poplar, and babul.

Mangrove Forests

These occur in the Indus Delta swamps. These are slow growing and have very little regeneration. These are evergreen trees with leathery leaves. They can grow in areas where other trees can't survive or areas where there is a deficiency of oxygen. They are occupying the large areas of Sind Coast that spread from Karachi to the border with India. Mangrove Forests of Indus Delta are ranked as number sixth in the world. They also occur along the Balochistan Coast. Mangrove habitats fish, shrimp, lobster, crabs contribute Rs. 5 billion annually from exports. These forests protect coastline and seaports from erosion and siltation respectively.

- 10 Indus Inundation Forests or Riverain Forests:** These are commonly known as "Bela Forests" occur on the flood plains and banks of major rivers of Indus Basin; the Jehlum, Chenab and Sutlej. They are covering 0.33 million hectares and mainly occur in Sind and Punjab. The area is entirely state owned (PFI, 2003). Annual flooding alluvial silk provides rich nutrients for tree growth. Now due to the construction of barrages and canals these forests receive only 20% of the flood water.
- 11 Tropical Littoral and Swamp Forests:** The progression of this type is often slow. They can be considered as gradually shifting their location with the site conditions favoring their shift, rather than as changing their time. It consists mainly of whistling pines, mangrove dates, palms, and bullet wood. They have roots that consist of soft tissue so that the plant can breathe in the water.
- 12 Linear Plantations:** This is plantation along the roadsides. Forest Department is managing with the help of Highway Department.
- 13 Farm Land Trees:** These include trees of fruits, fiber, fuel, fodder, small timber, green manure, oil seeds, honey and leaves for sericulture on farmlands.

Govt. of Pakistan (1992 b) has described the following categories of forest and tree resources found in each province:

- In Azad Jammu and Kashmir and in Northern Areas there are coniferous forests also called Himalayan Moist Temperate Forests, Scrub Forests, trees on farms and on private lands;
- In Balochistan there are coniferous forest also called Himalayan dry temperate forests), Scrub called alpine scrub and Thorn forest, and also trees on private land;
- In NWFP there exist same type of coniferous forest as in AJK and Northern Areas. Add to this there are trees on farms. Mazri Forests and Linear Plantation are also there. It has also Scrub forest but these are broad leaved and green;
- In Punjab most of them are irrigated plantations. In Punjab coniferous forest are sub-tropical pine. It also has Linear and farm trees as well. Scrub forest are also found in Punjab which are of evergreen type;
- In Sind there are Riverain, irrigated plantation, Thorn forest, farm and private land trees.

4.4 FOREST POLICIES, ADMINISTRATION AND MANAGEMENT

There is neither a well-defined land use policy nor development planning control in Pakistan but only different forests are under the management responsibilities of the government. Forests management depends on many factors some are policy based and others are program oriented. Basic documents related to these factors are (Jan, 1993 b):

1. Forest Policy
2. Five Year plans
3. Annual Development Plans
4. Development Projects: A development project is the mechanism, which is used to evaluate a change in the system of forest management.
5. Working Plans: A forest working plan is defined as a written, often printed and published instrument of forest management aiming at continuity of policy/ action prescribing and controlling basic operations in forest estate over a certain period

(Shahid, 1997). Working Plans usually focus on achieving sustained timber yields, watershed protection, employment opportunities, multiple forestland use, ecological and environmental concerns are seldom included in the action plans. The first forest policy statement before partition was issued in October 1894, with highest priority to the preservation of forests growing on hillsides. A search for a new Forest Policy was started after the independence but the resolution was made in 1955 and the directives in 1962 (Sheikh & Hafeez, 1977).

The main recommendations of the resolution of 1955 were: management of privately owned forests through legislation, control land use under a coordinated program of soil conservation and land utilization, classification of forests on the basis of utility and object, commercial role of forestry and beneficial role of forestry, 10% land and 10% water provision for new canal colonies for irrigated plantation, encouragement of co-operative forestry through farm forestry, plantation on rail, road and canal sides, research and education on proper lines, and for the first time adequate provision for the protection of wildlife.

The 1962 directives included special emphasis on rights in the forest areas, establishment of pilot projects, testing on species in saline and water-logged areas, planting of riverain lands, commercial concerns even on government owned forests, determining of grazing capacity of different areas and watershed management.

The main features of forest policies are as follows (Shahid, 1997 and Jan, 1993 a):

Forest Policy 1894

In 1947, Pakistan had only 2% of its land under forest. All the lands beyond villages had been declared as reserved or protected forests; in other words as government property. For meeting the local needs a large area of land had also been kept aside. The then Indian Forest policy 1894 was used as a policy guideline to manage forests until 1955. The main aim of the policy 1894 was to conserve the existing forests or to manage them to preserve ecological balance. This policy was not focusing on the increase of forest area and sustains harvest. This policy helped to preserve forests but no effort has been made to extent forest area. There was also no scientific management so with the passage of time the overall productivity had decreased. This policy was not suitable for only about 2% of forest area in Pakistan. The right holder's demands resulted in damaging the growth. Meanwhile from India the timber

supply had been suspended. Floods and soil erosion were other problems that resulted in the sustained yield management.

National Forest Policy 1955

The policy focused on forest development with equal emphasis on non-tangible benefits of forest resources. The main aim and contribution of Forest policy 1955 was to increase area under forestry, agro-forestry, and linear and irrigated plantation. Unused government lands were given to Forest Departments. The main features of the policy were: to increase area under forests, to classification of forests on the basis of their utility, intangible benefits should get preference over tangible (economic) benefits, scientific management under approved working plans, reserving 10% of land in new cultivation areas for irrigated plantation to increase forest areas, growing trees along roads and canals, managements in private forests through legislation and government assistance and necessary powers to be obtained to control land use, and soil conservation under coordinated program.

But the policy ignored the problems of hill and scrub forests, all watershed requirements and rangelands. Thus it was felt that the policy is inadequate.

National Forest Policy 1962

This policy was somehow a bold step. Some unconventional steps were taken: to shift population away from hilly areas, they have to acquire the rights to graze their animals and to cut trees from public forests, they are required to grow a minimum number of trees on their lands, tax has been imposed on eroded private lands, elimination of tree kinds of shortened rotation and fast growing capacity and research and farm forestry by Agriculture department. But the demand of forest products increased but forest area could not grow to a sizeable extent. In between 1955 and 1962 major developments have been taken place that led to the revision of Forest Policy of 1955. Major developments include: construction of dams and barrages, intensive irrigation network to new areas, emphasized the need of watershed management, soil and water conservation in the catchment areas, inclusion of States of Dir, Swat, Chitral and Amb into NWFP, scientific management in Azad Kashmir, population increase, and increase in wood import etc.

Because of the above mentioned and other developments, the Forest policy was prepared in 1962. Main features were: reorientation of the administrative organization

of government run forests for commercial concerns, scientific processing, quicker and better utilization of forest products, to increase forest area, government owned Rukhs should be afforested and exploited under regular working plans, agro-forestry and irrigation plantation, legislation to require the holder of an area to grow a specified number of trees, undertake the problem of rights in the forests, with the consultation of the flood commission, the programs for the management of river banks, assume direct responsibility of soil conservation, survey of entire watershed, the gradual shift of hill population, subsidy on kerosene oil, supply of electricity, development of cooperative societies for soil management, encouragement of fruit trees on private farm lands, legislation to impose higher taxation on highly eroded areas which are not afforested within a specified time, pilot projects for selected areas like Bhur Ban, hinterland of Islamabad and pilot projects for saline, waterlogged lands, agro-forestry and research in quick growing commercial crops.

The National Policy on Forestry and Wildlife, 1980

The developments that had taken place between 1955 and 1962, the functions under Forest policy 1962 had been expanded to different departments like Soil Conservation, Agriculture Development Corporation, Forest Dept. Farmlands were providing 90% of fuel wood and 50% of timber where as public forests produced only 10% firewood and 50% of timber. So there was a need to further develop the farmlands. This policy was the part of National Agriculture policy 1980. It considered the growing demand of forest products, watersheds and rangeland problems. Different suggestions were given to include forest growing tree species, fuel wood trees, out of public forest lands, local people involvement, and coordination between different levels of government, medicinal plant production and establishment of national parks. But no strategy has been developed to achieve these goals. Some difficulties arise when clear-cut responsibilities are not assigned and there is lack of cooperation among the departments. Some other difficulties were also realized during the implementation of the policy. These include financial and technical constraints, limited scope of forestry development on State-owned forestlands. Other features include: more attention on fast –growing trees in areas outside forests, public motivation and incentives for plantation in areas deficient in wood and in watersheds, management of wild lands in accordance with their potential, forest harvesting on scientific lines, increased production of industrial wood and integrated development

of forestry and wood-based industries, integrated and coordinated forestry at national and provincial level, scientific approach for wildlife management, development of national parks and production of medicinal herbs in wild lands

Pakistan Forest Policy, 1991

Forest policy 1991 was made as a part of the policy that was prepared for agriculture sector. The main objectives of the policy were to cover all forest area under the regular working plans during next 10 years, where as it was 80% in Punjab, 80 % in NWFP, 44% in Sind, 14% in Balochistan, 75% in AJK and 6% in Northern Areas. Motivation to farmers to raise 10% trees per acre, increasing network of protected areas for wild Fauna and Flora to 12% from 7% (of the total area of the country), covering national parks and wildlife sanctuaries by management plans, creation of development agencies such as Sind Arid Zone Development Authority (SAZDA) to improve rangelands (more than 50% of country's area is used as rangeland but only 12% is being managed), productivity of minor forest produce like resin, medicinal, mushrooms, mazri, promote sericulture industry, mechanized operations by aerial rope-ways and skyline cranes, incentives to farmers to establish horticulture crops to reduce soil erosion, to induce private investment by livestock owners in rangeland management, promotion of livestock feeds from agro- industrial remains/wastes, shifting the emphasis from open grazing to stall feeding, legislation to support range management agencies and programs, to ensure year-long optimum provision of fodder to livestock, ensure the survival of critical ecosystem, periodic surveys of habitats, and implementation of international conventions. The Forest Policy emphasized the need of private forestry because of the shortage of new lands for development. Now land is being used for more food crops. Promote the use of village Shaamlat for social forestry. Research trials, tours, workshops for farmer, induction of women in forestry profession, programs for establishing green wind breaks on arid lands, establish green areas in all cities, having population of 50,000 or more, to set aside area equal to 25% of the total in new towns and industrial colonies for parks and green belts, pollution standards for emissions impacting the wildlife, protected areas and wetlands, mapping surveys were some of the measures.

The policy announced the different incentives; exemption of the custom duties on aerial rope ways and skyline cranes, tree insurance scheme, concessions to certain

agro-industries i.e. sericulture, apiculture, cheaper credit and debt equity ratio of 80:20 and also study tours abroad.

When during 1970, the States of Dir, Swat and Chitral were merged with NWFP, people started demanding a share from forest sales. The provincial government resisted but in 1976 federal government agreed to give share to the local people to 80% and in some parts 60%. But the government did not agree to give them ownership rights. In government revenue documents the forests were shown as government property. Add to this, royalty is distributed among the male members and family having no male member takes no interest in forests. People, in order to claim ownership, try to convert forestland in cultivation land. Because of these reasons forest areas are shrinking.

The main objectives of the policy were: to increase forest area from 5.4% to 10% of the total land area during the coming fifteen years, conserve existing forests, promote social forestry programs including watersheds and farm forestry, planting of fast growing multipurpose trees, check soil erosion and silt, regulate water supply to save multipurpose dams and control flood, anti-desertification measures, rehabilitate water logged and saline lands, self employment and income opportunities for rural populace and promote non-governmental Organization [NGOs and Private Voluntary Organization (PVOs)].

Salient Features of the Policy 1991 are:

The policy aimed to extent road in hills from two meters to ten (10) meters per hectares. In watersheds, the incentives would be given to private land owners for fruit and other trees. Industry would be involved in leasing contracts for plantation. Seeds and saplings would be distributed and social forestry would be encouraged especially on common lands in rural areas. Stall-feeding to save rangelands would be encouraged. Feed from industrial waste would be produced. Training programs for NGOs, mediators, farm forestry. Integrating forestry education would be started with university education with university system, women to enter forestry career, to encourage industries to finance forestry and research programs. Establish green areas where population is more than 50,000, wind breaks will be established on arid lands. Insurance schemes for trees would be started.

Since the policy objective was to increase forest area to 10% during the next fifteen years with the cost of Rs. 40 billion i.e. Rs. 2700 m. per annum but since in different

five year plans i.e. fourth, fifth and sixth the annual allocation was Rs. 106 m. So it was difficult to increase this area to 10% with this allocation.

After the World Conservation Strategy in 1980, Pakistan with the help of IUCN has prepared The Pakistan National Conservation Strategy 1992. This conservation strategy has identified different core areas for conservation and rehabilitation. The strategy also provided a guideline for preparing provincial conservation strategies. So Sarhad Conservation Strategy (1996) and Balochistan Conservation Strategy (1990) were prepared. This policy guideline was further decentralized to district level, resulted in two District Conservation Strategies namely Abbottabad and Chitral.

National Forest Policy, 2002

This policy covered different Renewable Natural Resources (RNR) like Forests, Watersheds, Rangelands, Wildlife, and Biodiversity etc. This policy was actually a guideline for all levels of government to frame their own respective policies. The main objective of this policy was to focus on women, children and other special groups. The main elements of the policy were to reduce the effects of socio-economic causes, to prepare population planning in mountains and other eco system areas, to provide firewood substitutes, to supply gas, solar energy, and bio-gas and micro-hydel power etc. The policy further aimed to preserve forests and their biodiversity primarily for research and eco-tourism. Management of Irrigated Plantations, Chilghoza and Juniper forests of Balochistan was also the part of the policy. Management of Spruce forests i.e. Nalter forest that are situated near Gilgit consists of spruce, blue pine and juniper is already declared as Wildlife Sanctuary were also brought under the policy domain. The Federal Government ensured financial assistance for training of staff of provincial wildlife departments for advanced professional studies in overseas institutions.

Provincial Government had taken the responsibility to train the local people in all timber harvesting practices.

4.5 LEGISLATION

In 1947, the Government of Pakistan adopted the Indian Forest Act 1927, which replaced the Indian Forest Act of 1879. The word "Indian" was omitted in 1949. The Act was promulgated to assist to carry out the objectives of 1894 National Forest

policy. It is applicable to all the provinces and to Northern Areas but not to AJK. It proved in conserving public forests but it caused annoyance to the public because of the strict application of the provisions and rules (GOP, 1992 a).

The main features of the Forest Act 1927 are:

The government is the supreme owner of the land and gets the revenue as rental value, whosoever, cultivates it. The provincial government has the power to declare any piece of land as Reserved, Protected, Community or Unclassed Forests to facilitate the protection and to delete any rights of grazing, grass cutting etc. Government has the power to impose any duty or tax on timber and forest product and its transit. It has the legal power to impose any penalty or confiscate the property in case of any violation of the law. Even it can arrest the person without warrant. It can make any type of rules or delete any of the previous. Rules have been framed also for “Guzara Forest” wherein the owners cannot cut the tree without government approval.

Various other Acts, Regulations and Ordinances

Laws in Pakistan to Forests are general in nature. For example, Pakistan Penal Code deals with theft of forests products in the same way as theft of any other property. Many forest laws have lost their purpose. Sometimes they clash with non-forestry legislation for example laws mineral resources, laws for urban and regional planning etc. that results in conflict with other organizations and departments. Forests in Pakistan whether public or private, were treated alike in the fiscal and monetary policies of the government under its socio-economic development plans. Hazara Forest Act 1936 could not be applied to the forests in the tribal areas. In Guzara Forests, those parts, which are jointly owned (Shaamlat) are subject to excessive exploitation. These Guzara Forests are however, properly surveyed, demarcated on maps and on grounds and these are managed under working plans. But Guzara Forests in Rawalpindi and Murree hills are still un-demarcated because of people’s opposition. So it is difficult to implement working plans in areas with unknown boundaries. Only adhoc management remained there under the Guzara Committee, consisted of elders of the area and Deputy Commissioner with only a Divisional Forest Officer as a technical member.

Following are the main measures taken in five year plans related to forestry sector (GOP, 1994 b):

In the First Five- Year plan (1955-60), in forestry sector, following steps had been taken:

Construction of 885 Km. Road and repairing of 400 Km. Existing roads to facilitate the extraction of forest produce. Survey of the forest area and resources was conducted in Dir, Chitral and Amb States. Aforestation and regeneration at different places and in new barrages was done. Establishment of shelterbelts and planting on private lands was part of the plans. Research allocation was Rs. 4.27 million where as 2.75 m. could be utilized. Rupees 1.7 million for the development of minor forest products were provided but only Rs. 0.62 million could be utilized. Trees were planted on blank strips along roads and canals.

In Second Five –Year Plan (1960-65), the main features with respect to forestry sector were as follows:

The objectives of the plan for forestry sector were to manage watersheds, increasing fire wood production, development of wasteland into productive pastures and management plans for Dir, Swat and Chitral areas. It was considered that forest land area must be increased which make it equal to ten percent (10%) of the land area. Afforestation over an area of 81000 hectares and road/ canal side plantation was targeted. The targets had to be revised because of the financial difficulties but about 90 % of the total targets were achieved. Like the first Five Year plan again the targets were set to plant trees along road and canal sides. About 6,880 km. canal side, 2823 km. road- side and 669-km. rail side were planted which were more than the plan targets. The financial utilization was 95% and physical achievement was 120 %. In hilly areas 72,800 hectares were planted (against 70350 hectares target) with the allocation of Rs. 6.2 million (only Rs. 5.4 m. were utilized). So the utilization percentage was as 86% and achievement as 104 %. Besides, 87,500-sq km. area was surveyed for watershed management.

In the Third Five Year plan the measures were:

The plan allocation was Rs. 138.75 m. with special emphasis on research and education, range management, soil conservation, construction of roads, completion of aerial forest inventory in Northern Areas. Irrigated Plantation was 7100 hectares where the target was 38,200 hectares. For riverain and hilly areas 3200 hectares were planted against a target of 1,11,400 hectares. Canal plantation target was 24150, roadside 5100 and railway side 970 kilometers, but achievements were only 10%. Raising nurseries over 800 hectares was quite a success. Walnut plantation to be

planted on 2100 hectares was a complete failure. Forest education and research was expanded in Forest Institute, Peshawar. For rangeland management 1.7 million hectares of land was targeted and to be surveyed but less than 50% was attained because of low fund allocation. Delayed approval of schemes, paucity of funds and technical difficulties were observed.

The total allocation in the Fourth Five Year Plan was Rs. 216 m. Main emphasis was on rangeland management, soil conservation, watershed, afforestation in Dir, Chitral and Kalaam, riverain and rainfed areas, afforestation with fast growing species, farm forestry through supply of planting material at subsidized rates, work in the field of forest economics and collection of reliable forestry data, find out better uses of wood waste, improve livestock industry and to develop rangeland. The plan has been suspended in 1971 after one unit dismembered and four Provincial Forest Departments were recreated. The work was carried out under individual development plans.

Total allocation for the forestry sector in the 7th plan (1988 -93) was Rs. 2393.147 million. It was decided to launch a comprehensive program for afforestation, improvement in the collection of forestry statistics, social forestry, energy plantation, watershed management and range management (PCGOP, 1989). The allocation for environment in the eight five year plan was just 116.8 billion rupees whereas the next plan for 1998-2003 was not implemented because of the political turmoil in the country (GOP., 1994 b)

During different five- year plans the monetary allocation increased but there was not much real increase as far as the inflation and increase in forest area is considered (Jan A., 1993 a).

Pakistan has prepared a long term plan for forestry sector called Forestry Sector Master Plan for a period of 25 years (1993-2018) with the collaboration of Asian Development Bank. The concern areas are to review the state of forests, product demand, causes of forest depletion, strengthening the institutions, framework for various investment programs (GOP., 2002). The Plan (1992) highlighted that the wooded area of province is 1.490 million hectares and the area under the control of Forest Department is about 1.45 m. he. (NWFP Forest Department, 1993). Of this half is managed by the Forest Department under forest management plans.

The FSMP has linkages with other plans (GOP, 1992 a):

- Tropical Forestry Action Plan: This plan was presented by FAO in 1985. The main features included conservation of tropical forests ecosystems, control and management on 100,000 hectares of Hazara and other industrial forests, establish an additional 25000 hectares of industrial plantation and forestry for fuel wood and energy. The concept of national FSMP evolved an extension to the Tropical Forestry Action Plan (TFAP).
- National Conservation Strategy: The strategy prepared in 1992 highlighted different core areas of environment. The main stress was on public participation and integration of economics and environment
- Report of the National Agricultural Commission on Agriculture, 1988
- Seventh 5- Year Plan (1988-93): It envisaged a growth rate of 2.6% in forestry during the plan period

4.6 LAND REFORMS

Land Reforms introduced in 1959 and 1972 aimed at reducing the exploitative powers of landlords, distribution of lands among landless tenants and discouraging absentee landlordism. In 1959 land reforms, land ceilings were fixed as 1000 acres unirrigated and 500 acres irrigated. Over and above of the ceiling was to be surrendered by the owners. This ceiling was 150 acres irrigated and 300 acres unirrigated in 1972. In 1977, this further reduced to 100 acres irrigated and 200 acres unirrigated land (Zaidi, 1999).

Landowners preferred to retain agricultural land and surrendered woodlands and wild lands. These were ultimately handed over to Forest Departments for management. These are called Resumed Lands and notified under the Pakistan Forest Act 1927 as protected Forests. In Punjab about 8000 ha., In Sindh 57000 ha. and in NWFP 35000ha. were added to forest area i.e. total 100000 ha.

4.7 MANAGEMENT OF FORESTS

The ministry of agriculture (Ministry of Food, Agriculture and Cooperatives) in Islamabad has taken the task of management of forests (GOP, 1992 a). The management of forests includes systematic exploitation, regeneration, afforestation and scientific management. Management of different forests is as under: -

Conifer forests are characterized as having a volume of wood per acre but very low annual growth. Past management of these forests has been a custodial type. Scrub forests are used as protective cover to the watershed and as fire wood . Soil and water conservations are the important part of the management of these forests. Check damming and gully plugging is done to protect it. Irrigated forests are man made forests. A silvicultural system with rotational production of mixed shisham and mulberry comes under the objects of management. Fast growing species such as poplars and eucalypts are profitable in this case. The riverain or Bela forests located in flood plains in that Babul and Shesham are the main species. These are found in Punjab and Sind and depend on floodwaters. Due to construction of reservoirs and irrigation works, these forests are dying and becoming less productive. Coastal mangroves are mainly used for firewood and are managed under selection system. Not only the area under forest cover is less but also production per unit area is low. Main reasons are low soil productivity, slow growing species and adverse climatic conditions. Coniferous forests are the richest one and are a source of watershed and construction timber. Afforestation techniques such as making trenches and troughs or sowing useful species are in forest management planning. Leveling of ground is the requirement before irrigated plantation. In order to reduce the costs of leveling, the area is given on temporary cultivation leases rather than using heavy machinery. Linear plantation i.e. road, rail and canal side plantation also add to the production of forests. On saline, denuded, gullied and eroded soils special species are selected such as babul, bakain, eucalypts, phulai, dhak etc. In flood areas mounds and ridges may be prepared to plant trees on them. Polythene tubes longer than normal are best for planting trees on sand dunes.

Forest Act of 1927 regulated the forest management in Pakistan. In Hazara, forests were managed not by the forest Act but by the Hazara Forest Act 1936. The rate of deforestation is highest in the Guzara tenure system. Also people do not allow tree plantation and forest regeneration because of the fear that govt. will claim ownership to the mature trees.

One of the main reasons behind the slow growth and low production in the past was the sale of standing trees to contractors. Since these contractors had short time, they never bother to invest on permanent basis, to use skilled labors and to use mechanized

equipment. But this practice of sale of standing trees was stopped after the establishment of Forest Development Corporation (FDC) and the Azad Kashmir Logging and Saw Mill Corporation (AKLASC).

In 1962, the control of road and canal-side strips was transferred to the provincial Forest Departments from the Communication and Works Deptt. (C&W) and Irrigation Department to utilize the land for raising linear plantation.

Forests are heavily burdened with rights and concessions of all types. These rights are recorded in the “Wajib-ul-Arz” (Wajib-ul-Arz is a revenue document separately prepared for each village at the time of land settlement that indicates the rights and concessions in forests) that is maintained by the Revenue Officer. All acts are prohibited in the Reserved Forests unless specifically permitted and all acts are permitted in Protected, Resumed and Guzara forests unless specifically prohibited (Jan, 1993 b).

Forest Department also manages Guzara Forests but management by the Forest Department is criticized by the Guzara owners in NWFP for their indifference to the protection and regeneration of the Guzara Forests.

Forestry is a labor occupation and helpful to check migration to urban areas. As for the employment in the forestry sector is concerned there is no separate legislation for workers of wood based industries. Laws and regulations of other industries are applicable to labors of the forestry sector.

Farm forestry is a source of wood. Farmers in Pakistan face problems of feuds and litigation. Babul, Bakain, Eucalyptus, Simal, Mulberry, Jaman, Mango, Poplar, give reasonable return. Agro Forestry needs incentives; subsidy, grants, interest free loans, equipments and free supply of plants and advisory services. The greatest potential lies not in the state forests but on the farm lands. Several projects of agro forestry have been launched in the country. Protection and management of irrigated plantation is not a serious problem. The major concerns are theft of mulberry leaves for sericulture, rising water table, poor water management, influx of Kai grass and theft of trees left for prized timber (mother trees).

Under the technical and financial support of USAID, a program was started to plant wastelands and field boundaries particularly in the plains of Punjab and Sind.

Seedlings have been distributed free of costs. Planting stock has been provided at a pre-determined price by the Social Forestry Wings of the Forest Departments. Other incentives of this program include award of certificate, inter-provincial tours to observe success stories, meetings between private growers, industrial wood users and cash prizes. Government of Punjab under its Social Forestry Project announced different incentives in the form of cash and kind like air tickets for Umra those who plant more trees than specified targets. Tree planting campaigns twice a year i.e. during spring and monsoon are also arranged to motivate general public. Presidential awards of cash and certificates are also announced every year for educational institutions showing the best tree planting results. The government also gives fiscal incentives. For example, for rural industrialization the govt. gave five-year tax holiday for all agro-based industries established during 1990-95. Import license fee is also reduced and imported machinery is also exempted from different taxes (Jan, 1993 b).

4.7.1 Watershed Management

Watersheds start from Gilgit in the North, to the South and to the west. The watersheds of Indus Basin River and its tributaries play an important role in the agriculture. Uncontrolled felling of trees, overgrazing, and faulty pattern of cultivation have badly affected the watersheds. Erosion and more badly floods then added to the problem. Soil erosion is at a rate of 2.3 to 3.9 thousand tons per square Km. per annum, from the watersheds of Ravi and Kurrum and similarly from other areas like Jehlum and Chenab resulting in heavy siltation. NWFP watersheds cover about 3 million hectares. Out of this, 1.3 million hectares are under forests and about 0.6 m. ha. are under agriculture (Dijk and Maliha, 1994). Another program was started in Hazara (NWFP) under World Food Program (WFP) of UNDP by providing commodity assistance of wheat, sugar, tea, milk powder, butter as food for work to plant trees on barren hill slopes, terracing of fields, and construction of check dams, trees and fruit trees on slopes. This program was extended to Dir, and Swat districts in Malakand Division in 1980 and in 1985 in Muzaffarabad District, thus raising more than 200,000 ha. forests and forest area was raised by 2% in NWFP and 1% in Azad Kashmir.

Eight out of highest sixteen peaks of the world are located in Pakistan. Different watershed projects have been initiated with the help of International Union for

Conservation of Nature, United Nations and World Wide Fund for Nature etc. (GOP, 2002 a).

The main Watershed Regions in the country are:

1. The Northern Mountain Region: Inland Indus Basin above Attock with Swat, Chitral and Gilgit tributary catchments, and inland Jehlum Basin up stream of Mangla. Erosion is widespread.
2. The Uplands of Northern Punjab: Gully erosion is the main problem. Not the sectoral plans but integrated plans for these watersheds are important.
3. The Western Mountain Region: These watersheds include Catchments of Kohat, Toi, Kurrum, Zhob- Gomal, and Quetta District. This is poorly vegetated area.
4. The Southwest Baluchistan Plateau: This is water scarce area, and it lies west of Kirthar.
5. The Coastal Belt: Land between Makran range and Arabian Sea. The land is desertic and overused as pasture. There is a need to develop surface water because watershed management is limited in this region.
6. The Indus Plain: The Jehlum, Chinab, Ravi, Sutlej, from the east and the Kabul, Swat, Kurrum and Gomal from the west are the areas in these watersheds.

Other features are as follows:

About 90 % of the total water flows in the country is through Northern watersheds. There are two main rivers; the Indus and the Jehlum. The highest rate of erosion is in the Indus region. The estimated soil loss is 150 to 165 tones soil per hectare per year. Soil loss is also high in the Jehlum region (from 79 tones per hectare to 124 tones per hectare).

Terbela dame capacity of 1.43 ha-m million in 1974 has reduced to 1.24 million ha-m in 1984 due to sedimentation i.e. a reduction of 0.19 million ha-m per year. At this rate its life is 73 years. While Mangla's economic working life is estimated to be 170 years. The sedimentation rate, which was estimated as 5200 to 7500 ha. m. per year has reduced to 4200 ha. m. by 1983 due to control of soil erosion in watersheds.

4.7.2 Range Management

Three quarters of Pakistan's total geographical area (87.98 m. ha.) consists of mountains watersheds, deserts, platues and uncultivable wasteland of which 60% constitutes rangelands. Out of total rangeland area of 52 m. ha., only 12% is under the

control of Provincial Forest Departments. Range management consists of the following regions:

1. Quetta- Kalat Region: The soils are poor and the area is rugged.
2. Indus Plains: This area spreads from Karachi (South) to Thal (North). The main areas are Dhabeji, Kohistan, Ragistan, Tharparker, Cholistan and Thal. Summer temperature reaches to 52 degrees centigrade and rainfall varies from 5 m. m. to 75 m. m.
3. Scrub Zone: These are situated in the sub-tropical areas, usually in the foothills. There is a great potential for forage. The temperature is 47 C in summer, and rainfall is from 25 m. m. to 75 m. m.
4. Alpine Pastures: These are highest potential rangelands, and remains under snow fall for 5 months.

Rangelands in the provinces of Punjab and NWFP are mostly under private sector ownership. In Sind province most of it belongs to the government. Balochistan rangelands are not properly defined. Rangeland productivity is estimated as one third of its potential (Shahid, 1997). There exists a decision-making system called Jirga in each rangeland area but these traditional systems conflict with the intentions of the government. Land use rights are a hindrance in the way of proper management.

In Punjab, main rangeland areas are Thal desert, Cholistan desert and Potwar Plateau. In Punjab, ranges are divided into blocks for treatment, after treatment the grazing is opened for permit holders at nominal rate per animal. The richest grounds of grazing in Punjab are Potwar Plateau.

In Sind there are no identifications for the boundaries. In Sind main rangeland areas are sandy Tharparkar region and non-sandy Kohistan foothills.

Under the seventh 5-year plan, the allocation was Rs. 50 million for rangeland programs that is equal to one rupee per ha. Area wise distribution of rangelands is as follows:

Table 4.7: Range land Areas

Province/ State	Range Land Area (million ha.)	Percentage of total land area under Range Lands	Under control of Forest Department (m. ha.)
Balochistan	27.4	72	0.371
Sindh	7.8	55	0.437
Punjab	8.2	40	2.679
NWFP	6.1	60	0.15
Northern Areas	2.1	30	2.104
Azad Kashmir	.6	45	0.151
Total	52.2	59	5.892

Source: Forestry Statistics of Pakistan, by Wani, et al 2004

A range improvement scheme was started in 1961 for up to 2500 hectares in different climatic zones. The activities consist of demarcation of boundaries, fencing, collection of grass seeds, planting of grass roots, planting fodder trees, ploughing, reseeding etc. A program was launched in 1965 to develop 1.7 million hectares of rangeland including establishment of research organization, range management as a full subject, reservation of areas for improved livestock production and private participation in the development. In 1973, Range Management Sub-Committee was constituted by the government to make policy and strategies for more than 58 million hectares of land, a range resource of the country.

The area under rangelands and the common lands has declined in favor of agriculture. In NWFP more than 60% of the land is under some form of common property. The owners favor programs such as afforestation because of the prospects of additional income but the tenants and Gujars obstruct these programs as they will lose the use of the hill sides (Dijk and Maliha, 1994).

The areas along the mountainous passes are those areas where the govt. has little control because these are in tribal areas: Khyber Pass on the border of NWFP with Afghanistan, Kurrum Pass on the border of NWFP with Afghanistan, Tochi Pass on the border of NWFP with Afghanistan, Gomal Pass on the border of NWFP with Afghanistan, Bolan Pass on the border of Balochistan with Afghanistan, Dalbandin-Nok Kundi Pass on the border of Balochistan with Iran, and Khunjerab Pass on the

border of Northern Areas with China. The only mountainous area i.e. Hazara and Rawalpindi Civil Divisions are under the normal administrative control of the government.

4.7.3 Wildlife Management

Town development and forest cutting resulted in the disturbance and depletion of natural habitat. Poaching and hunting are the contributing factors resulted in the disappearance and decreasing number of mammals and birds like Deer of Bahawalpur, Thal and Thar area, Urial in Soan valley, and green pigeon and Marcopolo sheep. Northern Mountainous areas embracing the Himalayas, Karrakurum and Hindu Kush ranges in the areas Gilgit, Chitral, Dir, Swat, Baltistan, Diamar, rich in fauna provide an excellent habitat. Snow Leopard has gone alarmingly low. Western Horned Tragopan is included in the Red Data Book (IUCN list of endangered animals). Salt Range, Kalachitta Range as well as foothills covered with scrub forests supports bird fauna and medium sized mammals like Barking Deer, Goral, Wild sheep or Urial. In the plains of river Indus, almost all forms of wildlife have disappeared leaving only Jackals, Desert Cat and Hare, Mongoose and few others. In desert regions of the country, the wildlife population is almost eliminated. Along the river areas, because of the construction of dams and intensity of floods adversely affected the breeding stock and vegetation structure. Irrigated forests accommodate hares, rabbits, and chinkara. Sulaiman range supports straight horned Markhor while Kirthar range's main animal is Sind Ibex. A number of other wild animals are occupying south- western mountains of Balochistan. Large variety of both resident and migratory water bodies supports wildfowl population.

The National Council for Conservation of Wildlife (NCCW) has taken different measures to improve the situation. It has constituted national parks, game reserves and wildlife sanctuaries in the country. A ban has been imposed initially during 1981 on hunting, capturing and export of wild mammals, birds, their parts and products. Wildlife like forestry is a provincial subject under the constitution of the country. The extent of protected areas is to 9% of total land surface in Pakistan, which is quite impressive but the problem is to focus on the quality of the area. In NWFP, the protected area i.e. national parks, wildlife sanctuary, game reserves, wetlands of

international importance constitutes less than 0.6% of the total land area (Dijk and Maliha, 1994).

Wildlife Enquiry Committee was set up in 1967. It submitted its report in 1970 presenting the situation of wildlife, parks and policies related to the concerned area. The committee proposed the establishment of 5 National Parks, 18 Wildlife Sanctuaries and 52 Game Reserves. There are some ordinances prepared for wild life Protection; The West Pakistan Wildlife Protection Ordinance, 1959, The Wild Birds and Animals Protection Act, 1972 (Act, VIII of 1912), NWFP Wildlife Act, 1975 etc.

It is estimated that at the world's present rate of deforestation of about 5% to 10 % of the world species will be lost in a decade time (a loss of around 50,000 to 100,000 species). Out of total 6,000 floral species are recorded in Pakistan, of which 300 are considered endemic. Among 158 mammal species that are recorded in Pakistan, 6 species are endemic, one of which is Indus river dolphin. There are 660 birds are recorded in Pakistan. Two species Tragopan and the Cheer pheasant are endangered. Pakistan wetlands have great importance for these bird species. Houbara Bustard is an internationally threatened species, which is fast declining in Pakistan. Juniper forests of Balochistan are one of the special species in the world some of which are 2500 years old. These are exploited for fuel wood. Balochistan has some endemic species; fox, sand cat but no plan to establish wildlife sanctuaries has been implemented because Arabs favored this area for Houbara Bustard. There are fourteen national parks and ninety nine wildlife sanctuaries and ninety six Game Reserves in the country (Wani, et al 2004 and GOP., 1992).

Powers, functions and responsibilities of all tiers of forest officers are laid down in a series of manuals. These documents clearly define their managerial responsibilities.

For example:

- a) West Pakistan Forest Manual, Volume 1, dealing with forest administration, Forest Acts and Rules made under the forest Acts.
- b) West Pakistan Forest Manual, Volume II dealing with establishment, accounts and budgets.
- c) West Pakistan Forest Manual, Volume III dealing with procedure and preparation of working plans etc.

Ministry of Food, Agriculture and Cooperatives with a special administrative unit headed by Inspector General of Forests (IGF) was given the responsibility of forest management at federal level but implementation of forest policies was a provincial subject. Since the whole operation was not transparent so in 1977, Forest Development Corporation (FDC) was established. Directorate of Soil Conservation was created in 1960.

Besides the Federal and Provincial Forest Departments, other agencies are:

- 1 Water and Power Development Authority (WAPDA)
- 2 Azad Kashmir Logging and Sawmill Corporation
Established in 1968 to prevent damage by forest contracts, to establish wood based industries, to introduce mechanized methods of timber extraction.
- 3 NWFP Forest Development Corporation (FDC)
It was established in NWFP in 1976. It replaced the system of timber through stumpage sale by auction. It gives royalty to right holders for timber on the basis of market value including harvesting expenditure thus reducing the chances of malpractices under the previous system of stampage sale to contractors. Forest Department marks trees and it then assigns contractors to extract and transport timber.
- 4 Punjab Wildlife Department and Punjab irrigation and Power Department
- 5 Agency for Barani (arid) Agriculture Development (ABAD)
It coordinates and monitors all development programs implemented by line departments in rainfed areas.
- 6 Directorate of Soil Conservation
It is working for soil and water conservation, for terrace and gullied lands bundling and leveling etc.

Other institutions are: Watershed and Arid Land Development Authority (WALDA), Pakistan Forest Institute, Pakistan Agriculture Research Council (PARC), Barani Agriculture Development Project (BADP) of the Department of Agriculture, Extension NWFP, Barani Agriculture Research Institute (BARI), Cholistan Development Authority (CDA) and Barani Rain Development Authority in NWFP.

Owners Cooperatives have been set up in Hazara for management of private (Guzara) forests after transferring their control from the Forest Department to the Cooperatives. These Cooperative Societies are established under the Cooperative Act and are entitled to receive funds from the Cooperative Banks and other financial institutions.

A Cooperative Federation has been set up to supervise the activities of Cooperative Societies. It takes 1 % share from the total timber sales revenue. These societies also perform other functions such as construction of roads, raising of nurseries, re-forestation and planting of non-forested areas. Owner's share is 60% from the timber sale, 20% are the costs of exploitation and the 20% are for the development purposes. If costs are exceeded, the excess is adjusted from the owner's share. Forest Harvesting Societies are concerned only with the harvesting activities. The shares of the government and owners are in ratio 20:80 or 40:60.

4.8 CONCLUSION

The early history of forest management in British India was started during 1850's but the law was prepared in 1878. The first legislation attempt by the British in India is Indian Forest Act of 1865. Scientific treatment of the forests was started during the period 1871-1900. The commercial exploitation started in 1850's but the first forest law was promulgated in 1878 describing two main legal categories "Reserved Forests and Protected Forests". During 1894 and further in 1904, the work was done to classify the forests like the forests preservation for climatic purposes, for local consumption and pasture lands/grazing grounds. The Forest Act was again revised in 1927. Forest administration was decentralized to provincial governments from central government. Forestry was emphasized for the first time in 1960 when Indus Water Treaty was signed with India. Another event was the merger of Erstwhile States (Dir, Chitral, Swat and Amb into NWFP) in 1970's where an area of about one million ha. of forests land was added thus making forest area of Pakistan to 3 million hectares.

Forestry is a provincial responsibility, yet policy is a federal responsibility. Forestry sector contributed only 0.3% to the GDP in 1981 that dropped to .07% in 1999-2000. It provides about 3.5 million metric cube of industrial wood each year. It contributes 32% of total energy needs as fuel wood. The per capita forest area in Pakistan is 0.0333 hectare where as it is one hectare for the world. The primary reason is that 70 % to 80 % of the land area of Pakistan falls in arid or semi arid zones where precipitation is too low to support tree growth.

There are different types of forests that are determined by different factors. These factors are forest type on geographical basis, forest type on climate basis, on the basis

of ownership, and on the basis of tenure ship. On the basis of ownership, Pakistan's forests are divided into two categories; State Owned Forests and Private Forests. State owned forests are further divided into four classes; Reserved Forests, Protected Forests, Unclassed Forests and Resumed Lands. Private Forests are further divided into Guzara Forests, Communal Forests, Chos Act Area, Section 38 Area and Farm Forests. On the basis of tenure forest types are Protected Forests, Un-Protected Forests, Guzara Forests, and Afforestation Area. Protected Forests are owned by government and the people living nearby have few legal rights, however grazing is permitted. Un-Protected Forests are owned by the government but local people have substantial rights and a 60% share in the proceeds from the sale of produce. Guzara Forests are owned by families. They are either managed by the Forest Department or (since 1981) by Forest Cooperatives. Afforestation Area is privately owned lands being planted by the Forest Department under various projects. The forest types on the basis of geography are Coniferous Forests, Riverain Forests, Irrigated Plantations, Linear Plantations, and Farm Land Trees.

There is neither a well-defined land use policy nor development planning control in Pakistan but only different forests are under the management responsibilities of the government. Forests management depends on many factors some are policy based and others are program oriented for example Forest Policies, Five Year plans, Annual Development Plans, Working Plans. The first forest policy statement before partition was issued in October 1894, with highest priority to the preservation of forests growing on hillsides. A search for a new Forest Policy was started after the independence but the resolution was made in 1955 and the directives in 1962. The Indian Forest policy 1894 was used as a policy guideline to manage forests until 1955. The main aim of the policy 1894 was to conserve the existing forests or to manage them to preserve ecological balance. This policy was not focusing on the increase of forest area and sustains harvest. The main aim and contribution of Forest policy 1955 was to increase area under forestry, agro-forestry, and linear and irrigated plantation, classification of forests on the basis of their utility and scientific management. But the policy ignored the problems of hill and scrub forests and all watershed requirements. National Forest Policy 1962 took some other steps not included in the previous policies. In 1980 government prepared National Policy on Forestry and Wildlife incorporating new changes of the environment making it part of National Agriculture policy 1980. It considered the growing demand of forest products, watersheds and

rangeland problems. Again in 1991 new policy was formulated i.e. Pakistan Forest Policy, 1991. The main goals of the policy included: covering all forest area under the regular working plans, creation of development agencies such as Sind Arid Zone Development Authority (SAZDA) to improve rangelands and productivity of minor forest produce, incentives to farmers to establish horticulture crops to induce private investment, periodic surveys of habitats, emphasized the need of private forestry induction of women in forestry profession, establish green areas in all cities, reserve about 25% area in new township and industrial estates for parks pollution standards for emissions impacting the wildlife, protected areas and increasing forest area from 5.4% to 10% during next fifteen years. National Forest Policy 2002 was another policy prepared with new consideration providing guidelines to levels of governments to frame their own policies focusing on improving institutions and departments for the sustainable development. Other areas include management of rangelands and desert eco-systems, planting of trees and fodders on farmlands, and policies for fragile Eco-systems.

During different five- year plans the monetary allocation increased but there was not much real increase as for as the inflation and increase in forest area is considered. Pakistan has prepared Forestry Sector Master Plan for a period of 25 years (1993-2018). The FSMP has linkages with other plans like Tropical Forestry Action Plan, National Conservation Strategy, Report of the National Agricultural Commission on Agriculture 1988 and Seventh 5- Year Plan (1988-93).

Land Reforms introduced in 1959 and 1972 aimed at reducing the exploitative powers of landlords, distribution of lands among landless tenants and discouraging absentee landlordism. Landowners preferred agricultural lands and surrendered woodlands and wild lands. These were taken by Forest Departments for management and are called Resumed Lands.

As the legislation is concerned in 1947, the Government of Pakistan adopted the Indian Forest Act prepared in 1927, which replaced the Indian Forest Act of 1879. Apart from this various other legislations have been prepared to manage watersheds, rangelands and wildlife. The management of forests includes systematic exploitation, regeneration, afforestation and scientific management. In Hazara, forests were managed not by the forest Act but by the Hazara Forest Act 1936. As the employment in the forestry sector is concerned there is no separate legislation for workers of wood based industries.

CHAPTER 5

FORESTS AND FOREST POLICIES IN NWFP

5.1 INTRODUCTION

North West Frontier Province is rich in natural resources and is a source of forest production for the country. With growing population and high demand for timber and fuel wood, these forests are fast depleting. Add to this agriculture area especially cropped area is increasing. Following chapter highlights the main features and potential resources of the province. The share of NWFP in forestry, agriculture, livestock, irrigation and population shows the importance of the province to the economic growth of the country. Past initiatives of the government to promote forestry are also discussed.

5.2 ENVIRONMENTAL PROFILE OF NWFP

Population wise ranking of The North West Frontier province is third and area wise ranking of the province is fourth among four provinces of the country. Geographical area of NWFP is 10.17 million hectares that is 12.7% of the total area of the country. Cultivated area is 8.9% of total cultivated area of the country. Irrigated area is 4.63% of the total irrigated area of Pakistan. NWFP population is about 16% of the total population of the country. The total Reported area of NWFP is 5619307 hectares (Wani, et al 2004 and Govt. of NWFP, 2005).

Khan (1991) described that there are 7 divisions and 24 districts of NWFP. Each of these districts is broken down into several smaller administrative units called tehsils. Beside the four provinces in the country, there are certain areas, with a special administration under the relevant ministries of the federal government. These areas include the Federally Administered Tribal Areas (FATA), Federally Administered Northern Areas (FANA) and Azad Kashmir. These areas, which otherwise lie within the geographical boundaries of the NWFP, are administered at the federal level by the States and Frontier Regions Divisions.

The province may be divided into the following three physical divisions:

a) Northern Mountainous Areas

According to Sarwar, (1999) the districts of Chitral, Dir, Swat, Malakand, and protected area in Malakand division, Kohistan, Mansehra and the north-eastern part of Abbottabad district in Hazara division are generally the areas with high mountains. In the extreme northwest of this area, in Chitral district, lies the famous Hindu Kush range, whose highest peak is "Tirich Mir". In the central part of the area is the Kohistan range and in the east the offshoots of Himalaya and the Pir Panjal ranges. The important river valleys are those of the Chitral, Swat, Panjkore and Kunhar rivers. The mountains of Swat and Kohistan are generally barren and rugged while those of Abbottabad and Mansehra are covered with forests.

b) Central Hilly Areas

The hilly areas of the province cover major parts of Kohat and Bannu districts and portions of Peshawar and D.I. Khan districts. The hills in the west are the northern end of the Sulaiman range. Most of these hills are about 1,000 meters high, with the highest point about 2,000 meters (Khan,1991).

c) Plains

Peshawar, Mardan, D. I. Khan, Bannu and Haripur districts constitutes the plain of the province. The Kabul River flows through the centre of Peshawar plain. The second important plain is of D.I. Khan District. It is an arid to semi-arid plain bounded in the north by the Marwat and the Khisor ranges and in the east by the Indus River. In the west it is bounded by the hills of the Sulaiman range. The Bannu plain is a broad basin of the Kurram and Gambila Rivers. It is surrounded by the hills of Kohat district in the east, Sheikh Budin or Marwat range in southeast and in the west by the hills of the Sulaiman range. The plain is drained by the Kurram and Gambila Rivers. The last important plain tract of the province lies east of the Indus River in Haripur tehsil of Abbottabad district. The plain starts at a point where the Dor River emerges from the hills and runs south between the Nara and Khanpur hills in the east and the Tanawal and Gandgar hills in the west.

Climate

Kureshy (1997) described that climatically the region is diverse. The D.I. Khan district in the south is one of the hottest areas of the province with a maximum temperature of 48⁰ - 50⁰ C. The mountainous regions are temperate during summers while winters are extremely cold and often below freezing. There is a wide variation

in precipitation (150 mm in Chitral, 250 mm in southern D.I. Khan and over 1,000 mm in the mountains north of Mansehra).

Irrigation System

The irrigation system of the province depends on Kabul River Canal, Lower Swat Canal, Upper Swat Canal, Warsak-Swat Canal, Marwat Canal, and Paharpur Canal. The irrigation system, coupled with poor drainage of the soil and heavy cropping intensity have created water logging and salinity in the plains of the province (Khan, 1991). In the non-irrigated areas of the province, irrigated agriculture is largely confined to the development and use of ground water. It is estimated that nearly 85 percent of the irrigated land receives water supplies from irrigation canals and 15 percent from ground water.

The Indus, Kabul, Swat, Chitral, Kunar, Kurram are the important rivers in the province (Khan, 1991 and Kureshy, 1997).

Table 5.1: Irrigated Area

Irrigated area	(hectares)
NWFP	871663
District Abbottabad	7040
District Mansehra	20557

Source: Compendium on Environment Statistics of Pakistan-2004 and GOP, 2005

The above table shows that irrigated area of district Mansehra is more than district Abbottabad.

5.3 POTENTIAL RESOURCES IN N.W.F.P

The Province has mainly agro based economy producing wheat, maize, gram, jawar, bajra, barley, rice, sugarcane, sugar beet, tobacco, fruits and vegetables. Land used intensity stands at 61.71% and cropping intensity is above 100%. The province has 17.85% of the geographic area is under forest. Major industries are furniture, safety matches, and paper and board mills.

The province has large number of mineral resources like emeralds, phosphate, lime stone, gypsum, marble, chromites, china clay, soap stone, coal, silica sand, magnesite, dolomite, slate stone, rock salt etc.

According to the Govt. of NWFP (2005) the share of NWFP in the unemployment and underemployment of Pakistan is 15%. Value added of NWFP's agriculture in the total national value is 26%. Incidence of poverty in Pakistan is 32.7% but in settled district of NWFP it is 44%. The share of rural population decreased from 82.2% in 1951 to 67.5% in 1998 indicating rapid urbanization. Housing units were 7.816 m in 1960 that increased to 19.211 m in 1998 (grew by 2.39% which is 0.7% less than population growth).

The following table shows the trends of population from 1972 to 2000. Population of NWFP was 12% of the country in 1972 that increased to 13% in 2000. But in both the districts, the research area of the present study, the share of their population to the province has declined.

Table: 5.2 Population Trends in Study Area

Population	1972-73	2000-01
Pakistan	65.3 m	139.5 m
NWFP	8.4 (12.8%)	18.7 (13.4%)
District Abbottabad	0.55 m (6.5% of NWFP)	0.88 m (4.7% of NWFP)
District Mansehra	0.72 m (8.5% of NWFP)	1.2 m (6.4% of NWFP)
Population Density		
Pakistan	82	166
NWFP	113	238
District Abbottabad	-	448
District Mansehra	-	252
Average popu. Growth	From 1981 to 1998 (%)	
Pakistan	2.69	
NWFP	2.82	
District Abbottabad	1.82	
District Mansehra	2.4	

Source: Economic Survey of Pakistan, 2004 and NWFP Development Statistics, 2005

The following table highlights the area wise and population wise position of the two districts in the province. Out of total twenty four districts, the two districts have the following positions:

Table: 5.3 Area and Population wise Ranking of the Study Area

	Area as % of NWFP	Area wise position	District as % of NWFP population	Population Wise position among 24 districts
District Abbottabad	2.64	10 th	4.97	7 th
District Mansehra	6.14	5 th	6.5	4 th

Source: Compendium on Environment Statistics of Pakistan-2004 and GOP, 2005

Eighty-five percent of the total population residing in the rural areas of NWFP are directly connected with agriculture. According to 2002 figures the land utilization statistics in N.W.F.P. are as follows: -

Table 5.4 Land Use Statistics of Pakistan (m hec.)

S. No.	Items	Pakistan	N.W.F.P.	Percent Share of NWFP
1.	Geographical Area	79.610	10.170	12.77
2.	Reported Area	59.320	05.620	09.47
3.	Cultivated Area	22.160	01.670	07.54
4.	Net Sown Area	15.660	01.260	08.05
5.	Total Cropped Area	22.040	01.800	08.17
7.	Un-Cultivated Area	37.160	03.950	10.63
8.	Forest Area	04.244	01.684	40.00

Source: The State of Forests in Pakistan through a Pressure-State- Response Framework, Suleri (2002), SDPI, Islamabad

Livestock population of the country was 115 m in 1998 and become 138.5 in 2000 (Wani, et al 2004). Livestock position of the province is as follows:

Table 5.5: Livestock Population

S. No.	Items	% Share of NWFP
1.	Cattle	16.2
2.	Buffaloes	6.4
3.	Sheep	6.4
4.	Goats	11.2

Source: Agriculture Statistics of Pakistan 2000-2001

This data shows that share of NWFP is 16%, 6%, 6 %and 11% respectively for cattle, buffaloes, sheep and goats. Keeping in view its area and human population, NWFP has larger share as compare to country's average in cattle and goat population.

The province has also high contribution in the overall hydroelectric power generation for the country. If electricity consumption is to be taken as an indicator, between 1972 and 2000, it increased about 4 times in Punjab, about 5 times in NWFP, about 18 times in Balochistan, over 3 times in Karachi and over 7 times in Sindh excluding Karachi. Another significant factor is that NWFP and AJ&K produce a sizable percentage (over 40%) of the total electricity, while they consume only a small amount of it. Total installed hydro generation capacity (WAPDA) of NWFP is 3766 MW (NTDC, 2007 and Ali, 2003).

5.4 FORESTS IN THE NWFP

NWFP has 40% of the country's forest resources. These forests are mostly coniferous forests. The main coniferous trees include fir, deodar, blue pine and spruce. Shrub forests are also found in the foothills and plains of Peshawar, Mardan and Kohat districts. In Kohat district there exist dwarf palm, locally known as mazri. Most of the forests of the province are in Hazara and Malakand Division. Agricultural land covers about 15%, rangelands are spread over 48% of the area, barren lands are just 1% (Steimann, 2004).

According to Govt. of Pakistan (2005 b) per capita electricity consumption in Pakistan during 2002-03 was 363 KWH, whereas it was 239 KWH in NWFP i.e. 9.22% of Pakistan. Electricity generation by NWFP as percentage (%) share of Pakistan during 2000-01 was 22.56%. About 55% of the total gas in NWFP is consumed by household during 2000-01.

Table: 5.6 Housing units by type of cooking fuel In Pakistan

Cooking fuel	1980	1998
Wood	70%	69%
Kerosine	6.2%	3.7%
Gas	6.5%	20.2%

Source: Compendium on Environment Statistics of Pakistan-2004 and GOP, 2005

The above table shows that dependence on wood as fuel source has not substantially decreased. However, consumption of gas as fuel has increased.

Table: 5.7 NWFP- Housing Units by Source of Lighting and Cooking Fuel

Source of Lighting	1999-2000 (%)
Electricity	72.04
Kerosine oil	24.04
Others	3.19
Cooking Fuel	
Wood	86.54
Kerosine	1.32
Gas	8.79
Others	3.35
Total Housing units (No.)	2210455

Source: Economic Survey of Pakistan 2004 and Compendium on Environment Statistics of Pakistan-2004, GOP, 2005

The above table shows that in NWFP electricity is the main source of lighting and more than 86% of the population depends on wood as cooking fuel whereas a small

number of people depend on kerosene oil and gas is available to just 9% of the population.

Table: 5.8 Land Use Statistics in the Study Area during 1999-2000

	Dist. Abbottabad	Dist. Mansehra
Population	910 (000 persons)	1204 (000 persons)
Reported Area	178 (000 hec.)	439 (000 hec.)
Cultivated Area as % of reported area	35.39%	18.45%
Irrigated Area as % of cultivated area	11.11%	24.69%
Forest Area	83 (000 hec.)	332 (000 hec.)
Forest area as % of Reported area	46.63%	75.63%
Land Use intensity	83.5%	82%
Cropping Intensity	88.28%	136.7%

Source: NWFP Development Statistics, 2004 and Compendium on Environment Statistics of Pakistan-2004

The above table shows land use statistics of district Mansehra and district Abbottabad. Forest area and irrigated area of district Mansehra are higher than the other district. But cultivated area as percentage of reported area is higher in district Abbottabad as compare to district Mansehra.

Protected area in NWFP is 5.13 % of the total land area of the province. There are 3 national parks (out of 14), 6 wildlife sancturies (out of 99), and 38 game reserves. Share of NWFP in production of forests is 47.41%. The share in out-turn of firewood is 28.64 % whereas Punjab has highest with 53 %. Share in out-turn of timber is 31% which is second highest, whereas Azad Kashmir has highest share with 39% in 2000. The share of NWFP in revenue earned by Forest Departments was 47.3% that was highest as compare to other territories of the country (Wani, et al 2004).

Forest Area of NWFP during 2001-02 is as follows: -

Table 5.9 Forest Area of the North West Frontier Province

	Forest Area (Million Hectares)	Forest Area as percentage of total land
Pakistan	3.79	4.76%
N.W.F.P.	1.68	17%

Source: Forestry Statistics of Pakistan by Wani, et al 2004

The above table shows that only 4.76% of the total geographical area of Pakistan is under forest that is very low as compare to the required area of 25%.

Table 5.10 Share of NWFP in Rangelands

Area	Pak. (m. hectare)	%	NWFP (m. hectare)	%
Agriculture Area	20.58	23	1.546	15
Rangelands	28.507	32	4.894	48
Barren Lands	26.893	31	0.138	1

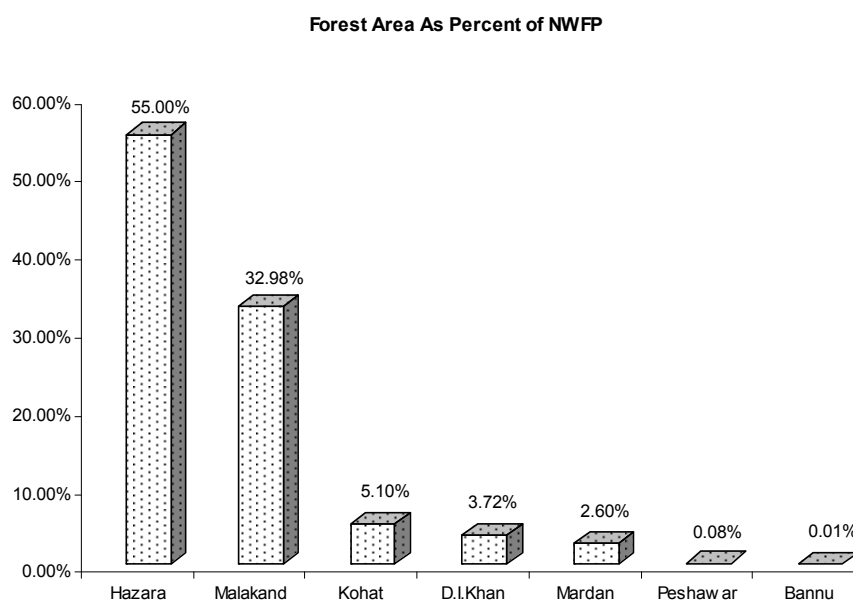
Source: The Decentralization and Participation in Forestry Sector of NWFP, Pakistan- The Role of the State”, Working Paper No. 7, Bernd Steimann, 2004

The above table shows the percentage share of NWFP in agriculture area, rangelands and barren lands. About 48% of the rangelands of Pakistan are in NWFP. The barren land is just 0.138 m hectares (1%) in NWFP.

Table 5.11 Forest Areas of Divisions in NWFP

Division	Forest Area As Percent of NWFP
Hazara	55.00 %
Malakand	32.98 %
Kohat	05.10 %
D.I.Khan	03.72 %
Mardan	02.60 %
Peshawar	00.0804 %
Bannu	00.012 %

Source: Calculated by the researcher from the data taken from Govt. of NWFP (2005) and GOP (2005 b) on 1999-2000 figures basis



The above table and graph shows the ranking of forest areas of all divisions in NWFP. The percentage of forest area of Hazara division is highest among all divisions.

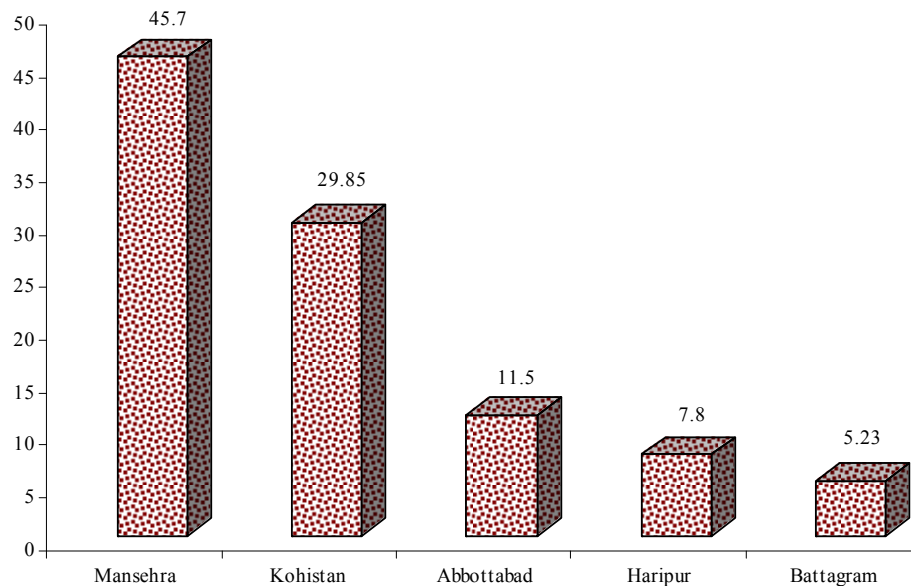
Table 5.12 Forest Areas of Hazara Division

Hazara Division	Forest Area (000 hec.)	Percent of the Division
Mansehra	332	45.7
Kohistan	217	29.85
Abbottabad	83	11.5
Haripur	57	7.8
Battagram	38	5.23
Total	727	100

Source: Calculated by the researcher from the data taken from Govt. of NWFP (2005) and GOP (2005 b) on 1999-2000 figures basis

The above table shows the forest areas of different districts in Hazara division ranking from high to low. The forest area of district Mansehra and district Abbottabad is 45% and 11.5% respectively of the divisions' forest area.

Forest Area of Hazara Division in Percent



5.4.1 Categories of Forests in NWFP

Mehmood (2003) and Steimann (2004) have described the following categories of forests in the NWFP on the basis of legal rights, ownership patterns, and on the basis of management responsibilities:

1. Reserved Forests

These are the forests, which are actually the property of the government and carry only few concessions like right of ways, fuel wood collection and permission of grazing by local communities. These forests are found in Hazara division. Around 6% of NWFP forests fall in this category. In these forests everything is disallowed except those permitted, and are demarcated for the objective of forest conservation. Provincial Forest Department is responsible for the management of these forests.

2. Protected Forests

These forests were taken from the states of Chitral, Dir and Swat. They have been declared as government property on the basis of payment of royalty on timber sale to the local right holders at 60% to 80% ratio. Royalties are as 60% share in Malakand Division and 80% share in Hazara Division. Out of total, 30% of the province forests fall in this category. Local people have a few rights, for example use of timber for locals with the permission of the FD, fuel wood and grazing etc. Protected forests were originally under private ownership but were resumed by the Provincial Governments under different reforms and since then all commercial and other activities are not allowed in these forests.

Grazing and grass cutting in these forest may be allowed by charging fee, and type, number and season of grazing animals to be decided by the Divisional Forest Officer. Any part of these forests may be closed for the purpose of regeneration or conservation.

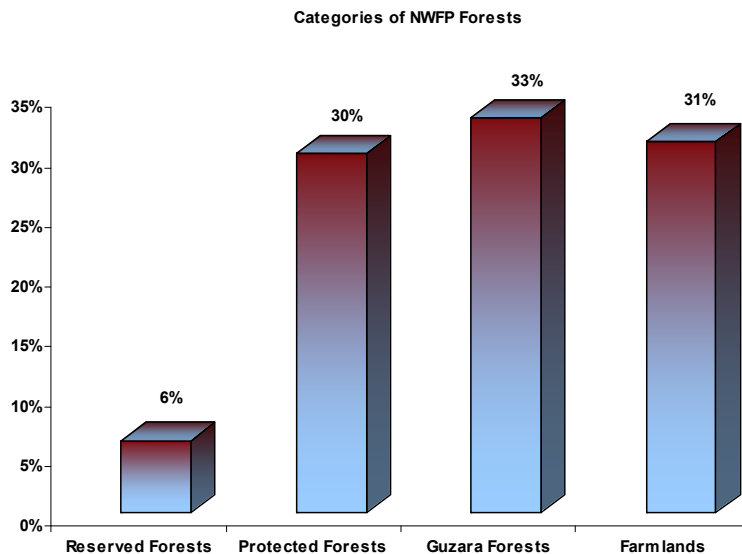
3. Guzara Forests

These forests are also called wasteland in documents and are the property of the local owners. Out of total, 33% of the province forests fall in this category. These forests are privately owned but managed by the FD. Only owners and right-holders in these forests can cut timber with the permission of the FD, others have no right to apply for the permit. Dry wood can be collected by people with the permission of right-holders. These forests are found in Hazara Division. With respect to their legal status, two classes of Guzara forests are recognized, namely, Mahduda and Ghair mahduda. Mahduda also known as protected waste lands, were demarcated and not allowed to for cultivation, house building. Ghair Mahduda had not such restrictions.

The Government has the right to demarcate and protect any part of the Guzaras against erosion, degradation or any prohibiting practice. The cost of management would be taken from the right holders and landowners. A Guzara may be individually owned locally called Malkiat or jointly owned by families and communities called Shamilat. According to one survey (Rafique, 1990), 81 percent of Guzara is owned by 12.3 percent of the households in the area, with each household owing an average of 196 acres (80 ha). There is a lot of literature on land tenure for agricultural lands, but little on tenure in forest areas. The Forest Department in Abbotabad Circle, NWFP does not keep ownership records for Guzara, and private forests as these can be sold, so their ownership keeps changing. The ownership of communal forests is recorded in the revenue record maintained by the Revenue Department. When a parcel of forest is sold, the permission of all the owners is necessary. Sales can be either with or without rights in the forests, and individuals with rights in communal forest can sell those rights to other individuals. Private forest owners can sell the ownership of forest land with or without rights to grazing, the proceeds of commercial harvesting, wood collection, etc.

4. Plantation and Trees on Farmlands

These are mostly individual properties. The remaining 31% of NWFP forests are plantations and trees on farmlands as well as communal and private forests. According to the Local Government Ordinance 2001 Farm forestry has been devolved to the local level (district level) (IUCN, 2003).



5.5 HARVESTING SYSTEMS

According to Mehmood (2003) there are two types of harvesting systems being practiced in the N.W.F.P since 1900.

Departmental System

Under the departmental harvesting system, the forest department hires the labors of work contractors. The timber then obtained is taken out and sold through sealed tenders or open auctions. In case of state forests the total sale value is given to the government. However, for other forests the sale proceeds are divided between the owners and government at the rate of 80:20 or 60:40.

Contractor System

This system was introduced in 1907. Under this the standing trees were sold through sealed tenders to the registered forest contractor. The amount of sale proceeds was recovered from the contractors in installments. This system was abolished in 1974. An alternative system in the form of Forest Development Corporation was created and launched in 1976. Apart from this, two more societies were created to look after the owners of the forests, which were:

- 1) Multipurpose Forest Cooperative Societies (MFCS)
- 2) Forest Harvesting Cooperative Societies (FHCS)

The Forest Cooperative Societies

The Guzara owners were not satisfied with the managerial control of the Forest Department. In their view FD could not protect the forests from migratory graziers and could not meet the demands for forest products. They made many petitions, finally the transfer of management of these forests took place to the owners organized cooperatives. Cooperative management of Guzara forests was launched in 1980 under the Cooperative Act 1925. But due to the strong influence and politics of the forest contractors in 1992 the government abolished all the 33 societies established in Hazara. The people were not taking serious interest in participatory resource management. The organization was dominated by few owners, with no participation of small right holders. Non-forested land close to Guzara forests was totally ignored. This was against the spirit of integrated resource management. The plans prepared for the management of these forests by the Forest department were suffering from many faults, resulted in cutting of trees far in excess of sustained yield.

5.6 PAST INITIATIVES IN NWFP FORESTRY: LEGAL AND INSTITUTIONAL REFORMS

The majority of NWFP statutes on natural resources deal with forests. Legislation adopted prior to the 1990s focuses largely on regulating natural resource exploitation. It is only late 1990s that NWFP begins with sustainable development. After independence in 1947, the Forest Act 1927 was enforced in the country including NWFP (but not in FATA). The NWFP Hazara Act 1936 (now has been repealed by the NWFP Forest Ordinance 2002) was enacted for Hazara division. The 1975 NWFP Wildlife Act did not specify the office or the authority responsible for the management and protection of wildlife. It only provided the establishment of NWFP Wildlife Management Board whose functions were merely advisory. The Water and Power Development Authority created in 1958 covered powers to administer fresh water resources including the conservation of forests and catchment areas but did not deal with dumping of human and other wastes into freshwater (River Protection Ordinance 2002 deals with this issue). Rural and urban development in the NWFP is governed by a significant number of legal instruments but provides few criteria or guidelines for administration. Laws governing the agriculture sector have been framed by the Federal Government or adopted from the British colonial administration and operate as provincial laws.

Mineral oil and natural gas are included in the Federal Legislative List. Other types of minerals and mining itself are not mentioned in either list. Exploitation of minerals other than oil and natural gas therefore, is a provincial subject. Laws governing extractive industry in the NWFP provide limited, discretionary protection to trees but do not provide guidelines for managing the effects of mining operations on natural resources. Legislation for the non-extractive industrial sector in the NWFP only focuses on licensing, pricing and other administrative matters but not on the regulation of impacts of the activities. Laws governing Hydel and energy sector is relatively recent, but deals purely with administrative matters. No criteria are provided for sitting and operating hydel schemes in the legislation. Land Reforms (NWFP) Act 1972 contains no provisions related to natural resource management. The main aim of the NWFP Land Reforms Rules 1972 was to improve the economic condition of the rural population by making agriculture a profitable vocation but does not specify how this is to be done. North West Frontier Province Timber Market

(Peshawar) Ordinance 1972 establishes timber markets in the province and allows the government to acquire land for this purpose. The provisions of this Ordinance can not be questioned in the court of law where as in case of number of other laws, the jurisdictions are always open for the civil courts to decide. Hazara District Protected Forest Rules 1973 cover matters related to the cutting of trees and issuance of licenses for this purpose. These rules remain in force to the extent they are consistent with the Ordinance 2002. North West Frontier Province Establishment of Sale Depots and Sawing Units Rules 1975 require all depots and mills be registered with the Forest Department. North West Frontier Province Forest Produce Transport Rules 1975 and North West Frontier Province Management of Protected Forests Rules 1975 remain in force to the extent they are consistent with the Ordinance 2002. North West Frontier Province Forest Development Corporation Ordinance establishes the Forest Development Corporation. It is empowered to establish primary wood processing units. Hazara Forest and Local Government Laws Ordinance 1978 has now been repealed by Forests Ordinance 2002. The NWFP (Conservation and Exploitation of Certain Forests in Hazara Division) Ordinance 1980 provisions are consistent with the Forests Ordinance 2002.

North West Frontier Province Establishment of District Development Advisory Committees Act 1989 establishes committees to formulate and recommend proposals for the district Annual Development Programme. Galiyat Development Authority Act of 1996 and Amendment in 1999 resulted in establishment of the Galiyat Development Authority to formulate schemes in the areas of education, health, agriculture, industry, forest conservation, wildlife protection, tourism, water supply, landslide management, irrigation, communication, housing sewerage, environmental improvement and slum clearance. Similarly Kaghan Development Authority Act 1996 and Amendment 1999 have similar provisions to those of Galiyat Development Authority Act 1996. North West Frontier Province Katchi Abadis Act 1996 provides for the regularization and development of temporary settlements or shanty towns. Hazara Forest (Amendment) Ordinance 1997 enables village communities to participate in the management of a reserved forest but the form and extent of participation are left undefined. This ordinance remains in force despite the promulgation of the NWFP Forest Ordinance 2002. NWFP Forestry Commission Act 1999 establishes a forestry commission and forestry roundtable. It oversees the

process of institutional and legislative reforms and performs advisory functions and resolve conflicts between stakeholders (IUCN, 2003 and Steimann, 2004).

Apart from the above ordinances and rules, a number of policy documents are in force related to wildlife, fisheries, salinity control and irrigation.

Following are other initiatives taken for forestry development in NWFP:

Kalam Intergrated Development Project (KIDP)

This program was launched by Swiss government from 1981 to 1998. Focusing on community based programs by establishing Community Based Organizations (CBOs) in Kalam and Bahrain Tehsils. It started with forest related activities like to establish local timber check posts and developing a new harvesting system but then its activities extended to agriculture, marketing and social life of the communities (Suleri, 2001). According to one impact assessment report of KIDP prepared in 2005, the communities are better off as compare to others in the same region. Agricultural diversification was the most successful result of the project. However, the project could not complete many s because of its suspension.

Social Forestry Project Malakand and Dir (SFPMD)

The Dutch sponsored project started from 1987 and ended in 1997 aimed at social organization of local communities. It launched the Village Land Use Planning approach (VLUP) that was then adopted by the Forestry Sector Project (FSP) and also resulted in the establishment of a Social Forestry Section in the Forest Department. The main goal of the project was to upgrade the standard of living of people of Malakand Agency and Dir District by enhancing the productivity and use of the hilly areas and marginal lands that covers a large part of the region. The program started from simple plantation practices and then extended to other areas like range The main objective of VLUP was to train the local communities to develop the management plan to increase the productivity of trees, shrubs and other species on private and common lands. Attention was also given to women issues. Conflicts of interest, power sharing at village level and disputes over the protection of the communal areas under management were some of the major constraints faced by the project.

The project introduced some innovations, such as fine money imposed on offenders now will go into the village fund, which the project has set up. An interesting point is that the fine for the women offenders had been fixed by the villagers twice the amount imposed on men on the ground that women did not know how to lop trees and were destroyers of the forests. But the project suggested that there should be a uniform system for both men and women and those men should train the women in lopping trees.

Siran Forest Development Project (SFDP)

The project was started by German government in 1992. Under this program Joint Forest Management Committees (JFMCs) had been set up in Pakistan to bring together the local people and FD officials. This idea was first introduced by this program.

It was started from Siran Forest Division, and Agror Tanawal Forest Division the densely forest regions of Hazara Division. It was closed down, till the Swiss-funded Forest Management Centre Support Unit (FMCSU) again started to launch JFM, in the same area. A Joint Forest Management Committee (JFMC) was elected on democratic lines by the locals to implement the program.

The JFM during 1990s gave encouraging results like better permit procedure for construction timber. Both JFM and VLUP were based on the same principles, so both were merged. The only difference was with the scope of the approach i.e. JFM: designated forest area and VLUP focused on only village area, and also the degree of involvement of the FD in management was high in JFM than in VLUP. The joint approach led to many misunderstandings. The FD did not agree to include local people in the management of designated forests. The main reasons for disagreement between province and district level governments were the power and control exercised by the both governments, and the distribution of funds between the two levels.

Provincial Forest Resource Inventory (PFRI)

Since after the floods there was a ban imposed on commercial timber harvesting so it was important to estimate and meet the supply and demand of timber. With the help of the German GTZ, an in-depth study in NWFP was started to establish a scientific data base and to identify further activities related to state of forests of NWFP. The

report of PFRI for the first time pointed out the alarming gap between supply and demand and predicted the extinction of forests within the next two decades.

Forestry Sector Master Plan (FSMP)

In 1992, the Government of Pakistan with the help of ADB and UNDP prepared a 25-years master plan for a national perspective of the forest sector and its future priorities. The identified areas were: doubling tree cover in area terms and quadrupling wood production until 2018 by intensified and scientific management plan.

Hazara Protected Forest Rules 1996

Most of the forest policies in Pakistan were completely related to their colonial past. Apart from minor changes, the Forest Act 1927 was never adapted until 1996; the Act was modified then with the Hazara Protected Forest Rules of 1996, describing a mandate and guidelines for forest management in the province.

The Forest Policy 2001 and The NWFP Forest Ordinance 2002

The NWFP Forest Policy 2001 is focusing on participatory approach in forest management. Participation of local communities, encouragement of private sector investment, illegal harvesting and the local need for fuel wood and construction timber are considered as the main problems.

The Ordinance that has been promulgated in 2002 defines the institutional details for forestry in the province, considering the guidelines of the Forest Policy 2001. The Territorial Staff of the FD is mentioned as a 'force' and can now carry weapons on duty for self-defense, but only Range Officers are allowed to open fire. The ordinance has given more powers to the staff in dealing with offenders. The Ordinance also provides a legal cover to Village Land Use Planning and Joint Forest Management. The Ordinance has replaced the former Forest Act 1927.

An important feature of the Ordinance is that it gives power to the government to assign any reserve forest to any community as village forest. The government may make rules to regulate the management of village forests, and prescribe joint responsibilities for the provisions of the rules. So far, no progress in making rules for village forests has been notified by the Government of NWFP.

The said law demands that the rates of sale to be revised every ten years, but the rates i.e. seigniorage⁵ fee that had been fixed in 1912 were not revised until the promulgation of the Ordinance 2002. NWFP Forest Department charges fees on private sales whereas pays fees on sales from State forests.

Village Land Use Planning (VLUP)

A mechanism for the integration between the Forest Department and local people was Village Land Use Planning (VLUP), the measure which has been introduced in the province by the Social Forestry Project Malakand and Dir in the early 1990s. The whole province was divided into three Resource Management Circles (RMC) and twenty nine Resource Management Units (RMUs), which are further sub-divided into 118 Resource Management Sub-Units (RMSs). This approach covered about 5,000 villages, out of which about 3,000 were considered significant. RMSs served as planning units for which operation plans (OPs) were prepared that provided an organizational basis and support for implementing village land use plans (VLUP).

Village Development Committees (VDC) and Women Organizations (WO) had been established under Village Land Use Planning program. A study was conducted (Babar and Tanvir, unpublished) to find out the degree of trust and level of participation in local institutions by Various local institutions. The institution of JIRGA was also selected for this study, because it is the most important village level local institution for dispute settlement and other collective problems. The Union Council (UC) was also taken (though it has not any direct involvement in forestry because the forest department was not devolved to local power plan), but local councilors were also the members of the VDCs. The results indicated that the respondents showed least trust on WO. Similarly the respondents had less trust on the forest department, while the JIRGA enjoyed highest trust of the villagers.

In Mansehra District the respondents showed very low trust on the Joint Forest Management Committee (JFMC) mainly because it comprised of very influential forest owners, and the common respondents were unaware of its activities. The trust of the respondents on local institutions like VDC, union council and JIRGA was higher than that of the government institutions. Interviews with some informants

⁵ Seigniorage fee is a reciprocal right enjoyed by the people fo state owned reserve forests and by the government for privately owned Guzara forests. The fee is payable on the revenue earned from the sale of harvested trees; the rates are to be fixed by the government.

showed that the WO exists only on paper and in many villages even a single meeting of WO was not held for years. The observations revealed that the local people are loosing their trust on these institutions and the forest department is responsible for the mistrust. The forest department did not consider for the demands and suggestions of the VDC/WO. The study further revealed that in some areas the forest department had not paid wages to local labors for several months where the VDC had done plantation.

There are numerous environmental NGOs in the NWFP. Two of them are most important. These are Sungi and SAFI. The Sungi Development Foundation has been established in 1989. Sungi works on issues of policy advocacy and community development. It covers more than 100 communities and about 150 community-based organizations in Hazara. In 1997, Sungi established the Sarhad Awami Forestry Ittehad (SAFI), an alliance of various forest stakeholders addressing and challenging the forest reform process by state. The main aim is to protect the people's rights in forests. By 1999, SAFI had a membership of around 3000 forest dwellers, organized with committees at provincial, divisional, and district level.

Several international donors support the forestry sector reforms in the NWFP. Among them are the Swiss and the Dutch government and the Asian Development Bank (ADB) that jointly established the Forestry Donor Coordination Group, a platform for discussing forestry-related issues with the government.

5.7 CONCLUSION

The North West Frontier province is the smallest province in terms of area of the four provinces of Pakistan. The irrigation system, coupled with poor drainage of the soil and heavy cropping intensity have created water logging and salinity in the plains of the province. The province is rich in forests and 17 % of the geographic area is under forest and are primary sources of furniture, safety matches, and paper and board mills industries. Incidence of poverty in NWFP is higher than the national average. The share of rural population has decreased indicating rapid urbanization. Housing units have been increased. Eighty-five percent of the total population residing in the rural areas of NWFP are directly connected with agriculture.

The Hydel energy is a big source of NWFP, with a number of major hydroelectric power projects. Per capita electricity consumption in NWFP is 9.22% of the country. Electricity generation by NWFP as percentage (%) share of Pakistan is 22.56%. In

NWFP the dependence on wood as fuel source has not substantially decreased. However, consumption of gas as fuel has increased. Electricity is the main source of lighting and more than 86% of the population depends on wood as cooking fuel. The province has a high contribution in the overall electric power generation for the country.

NWFP has 40% of the country's forest resources. These are mostly coniferous softwood forests with some broad leaf species growing at the lower altitudes. Most of the forests of the province are found in the valleys of Hazara and Malakand Division. Forest area and irrigated areas of district Mansehra are higher than district Abbottabad. But cultivated area as percentage of reported area is higher in district Abbottabad as compare to district Mansehra. The share of NWFP in production of forests is 47% and in out-turn of firewood is 28 %. Share in out-turn of timber is 31% which is second highest, whereas Azad Kashmir has highest share with 39% in 2000. The share of NWFP in revenue earned by Forest Departments was 47.3% that was highest as compare to other territories of the country. About 48% of the rangelands of Pakistan are in NWFP. Only 1% of the barren land of the country is in NWFP. The percentage of forest area of Hazara division is highest among all divisions. The forest area of district Mansehra and district Abbottabad is 45% and 11.5% respectively of the divisions' forest area. The forests in the NWFP are divided into different legal categories, based on ownership patterns, rights and management responsibilities. Reserved Forests which are situated in Hazara division are 6% of NWFP forests. Second is Protected Forests. These forests were inherited from the princely states of Chitral, Dir and Swat. Out of total, 30% of NWFP forests are in this category. Third category is Guzara Forests. About 33% of NWFP forests are in this category. The remaining 31% of NWFP forests consist of plantations and trees on farmlands as well as communal and private forests. There are basically two types of harvesting systems being run in the N.W.F.P since 1900. One is Departmental System under which the forest department directly engages the labor crews of work contractors. The timber so obtained is taken out and sold through sealed tenders or open auctions. Second is Contractor System. Under this system the standing trees were sold through sealed tenders to the registered forest contractor. The contractor system was abolished in 1974. An alternative model in the shape of Forest Development Corporation was created and formally launched in 1976. Other than this, two more societies were

launched to look after the owners of the forests. But in 1992, Forest Cooperative Societies were abolished in Hazara. The majority of NWFP statutes on natural resources deal with forests. Legislation adopted prior to the 1990s focuses largely on regulating natural resource exploitation. It is only late 1990s that NWFP begins with sustainable development. After independence in 1947, the Forest Act 1927 was enforced in the country including NWFP. The NWFP Hazara Act 1936 (now has been repealed by the NWFP Forest Ordinance 2002) was enacted for Hazara division. North West Frontier Province Forest Development Corporation Ordinance establishes the Forest Development Corporation. Other than this there are numerous environmental NGOs and programmes for forestry development in the province.

CHAPTER 6

RESULTS AND DISCUSSION

6.1 INTRODUCTION

The present chapter is divided into two parts. Part first presents the results of the primary data. Part second discuss and analyze the results of the primary data and the results obtained from Linear Regression Model using secondary time series data of selected macro- economic variables. Results of the model are further discussed in the light of the primary data. Other studies have also been used to interpret the results. The implications of the results have also been specified.

PART 1

6.2 RESULTS OF PRIMARY DATA

Following are the results obtained from two districts; Abbottabad and Mansehra.

Table 6.1 Gender and Age of Respondents

District	Gender (%)		Age (%)			
	Male	Female	NR	Up to 30	31-60	>60
Abbottabad	75	25	1	30	49	20
Mansehra	79	21	3	32	54	11
Total	77	23	2	31	51.5	15.5

Source: Field Survey

The table 1 shows that total sampled population include at least 20% female. Most of the female are either serving as teachers or taking care of the household. Female participation in forestry related services are very low. All age groups have been included. Out of the total sampled population 31% are young, most of them are students and teachers, rest are doing labor work. In both districts, 51% of the sampled population belongs to the age group above 30 and below 60 years.

Table 6.2 Level of Education

District	NR (%)	Uned (%)	Primary (%)	Middle. (%)	Matr (%)	FA (%)	BA/ BSc (%)	High (%)
Abbottabad	5	0	3	14	29	20	21	8
Manshra	3	2	16	4	20	17	21	21
Total	4	1	9	9	24	18	21	14

Source: Field Survey

The table 2 shows the level of education of all respondents. Six levels show that only 9 % respondents are primary educated, 9% are middle, 24% are metric, 18% are F.A., 21% are bachelor in science or arts and 14% are highly educated i.e. they have master or M.Phil degrees. Out of the total, 99% respondents are educated. Abbottabad city is considered as a seat of learning in the country, having some of the good institutes here. However, in both the districts, education has not changed their attitude towards forest conservation unless alternate energy resources are not provided.

Table 6.3 Profession of Respondents

District	Profession (%)				
	NR	No job	Agri.	Serv.	Small business/Lab.
Abbottabad	0	4	16	61	11+8
Manshra	2	5	12	49	25+7
Total	1	4.5	14	55	18+7.5=25.5

Source: Field Survey

Table 3 shows the professions of the respondents. Most of the population is in services. Services include government services, education, law, nursing, etc. People are hard worker. Only 5% of the respondents are jobless. However poverty and unemployment is a problem in the whole area. There is a shift from agriculture to services because of low returns from agriculture, water shortage and droughts in the area. There was a time when 70% of the total population was engaged in agriculture sector. The data shows that 14% respondents have agriculture as profession, 55% belong to service group, 18% are doing small business like shop keeping, transportation, and hotels, 8% are labors and most of them are related to construction, white washing etc. There is as such no potential for heavy industry in the area being far away from ports and other networks of the country but there is a wide scope for

dairy farming, poultry farming, tourism industry and forestry as an organized business.

Table 6.4 Size of Family

District	Family members			
	NR	Up to 6	7-10	11 +
Abbottabad	1 (%)	24 (%)	22 (%)	53 (%)
Mansehra	1 (%)	39 (%)	40 (%)	20 (%)
Total	1	31.5	31	36.5

Source: Field Survey

Table 4 shows the size of families of respondents. The number of sampled population having up to six members is 32%. Those who have seven to ten members their number is 31%, and those having members more than ten are 37%. In both the districts joint family system is still strong. They share resources. However, conflicts on joint landed property are common that is one of the reasons of not taking interest in agriculture and is resulting in migration to cities and services.

Table 6.5: Forest Distance from Respondent's House

District	Forest Distance (kilometers)			
	NR	0-2	3-10	10+
Abbottabad	3 (%)	54 (%)	35 (%)	8 (%)
Mansehra	2 (%)	60 (%)	33 (%)	5 (%)
Total	2.5	57	34	6.5

Source: Field Survey

Forest distance is an important factor among the causes of depletion that have been considered in the study. Since population is scattered, so questionnaires have been distributed in many villages where stakeholders are living. The number of respondents living at a distance of 0-2 kilometers is 57%. Those who are living at a distance of 3 to 10 km. are 34%, and those who live at a distance of 10 km. or more are 7% of the total sampled population. So, most of the respondents are living very close to forests.

Table 6.6 Perception of Respondents Regarding forest cutting and Timber Mafia

District		Who cut trees (%)				Timber Mafia (%)			
	Priority	NR	Locals	FD.	TM.	NR	Locals	Political	FD.
Abbottabad	1 st	18	45	20	17	25	26	25	67
	2 nd		4	54	13				
	3 rd		20	4	34				
Mansehra	1 st	3	43	37	12	36	28	29	41
	2 nd		14	26	25				
	3 rd		14	14	32				
Total		10.5	44	28.5	14.5	30.5	27	27	54
			9	40	19				
			17	9	33				

Source: Field Survey

The table 6 highlights the information based on the opinion of the respondents that who is responsible for tree cutting and who is timber mafia? The respondents were allowed to select more than one option and they were asked to express their choice for any body else that is not mentioned in the options given. Out of total, 11% have not given response. However, 44% from both the districts mentioned that local people are responsible for tree cutting. Second major source that is responsible for tree cutting is Forest Department that has been mentioned by 29% of the total respondents. Out of total, 15% of the respondents considered timber mafia responsible for tree cutting; it is the third factor responsible. In expressing their second priority for making them responsible, the respective numbers are 9% for locals, 40% for Forest Department and 19% for timber mafia respectively. In the third priority case, the number of respondents is 17%, 9% and 33% for locals, FD and timber mafia respectively. In both the districts separately, most of the respondents as first priority made locals responsible for tree cutting, then FD and then timber mafia. However, their information and knowledge has been cross checked by other questions like who is timber mafia? The result shows that their response is a little bit contradictory to their earlier analysis. In expressing their opinion about timber mafia, 54% respondents think that Forest Department is actually timber mafia, where as 27% say timber mafia is political representatives and 27% say locals is timber mafia. Interestingly in both the districts most of the respondents have given vote against FD in comparison with locals and political representatives. However, 11% from district Abbottabad and 11% from district Mansehra mentioned that timber mafia consists of all three. Some of

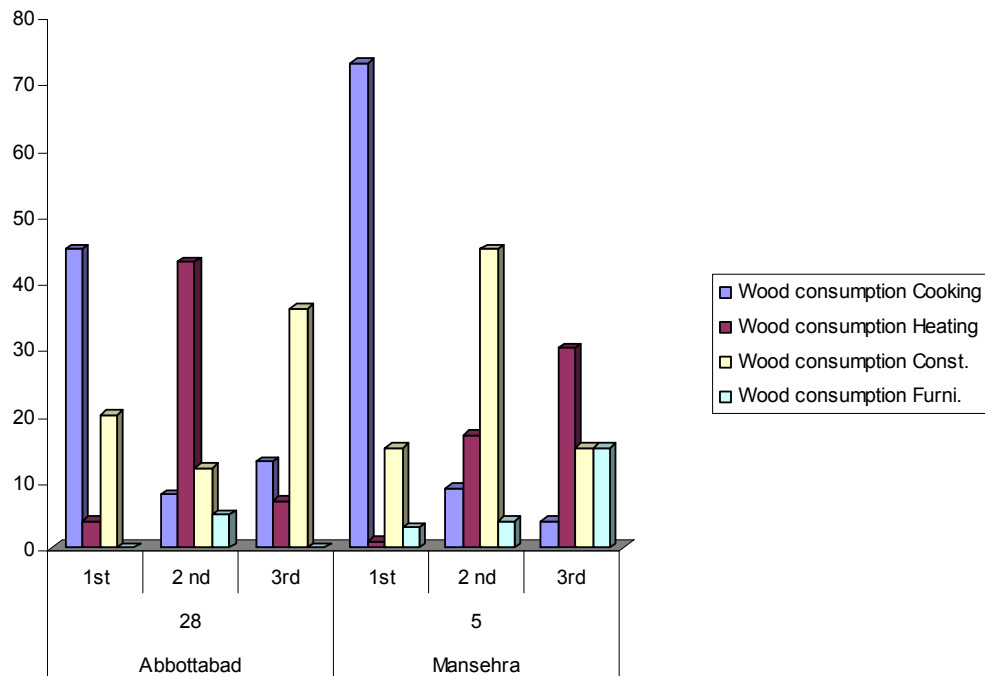
them mentioned that police, contractors and unemployed people all are involved. Out of total sample population 3% mentioned that 80% of the people involved in timber mafia consist of capitalists those who smuggle wood with the help of transporters and contractors. Trees are also cut for tobacco husking.

Table 6.7: Uses of Wood

District	Wood consumption (%)					
	NR	Priority	Cooking	Heating	Const.	Furni.
Abbottabad	28	1 st	45	4	20	0
		2 nd	8	43	12	5
		3 rd	13	7	36	0
Mansehra	5	1 st	73	1	15	3
		2 nd	9	17	45	4
		3 rd	4	30	15	15
Total	16.5		5.9 8.5 8.5	2.5 30 18.5	17.5 28.5 25.5	1.5 4.5 7.5

Source: Field Survey

Note: Cooking and heating combine effect is 61% where as construction has 17%.



In Table and graph 7 another important socio-economic activity has been considered i.e. consumption and use of wood for different purposes like for cooking, heating, construction, furniture making or any other. The respondents were given the options

to select on priority basis and have been asked to select more than one choice if any. They expressed their opinion that most of the wood is consumed for cooking throughout the year. The number of such respondents is 59%. Another major use of wood is for construction. The number of such respondents is 17%. However, only 2% say that it is used in furniture. Only 3% say that the first main use of wood is heating. Actually the fact is that after cooking, the second major use of wood in these areas is heating which is mentioned by 30% of the respondents. Here one thing is important to mention that in order to know the actual ranking among different usage, it is the second priority figure that should be considered for heating and not the first priority. Similarly it is the third priority that should be counted for construction and fourth priority for furniture. So most of the respondents (59%) say cooking is the main use of wood. Again, most of the respondents (30%) say heating is the second purpose for which wood is used. However, 29% of the respondents consider construction not as third but again as a second purpose of wood consumption. The reason being that lot of wood that is used in construction of houses, doors and fences is more than the wood use for heating purposes. A greater number of population use wood for heating but they use branches and small trees, where as construction wood is used by small number of people but in large quantity. Big trees are cut down that damages forest more than firewood.

Table 6.8 Provision of Natural Gas

District	Gas availability (%)		
	NR	Y	N
Abbottabad	3	17	80
Mansehra	0	3	97
Total	1.5	10	88.5

Source: Field Survey

Table 8 shows that 80% of the respondents in district Abbottabad and 97% of the respondents in district Mansehra have no natural gas facility. Overall 89% of the sampled population has no gas facility.

Table 6.9 Conversion of Forest Land

District	Conversion of forest land for (%)		
	Const.	Agr.	Other
Abbottabad	56	13	Grazing land =2
	10	39	Left Barren =1
	0	0	Sold off=3
Mansehra	34	21	Grazing land =6
	9	18	Left Barren =5
	0	0	
Total	45	17	Grazing=4
	9.5	28.5	Barren=3, Sold off=3
	0	0	

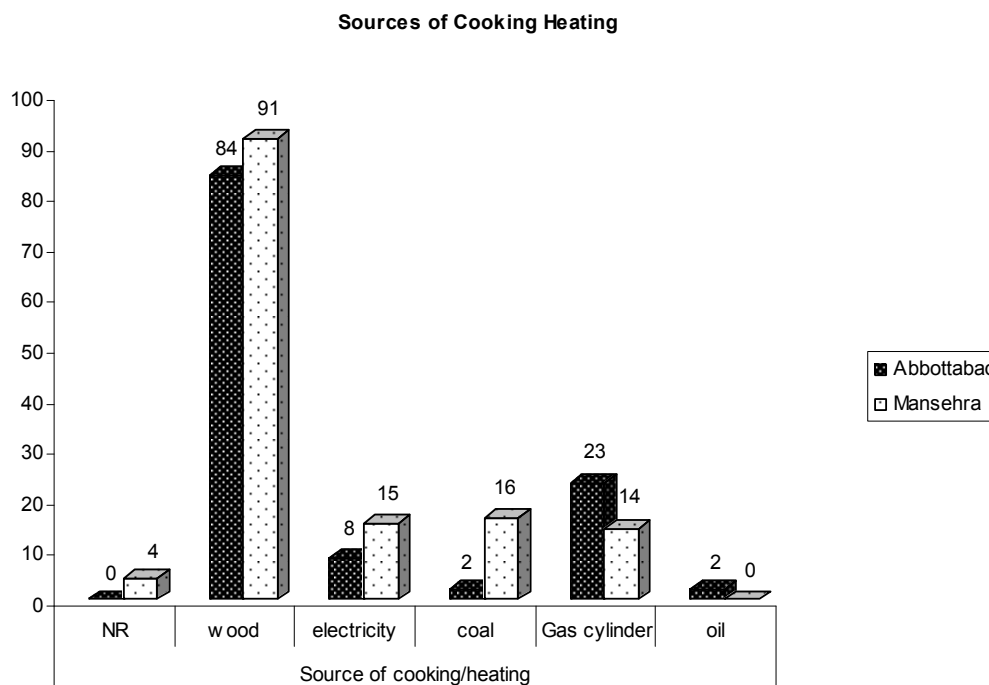
Source: Field Survey

Conversion of forest land is another factor that is causing forest's depletion. Forest land is converted into agriculture land. It is used for construction. Out of the total sampled population 45% have mentioned that forest land has been used for construction of houses and paths (however, out of total who responded they are 62%). Those who mentioned that forest land has been converted mainly to agriculture land, their number are 17% out of the total sampled population. However, those who are of the opinion that forest land conversion to agriculture land comes next to construction, their number is 29% (this figure is 40% out of those who actually responded). Same trends are there in individual district case. Out of total 4% say that forest land has been converted into grazing areas. This pressure is more in district Mansehra. Out of total 3% are of the opinion that forest land has become barren. Again this pressure is more in district Mansehra. In district Abbottabad, 3% respondents mentioned that forest land is sold off by local people. The land is sold off by mixing it with their own lands especially where there are no forest land boundaries and there is no check by the government.

Table 6.10 Source of Cooking/heating

District	Source of cooking/heating (%)					
	NR	wood	electricity	coal	Gas cylinder	oil
Abbottabad	0	84	8	2	23	2
Mansehra	4	91	15	16	14	0
Total	2	87.5	11.5	9	18.5	1

Source: Field Survey



In order to check the means of cooking and heating different options have been mentioned. Some people use more than one source simultaneously. Out of total, 87% population use wood for cooking and heating. Gas cylinder is used by 18% of the respondents. Electricity and coal is used by 11% and 9% respectively. In district Abbottabad, people prefer gas cylinder because of comparative easy availability than the other district. Oil is expensive to use for cooking and heating.

Table 6.11: Provision of Alternate Energy Sources

District	To save forest (%)					
	NR	Priority	Gas	Coal	Elect.	other
Abbottabad	14	1 st	84	0	0	Need security/law enforcement=2
		2 nd	0	48	9	
		3 rd	0	5	38	
Mansehra	1	1 st	97	0	1	Need security/law enforcement=1
		2 nd	1	19	25	Cow dung gas plants=1
		3 rd	0	24	20	
Total	7.5		90.5	0	1	Law =1.5 Cow dung gas plant=0.5
			1	33.5	17	
			0	14.5	29	

Source: Field Survey

Table 11 shows the priorities of the people for different alternate energy sources which if provided in their locality, forest resources could be saved. Among these resources gas, electricity and coal are the options given to people. The sampled population showed their interest in the provision of natural gas facility and those who selected gas their number is 90% out of total (98% out of those who actually responded). In case gas is not provided then coal is the second priority of 33% sampled population (36% of those who actually responded). Electricity is the third option, which is expressed by 29% population (i.e.32% of those who actually responded). However, in district Mansehra, second and third priority is slightly different. People gave priority to electricity because of a number of accidental deaths by using coal for heating. In both the districts people are of the opinion for cooking and heating, government should not provide electricity because then there would be electricity theft.

Table 6.12 Permission of Grazing

District	Grazing permission (%)					
	NR		Free	Pay Fee	Any other	
Abbottabad	17	Y	24	2	Bribe to FD	7
		N	47	7	Own area	3
					Shamilaat	2
					Theft	3
Mansehra	13	Y	56	0	Market	6
		N	11	5	Own area	3
					Theft	9
Total	15		40 29	1 7.5	Own area=3 Theft=6	

Source: Field Survey

Grazing is another important factor that causes depletion of forest productivity in several ways. It depends how grazing practices are managed by the government. If people are freely allowed to graze and if there is no restricted areas then they would have easy access to enter in forest areas. Forest laws restrict people from free grazing but since there is no proper enforcement of the legislation, people have no knowledge about grazing permission. Table 12 highlights the knowledge and practice of people about grazing. A large number of respondents (15%) have not responded mainly because of their ignorance. In district Abbottabad 47% respondents (56% of those who actually responded) mentioned that there is no free permission. But in district Mansehra 56% say there is free permission. It shows weak implementation of forest laws in the area. In addition to this, people are unaware about fee payment. In district Abbottabad 3% and also in district Mansehra 3% population own an area that is used for grazing. In district Abbottabad 3% and in district Mansehra 9% use illegal means to graze their animals. In district Abbottabad 7% mentioned that they have to bribe the FD for grazing. The field observations showed that people have preferred stall feeding. People can purchase wood from the market but only 6% in district Mansehra showed interest whereas rest mentioned that they can't afford.

Table 6.13 Forest Land Ownership

District	Forest land ownership (%)			Kind of forest (%)		
	NR	Y	N	NR	Guzara/ Shamilaat/Family	Any other
Abbottabad	4	29	67	67	19	Farm trees=14
Mansehra	4	54	42	47	53	0
Total	4	41.5	54.5	57	36	

Source: Field Survey

Table 13 shows that majority of the respondents (54%) have no forest land. In district Mansehra forest land ownership is more (54%) than the other district. Most of the owners have community forests. Farm tree owners are 14% in district Abbottabad.

Table 6.14 Sources of Income

District	Source of income (%)					
	NR	Lab.	Business	Agri.	Forest	Serv.
Abbottabad	6	42	22	26	8	22
Mansehra	5	41	21	36	9	20
Total	5.5	41.5	21.5	31	8.5	21

Source: Field Survey

People have different sources of income other than main profession. In both the districts most of them are earning from labor. Second major source of income is agriculture. Third major source of income is service. Forests are the source of income of only 8% to 9% of the people.

Table 6.15 Land Ownership

District	Land ownership (%)			Tenancy (%)		
	NR	Y	N	NR	Y	N
Abbottabad	4	85	11	4	5	91
Mansehra	1	71	28	2	14	84
Total	2.5	78	19.5	3	9.5	87.5

Source: Field Survey

In both the districts, 78% of the total have their own lands (88% in district Abbottabad and 71% in district Mansehra) where as only 10% are tenants (5% in district Abbottabad and 14% in district Mansehra).

Table 6.16: Plantation by Respondents

District	Exercise plantation (%)			Plantation type (%)			
	NR	Y	N	NR	Fruits	Const. wood	Firewood
Abbottabad	6	72	22	25	68	10	30
Mansehra	6	65	29	29	30	1	50 and 2% for goats
Total	6	68.5	25.5	27	49	5.5	40

Source: Field Survey

Out of the total, 68% take interest in plantation. Most of the respondents in district Abbottabad (68%) plant fruit trees, 30% plant firewood trees and only 10% are interested in construction wood trees. Majority of the respondents (50%) in district Mansehra are interested in firewood trees.

Table 6.17: Access of Locals to Forest Department

District	Access to FD (%)		
	NR	Y	N
Abbottabad	7	21	72
Mansehra	2	46	52
Total	4.5	33.5	62

Source: Field Survey

Contact with Forest Department is important for many reasons. The authority should provide easy access so that people can share their problems, take advantage of government activities and inform it about forest fires and other things. The data shows that 62% out of the total have no knowledge or having hesitation to contact FD. People mentioned that forest department has rude behavior and general public has no idea about the locality of Forest Department.

Table 6.18 Local Efforts in Tree Plantation

District	Local efforts (%)		
	NR	Y	N
Abbottabad	1	35	64
Mansehra	2	23	75
Total	1.5	29	69.5

Source: Field Survey

Out of total, 70% respondents say that local people make efforts in tree plantation but there is a need of government support and guidance. However this trend and unawareness level is low in district Mansehra as compare to other district.

Table 6.19 Use of Permit for Tree Cutting

District	Permit use (%)		
	NR	Y	No or no knowledge
Abbottabad	11	48	41
Mansehra	1	32	67
Total	6	40	54

Source: Field Survey

Out of total 48% in district Abbottabad and 32% in district Mansehra use permit from FD to cut trees. Out of total 54% either don't use or have no knowledge about any permit.

Table 6.20 Increase in Different Types of Areas

District	Increase in cultivated area (%)			Increase in forest area (%)			Increase in grazing area (%)		
	NR	Y	N	NR	Y	N	NR	Y	N
Abbottabad	3	18	79	3	6	91	1	32	67
Mansehra	2	28	70	2	6	92	2	39	59
Total	2.5	23	74.5	2.5	6	91.5	1.5	35.5	63

Source: Field Survey

The above table shows statistics based on the experiences of the respondents about the changes occurred in their respective areas that whether there is any increase in

cultivated area, forest area, and grazing area over the past couple of decades. Out of total, majority expressed that there is no increase in cultivated area (75%), no increase in forest area (92%), and no increase in grazing area (63%). However, 24% expressed that there is an increase in cultivated area over time. Increase in cultivated area is more in district Mansehra as compare to other district.

Table 6.21 Increase in Animals

District	Increase in animals (%)			Number of animals (%)				
	NR	N	Y	NR	1-5	6-10	>10	No animals
Abbottabad	7	77	16	17	35	5	2	41
Mansehra	8	68	24	12	30	7	0	47
Total	7.5	72.5	20	14.5	32.5	6	1	44

Source: Field Survey

Out of total, 73% expressed that over the past few years there is no increase in animals. In both the areas, 39% of total respondents have animals whereas 44% have no animals. In district Abbottabad, out of hundred, those who have animals their number is 42. Out of these 42 all have milk animals but out of these 42 only 15 have other animals. Similarly in district Mansehra those who have animals their total number are 37. Out of these 37 all have milk animals but 20 have other animals. So in both districts the number of milk animals is greater than other animals.

Table 6.22 Increase in Wood Prices and Gas Cylinder Availability

District	Cylinder available (%)			Increase in wood prices (%)			
	NR	Y	N	NR	10%	50%	>50%
Abbottabad	8	50	42	10	7	63	20
Mansehra	6	61	33	3	5	49	43
Total	7	55.5	37.5	6.5	6	56	31.5

Source: Field Survey

In both the areas, gas cylinders are used by 56% of the respondents as a whole but it is expensive so rests of 37% of the respondents don't use it. In order to know the effect of rise in the prices of wood, different options have been given. How many among

them feel that the rise in prices is just 10%, 50% or more than 50%? The result is 6%, 56%, 32% respectively. So a great number of respondents (59%) feel that prices have increased up to 50% during the last few years.

Table 6.23 Reasons of no interest in plantation

District	Reasons of no interest in plantation			
	NR	Common property (%)	Water shortage (%)	Non cooperation (%) of FD
Abbottabad	8	25	61	74
Mansehra	5	41	43	32
Total	6.5	33	51	53

Source: Field Survey

In order to know the reasons of not taking interest in plantation few factors have been identified in both the areas; common lands, water shortage, non-cooperation of FD etc. The results show that 33% of people don't take interest because their land is common property, 51% face difficulties because of water shortage and 53% say that FD is not cooperating.

In district Abbottabad only 1% mentioned that we have interest in plantation, 2% said plants are expensive and we have no resources to plant trees, 2% mentioned that because of unavailability of land, 2% said that local people don't consider it their responsibility and 2% were of the opinion that we have no time for plantation. In district Mansehra, 9% respondents mentioned that we are interested in plantation but we have no land for plantation, 1% said that since we have no share in forest so we have no interest in forest growth, 2% said because of unavailability of time and 1% mentioned that plants are very expensive.

Table 6.24 Payment of Fine

District	Fine payment		
	NR (%)	Y (%)	N (%)
Abbottabad	21	48	31
Mansehra	14	71	15
Total	17.5	59.5	23

Source: Field Survey

In case of illicit cutting, fine is imposed. Fine is charged on the basis of quantity and quality of the wood cut. But 60% of the total respondents are of the opinion that fine is imposed and they use to pay the fine while rest 23% doesn't pay fine.

Table 6.25 Participation of Different Organizations in Forestry

District	Organizations involved (%)				Benefits received (%)			
	NR	NGOs	Govt.	Local	NR	Govt.	NGOs	Local
Abbottabad	10	10	8	5	37	7	13	9
Mansehra	5	10	23	9	19	11	5	3
Total	7.5	10	15.5	7	28	9	9	6

Source: Field Survey

In district Abbottabad 42% and in district Mansehra 76% people rejected as a whole that benefit of none of the agency's work has reached to the local community in the area. In Mansehra district however, people mentioned that a German project, Barani Project, Sarhad Rural Support Program are working as NGOs, Joint Forest Management Committee and Pine Group are working as local people organization and in government sector Forest Department and watershed projects are working.

Table 6.26 Knowledge of Forest Policies

District	Knowledge of forest policies (%)		
	NR	Y	N
Abbottabad	14	17	69
Mansehra	6	10	84
Total	10	13.5	76.5

Source: Field Survey

Out of the total respondents, majority (77%) have no knowledge about any forest policy prepared for the country or province.

6.3 VIEWS OF THE GENERAL PUBLIC

District Mansehra

- The organizations that are involved in plantation should monitor the situation themselves and should be given the rights to arrest and punish the culprits.
- Wood is also used for tobacco husking in the district.

- In order to pay the fine one has to appear before the magistrate. Fine is according to the tree and per feet. For Cheer it is 250 rupees per feet, Diar 1000 rupees, Biar 500 rupees per feet. Permit of one is taken and utilized by others. People get permit for one or two trees and actually cut twenty trees which rather than using it for their own use they sell them in the market. Permit should not be given to rich people because they use it for commercial purposes. Permit should be on the basis of “cut one and plant five trees”. Permit is given for construction wood not for fire wood.
- Poplar production in the area is increased as compare to past years. It takes less time to mature, further it is used in industry. People prefer trees of wide leaves because they mature early and one can get cash easily. People plant Gond and poplar because their leaves are not eaten by animals. Animals use to eat leaves so trees are destroyed and people avoid the plantation of such trees. Kikar is fast growing species so people prefer to plant it.
- Cylinders are expensive, only rich people can afford.
- It is suggested by the people that barren and non-populous and uncultivated area should be taken from people and should be given to locals on lease for tree cultivation.
- Wood is easily available in the black market. Fire wood is not the cause of forest depletion; it is the timber mafia which is responsible.
- Forest Department should have coordination with the local land owners.
- Government should ban private wood cutting machines and there should be only limited machines under government control. Government should limit and control all such things that facilitate wood processing for different purposes.
- Different parts of the forest should be allocated to local people to take care and to enhance productivity.
- If one tree is cut down then 20 trees should be planted only then in fifteen years we would be able to recover the damages already done.
- Trees are cut during night.
- Fire is extinguished with soil and sand. The department should check whether the trees had been cut before the fire or these have been burnt with fire. People set fire to destroy trees so that grass could grow for their animals.

- Forest guards and other personnel have less pays, their pays should be increased.
- People use to smuggle roots of wall nut trees to Punjab and earn lakh of rupees.
- People use to bribe at ten to fifteen different place to clear wood lots.
- Use of “Ungheethi” has reduced the quantity of wood burnt.
- People had established a local people committee but ultimately that also started serving the interests of the department.
- The department should extract depleted wood from the forest and make depot from that wood.
- Government should allot public landed property to local people to plant trees.
- Government reserve forests should be converted into Guzara forests.
- There is a local group called “The Pine” but its activities are limited.
- In plantation season the department should distribute plants free of cost at door steps and should take receipt so that proper follow up could be arranged to make the campaign successful.
- Agriculture land has increased.
- Government should not allow auction of wood at very low rate because when low price is charged, more trees are cut.

District Abbottabad

- People demanded loans to install animal’s waste gas plants at subsidized rates.
- People in the area have permission for grass cutting but no permission for grazing.
- People first use forest for grazing, then cut trees and then convert it into agricultural land or use it for construction purposes.
- There should be proper legislation, check and balances for misusing and converting public lands.
- Number of animals in the area has decreased over time because people migrated to cities for employment opportunities.
- As for as knowledge of policies are concerned, even people from the forest department don’t know about these policies.

- People prefer to plant Sufeda and Toot because these need less care, less time to mature and give more return. Kikar and Gond are also planted. Darek, Pine, Kahu, Khobani, walnut, orange, toot, phulai, are also planted in the area.
- Fine is according to the tree that is cut down. If the fine is not paid, the wood is confiscated. Fine is some times from 20000 to 40000 rupees but people get receipt less than the actual amount. If they raise any objection then the double amount of fine is imposed. Some times fine is reduced from 1000 to 300 rupees so as to avoid the receipt.
- There is no arrangement to control forest fire, local people extinguish it by throughing soil dust on it. Forest department and black marketer are responsible for fire. Cigarette is also a cause of fire.
- People also use kerosine oil but it is very expensive.
- Government should give subsidy for tree plantation because people substitute trees for vegetable cultivation.
- Healthy and green trees are declared dry by the Forest Department and are then cut down. Impartial agency should check these things.
- Govt. should provide fruit trees on subsidized rates and then should check whether they have planted or not.
- Local political representatives should be involved in natural resource conservation. There should be committees at union council level.
- The area is a hilly area so it is very difficult to carry cylinder up to high places.
- Seeds should be distributed free of costs. High quality seeds should be imported.
- Some suggested that forest should be given to Army.
- Forest area should be given to poor deserving people to take care and to plant trees.
- The forest area owned by people wherever people had done the care of plantation is in a good condition but that part, which had been taken up by the forest department, could not improve.
- In plantation season only the area is demarcated with white wash to show that this area has been planted or seed had been thrown but in practice no tree is planted. Planning is done only on papers but not on ground.
- Some times children set fire in the forest area.

- There is encroachment first and then the land is sold. Since there are no boundary lines so people encroached towards forest area and mix with their own land.
- Officer should visit each and every Beat and personally ask people about the problems and situation. Every union council should be given wood according to the requirements, should ask about the fire, and should call on all the employees there on the site.
- The Forest Department should have Survey of Pakistan Sheets to install boundary pillars and then these should be painted. Patwaris should then not be allowed to change these marked boundaries.
- Government should check the assets of all employees of forest department.
- Tree plantation campaign should be started before the season and be made effective by involving local population. Before plantation campaign seeds should be distributed free of costs among local people.
- People are migrating to cities and they are no more interested in bringing up animals.
- All paper work should be made public.

6.4 VIEWS OF FOREST DEPARTMENT (FD) AND FOREST DEVELOPMENT CORPORATION (FDC)

The activities of Forest Development Corporation are related to high hill forests. When the age of the tree is matured then Forest Department marks the tree and hands it over to FDC to cut and auction all marked trees. There are three different contracts being practiced by FDC⁶:

Harvesting Contractors: They are responsible to cut marked trees. Then these are converted in logs. These are from approachable trees. Trees which are not approachable are cut into scants. These scants are then loaded on animals to roads.

Carriage Contractors: They are responsible to carry these lots to depots. There are two main depots; one in Hazara (Havalian), the other in Chakdara. FD takes illicit timber; they have their own depots.

⁶ The information are collected from the officials of FDC and FD (June, 2007)

Stacking Contractor: They are responsible to divide the big lots into sub lots on the basis of quality and quantity of timber.

There are three to four auctions per month. These are open auctions. There is always a reserve price, which is kept secret and buyers give their own prices till everything is settled. In Hazara there are Guzara Forests where harvesting etc. is done by Joint Forest Management Committee whereas in Malakand these forests are called Protected Forests where harvesting is done by FDC. Owners use to sit in auction because they have share in sale so according to the FD there is no chance of corruption as mentioned by the general public in the two districts.

Forest Department has justification for charging fine at the spot. Approved fine rates are with the FD, but the charge needs evidence and the property of the case, which is actually a big tree (trees). Since these trees are difficult to carry to the magistrate especially from far of forests so in order to avoid lengthy process FD has been given the authority to take fine at the spot which is determine on the basis of kind and quality of the specie. Divisional Forest Officer (DFO) has the authority for compounding. Forest Guard can only give temporary receipt.

The case of grazing lands is different. Grazing lands are private lands. Owners can charge from those who use these lands on the basis of per animals.

According to FD, the problem of permit and use of permit depends on the system of issuance of permit. Patwari, according to the Wajib-ul-Arz declares that this person has the right in these forests for tree cutting, then, forest guard to cut tree verifies that. No person is allowed to use permit of other people because now things have been improved automatically. Community forests have been divided into small segments called "Khusra" and it becomes individual property. So even if any body has the permit of the other, the other person does not allow him to cut tree from his Khusra. They are even not allowed to collect dry twigs from that Khusra. So people objection of issuance and misuse of permit is not correct.

Federal govt. has banned tree cutting since 1992. Forest Department has accommodated only 0.5% tree cut in the management plan so that there would be smooth natural regeneration. There is a huge gap between demand and supply of timber and firewood. Huge quantity of wood is taken out of the province to other

areas especially to Punjab for construction purposes. Local communities are suffering from shortage, thus resulting in illicit cutting by local people.

According to FD, the main cause of forest fires is not the timber mafia that sets fire in order to conceal illicit cutting but the local people who use these forests as grazing lands. When the surface of the land is filled with dry leaves and twigs, it restricts growth of grass. They set fire to burn the litter, which in turn causes fire spreading to the rest of the forest. During British time there was controlled fire, which was often set by FD itself to burn unnecessary dry material for the growth of grazing stuff.

Majority of the people demanded that FD should distribute plants at subsidized rates. Forest Department is of the view that since 1972 the plants and seeds are provided free of cost under watershed management project. The general public has been offered different incentives like cattle feed when they substitute it for plantation, labor to plant trees, a guard to look after trees etc. But the problem is that they are not taking interest mainly because of being absentee landlords and because of clash of interest with land -owners (mostly Swatis in Mansehra district) and confiscators of hilly areas (called Gujar) who are interested in growing grazing material and uproot plants.

People in the area are interested in growing fruit trees. Forest Department has mentioned land use classification according to which trees including fruit trees are distributed among communities. For 0-25% slope, the land is used for agriculture production. For 25-50% it is used for fruit trees. For 50-75% land slope timber trees are grown and 75% and above are used as grazing area.

PART 2

RESULTS AND DISCUSSION

This is the first study to look at the relationships between forest areas, socio-economic conditions of a forest rich area and explanatory variables at national level with the help of an econometric model in Pakistan.

6.5 Primary Data

The results of the primary data show the following information.

6.5.1 Education

Level of education is an important factor that helps the communities to understand their environment. Out of total respondents most of them (24%) are metric, and 15% of the total is highly educated. Rests are also educated and are attaining different levels of education. The trends for getting education is high in both the districts which supports the official figures that participation rate at primary, middle and high level of education in NWFP is 64%, 28% and 22.41% respectively. Whereas these figures for district Abbottabad are 91%, 38% and 27% respectively and for district Mansehra these stand as 76%, 23%, and 16.37%. So the results imply that at primary and middle level of education the participation rate of these two districts is above the provincial level. Add to this in Abbottabad district participation at primary level (91.13%) is highest among all 24 districts of NWFP.

6.5.2 Age Group

Age of the respondents is considered towards their experience about the causes of deforestation in respective areas. In both the districts most of them (51% of the total sampled population) belong to age group between 30 and 60 years. Old age group among the respondents is 15% of the total sampled population. This implies that the information from the study area are obtained from experienced people and their experience and information is a valuable addition to the results of the study.

6.5.3 Profession

The study highlights that in both the districts most of the respondents (55%) belong to service group for their earnings, 15% to agriculture, 18% are doing small businesses and 8% are labors (non-farm). However the study conducted by Shahbaz and Ali,

(2004) contradicted the results (29% of the respondents were depending on labor (non-farm) as primary source of income for livelihood, salaried class (15%), business 14%, farming and forest income 7%, livestock income 5%). The reason is that they have taken district Swat and Mansehra. The official statistics of the province gives the mixed trends. Out of total 42% of the people in NWFP belong to agriculture whereas this figure is 19% and 47% for district Abbottabad and district Mansehra respectively. This shows that participation in agriculture sector in Mansehra is higher than the provincial as well as than the other district. The official data supports the study results that service group is one of the important and growing employment category in district Abbottabad (i.e. 23% as compare to 17% for NWFP and 16% for district Mansehra).

6.5.4 Alternate Source of Income

The study reveals that other than the main profession most of the respondents (44%) are doing labor (non-farm), second comes agriculture and third is service as an alternate source of income. Forests are the alternate source of income of only 9% of people. These results are supported by Shahbaz and Ali (2004) who found the same ranking as: daily wages 15%, farming 9%, business 8%, and forest wood 7%. Another study is conducted by Ali, et al. (2006) in district Mansehra and Swat that shows almost similar trends (15% of the household were depending on salary, on farming 13%, income from business 12%, 2.3% on livestock and 2% from forests in NWFP). This implies that results of all these studies contradict the popular assumption that rural people depend on forests for their livelihood instead they have multiple strategies. Daily wage is the most important source of income and people depend on forests just for subsistence.

6.5.5 Family Size

The study results show that on average the size of the family is 6 to 8 persons in both the districts. These results are supported by the official statistics that the average household size in the country was 5.7 in 1960 that increased to 6.8 persons in 1998. In NWFP average household size is 8.0 persons that is above the national average. Field observations show that joint family system is still strong; it leads to keep the assets, land ownership and sources of income together.

6.5.6 Forest Distance

Distance from the forests is one factor that provides an easy access to forest resources and results in faster deforestation. Add to this if population is living with in forest areas so it is difficult for the government to keep a close check on these people. The study shows that most of the sampled population (57%) is living very close to forests (0-2 Km.). The results of the present study are supported by Wannitikul (2005) who found that distance from Bangkok is positively correlated with forest area means that farther each province was from Bangkok, the more forest remained. Forests closer to Bangkok are more likely to be exploited heavily for industrial use, while those away from city remain pre-industrial.

6.5.7 Responsible Figure for Deforestation

In the study areas 44% of the sampled population considered that the local population is responsible for destroying forests and 29% expressed that FD is responsible but again when most of respondents are of the view (54%) that FD is actually timber mafia so the study concludes respondents' views that staff of forest department is the most responsible figure in destroying this national asset. People also considered police and political representatives as part of timber mafia. This implies lack of trust on Forest Department and on other government figures.

6.5.8 Preference wise Use of Wood

The study counts the preferences of local people for the uses of wood. Most of them (59%) say that the main use of wood is for cooking. The second major use of wood is construction that consumes a large quantity of wood. Heating is the second purpose but third item with respect to quantity that consumes wood. Only 3% sell wood in the market. The results of the present study are supported by Shahbaz and Ali (2004) that in district Mansehra 90% of the respondents were using forests for fuel wood and 56% for timber, 42% for grazing/fodder, only 4% sell wood in the market. Less number of respondents uses wood for commercial purposes. The present study results are further supported by Provincial Forest Resource Inventory (1992), which concluded that the actual pressure on forests was for the purpose of fuel wood (88%) and not for the timber (12%) [but illegal cutting was not considered by Provincial Forest Resource Inventory (1992)]. Ali, et al. (2006) also concluded the same results that 90% people are using forests for fuel wood, 73% for construction, and 50% for

grazing. Average per capita need of firewood in NWFP has been calculated as 1.5 m³ per year (Khattak, 1995). So the results imply that fuel wood is one of the main item for which forests are used but field observations further revealed that most of the wood is extracted illegally and grazing is also limited.

6.5.9 Conversion of Forest Land

The study shows that 62% of the sampled population is of the opinion that forest land had been converted to construction of houses and paths, where as 40% are of the opinion that it has been converted into agricultural land. Only 3% mentioned that forest land has become barren because of encroachment. Steimann (2004) mentioned that in Hazara 4% of the houses are under construction and renovation. The official statistics show that during 1973 total housing units in NWFP were 1074000 which increased to 2211000 in 1998. So the results show that construction activities are rapidly growing and in future this trend will rather increase further.

6.5.10 Source of Cooking and Heating

The study results show the sources of cooking and heating in the study area. Out of total, 87% sampled population use wood for cooking and heating. Gas is used by 18% respondents for cooking, electricity is used by 11% and coal is used by 9% of the respondents. These results are supported by national statistics that 69% people in the country use wood as cooking fuel, 20.2% use gas and 3.7% use oil (that was used by 6.2% in 1980). In NWFP during 1999-2000 same priority of the people has been observed for example, 86.54% of the total household used wood for cooking, 8.79% household used gas, 1.32% used kerosene oil and 3.35% used other things for cooking fuel. The present study further shows that out of the total sample population, 98% of the respondents demanded natural gas for cooking and heating to save forests. The respondents do not welcome electricity, because of its high rates, load shedding and theft. Out of the total sampled population, 89% presently has no gas facility. Most of the people (59%) are of the opinion that wood prices have increased during the last ten years and this increase is up to 50%. On the whole the results indicate the shortage of wood substitutes in the study area.

6.5.11 Grazing Permission

The study shows that in district Abbottabad, a large number of respondents (56%) mentioned that there is no free grazing permission by the government. But in district

Mansehra, most of the sampled population (56%) revealed that they have free permission. People mentioned that they have to bribe the FD. The results show that in fact in both the districts the general public has no knowledge which forest is Reserved Forest and which is Protected Forests. So they have no idea in which forest they have the permission to graze. So they are unable to properly exercise their legal rights. The field observations further show that this information is not communicated by the Forest Department to local communities.

6.5.12 Forest Land Ownership

Most of the respondents in district Abbottabad (54%) have no forest lands, 39% were the owners of forests (rests have not responded). These results are supported by a study conducted by Simorangkir (2003) according to which, 81% of the Guzara is owned by just 12.3% of the households (an average of 80 ha per household). He further mentioned that until the first regular land settlement of 1872, there was no record of rights to Guzara forests. The people's customary uses of forests were ascertained from the village elders, admitted and recorded in the village record of rights. These rights then survived the two subsequent land settlements of 1904 and 1946. Ali (1999) found that once the ownership rights are given and boundaries are known to the villagers, they are then willing to invest and negotiate the conflicts. So the study shows that forest land ownership is very small and also people are not taking interest in the management of joint property. Many of them even have no knowledge about their ownership⁷.

6.5.13 Tenancy

In the study areas, 78% respondents are landowners of agriculture land and 10% are tenants. The field observations show that most of the land -owners are small landowners. This implies that land ownership is not the main cause of lack of interest in forestry.

6.5.14 Plantation; Trends and Difficulties

The results show that most of the respondents (68%) in district Abbottabad are interested in planting fruit trees, 30% are interested in firewood and only 10% are interested in construction wood. Whereas 50% of the respondents in District

⁷ The researcher also belongs to the same area, have Shamalat; the community owned land but have no knowledge about the exact location and demarcation of that property.

Mansehra are interested to plant firewood, 30% are in favor of fruit trees, only 1% are interested in planting for construction wood. Most of them are interested in firewood trees. So the results imply that the main reasons are non-availability of piped gas and expensive cylinder gas to many parts of district Mansehra. So people need firewood. People in both the districts prefer fruit trees and firewood trees because, according to locals it takes short time to mature and give more return.

The present study has highlighted the fact that people (70%) are interested in tree plantation but they demanded for government support in the form of sapling and guidance. Some people are not taking interest in plantation because; FD is not cooperating (53%), water shortage is a problem (52%) and land is a common property (33%). Soares et al. (2004) also suggested that landholders clear their forest less if they have legal titles on their properties and if they are provided with access to credit and technical assistance in support of sustainable intensive land-use systems.

6.5.15 Access to Forest Department

The study shows that 62% of the total respondents have no access to FD. The study by Shahbaz and Ali, (2004) showed the same results that institutional access is difficult in Mansehra but very difficult in Swat. Dasgupta (1986) also mentioned that there is a large communication gap between hilly area people and the government. People in both the districts criticized FD for its non-availability to locals. It is one of the reasons of institutional failure.

6.5.16 Use of Permit and Payment of Fine

The study shows that 54% of the total respondents either don't use permit or have no knowledge about the use of permit for tree cutting. Out of the total 23% of the respondents do not pay the fine. People mentioned that if the fine is not paid, the wood is confiscated. Fine is some times from 20000 to 40000 rupees but they give receipt less than the actual amount. If people raise any objection then the double amount of fine is imposed. Some times fine is reduced from 1000 to 300 rupees so as to avoid the receipt. But the study by Steimann, (July 2004) mentioned that there are different rates for different timings (day and night) for different types of timber. So the statement against Forest staff lead to the impression that the rules on fining offenders are in fact shaped by the field staff themselves in a rather individual manner. The same study revealed that in Mansehra district people are satisfied with

the work of Joint Forest Management Committees that it works more than FD for permit procedures. However, some people blamed that JFMC for preferring influential people, not forwarding poor people's application in the same manner for getting permit. FD is not cooperating with JFMC and just issues 2 to 3 permits per year and takes money up to Rs.2000 to 3000 for each permit. Getting permit takes long time usually months. A study by Javed and Fawad (1998) mentioned that no right can be acquired over reserve forest except by succession and no right can be alienated by mortgage, grant, lease, and sale or otherwise without the sanction of the government. However, the study indicated that the sale and purchase of rights has been one of the major causes of deforestation in NWFP. This result supports the result of the present study. Dasgupta (1986) also mentioned that permit system resulted in felling of best trees leaving only defective trees. His findings show that there is a huge gap between felling of trees and replantation.

Overall, the system of issuance of permit and use of permit has not implemented properly.

6.5.17 Change in Land use Areas

The present study shows that most of the respondents are of the view that there is no increase in cultivated area (75%), no increase in forest area (92%) and no increase in grazing area (63%) during the past couple of decades. They are of the opinion that most of the area is left uncultivated. People have migrated to cities. The results show that already cultivated area is converted into construction areas and forest area is converted into cultivated areas and with growing population there is no sizable increase in cultivated area.

6.5.18 Livestock Population

Out of total, 73% are also of the opinion that there is no increase in animals. Those who are keeping animals they are just 39% of the total. Contribution of district Abbottabad and district Mansehra in the livestock population of the country is 4.3% and 5.3% respectively. According to Livestock Census 2006 there is an increase in country's cattle (bullocks, cows) population (from 1996 to 2006) that increase is 44%, in buffaloes 34%, in sheep 12%, in goats 30%, in draft animals (horses, camels, mules, asses) 3%, 13%, 18% and 19% respectively. Overall livestock population has increased. But in this whole increase, the increase in NWFP is lowest and

insignificant as compare to other provinces. Only mule population has increased more than the other provinces. Livestock Census 2006 shows that contribution of NWFP in livestock of the country is; for cattle 20% of the country, for buffaloes 7% of the country, for sheep 13%, for goats 18%, for camels 7%, for horses 22%, for mules 43% and for asses 13% of the country. So grazing is not a threat towards deforestation.

6.5.19 Response of Locals towards Forest Organizations and Forest Fires

In district Abbottabad 42% and in district Mansehra 76% people opined that benefit of none of the agency's work (Govt., NGO, local) has reached to the local community. Out of the total respondents, majority (77%) have no knowledge about any forest policy prepared for the country or province. Shahbaz and Ali (2004) mentioned the same results that the degree of trust of local people on Village Development Committees, union council and Jirga was comparatively higher than national institutions. Very low trust has been observed for Women Organization because according to local people it is only on papers. FD is sole responsible for deforestation and is working with timber mafia. Jirga has maximum participation of respondents. Field observations revealed that people are losing trust on VDC because of non-participation of the local people.

The study highlights the observations that there is no arrangement to control forest fires; local people extinguish it by throwing soil dust on it. Forest department and black marketers are responsible for fire. Cigarette is also a cause of fire. According to Wani (2004) about 50000 ha of forests i.e.1.27% of the total forests (of 3.95 m ha surveyed) are affected by forest fires annually and 2.1% of scrub forests burnt annually which are more prone to fires. Fires burn about 1.85% of the irrigated plantations. According to FAO, Forest Resource Assessment 2005 the disturbance in the forest area was as follows:

Table 6.27 Annual Average Area Affected (000 hectares)

	1990-91	2000-01
Disturbance by Fire	49	41
Disturbance by insects	5	10
Disturbance by diseases	51	70

Source: FAO, Forest Resource Assessment 2005

The present study concluded that there are no proper arrangements at national and local level to control fires.

Nadkarni, et al (1989) however found that people complaint against Forest Department. Locals themselves degraded forests by deliberately putting them on fire to promote grass cover and to keep away wild animals and mosquitoes.

6.6 Regression Analyses

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots \beta_k X_k + \varepsilon \dots \dots \dots (1)$$

where Y represents forest area and
 $X_1 \dots \dots X_k$ represent the explanatory variables.

The error term ε represents the collective unobservable omitted variables.

The estimated regression parameters, or regression coefficients, for the model denoted by \hat{Y} are given by

$$\hat{Y} = b_0 + b_1 X_1 + b_2 X_2 + \dots \dots \dots b_k X_k \dots \dots \dots (2)$$

Following are the two regression Models developed and estimated by taking forest area of Pakistan and forest area of NWFP and explanatory variables taken from the macro economy of Pakistan. The data is log transformed, inflation factor is removed and unit of account is expressed from thousand to millions wherever necessary.

6.6.1 The Regression equation for Model A where dependent variable is the forest area of Pakistan:

The Overall Regression Model Equation is:

$$\begin{aligned} \text{LOG Forest Pak} = & 1.63 - 0.843 X_1 + 0.151 X_2 + 1.01 X_3 - 0.189 X_4 - 0.095 X_5 - 3.45 \\ & X_6 + 0.722 X_7 + 1.22 X_8 + 0.099 X_9 - 0.452 X_{10} + 0.0058 X_{11} + \\ & 0.0205 X_{12} + 0.111 X_{13} - 0.0189 X_{14} - 0.0779 X_{15} + 0.115 X_{16} - \\ & 0.0096 X_{17} \dots \dots \dots (A) \end{aligned}$$

- \hat{Y} = log Forest area Pakistan (m hec.)
- X_1 = log Real Agriculture value (m Rs.)
- X_2 = log Real Manufacturing value m Rs.)
- X_3 = log Real GDP (MP) (m. rupees)

- X4=log Real construction (m. rupees)
 X5 = log Real Per capita income at MP (Rs.)
 X6 =log cultivated area (m hec)
 X7=log irrigated area (m hec)
 X8 =log population (Mln.)
 X9 =log Household Gas Consumption (mm cft)
 X10 =log Household electricity consumption (mm c)
 X11 =log Household Coal Consumption (000 M tons)
 X12=log Out turn of firewood (000 cubic meter)
 X13 =log Livestock population (million no.)
 X14=log paper and paperboard (tones)
 X15=log chipboard and hardboard (tones)
 X16= log Total road length (kilometers)
 X17 = log Timber Consumption (cubic meter tones)

Table 6.28: Model A Dependent Variable= Log Forest Area Pakistan

Predictor	Coef	StDev	T	P	Significant
Constant	1.627	1.140	1.43	0.181	
LOG rea agr	-0.8434	0.3560	-2.37	0.037	*
LOG real manu	0.1513	0.2498	0.61	0.557	
LOG real gdp	1.0063	0.5599	1.80	0.100	
LOG cons	-0.18891	0.08560	-2.21	0.049	*
LOG perc	-0.0949	0.3729	-0.25	0.804	
LOG cult area	-3.447	1.340	-2.57	0.026	*
LOG irri area	0.7223	0.6663	1.08	0.302	
LOG popu	1.2214	0.6338	1.93	0.080	
LOG gas cons	0.0994	0.1067	0.93	0.372	
LOG elec cons	-0.4517	0.2920	-1.55	0.150	
LOG coal cons	0.00576	0.01419	0.41	0.693	
LOG firewood	0.02053	0.03376	0.61	0.555	
LOG livestock	0.11064	0.05359	2.06	0.063	*
LOG paper	-0.01886	0.01456	-1.30	0.222	
LOG chipboard	-0.07792	0.04831	-1.61	0.135	
LOG road	0.11514	0.08379	1.37	0.197	
Log Timber	-0.00958	0.02793	-0.34	0.738	

S = 0.01012 R-Sq = 98.3% R-Sq(adj) = 95.6%
 F= 37.04 P = 0.000

Durbin-Watson statistic = 2.40
 * Show significant variable

Model A shows the effects of selected variables taken from Pakistan on forest area of Pakistan. The results are as follows:

1. Real Agriculture Production value

The effect of increase in agriculture production value of the country has negative effects on the forest area of Pakistan. One unit increase in its value brings about 0.84 units decrease in forest area of Pakistan.

Coxhead (2002) also supports these results and mentioned that deforestation and conversion of land to agricultural production are most important issues. In other countries like Java, within a century of agricultural development 80 percent of forest area has been converted to agriculture. He expressed that causes and consequences of the damages are both direct and indirect and difficult to identify. Ganguly (1986) also mentioned that agriculture has higher returns as compare to forestry. He justified that in India forests occupy 23% of the total area but provide employment to 3 million people, agriculture accounts 50% of the land area but providing employment to 126 million people. Pati (1992) mentioned the same result that in Himalayan region agriculture output is already low. Hill and Curran (2003) results are however opposite. They found that there is no significant relationships between tree species numbers and logging or agricultural activity. Cole (2003) provided a detailed examination of Bjorn Lomborg's book in which Lomborg disproved claims of Malthus about food shortage and presented data showing the significant increase in production of rice, corn and wheat in developing countries over the period 1960–2000 because of the Green Revolution. The results of Munroe and Abigail (2003) are also opposite. They mentioned that the abandonment of agriculture land and changing agriculture profitability is leading to private forest re-growth.

This implies that increase in agriculture productivity has adverse effects on forests and with the passage of time if this trend would continue the rate of effect would be higher than the present as shown in the model.

2. Real Manufacturing Product value

The effect of increase in manufacturing product value in the country has positive though very minor effects on the forest area of Pakistan. If there is one unit increase in the value of manufacturing it results in change in forest area at a rate of 0.15 units in Pakistan. Manufacturing demand is met from plantation.

Nadkarni, et al (1989) mentioned that on Karnataka forests among the interested parties, the first one is the locals, second is commercial and industrial interests that used forests as a source of raw material. Thakurta (1986) also mentioned that the ecological crisis of today is an important manifestation of the general crisis of capitalism. Ewing and Tarasofsky (1996) further supports these results that wood is used as raw material for construction and industrial purposes in Pakistan and its demand is increasing.

But the result of the present model shows positive relationship between forest area and manufacturing. According to the forest officials, in Pakistan with growing manufacturing activity people especially in NWFP started growing those tree species which were needed by industries like for sports goods industries, plywood industries etc. Add to this after the fall of East Pakistan in 1971 the growth of those species increased which were being used by match industry for which resources were coming from East part of the country. People are getting better returns from the production of such tree species in Pakistan.

This implies that if there are enough incentives and better returns in manufacturing sector for forestry products, it encourages forest related activities. But there is need of a care because a small change i.e. 0.15 positive change may fall to negative side whenever any disincentive occurs in the economy and then adverse effects of manufacturing starts.

3. Real GDP

The national income effect on the forest area of Pakistan is found positive. This result is against the general assumption that increase in national income is always attained by unsustainable use of natural resources. The model shows that one unit increase in Gross Domestic Production of Pakistan brings about 1.006 units positive change in the forest area of Pakistan. Increase in national income shows good effects on forest area because of increase in investment on energy substitutes and increase in imports of wood products. In the first phase of increase in GDP, household incomes increase that leads to increase in wood consumption but after the first phase further increase in national income leads to increase in the consumption of wood substitutes.

Consumption and import of rot iron furniture and imported material use in construction industry has increased.

Munroe and Abigail (2003) found that the area with low employment and low regional advantage has experienced more forest re-growth and areas with high employment and growth are experiencing deforestation. Their study also concluded that using aggregate national level data is a limiting factor to determine the overall impact of land use change on forests because country level data suffers from aggregation biases. White and Dean (2004) mentioned that empirical studies find positive links between environmental amenities and economic growth.

4. Real Construction value

It is generally assumed that increase in the construction activities deplete the forest resources. The model results show the same effect on the forest area of Pakistan. A unit increase in the real construction value of the country negatively effects at a rate of 0.188 units. However this effect is lower than the effects of agriculture production on forests. Redeloff, et al. (2005) research also showed the same result that in USA housing density was negatively correlated with the amount of inferior forests. Suburban sprawl has major environmental impacts on comparatively small areas because of high housing density but it affects larger areas. Munroe and Abigail (2003) also showed the residential conversion that is decreasing forest cover.

Govt. of Pakistan (1986 a) however mentioned that projects in areas like housing schemes, ports and harbors, roads, mining, dams and reservoirs, energy, fertilizers, industrial irrigation and many others do consider forest cutting, land clearing and restoration of the disturbed areas etc. It is mentioned that all these issues are addressed and checked under Environmental Impact Assessment of the projects. The budget 2004-2005 also showed that construction sector grew by 8% against the target of 5%. Munroe and Abigail (2003) suggested that population density alone is not enough to measure the ratio of urban to forest land uses but residential land value and industrial construction should also be used because they have negative impacts on forests. Results by Sheikh and Mohammad (1977) also emphasized to take into consideration the negative impacts of construction on forests.

5. Real Per Capita Income

The model shows that as per capita income in Pakistan is increasing the forest area of Pakistan is negatively affected by 0.09 units. Increase in per capita income is showing adverse affects on forest area as it has resulted in increase in the consumption of the household in the first phase of consumption thus putting negative pressure on available resources. People in the second phase of consumption are also using firewood substitutes but these substitutes have not yet contributed significantly (as shown by the model result for energy substitutes) to save forest areas in Pakistan. Investment in energy sector is increasing as national income is increasing. Primary data also supports the results of the model that people demand is increased but firewood substitutes are very expensive.

Wilkie et al. (2000) showed the negative relationship between per capita and land degradation that higher the per capita high the land degradation is. In other words higher the per capita income high deforestation is. Cole (2003) showed that as per capita incomes increase, the composition of a nation's economy changes that change the emphasis from manufacturing to services. Given that tropical forests are typically located in relatively low income countries with rapid population growth, there may be a case for arguing that the socially optimal rate of deforestation is not zero. PARD (1994) also found that developing countries environmental problems are because of the effects of poverty and effects of economic development. Ahmad (1994) highlighted the reasons of environmental depletion particularly forests among which poverty is one. IUCN (1996) examined the efforts for preparing provincial conservation strategy in which major environmental problems of the province are deforestation, grazing land depletion, population growth and poverty.

6. Cultivated area

It was assumed that as the cultivated area in the country is increased forest area is depleted. The model shows the same results in Pakistan that cultivated area of the country has negative impacts on the forest area of Pakistan. These results are also supported by primary data that people encroach to forest areas and then start cultivation and construction especially on terraces. The model shows that one unit increase in cultivated area of the country brings about 3.44 units decrease in the forest area of Pakistan. In the overall regression model, the most significant factor ($T = -2.57$, $P = 0.026$) affecting on forest area is the cultivated area of the country. Its

negative effect on forest area is higher than construction. This implies that cultivation is one of the main areas that need special attention of the government.

Dasgupta (1986) support these results that Darjeeling Hill area was suffering from extensive fires, and conversion of these forests into cultivated lands. Dijk and Maliha (1994) also support these results that the area under rangelands and common lands has declined in favor of cultivation in NWFP.

7. Irrigated Area

The model results show positive effects of irrigated area on the forest area of Pakistan. As one unit change is made in the area of irrigation, 0.722 units increase the forest area. The important fact is with increasing irrigation facilities commercial plantation in the plain areas of the country has also increased thus reducing the burden on the forests of Pakistan. However, the study conducted by Wannitikul (2005) showed that no correlation was found between the area of irrigation systems (IRG) and forest cover in Thailand.

The results by McNeely (1987) showed that Asia is densely populated and major investment is going on in water resources to increase area under irrigated agriculture to increase agriculture production. His results showed that if current trend of developing water courses would continue without building dams only then wildlife would perish and have negative consequences. The project evaluated in his study aimed to cultivate lowlands through irrigation thus reducing pressure of agriculture on marginal lands thus reverting uplands for forestry and wildlife conservation. If dams are constructed pressure on fossil fuel is reduced. Similarly, Ledec (1987) mentioned that large scale irrigation or land settlement projects in populated areas will not be most desirable agriculture development strategies unless environmental considerations are taken into account. Bura irrigation project in Kenya has failed because it ignored fuel wood plantation. If plantations and fuel wood requirements are considered then irrigation projects have positive contribution to forests. Eiser and Roberts (2002) also mentioned that farm wood lands generate greater output across the entire country than an equivalent area of agriculture products. The results further show that the plantings have been established on lands not use for agriculture.

8. Population

Population is generally considered as one of the most important factor that is responsible for deforestation. But the model results show that population of Pakistan has not negatively affected the forest area of the country. A unit increase in the population of the country has brought about 1.22 positive changes in the forest area. This leads to the conclusion that effects of population may be positive or negative depending on the situation in the country that whether it is used as human resource for plantation and natural resource generation or as a source of only consumption. This also implies that if population growth has slow down then its effects are not adverse. However these results are opposite to the results of Wannitikul (2005) in which population in Thailand have the highest negative effect but he mentioned that this perspective of blaming population growth alone for natural resource destruction in developing economies is an oversimplification of a complex social problem instead, government policy on infrastructural development, including the forest clearances and a increasing cash crop production are considered as likely causes. Similarly a study by Ali, et al (2006) also mentioned that population is not the most responsible factor in forest depletion.

Write and Muller (2006) while discussing the relationship between population and forest cover mentioned that although in the past the relationship was inverse but because of fast urbanization and slow growth of population has now positive and less destructive effects that lead to increase in forested area and forest regeneration. For example Guyana population is projected to decline by 8%. White and Dean (2004) also mentioned that empirical studies find positive links between environmental amenities and economic and population growth. Burgi, et al (2000) have also taken information about the history of human impacts to interpret the changes. Their conclusions show that the general changes in forest composition through the historical period include decline in some species and increase in some other species and that human activities do not necessarily lead to more similar species composition between regions. Their results further support the present study that improved transportation facilities for example the extension of the railroad in mid-19th century has lessened the impact of local industries on local forest resources. Therefore some activities lost their direct impact in the second half of 19th century. Similarly, the

increase of transportation of goods and movement of people weakened the link between total population and impact on the local forests.

Lodha (1991) suggested being more careful in the settlement of population, which always prefers to green and fertile lands. Pati (1992) also support Lodha that Himalayan belt has witnessed an unprecedented growth of population and unplanned forestry practices. Dijk and Maliha (1994) showed negative effects of Population growth and mentioned that Afghan Refugees has added to provincial population. Ahmad R. (1994) also blamed population explosion, which increases at geometric progression causing more unemployment, consumption, illiteracy and poverty. IUCN, Pakistan (1998) and Payr (1999) also said that local population is the prime threat to forests.

9. Household Gas Consumption

Gas is a fire wood substitute. It is assumed that increase in the consumption of gas has positive impacts on the forests. The model shows the same results that increase in the consumption of gas by household in the country has positively affected the forest area of Pakistan. Its consumption has reduced the burden from the forests of the country. However, its effect is only 0.99 units on these forests. These results are further supported by provincial statistics that a small number of houses depend on kerosene oil (2%) and gas is available to just 9% of the houses in NWFP that is much below the national figure. In Pakistan, housing units using gas as cooking fuel has increased from 6.5% to 20.2% in the country but still there is a need to increase it further.

10. Household Electricity Consumption

Electricity is a source of energy, a source of lighting and may use for cooking and heating. The model results show that increase in electricity consumption by household in the country has negative impacts on the forest area of Pakistan. These results are against the general assumption that electricity is a firewood substitute. The model shows that one unit increase in the consumption of electricity negatively effects at a rate of 0.45 units on the forest area of Pakistan. These results show that electricity is expensive and people are not substituting it for firewood. The unit effect as shown in the model is also insignificant. These results are also supported by primary data included in the present study. According to forest officials with

increasing electricity and availability of electricity saw mills and use of electric wood cutting machines have increased thus speeding up the process of deforestation. Electricity theft has also increased for these operations thus putting negative pressure on forests. These results are also supported by primary data. Local people mentioned that government should take the control of these so as to properly regulate these activities.

11. Household Coal Consumption

Coal is an energy source. Any increase in the coal consumption brings positive change in the growth of its substitutes like forests. The model results show the same result that an increase in the consumption of coal by household in the country has positive impacts on the forest area. A unit increase in coal consumption has brought 0.006 units increase in forest area. However this impacts is very minor. Increase in electricity, gas and coal consumption could not improve the situation in the country. These model results are supported by primary information collected from the two districts that only 9% people use coal for cooking and heating and 89% sampled population in NWFP has no gas facility. So far coal reserves have not been properly utilized in Pakistan.

12. Firewood Production

Firewood production is an important variable causing deforestation. Increase in firewood production results in decrease in forest area. The model shows that the effect is estimated as 0.0205 units. The effect is however found positive. The model results imply two important things; one the unit effect is minor and secondly the effect is not adverse on the forest area. These results are opposite to general information. The main reasons are that illicit felling for which data was not available is more than the recorded official production of firewood. Secondly firewood is mainly obtained from plantation in Punjab. According to forest officials the export and import of firewood is insignificant. Firewood is obtained from plantation and the official figures for firewood production are not accommodating production from private farm plantation. There is no study and no record of time series data for the production from farm plantation in Pakistan. Add to this there is no time series data for firewood consumption in Pakistan. If we use per capita consumption and population to obtain total consumption, again per capita consumption for the study period is neither available nor even any decade wise average value for per capita

consumption is given. Considering these limitations official figures for firewood and timber productions are used.

However, Ayaz and Wani (2000) provided some forestry statistics in which one year data is given that was not sufficient for the analysis of time series data with multiple regressions. They mentioned that in 1995-1996, the state controlled forest supplied 0.250 million m of timber (7.3%), import of wood products was 1.494 million m (43.9%), costing about Rs.6,660 million. The major contributors in the national wood supply were farmlands, making up the balance of 1.663 million m (48.8%).

13. Livestock population

Grazing pressure destroys the upper fertile layer of soil, uprooted young tree crops thus putting negative pressure on forest resources. But the model results show that livestock population has positive impacts on the forest area of Pakistan. A unit increase in livestock population has 0.11 units increase in the forest area. Increase in livestock population is not causing any negative pressure on forest area depletion mainly because the growth in its population as discussed in chapter 4 is rather slow especially in NWFP. The primary data also shows that as compare to past decades free grazing is now limited and stall-feeding is gaining importance. In areas where there is less stall feeding people have started planting those trees (fodder trees) which they can use for their animals.

Eiser and Roberts (2002) support these results that almost all of the increase in forest area in Scotland between 1975 and 1990 occurred on land previously used as land of low agriculture value. Despite using sheep grazing areas for plantation sheep number increased and arable farm land remained constant though there was 40% increase in forest area. Plantation does not result in decrease in agriculture out put if land that has been set aside is used. Chekeredza et al. (2007) showed that in some African countries fodder tree technology is applied. Tree and shrub forage can be integrated without compromising crop production. Write and Muller (2006) said that global change and technology will have unforeseen effects and gives hope to decrease in deforestation. However Sheikh and Mohammad (1977) results are opposite to the present study. IUCN, Pakistan (1998) also mentioned that free grazing is common in Dir- Kohistan. These results are supported by Ali (1999) but he mentioned that it happened in past. Hooper et al. (2005) support livestock population growth for seed dispersal because insufficient seed dispersal is a major limitation to natural

regeneration. The majority of tropical tree species has animal-dispersed fruits but most animals, don't enter far into these deforested areas.

14. Production of paper and paperboard

Increase in the production of paper and paperboard is generally considered as depleting factor for the forest area of the country. The model results show the same trends that as its production increases, deforestation is also increased. A unit increase in its production leads to deplete forest area by 0.0188 units. However the effect is minor because its total production from forestry resources in Pakistan is also low.

15. Production of chipboard and hardboard

Production of chipboard and hard board is considered a factor causing deforestation. The model results show the same results. A unit increase in the production of hardboard and chipboard leads to deplete the forest area by 0.077 units. The unit effect is however minor but greater than the unit effect of production of paper and paperboard. The reason is that as shown by the official statistics total production of chipboard and hardboard has not significantly increased to effect forest area. Pakistan mainly imports chipboard and hard board.

16. Total Road Length

Road construction destroys forests because these are built by cutting trees. But the results of the model show otherwise. Roads in Pakistan has no negative effect on the forest area rather a one unit increase in the road leads to have positive effects by 0.115 units on the forest area of Pakistan. This implies that road linkages have provided a facility to forest communities for easy movement and an access to other employment opportunities. Add to this with road construction, road plantation has increased especially in the plains of Punjab and Sind. Another fact is, in other parts of the country all roads are not constructed at the costs of cutting of forest areas.

Watkins et al. (2003) showed that roads affected forest conditions. However, these effects are limited in managed forests. Exotic species richness increase near roads and native species richness decrease but total species richness did not change near the road. Haskell (2000) mentioned that if roads are confined to small areas of forests, effects might be negligible. If roads are spread to the entire forest region the cumulative result of small effects may be large. Rudel (2006) showed that as forests decline in size new roads no longer destroy forests, corporate loggers leave forests, community forest managers become more effective, parks become more feasible as

conservation and urban consumers initiate tree plantation. Semlitsch et al. (2007) showed that the abundance reduced near the road. Road effects extended 35 meter on either sides. However their results that active forest roads and abandoned logging roads have negative effects on forest dependent species are opposite to the present study and other studies mentioned above. Wilkie et al. (2000) showed positive relationship between road density and land degradation in eighteen nations in Africa. The Pakistan Environmental Protection Act 1997 (PEPA '97) made Environmental Impact Assessment (EIA) a mandatory requirement for all developmental projects. It is formed an integral part of the project feasibility and suggests mitigation measures to eliminate or minimize impacts, and provides environmental management and monitoring plan.

Kohlin and Gregory (2005) also concluded that distance to the natural forests is negatively correlated with collection in the natural forests and positively correlated to collection in the Community Forests. Similarly Deckers et al. (2005) determined that sunken road isolation and age species richness increased with their age. Soares et al. (2004) also showed that the paving of the highway will stimulate forest conversion to cattle pasture and agriculture, but the magnitude of this effect is responsive to interventions by government and civil society that have begun in recent years. Therefore, governance could entail up to 60% reduction in the expected deforestation due to the paving of the road.

17. Timber Consumption

Timber consumption is considered as one of the important factor causing depletion of forest area in the country. The model shows the same result that one unit increase in its consumption leads to decrease the forest area by 0.01 units. However, the unit change as shown by the model is minor. The main reason is that the official data included in the study is not the true representative of actual timber extraction from the forests in Pakistan. The actual consumption and production of timber is much higher than what the official figures show. But the main problem is no data is available on illicit felling. So the finding of the study shows that despite ban illicit felling has not been controlled and unofficial timber extraction is higher than that of the recorded stock available for consumption. The results are also supported by the primary data. Field observations also show that people cut firewood and timber during night.

According to forest officials⁸ people get permit for Guazara Forests and cut tree from Reserve Forests and it is difficult for the Forest Department to check it because per forest personnel the forest area is very vast to take care. Add to this there is no data available for smuggled timber. In case of smuggling timber between Pakistan and Afghanistan, the smuggling is two way. Timber is smuggled from Afghanistan to Pakistan to buy food and other consumer items (barter exchange). Timber is also smuggled from Pakistan to Afghanistan to bring it back to Pakistan to declare it as Afghan timber especially from Chitral channel. Timber which is smuggled back from Afghanistan to Pakistan is equal to the average timber production of NWFP forests. Similarly official timber production includes production from the forests which are only under the control of Forest Department. Add to this since timber consumption includes domestic production, imported timber and timber from farm land and since from farm lands no data is available so official statistics for timber consumption and production are not the true representation to estimate the effect. In order to estimate the effect of timber, timber consumption was replaced with timber production in the model (see Appendix 3). But that model was not showing any significant effect and change from the present model.

Schlich (1922), Sheikh and Mohammad (1977), Ayaz and Wani (2000), Knudsen (1995), Ewing and Tarasofsky (1996), Ali, et al. (1997), Ali (1999), and Michoacan, et al (2004) also mentioned that one of the main reasons of deforestation is timber and firewood in the country. Knight (2000) however mentioned that in recent decades domestic timber has been replaced by imports and forest tourism has emerged. Schlich (1922) found that in the British Empire the import of forest products mainly timber steadily increased since 1884.

The value of $F = 37$, $P = 0.000$ in the model shows that model is overall significant. The value of R square shows that model explains 98% variations. Rest of the variations may be due to other factors for example forests fires, illicit felling for which data was not available.

⁸ Information are collected from the officials of Pakistan Forest Institute, Peshawar dated Sep.2007.

6.6.2 The Best Regression Equation for Model A is:

Response is LOG forest area Pakistan on 17 predictors, with N = 29

$$\text{LOG forest Pak} = 3.01 + 0.812 \text{ LOG popu} - 3.05 \text{ LOG culti} + 0.0853 \text{ LOG livestock} \\ - 0.0622 \text{ LOG chipboard}$$

Table 6.29 Best Regression Model A Dependent Variable= Forest Area Pakistan

Predictor	Coef	StDev	T	P	Significant
Constant	3.0122	0.8316	3.62	0.001	*
LOG popu.	0.8123	0.1458	5.57	0.000	*
LOG cultiv.	-3.0532	0.8198	-3.72	0.001	*
LOG livestock	0.08526	0.02921	2.92	0.008	*
LOG chipboard	-0.06220	0.02979	-2.09	0.048	*

S = 0.01264 R-Sq = 94.1% R-Sq(adj) = 93.2%

Durbin Watson = 2.3

F = 96.51 P= 0.000

1. Population

The best model shows the same trend of effect of population (P=0.000, T=5.57) on the forest area of the country. It brings 0.812 unit positive change in forest area. The best model shows that the most influencing factor on the forest area of the country is population of the country. However population has 1.22 units effect on the forest area of Pakistan when it appears in the overall model. It shows that when it appears with variables taken in the overall regression model its effect is high but the difference is not too much. The reasons and implications are already discussed in section 6.6.1.

2. Cultivated Area

In the best model cultivated area of the country is the second most significant factor affecting on the forest of the country. One unit change in log-cultivated area (P=0.001, T= -3.72) negatively affects forest area at a rate of 3.05 units. The trend of effect is same as in the overall model however unit effect is low when it appears in the best model. However the difference is very minor. The effect of cultivated area on forests, reasons and implications are discussed under the overall regression model.

3. Livestock Population

Livestock population is the third significant factor (T= 2.92, P= 0.008) in the best model. The trend of effect is same as in the full regression model discussed above. Its effect is estimated as 0.085 on the forest area of Pakistan. The results show that the difference between its unit effects of overall model and best model is very small and its effect on forest area is also very small. The reasons are as discussed in section 6.6.1.

4. Production of Chipboard and Hardboard

Production of chipboard and hardboard is the fourth significant (T= -2.09, P= 0.048) factor. The effect is 0.622 units on the forest area of Pakistan. The trend of effect is same as discussed in the overall regression model. The unit effect is also almost same as in the full regression model.

The variables expressed in the best model explain 94.1% of the total variations. The rest of the variations may be due to illicit felling and fire for which data was not available. The values of F=96.51 P= 0.000 show that best model is statistically significant. The value of Durbin Watson = 2.3 shows that since it is close to 2 so there is no autocorrelation. If it is close to D= 0 so it would have positive and in case D=4 it would have negative auto correlation. All the variables are statistically significant and have high R-square so there is no multicollinearity.

6.6.3 The Regression equation for Model B where dependent variable is the forest area of NWFP:

The Overall Regression Model Equation is:

$$\begin{aligned} \text{Log forest N} = & 6.91 - 1.23 X_1 + 0.146 X_2 + 2.52 X_3 - 0.298 X_4 - 1.13 X_5 - 8.13 X_6 + 2.59 \\ & X_7 + 0.77 X_8 + 0.265 X_9 - 0.561 X_{10} + 0.0445 X_{11} + 0.0367 X_{12} + \\ & 0.211 X_{13} - 0.0514 X_{14} - 0.113 X_{15} + 0.025 X_{16} - 0.0396 \\ & X_{17} \dots \dots \dots (B) \end{aligned}$$

- Y[^] = log Forest area NWFP (000 hec.)
- X₁ = log Real Agriculture value (m Rs.)
- X₂ = log Real Manufacturing value m Rs.)
- X₃ = log Real GDP (MP) (m. rupees)
- X₄ = log Real construction (m. rupees)
- X₅ = log Real Per capita income at MP (Rs.)

X₆ =log cultivated area (m hec)

X₇=log irrigated area (m hec)

X₈ =log population (Mln.)

X₉ =log Household Gas Consumption (mm cft)

X₁₀ =log Household electricity consumption (mm c)

X₁₁ =log Household Coal Consumption (000 M tons)

X₁₂= log Out turn of firewood (000 cubic meter)

X₁₃ =log Livestock population (million no.)

X₁₄=log paper and paperboard (tones)

X₁₅=log chipboard and hardboard (tones)

X₁₆= log Total road length (kilometers)

X₁₇ = log Timber Consumption (cubic meter tones)

Table 6.30: Model B

Dependent Variable = Log Forest Area NWFP

Predictor	Coef	St Dev	T	P
Constant	6.907	3.019	2.29	0.043
Log real agr	-1.2253	0.9429	-1.30	0.220
Log real manu	0.1461	0.6617	0.22	0.829
Log real gdp	2.518	1.483	1.70	0.118
Log cons	-0.2983	0.2267	-1.32	0.215
Log perc	-1.1259	0.9878	-1.14	0.279
Log cult. area	-8.133	3.549	-2.29	0.043
Log irri. area	2.594	1.765	1.47	0.170
Log popu	0.770	1.679	0.46	0.655
Log gas cons	0.2654	0.2827	0.94	0.368
Log elec cons	-0.5613	0.7733	-0.73	0.483
Log coal cons	0.04447	0.03758	1.18	0.262
Log firewood	0.03670	0.08941	0.41	0.689
Log livestock	0.2106	0.1419	1.48	0.166
Log paper	-0.05144	0.03855	-1.33	0.209
Log chipboard	-0.1127	0.1280	-0.88	0.397
Log road	0.0248	0.2219	0.11	0.913
Log Timber	-0.03960	0.07399	-0.54	0.603

R-Sq = 98.2% R-Sq (adj) = 95.4%

F = 35.30 P = 0.000 Durbin-Watson statistic = 2.35

1. Real Agriculture Production value

The effect of increase in agriculture production value of the country has negative effects on the forest area of NWFP. One unit increase in its value brings about 1.2253 units decrease in forest area of NWFP. The trend of effect is same as discussed in Model A. However the intensity of effect is found higher because NWFP is rich with forest resources so receiving higher effect than the overall forests receives in the country. This implies that any increase in agriculture production value in the country has high adverse effects on the forests of NWFP as compare to other forests of the country.

2. Real Manufacturing Product value

The effect of increase in manufacturing product value in the country has positive though very minor effects on the forest area of NWFP. If there is one unit increase in the value of manufacturing it results in change in forest area at a rate of 0.1461 units in the province. The trend of effect is found same in both the models. The unit effects are almost same as discussed in the model A. However manufacturing effect is less on the forests of NWFP as compare to the overall forest area of Pakistan. It implies that manufacturing effect is more on overall forests than on NWFP forests. Irrigated plantation in Sind and Punjab are contributing a lot to manufacturing sector in the country.

3 Real GDP

The national income effect on the forest area of NWFP is found positive. The model shows that one unit increase in Gross Domestic Production of Pakistan brings about 2.518 units positive change in the forest area of NWFP. The trend of effect is same as discussed in model A. However the intensity of effect is higher on the forests of NWFP as compare to the overall forests of the country. It shows that economic growth brings positive change for the forests of Pakistan especially for the forests of NWFP.

4. Real Construction value

It is generally assumed that increase in the construction activities deplete the forest resources. The model results show the same effect on the forests area of Pakistan as

well as of NWFP. A unit increase in the real construction value of the country negatively effects at a rate of 0.2983 units. The trend of effect is same as that of the forests of Pakistan but unit effect is higher than the overall forests of Pakistan. It shows that negative effect of construction in the country is more on the forests of NWFP than on Pakistan's forests.

However this effect is lower than the effects of agriculture production. Agriculture production has higher effects both on the forests of Pakistan and on the forests of NWFP as compare to the effects of construction.

5. Real Per capita income

The model shows that as per capita income in Pakistan is increasing the forest area of NWFP is negatively affected by 1.1259 units. The trend of effect is same as discussed in case of Pakistan's forests but again NWFP forests receives higher effect of this increase as compare to the overall forests of Pakistan because NWFP has more forests than other parts of the country.

6. Cultivated area

It was assumed that as the cultivated area in the country is increased forest area is depleted. The model shows the same results that cultivated area of the country has negative impacts on the forest area of NWFP. These results are also supported by primary data from district Mansehra and district Abbottabad. The model shows that one unit increase in cultivated area of the country brings about 8.133 units decrease in the forest area of NWFP. In the overall regression model, the most significant factor ($T = -2.29$, $P = 0.043$) affecting on forest area of NWFP is the cultivated area of the country. Its negative effect on forest area is higher than construction which was also found in the same way as in case of Pakistan. The model further shows that effect of cultivated area of the country on forest areas of NWFP is higher than the effect on overall forest area of Pakistan. These results are also supported by primary data. People also mentioned that forest land is also sold off by local people and those who have purchased they are using it for cultivation and construction. The reasons and implications are discussed in section 6.6.1.

7. Irrigated Area

The model results show positive effects of irrigated area on the forest area of NWFP. As one unit change is made in the area of irrigation, 2.594 units increase the forest area. The trend of effects is same as discussed in case of forest area of Pakistan (Model A). Again this variable is receiving higher effect as compare to the overall forests of Pakistan. This implies that if we want to save the forests of NWFP, we have to increase irrigated plantation in the plains of Sind and Punjab.

8. Population

The model results show that population of Pakistan has not negatively affected the forest area of NWFP. A unit increase in the population of the country has brought about 0.770 positive changes in the forest area of NWFP. This leads to the same conclusion that effects of population may be positive or negative depending on the situation and growth rates which have declined in Pakistan on average from 3% to 2.1%. The trends of effects are same as in model A. The reasons and implications are already discussed under Model A.

9. Household Gas Consumption

It was assumed that increase in the consumption of gas has positive impacts on the forests. The model shows the same results that increase in the consumption of gas by household in the country has positively affected the forest area of NWFP. Its effect is 0.2654 units on these forests. The trend of effect is same but unit effect is lower than that of overall forests of Pakistan. It shows that gas facilities are not provided up to the demand and also it is provided mostly to non-forest communities. These results are also supported by the primary data discussed above.

10. Household Electricity Consumption

Increase in electricity consumption by household in the country has negative impacts on the forest area of NWFP. These results are against the general assumption that electricity is a firewood substitute. The model shows that one unit increase in the consumption of electricity negatively effects at a rate of 0.5613 units on the forest area of NWFP. These results show that trends of effects are same as shown in model A. However unit effect is slightly higher than that of overall forest area of Pakistan. These results are supported by primary data that electricity is not used as firewood substitute in NWFP rather there is electricity theft in saw mills operations.

11. Household Coal Consumption

The model B results also show that an increase in the consumption of coal by household in the country has positive impacts on the forest area of NWFP. A unit increase in coal consumption has brought 0.04447 units increase in forest area. The trend of effect is same as in model A. However this impact is greater than the impact on forest area of Pakistan as a whole. These model results are supported by primary information collected from the two districts that only 9% people use coal for cooking. Reasons are already discussed in model A.

12. Firewood Production

Increase in firewood production results in decrease in forest area. The model shows that the effect is estimated as 0.03670 units. The effect is however found positive and slightly greater than that of Pakistan's forest area. The model shows two important things; one the unit effect is minor and secondly the effect is not adverse on the forest area of NWFP as well as on the forests of Pakistan. The macro data of Pakistan is not the true representative of firewood and timber consumption in the country. Further primary data shows that people prefer to plant fruit trees and firewood trees for their consumption. Ali, et al. (1997) mentioned that in NWFP about 90% of the rural and 50% urban population use traditional fuels like crop residues and animal wastes. The per capita fire wood consumption in Pakistan is only 7 cubic feet per year, lowest among all the developing countries in South Asia. The majority of the production comes from the scattered trees privately grown on farm- lands.

13. Livestock population

Livestock population has positive impacts on the forest area of NWFP. A unit increase in livestock population has 0.2106 units increase in the forest area. This trend is same as found in model A. Increase in livestock population is not causing any negative pressure on forest area depletion. The primary data also shows the same results that as compare to past decades stall-feeding is gaining importance. People are planting themselves for their animals. The results of the primary data further support these results and mentioned (73% of sampled population) that there is as such no increase in livestock population. Add to this in district Abbottabad 56% of the respondents mentioned that there is no free grazing permission by the government and fine is imposed (60%) if forest area is used for grazing. The locals further

mentioned that people prefer to plant trees which grow early and which can be used for their animals.

14. Production of paper and paperboard

Increase in the production of paper and paperboard is considered as depleting factor for the forest area of the country. The model results show the same trends that as its production increases, deforestation is also increased. A unit increase in its production leads to deplete forest area of NWFP by 0.05144 units. However the effect is minor. Trend and effect is almost same as discussed in model A.

15. Production of chipboard and hardboard

Production of chipboard and hard board is considered a factor causing deforestation. The model results show the same results. A unit increase in the production of hardboard and chipboard leads to deplete the forest area by 0.1127 units. The unit effect is however minor but greater than the unit effect of production of paper and paperboard. The same trend of effect is found as discussed in model A.

16. Total Road Length

Roads in Pakistan has no negative effect on the forest area of NWFP rather a one unit increase in the road leads to have positive effects by 0.0248 units on the forest area of NWFP. The trend of effect is same as in model A. These results are further supported by primary data that people have moved to cities and opting for services rather than depending on forests resources.

17. Timber Consumption

Timber consumption is one of the important factors causing depletion of forest area in the country. The model shows the same result that one unit increase in its consumption leads to decrease the forest area by 0.03960 units. However, the unit effect as shown by the model is minor. The main reason is that the official data included in the study is not the true representative of actual timber extraction from the forests of Pakistan as well as of NWFP.

The value of $F = 35.30$, $P = 0.000$ shows that model is overall significant. The value of R square shows that model explains 98.2% variations. Rest of the variations may be due to smuggling, illicit felling and forests fires for which data was not available. The primary data also supports these arguments that timber mafia is responsible for

tree cutting. This has been mentioned by most of the (66% of the total) sampled population.

6.6.4 The Best Model B Regression Equation is:

$$\text{LOG forest N} = 7.06 - 0.846 \text{ Log r agr} + 0.856 \text{ log r man} - 5.14 \text{ LOG culti} + 1.46 \text{ LOG popu}$$

Table 6.31: Best Regression Model B

Dependent Variable= Log Forest Area NWFP					
Predictor	Coef	St Dev	T	P	Significance
Constant	7.059	2.407	2.93	0.007	*
Log r agr	-0.8459	0.1801	-4.70	0.000	*
Log r man	0.8562	0.1646	5.20	0.000	*
Log cult	-5.145	2.321	-2.22	0.036	*
Log popu	1.4634	0.3968	3.69	0.001	*

$$R\text{-Sq} = 93.7\% \quad R\text{-Sq(adj)} = 92.7\%$$

$$F = 89.63 \quad P = 0.000$$

$$\text{Durbin-Watson statistic} = 1.48$$

Response is Log fore on 17 predictors, with N = 29

The value of Durbin Watson = 1.48 shows that since it is close to 2 so there is no autocorrelation.

1 Real Agriculture Production Value

The best model shows that as real agriculture production value is increased the forest area of NWFP is negatively affected and the effect is estimated 0.84 units. This variable is the second most significant factor (T = -4.70, P = 0.000) affecting on the forest area of NWFP. The trend of effect is same as discussed in the overall model.

2 Real Manufacturing Production value

The results of the best model show the same trend of manufacturing sector on the forest area of NWFP as discussed above in the overall model. Its effect is positive showing highest significance level (T = 5.20, P = 0.000) with 0.8562 units effect on the forest area of NWFP.

3 Cultivated Area

The cultivated area is showing negative impacts with -5.14 unit effect on the forest area of NWFP. This variable is ($T = -2.22$, $P = 0.036$) not only having a high effect but also a variable which appeared in all models as statistically significant.

4 Total Population

The population of the country is showing positive effects. This unit effect is 1.4634. The trend of effect is same as described in the overall models above. It is the third most significant factor ($T = 3.69$, $P = 0.001$).

6.7 CONCLUSION

The results of the study showed that there is a shift from agriculture to services in the study area because of low returns from agriculture, water shortage and droughts in the area. There is a wide scope for dairy farming, poultry farming, tourism industry and forestry as an organized business. In both the districts joint family system is still strong. They share resources. However, conflicts on joint landed property are common that is one of the reasons of leaving agriculture and migrating to cities and services.

The study results showed that trends for getting education are high so at primary and middle level of education the participation rate of these two districts is above the provincial level. In the study areas other than the main profession most of the respondents are doing labor (non-farm), second comes agriculture and third is service as an alternate source of income. Forests are the alternate source of income of only a small number of people. People depend on forests just for subsistence.

Easy excess to forest resources is one of the causes of destroying forest resources. Local people blamed Forest Department to be responsible for destroying forests. People also considered police and political representatives as part of timber mafia.

The main use of wood in the area is for cooking. The second major use of wood is construction. Heating is the third item with respect to quantity that consumes wood. Only small quantity of wood is sold in the market.

The study showed that a large number of the sampled population is of the opinion that forestland had been converted to construction, and small number is of the opinion that it has been converted into agricultural land. Only few mentioned that forestland has

become barren because of encroachment. People in both the districts prefer fruit trees and firewood trees because, according to the locals it takes less care, short time to mature and give more return. The study shows that locals have no easy access to FD. The study shows that people either doesn't use permit or have no knowledge about the use of permit for tree cutting. People are satisfied with the work of some NGOs more than FD.

The present study mentioned that most of the respondents are of the view that there is no increase in cultivated area, no increase in forest area and no increase in grazing area during the past couple of decades. The present study has highlighted the fact that people are interested in tree plantation but they demanded government support. Some people are not taking interest in plantation because; land is a common property, water shortage is a problem and FD is not cooperating. The study highlighted the observations that there is no arrangement to control forest fires. The results of the MR analyses have highlighted the relationships between the forest areas and socio-economic variables of Pakistan. Some of the variables show their response against the general assumptions that these are highly contributing to forest depletion, for example population growth, increase in irrigated area, and construction of roads. Some other factors are generally assumed that they are positively contributing to forest area for example, consumption of gas, electricity and coal, but the models presented in the present study show that so far these variables could not help the forest area to improve. The most influencing factors on the forest area of Pakistan are cultivated area, real agriculture production value and construction from high to low effect respectively. Again in case of NWFP cultivated area, construction and agriculture production are found the responsible factors affecting on the forest area of NWFP.

CHAPTER 7

MAIN FINDINGS, CONCLUSION AND RECOMMENDATIONS

7.1 A RECAPITULATION OF THE NATURE OF THE STUDY AND HYPOTHESIS

The main objective of the study was to analyze some socio economic factors that cause depletion of forest resources in the country. In order to achieve this objective the study aimed at reviewing the forest management structure, policies and legislation in Pakistan, identifying some of the socio- economic factors that negatively affects the growth of forest area and analyzing the selected socio-economic factors that affect forest area in the country. The study further aimed to recommend policy measures for the growth in forest area in the country.

In order to meet the objectives of the study, the previous studies and literature reviewed had suggested consulting the general public in the forest rich areas about their socio-economic needs and patterns for forest and forest related activities. So forest communities of two forest rich districts of Hazara Division have been consulted. These results are given in the next section 7.2. Different socio economic factors have also been analyzed on the basis of secondary data. In order to assess the socio economic factors two models have been constructed. In the first model the forest area of Pakistan is selected as dependent variable. The socio economic factors have been selected from the macro economy of Pakistan to analyze their effects on the forest area of Pakistan. These are: Real Agriculture value in million rupees, Real Manufacturing value in million rupees, Real GDP at Market Prices (million rupees), Real construction in million rupees, Real Per capita income at MP (Rs.), Cultivated area and Irrigated area in million hectares, Population in million, Household Gas Consumption in million metric cft, Household electricity consumption in mm c, Household Coal Consumption in thousand Metric tons, Livestock population in million no., Production of Paper and paperboard in tones, Production of chipboard and hardboard in tones, Total road length in kilometers and Production of firewood and consumption of timber in thousand cubic meter. The model explained 98% of the total variations in forest area of Pakistan. The remaining effects may be due to illegal felling, forest fires etc. for which data was not available. The results are given in the following section 7.2.

In the second model forest area of NWFP was taken as dependent variable but the socio- economic variables have been selected from Pakistan. The model explained 98.2% of the variations in the forest area of NWFP. The remaining variations may be because of woodcutting by timber mafia and forest fires for which data was not available.

The study tested the following hypotheses:

- Area under cultivation for meeting growing agriculture products demand has contributed to the reduction of forest area in Pakistan.

The hypothesis is accepted on the basis of the results of the study. Cultivated area is taken as an independent factor in the models constructed in the present study. In these models as discussed in section 7.2, cultivated area has shown negative impacts on the forest areas of the country and this factor is estimated highly significant as compare to other statistically significant variables taken in the analysis.

- Increase in the production of oil, coal and gas have positively affected forest area in the country.

The other hypotheses was that increase in the production of oil, coal and gas have positively affected forest area. Oil production in the country was 3007 thousand barrels in 1972 that increased to 21262 thousand barrels in 1997. Similarly gas production increased from 3.5 thousand billion cubic meters to 19.8 in 2000. Coal production also increased from 1255 thousand metric tons to 3401 in 2000. The data shows that production of oil, coal and gas has increased but the study results show that in forest rich areas 89% of the population has no gas facility, coal is not used by 91% of the respondent population, and 98% of the total don't use oil because it is very expensive. On the whole majority are of the opinion that these three factors have not positively affected forest areas. The model results also indicate the same trends that these wood substitutes have not significantly contributed towards forest area. So on the whole the hypothesis is rejected.

- Expenditure under Annual Development Plan (ADP) for Physical Planning and Housing and real growth of construction to the national income affects forest area in the country.

Expenditure under Annual Development Plan for physical planning and housing was 268 million in 1972 that increased to 2065 million in 1982. Further it increased to 9783 m in 1996. On the other hand real growth of construction to national income was 15.74% in 1972, which increased to 17.72% in 1974. On average from 1972 to 2000 it remained 6% to the national income. In the present study the model results also show that construction sector has negative impacts on the forest area. These results are also supported by primary data that 62% of the total respondents made construction sector responsible for deforestation. On the basis of this information the hypothesis is accepted.

- Growth in human and livestock population has severely depleted forest area. There was another hypothesis that growth in human and livestock population has severely depleted forest area. The study results showed that growth in human and livestock population in the country has not negatively affected forest areas of the country. These results are discussed in section 7.2. On the basis of these results the hypotheses is rejected.
- Increase in the national income has impacts on the consumption of wood and wood products.

Another hypothesis was that increase in the national income has impacts on the consumption of wood and wood products. The models in the study have shown positive impacts of national income. The literature showed that if the current rate of planting (about 92 million seedlings on about 46000 ha per year) on private and community lands continues, the annual growth will increase by the year 2018 to about 22.5 million m³. Some 3.5 million m³ of industrial wood were required in 1993 is expected to rise to 9.9 million m³ by 2018 of which the greatest demand is for construction timber that comes from the coniferous forests of NWFP, AJK and Northern Areas. About Rs. 3 billion worth of pulp and paper products are imported every year. Domestic fuel wood consumption is amounting to about 46 million m³ in 1993 and rising to about 76 million m³ in 2018. Around 300,000 residential houses are constructed every year in the country. Our country needs 820,000 housing units annually over the next twenty years. With increasing demand of firewood the average annual retail prices of firewood increased from Rs.

50.74 per 40 Kg. in Karachi market in 1991 to Rs. 110 in 2000. Similarly in Peshawar it increased to 120 rupees. The retail prices of charcoal increased from Rs. 128 to Rs. 236 in Karachi market and up to 520 rupees in Peshawar. Similarly imported timber wholesale prices at Karachi market from 1991 to 2000 increased from 45000 Rs./m³ to 98000 Rs./m³. Import of wood products increased to 8041.8 m rupees in 2000 that was 387.5 in 1976. The model results show that consumption of timber that includes domestic production and imports has also increased.

- Forest policies prepared in the country in the past have not significantly contributed towards increase in forest area in the country.

Another hypothesis was that forest policies prepared in the country in the past have not significantly contributed towards increase in forest area in the country. The first forest policy statement before partition was issued in October 1894. Other policies were prepared during 1955, 1962, 1980, 1991 and 2002. The change in forest area of the country during different policy periods is estimated as follows:

In 1947 the forest area was 1.38 million hectares that decreased to 1.28 m hectares in 1955. That is a decrease of 7.25%. During this period Forest Policy 1894 was enforced. During the next policy period of 1955 to 1962 the forest area has increased slightly from 1.28 m hectares to 1.67 m he. Similarly from 1962 to 1980 the forest area has increased substantially from 1.67 m to 2.85 m hectares In 1991 the forest area was 3.47 m hectares that increased to 4.04 m hectares during next policy period. In fact in real terms the forest area has not increased. The forest area has decreased to 4.01 in 2006 that is a decrease of 0.75% from 2000 to 2006. The reasons of these developments and policy deficiencies have been discussed in chapter 4 and 5. Although forest area during some policy periods have increased but overall the policies could not meet the target of increasing forest area to 25%. Despite total area afforested from 1972 to 2000 was 639.92.72 thousand hectares and total area regenerated from 1972 to 2000 was 756.34 thousand hectares. The effects of afforestation and regeneration could help the area to increase in line with the target levels these policies have set but because of the increasing level of deforestation the

policies could not meet the targets as discussed in chapter 5. So the hypothesis is accepted.

7.2 MAIN FINDINGS

Forest is a renewable energy resource but fast depleting. There is a huge gap between demand and supply of forest products. The present study has found that Pakistan consumes about 50 million m³ of firewood and timber each year, whereas the growth of fuel wood and timber in forests and plantations is 8.8 million m³ per year. Some 3.5 million m³ of industrial wood were required in 1993 is expected to rise to 9.9 million m³ by 2018. About Rs. 3 billion worth of pulp and paper products are imported every year. Domestic fuel wood consumption amounted to about 46 million m³ in 1993 and expected to about increase 76 million m³ in 2018. It has been found out that villagers in Pakistan had free rights in the past to collect timber and firewood thus resulted in unsustainable use of these resources.

The importance of forestry is realized from the fact that it provides forage to one-third of Pakistan's 138.5 million heads of livestock. Forestry sector contributed 0.3% to the GDP in 1981 but that dropped to 0.07% in 1999-2000. In Pakistan 4.72 million hectares or 5.36% of land mass is covered with forests, 85% of this is public forest. Over 40% of it is coniferous and scrub forests. Pakistan imports 400,000 tons of wood pulp, paper and paperboard products. Apart from the above, many other problems and facts have been identified and are discussed below:

According to the constitution of Pakistan, forestry is a provincial subject yet policy is a federal responsibility. The proper definition of forest is important for the management of forests. A legal definition is different from an ecological definition. The limited availability of reliable data on forest resources in Pakistan is a major issue that affects the planning of appropriate actions to achieve these targets.

In Pakistan since 1999 the Standardized Methodology for Resource Inventory and Planning is adopted that introduced the concepts of Planning for all land uses. On the basis of these concepts three levels of planning are agreed for forest management plans in NWFP namely strategic level, Operational level and Village Land Use Planning/ Joint Forest Management level.

The per capita forest area in Pakistan is very low (0.0333 hectare) as compare to the World average of one hectare. The greatest potential in Pakistan lies not in the state forests but on the farm -lands. The area under rangelands and the common lands has declined in favor of agriculture. In NWFP more than 60% of the land is under some form of common property.

Employment in forestry in Pakistan during 1990 was 33000 persons per year that decreased to 30000 persons per year. There is no separate legislation for workers of wood based industries. Laws and regulations of other industries are applicable to labors of the forestry sector.

Population of NWFP was 12% of the country in 1972 that increased to 13% in 2000. But in both the districts, the research area of the present study, the share of their population to the province has declined. Area wise position of District Abbottabad and District Mansehra is 10th and 5th respectively in NWFP whereas population wise position among 24 districts is seventh (7th) and fourth (4th) in the province. Eighty-five percent of the total population residing in the rural areas of NWFP were directly connected with agriculture.

Hazara Division is the most forest rich division of NWFP i.e. 55% of total forests of NWFP. District Abbottabad and district Mansehra account 12% and 46% of the division's forests. Both districts account 54% of Hazara Division's forests. Out of total five districts in Hazara division, Dist. Mansehra has highest ranking with respect to forest area (45.7%) and District Abbottabad has third rank (11.5%).

Female participation in forestry related services in the study area was very low. Most of the population in the study area was in services. Services include government services, education, law, nursing, etc. Only 5% of the respondents were jobless. There was a shift from agriculture to services because of low returns from agriculture, water shortage and droughts in the area. The data showed that most of the respondents belong to service group, few respondents have agriculture as profession, and rests were doing small businesses like shop keeping, transportation, and hotels.

In both the districts joint family system was very strong. They shared resources. However, conflicts on joint landed property were common that is one of the reasons of not taking interest in agriculture and is resulting in migration to cities and services.

Most of the respondents were living very close to forests. Closer to forests they are more access to forest resources they have. This leads to the problem of proper management of the population, more focused attention and strict implementation of the law.

People blamed Forest Department for illegal cutting. In expressing their opinion about timber mafia, most of the respondents mentioned that Forest Department is actually timber mafia, where as few mentioned that timber mafia consists of political representatives and also locals. Interestingly in both the districts most of the respondents have given vote against FD in comparison with locals and political representatives. Some of them mentioned that police, contractors and unemployed people all are involved.

The sampled population opined that most of the wood was consumed for cooking throughout the year. Another major use of wood was for construction. However, only few mentioned that it was used in furniture.

Most of the respondents (59%) expressed that cooking is the main use of wood. Some of the respondents (30%) said that heating is the second purpose for which wood was used. However, 29% of the respondents considered construction not as third but again as a second purpose of wood consumption. The reason being that lot of wood that is used in construction of houses, doors and fences is more than the wood use for heating purposes. Big trees are cut down that damages forest more than firewood.

Out of the total sampled population 45% have mentioned that forest land has been used for construction of houses and paths (however, out of total who actually responded they were 62%). Those who mentioned that forest land has been converted mainly to agriculture land, their number was 17% out of the total sampled population. However, those who were of the opinion that forest land conversion to agriculture land comes next to construction, their number was 29% (this figure is 40% out of those who actually responded). Same trends were there in individual district case. Out

of total 4% say that forest -land has been converted into grazing areas. This pressure was more in district Mansehra. Out of total 3% were of the opinion that forest land has become barren. Again this pressure was more in district Mansehra. In some areas forest land is sold off by local people. The land is sold off by mixing it with their own lands especially where there were no forest land boundaries and there was no check by the government.

Out of total, 87% of the sampled population was using wood for cooking and heating. Gas cylinders were used by few of the respondents. Electricity and coal was used by 11% and 9% respectively. Oil is expensive to use for cooking and heating.

There is no proper enforcement of the legislation; people have no knowledge about grazing permission. A large number of respondents have not responded mainly because of their ignorance about grazing permission. Some people were unaware about fee payment. In the study area very few respondents own an area that is used for grazing. People were using illegal means to graze their animals. Number of animals in the area has decreased over time because people migrated to cities for employment opportunities.

In the study area majority of the respondents have no forest lands. In district Mansehra forest land ownership was more than the other district. Most of the owners have community forests. In both the districts most of the respondents were earning income from labor as an alternate source. Second major source of income was agriculture. Third major source of income was service. Forests were the source of income of few people.

Most of the respondents prefer fruit trees and firewood trees and only few were interested in construction wood trees. The results showed that 33% of people don't take interest because of their land as common property, 52% face difficulties because of water shortage and 53% said that FD is not cooperating. People mentioned that plants are expensive and we have no resources to plant trees, there is unavailability of land. Few were of the opinion that we have no time for plantation. The data showed that the sampled population has no knowledge or having hesitation to contact FD. People mentioned that forest department staff has rude behavior and general public has no idea about the locality of the office of Forest Department.

Out of total, majority expressed that there is no increase in cultivated area, no increase in forest area and no increase in grazing area. People have constructed houses on grazing areas. Out of total, majority expressed that over the past few years there is no increase in animals. In both districts the number of milk animals was greater than other animals.

In the study area people rejected as a whole that benefit of none of the agency's work has reached to the local community in the area. Majority has no knowledge about any forest policy prepared for the country or province.

Poplar production in the area has increased as compare to past years because it takes less time to mature, further it is used in industry. People preferred trees of wide leaves because they mature early and one can get cash easily. People used to plant Gond and poplar because animals do not eat their leaves. Kikar is fast growing species so people preferred to plant it.

In the study area permit for cutting trees of one person was taken from the authority and utilized by others. People get permit for one or two trees and actually cut twenty trees which rather than using it for their own use they used to sell them in the market.

According to the officials of Forest Department, the problem of permit and use of permit depends on the system of issuance of permit. Community forests have been divided into small segments called "Khusra" and now it has become individual property. So even if any body has the permit of the other, the other person will not allow him to cut tree from his Khusra. They are even not allowed to collect dry twigs from that Khusra. So people objection of issuance and misuse of permit is not correct.

According to FD, the main cause of forest fires is not the timber mafia that sets fire in order to conceal illicit cutting but the local people who use these forests as grazing lands. They set fire to burn the litre, which in turn causes fire spreading to the rest of the forest.

Majority of the people demanded that FD should distribute plants at subsidized rates. Forest Department was of the view that since 1972 the plants and seeds are provided free of cost under watershed management project. The general public has been

offered different incentives like cattle feed when they substitute it for plantation, labor to plant trees, a guard to look after trees etc. But the problem was that the people were not taking interest mainly because of being absentee landlords and because of clash of interest with land -owners (mostly Swatis in Mansehra district) and confiscators of hilly areas (called Gujar) who are interested in growing grazing material and uproot plants.

The results of the secondary data in Model A showed the effect of socio-economic variables of the country on the forest area of the country. The impact of manufacturing, GDP, irrigated area, population, electricity consumption, fire wood production, livestock population and increase in road construction is against the expectation and general perception. National income has positively affected forest area. Increase in irrigation facilities led to increase in plantation. Livestock stock population has not increased tremendously thus having no negative effect on forest area. Electricity is not used as substitute for firewood. Timber production has negative effect on the forest area of the country but firewood is having no adverse effects on the total forest area of the country. The study showed that timber and firewood consumption and production recorded in the national statistics is not the true representation of the actual quantity produced and consumed in the country. On the other hand increase in the real agriculture production value, increase in construction, increase in per capita income, cultivated area, consumption of timber, production of paperboard, chipboard and hardboard are adversely affecting forest area of the country. The case of household gas and coal consumption is having positive impacts. The most influencing factor is increase in cultivated area, which is adversely affecting forest area at a rate of 3.4 units. In the best model selected the cultivated area is highly affecting at a rate of 3.05 units on the forest area of the country. Human and livestock population have no adverse effects on the forest area. The production of chipboard and hardboard is adversely affecting but the unit effect is low (0.06). The variables expressed in the model explain 94.1% of the total variations in the forest area of the country.

The results of the secondary data analysis showed that forest area of NWFP was negatively affected by increase in agriculture productivity, construction sector, per capita income, cultivated area, production of paper and board, production of

chipboard, hardboard, and consumption of timber and production of firewood of the country. Increase in GDP as against assumptions has positive impact on forest area mainly because with the increase in the national income, investment and expenditure in the forestry sector also increased thus off setting the impacts of unsustainable growth of the economy. Irrigated area was another factor that showed positive relation with forest area. The results showed that increase in irrigation facilities has positive impacts on forest area.

Population was assumed to be one of the major factor causing deforestation and depletion of forest area in the country. But the results showed that the country's population was not affecting forest area. Electricity consumption by household in the country has no positive contribution towards forest area because electricity is expensive and people are not substituting it for firewood.

Road construction in the country has not negatively affected forest area of the province as is generally assumed rather road construction resulted in providing linkages of rural communities with urban areas thus decreasing the dependence of local communities on forests and providing more employment opportunities in other areas of the country.

In the overall regression model, the most significant factor affecting negatively on forest area of NWFP is the cultivated area of the country, which is affecting at a rate of 8.1 units. Increase in national income has positive impacts on the forest area. One unit change in GDP of the country brings 2.5 units positive change in forest area of the province. On the other hand if there is 1 unit increase in per capita income of the country, the forest area of the province is decreased by 1.12 units. However, increase in the consumption of gas by household improves it by 0.26 units. Coal consumption by household has positive minor impact on the forest area i.e. just 0.04 units. The timber consumption has negative impacts at a rate of 0.39 units and firewood production has 0.036 unit effect on the forest area of NWFP. Production of chipboard and hardboard and paperboard has negative though minor impacts on the forest area. Agriculture and construction both have negative effects on the forest area however the effect of agriculture productivity is higher than construction.

7.3 CONCLUSIONS

Forest is an important source of energy for the household economies of Pakistan. Although the importance of forestry is being realized by all segments of society and is mentioned in all planning documents but the data shows that its overall contribution to the GDP of the country has dropped. The forest area of the country and per capita forest area in Pakistan is very low as compare to the international standards.

In Pakistan federal government is responsible to formulate forest policies and provincial governments are responsible to implement these policies and programs. Since there are different types of forests according to the use and geography so there is no single definition of forest that some times creates problems in the management of these forests. But the most important problem in Pakistan is the availability of reliable data related to forests and forest services.

The government since 1990 has also made changes in the strategies developed for forest management by including all stakeholders in policies, programs and implementation. One such effort is Standardized Methodology for Resource Inventory and Planning. Now Geographic Information System and satellite images for land use planning are also being used in Pakistan.

Since per capita forest area is very low in Pakistan as compared to the world average so the policy makers has to see that how they can increase forest area and from where the demand supply gap of forestry products can be filled. It has been found out that the potential lies in farm -lands more than the state forests in Pakistan.

In NWFP more than 60% of the land is under some form of common property. Further there are many industries, which are related to wood and wood based products but there are no separate laws dealing with these areas especially the labors of forestry sector.

Female participation in the forestry related services was very low in the study area, most of them though educated but were at home or serving as teachers.

In both the districts joint family system was found very strong. They share resources but sharing resources has many problems including lack of interest in management of

land, cultivation and planting thus resulting in migration to cities and change of profession to services and labor in other fields. People living very close to forests are difficult to check by the government. Most of the respondents considered local people responsible for tree cutting.

In the study area most of the wood was consumed for cooking. Second major use of wood was heating. Wood use for construction was the third main item. However, a small quantity of wood was used for furniture and tobacco husking. Most of the respondents were of the view that forest land has been converted to construction. Rests were of the opinion that it has also been converted for cultivation. A small number has however mentioned that it has been converted to either grazing areas or become barren. This pressure was more in district Mansehra than district Abbottabad. In case where boundary marks of land have disappeared, locals have sold off that land.

People in the study area were also using illegal means to use government lands. This rate was high in district Mansehra as compare to the other districts. Even for wood cutting people didn't use permit or have no knowledge, again this rate was high in district Mansehra as compared to district Abbottabad. In case of imposition of fine very few pay fine, others avoid it. There were reports of misusing the permits taken from the government but these reports have been rejected by the Forest Department. In the study area majority of the respondents have no forest lands. People in the study area were interested in plantation especially in fruit trees, firewood and timber from high to low priority respectively. Some of them didn't take interest in plantation because of non-cooperation of Forest Department. Other constraints were land as common property, water shortage, expensive saplings, unavailability of land, no share in forest revenue and less time to care plants. People have constructed houses on grazing areas. Number of animals in the area has decreased over time because people migrated to cities for employment opportunities. Those who own animals they preferred milk animals.

In the study area people were not aware of forest laws and of any government or non-government organization working for forestry. Few of them have knowledge but they were not satisfied of their work because of no follow up of the programs. Fire also causes destruction. According to Forest Department locals are responsible whereas

according to locals timber mafia is responsible. The FD has no arrangements to extinguish fire.

The results of the secondary data analysis showed that forest area of NWFP was negatively affected by increase in agriculture productivity, construction, per capita income, cultivated area, production of paper and board, production of chipboard, hardboard, and consumption of timber. Increase in GDP and irrigated area has positive impact on forest area. Population increase has not negatively affecting forest area of NWFP. Electricity consumption by household in the country has no positive contribution towards forest area because people in NWFP are not substituting it for firewood. Road construction has not negatively affected forest area of NWFP. Another model showed the effect of socio-economic variables of the country on the forest area of the country. The impact of manufacturing, GDP, irrigated area, population, electricity consumption, fire wood production, livestock population and increase in road construction is against the expectation and general perception. National income has positively affected forest area. Increase in irrigation facilities led to increase in plantation. Livestock stock population has not increase tremendously thus having no negative effect on forest area. Timber consumption has negative effect on the forest area of the country but firewood is having no adverse effects. On the other hand increase in the real agriculture value, increase in construction, increase in per capita income, cultivated area, and consumption of timber, paperboard, chipboard and hardboard were adversely affecting forest area of the country. The case of household gas and coal consumption was having positive impacts. The most influencing factor was increase in cultivated area, which was adversely affecting forest area.

7.4 SUGGESTIONS

On the basis of the above findings and conclusion, following are the worth mentioning suggestions to save forest resources from further depletion and to increase forest area up to required standard.

The present study has reviewed different policies and programs that have been implemented in the country from time to time that could not meet the target not only because of financial and political constraints but mainly because of setting very high and vague targets. The forest area, which has increased just to 5.3% during five decades despite thousands of hectares of afforestation and regeneration, is not possible to increase to new target of 25% during the next few years unless drastic policy measures are taken. Government should not commit in the policies, which it knows it can not honor, for example, setting very high growth targets and extension of services etc. Realistic policy approach is needed. Add to this, as much number of legislation as can be launched is not a meaningful approach because when there are more rooms there are more doors to escape. Overlapping policies create problems in implementation and misspecification of the duties for government departments.

During primary data collection it has been observed that if people cut branches for fuel wood it damages less as compare to cutting trunks of big trees. So locals should be trained and enforced to cut only branches.

It has been observed that common property is one of the hurdle and litigation cases are pending in courts for years, which is one of the reasons of low productivity in agriculture sector and shift of people from agro based activities to services. Government in the past has once tried to solve the problem of joint property but that legislation is still awaited. The government should implement it so that property distribution and ownership problems would be solved.

The study found that extension in cultivated area especially on hill sides is one of the main reasons responsible for forest area loss. Land use policy needs special attention of the government. Forest Department can play a role in the implementation of land use policy. Restriction on construction and cultivation activities should also be the part of environmental policies.

Construction sector activities are found another major destructive element for forest resources that need to be regulated. People even in rural areas especially in forest rich

areas should be restricted to construct houses and paths only with the prior permission of the local government.

The study has identified that the two very important variables; timber and firewood extraction that are major sources of deforestation has not shown high significance because of lack of proper time series data collection, need focused attention of the relevant departments. Until and unless we have proper information about the cause and effect, the out come could be misleading. New formula /mechanism are needed to be developed to estimate the production and consumption of these two important variables.

For meeting the target of increase in forest area to 25% only poor forest communities and foreign funded and short time domestic projects are not enough. It is suggested that under the law it should be made obligatory on part of other institutions e.g. educational institutions to plant a required number of tree species. There are hundred of private schools in district Abbottabad which if participate in plantation on regular basis the losses of deforestation could be covered. The cost should not be only on government budgets. Throughout the country schools, colleges and other institutions can play very decisive role by creating competition among them for plantation.

Apart from the above, on the basis of field observations in the study area some suggestions are given below:

- Barren and non-populous and uncultivated area should be taken from people and should be given to locals on lease for tree cultivation.
- Different parts of the forest should be allocated to local people to take care and to enhance productivity. Government should allot public landed property to local people to plant trees.
- There should be proper legislation, check and balances for misusing and converting public lands. Government should give subsidy for tree plantation because people substitute vegetable/crop cultivation for trees.
- There are no boundary lines and forests are not properly demarcated so the people encroach towards forest area and mix with their own land. These lines

can be identified with the help of planted trees that would not be allowed to cut down.

- Awareness level about forest laws is very low in Pakistan. The law should be publicized so that people should take care of these resources. In Pakistan law making is not the problem but proper and effective implementation is weak. The government should concentrate more on this area. Stress should be on prevention than cure because it is more economical.

7.5 SUGGESTIONS FOR FURTHER RESEARCH

In the above study an effort has been made to evaluate some socio-economic factors that are affecting on the forest area of the country. There are some variables other than the above socio-economic factors for example fire burnt loss, imports of certain wood items, exports, budgetary allocations etc would be analyzed. Add to this the dummy variables for example; forest ban years, Policy and non-policy time period, project areas and non-project areas etc. can be included in the study. Further the factors evaluated would be checked and analyzed in the light of their long run and short run effects on forest areas. Since unofficial timber and firewood production and consumption is far higher than official estimates so there is a need to estimate data and develop relevant econometric model. This would be inshallah one of the future study that would be linked with the present research.

BIBLIOGRAPHY

Books

- Agarwal, A. K., (1986). Planning for the Development of Arunachal's Forests- An Approach (Ed.), *Forestry Development In North East India*, Omsons Publications Rajouri Garden, New Delhi
- Bahuguna, S. (1986). Forests and Tribals- The Chipko Approach (Ed.), *Forestry Development In North East India*, Omsons Publications Rajouri Garden, New Delhi
- Banerjee, A., M. Dasgupta, and P. Prasad. (1986). The importance of Forests in the Economic Life of the Jhumias of Tripura (Ed.), *Forestry Development In North East India*, Omsons Publications Rajouri Garden, New Delhi
- Bingham, W. Charles (1985). 'Rationale for Intensive Forestry Investment: A 1980's View' in *Investments in Forestry: Resources, Land use, and Public Policy*, ed., (PP. 21-31), Westview Press, 5500 Central Avenue, USA.
- Chakarvati, P.K., S.K. Grag, and M.D. Shedla, (1992). Problems and Strategies of Development in Darjeeling Himalaya (ed.), *Health Environment and Development*, S.B. Nangia, Ashish Publishing House, 8/81, Punjabi Bagh, New Delhi 110026
- Champion, S. Harry, S.K. Seth, & G.M. Khattak (1965). *Forest Types of Pakistan*, PP:3-6, 8-23, Pakistan Forest Institute Peshawar.
- Chandler, Craig, et al. (1983). *Fire in Forestry; Forest Fire, Management and Organization*, Vol. 2, ISBN-0-471-87447-7, John Wiley & Sons, New York, USA.
- Clawson, Marion (1985). 'Problems of Public Investment in Forestry' in *Investments in Forestry: Resources, Land use, and Public Policy*, ed., (PP. 167-181), Westview Press, 5500 Central Avenue, USA.
- Das Gupta, et al. (eds.) (1986). *Forestry Development in North- East India*, Omsons Publications, Rajouri Garden, New Delhi
- Dasgupta, M., (1986). Forest Management in Darjeeling Hill Area From British Raj To Swaraj (Ed.), *Forestry Development In North East India*, Omsons Publications Rajouri Garden, New Delhi
- Dorfman, Robert & Nancy Dorfman., (1993). *Economics of The Environment; Selected Readings*, W.W.Norton & Company, New York.

- Duerr, William A. (1960), *Fundamentals of Forestry Economics*, McGraw-Hill Book Com., New York.
- Dutta, B.B., (1986). Tradition VS Modernity: Problems of Forest Planning in The Khasi Hills of Meghalaya (Ed.), *Forestry Development In North East India*, Omsons Publications Rajouri Garden, New Delhi
- Fernie, John and Pitkethly, S. Alan (1985). “*Resources, Environment & Policy*”. Paul Chapman Publishing Ltd. London.
- Ganguly, J.B., (1986). Planning for Forestry Development in the North Eastern Region-An Approach (Ed.) *Forestry Development In North East India*, Omsons Publications Rajouri Garden, New Delhi
- Gilmour, D.A. & R. J. Fisher (1991). *Villagers, Forests and Foresters: The Philosophy, Process and Practice of Community Forestry in Nepal.*, Sahayogi Press Kathmandu.
- Greeley, William B. (1953). *Forest Policy*, McGraw-Hill Book Company, USA.
- Indurkar, Pushpa, (1992). *Forestry Environment and Economic Development*, Ashish Publishing House- New Dehli-110026
- Jan, Abeer Ullah, (1993 a). *Review and Analysis of Forest Policies of Pakistan*, PP: 2-4, 17-24, 47-63,82-84,125,128,Pictorial Printers (Pvt.) Islamabad, Pakistan
- Jan, Abeer Ullah, (1993 b). *Forest Policy: Administration and Management in Pakistan*, PP: 2-6,17, 32,37,49,50,55,57-62,72,79.80,83,133-135,136, Pictorial Printers (Pvt.) Islamabad, Pakistan
- Jawad, A. & Tor A. Benjaminsen, (Nov.2004). ‘Fuelwood, Timber and Deforestation in the Himalayas’, *Mountain Research and Development*, Vol. 24 No.4. United Nations University Shibuya-Ku, Tokyo and International Mountain Society, Institute of Geography, University of Berne, Switzerland.
- Kumar, N. and P. Saxena, (1992). “Strategy for Conservation of Economic System in Madhya Pradesh” (ed.), *Health Environment and Development*, S.B. Nangia, Ashish Publishing House, 8/81, Punjabi Bagh, New Delhi 110026
- Kureshy K. U. (1997). “*Pakistan Studies, Geography of Pakistan*”, Lahore, pp-56
- Lodha, R.M. (1991). *Environmental Essays*, Ashish Publishing House- New Delhi-110026
- Miller, Donald and Robert Rose. (1985). ‘Changes in the Urban Land Base and the Consequences for the Future of Forestry (Ed.)’, *Investments in Forestry: Resources, Land use, and Public Policy*, ed., (PP.73-120), Westview Press, 5500 Central Avenue, USA.
- Nadkarni, M.V., Syed Ajmal Pasha & L.S. Prabhakar, (1989). *The Political Economy of Forest Use and Management*, Sage Publications, New Delhi.

- Negi, S.S. (1986). *A Hand Book of Social Forestry*, International Book Distributors, 9/3, Rajpur Road, Dehra Dun, India.
- Ostom, E. (1990). *Governing the Common: The Evolution of Institutions For Collective Action*, Cambridge, Cambridge University Press.
- Pati, R.N. (ed.) (1992). *Health, Environment and Development*, S.B. Nangia, Ashish Publishing House 8/81, Punjabi Bagh, New Delhi 110026
- Poffenerger, M. & B. Mcgean, (1998), *Village Voices, Forest Choices*, Oxford India Paperacks, Oxford University Press, Delhi, India
- Rostow, W.W. (1985). The Fifth Kontratoeff Upswing and the Fourth Industrial Revolution: Their Meaning for Forestry (Ed.) , *Investments in Forestry: Resources, Land use, and Public Policy*, ed., (PP.11-17), Westview Press, 5500 Central Avenue, USA.
- Saikia, P. D. and Goswami, (1986). Forestry In Assam and Programme of Social Forestry (Ed.), *Forestry Development In North East India*, Omsons Publications Rajouri Garden, New Delhi
- Schlich, W.M., (1922). *Forest Policy in the British Empire, Schlich's Manual of Forestry*, vol. 1, Bradbury, Agnew & Co. 10 Bouverie Street London
- Sedjo, Roger A. (1985). *Investments in Forestry: Resources, Land use, and Public Policy* (ed.), Westview Press, 5500 Central Avenue, USA.
- Shahid, Imtiaz, (1997). *Forestry in Pakistan*, PP: 101,107-109,123-133,177-192,265, Carvan Enterprises, Kachehri Road Lahore.
- Sheikh, M. Iqbal, (2000). *Trees of Pakistan*,__ PP:1-5, Pictotal Printers Ltd. Islamabad.
- Sheikh,M. Iqbal & Mohammad Hafeez, (1977), *Forests and Forestry in Pakistan*, P:1-4,14-2240-42,47-51,64-66,70,72,113,234, Pakistan Forest Institute, Peshawar
- Teeguarden, E. Dennis (1985). Effects of Public Policy on Forestry Investments (Ed.), *Investments in Forestry: Resources, Land use, and Public Policy*, ed., (PP.215-237), Westview Press, 5500 Central Avenue, USA.
- Thakurta, S.N. G., (1986). Political Economy of India's Forest Policy (Ed.), *Forestry Development In North East India*, Omsons Publications Rajouri Garden, New Delhi
- Waggener, R. Thomas (1985). The Economics of Shifting Land use Margins (Ed.), *Investments in Forestry: Resources, Land use, and Public Policy*, ed., (PP. 35-69) Westview Press, 5500 Central Avenue, USA.
- Yoho, G. James (1985). 'Continuing Investments in Forestry: Private Investment Strategies (Ed.), *Investments in Forestry: Resources, Land use, and Public Policy*, ed., (PP.151-165), Westview Press, 5500 Central Avenue, USA.

Youngquist, Walter, (1977). *Investing in Natural Resources*, Patricia Brooks, Lester Brooks, Stein and Day Publishers, USA

Zaidi, S. Akbar, (1999). *Issues In Pakistan's Economy*, PP: 29-30, Oxford University Press, Sharae Faisal, Karachi, Pakistan.

Journals / Reports and Working Papers

Ahmad, Rafique (Sep. 1994). The Environment Today and its Decay, *Journal of Rural Development and Administration*, Vol. XXVI, No.3, Pakistan Academy of Rural Development, Peshawar

Ali & Shah (2004). Local Communities' Access to Forest Resources of Hilkot Watershed, Mansehra, *Pakistan Journal of Forestry*, Vol. 52(2), Pakistan Forest Institute, Peshawar

Ali, H.A., (Nov.1999). Management of Natural Resources Through Partnership Arrangement: Experiences from Social Forestry Project Malakand, *Seminar Proceedings "Changing Roles In Development: The Effects of Community involvement on Line Agencies and NGO's*, Department of Forestry, Fisheries and Wildlife, NWFP"

Ali, Haider K. (1999). Management of Natural Resources Through Partnership Arrangement: Experiences from Social Forestry project, Malakand, NWFP, *Changing Roles in development: The Effects of Community Involvement on Line Agencies and NGOs*, p. 89-96, Department of Forestry, Fisheries and Wildlife NWFP, Peshawar.

Ali, et al. (1997). *Forestry in NWFP*, Govt. of NWFP, Forests, Fisheries and Wildlife Department, Peshawar,

Ali, Mukhtar Ahmad (2003). *Privatisation of Public Utilities: How is it Generating and Impacting Conflicts in Pakistan*, Centre for Peace and Development Initiatives CPDI, Pakistan - December 2003

Ali, Tanvir, Babar Shahbaz and Abid Suleri (2006). Analysis of Myths and Realities of Deforestation in North West Pakistan: Implications for Forestry Extension, *International Journal of Agriculture and Biology* , pp: 107-110

Amir, A.A. (1991). *The Forest Manual*, Irfan Lae Book House, Lahore, Pakistan.

and 9600 Garsington Road, Oxford OX4, 2DQ, UK.

Ayaz, M. and Bashir Ahmed Wani(2000). Abstract, *The Pakistan Journal of Forestry*, Vol.50 (1-2), 2000, Pakistan Forest Institute Peshawar

Bashir, M. (1999). *Current Status of Environmental Laws, Rules, Regulations and Policies in Pakistan*, GTZ/UIEP, EPA Project, Peshawar

- Bennett, L. T. and M. A. Adams (August 2004). Assessment of ecological effects due to forest harvesting: approaches and statistical issues, *Journal of Applied Ecology*, Volume 41, Issue 4 Page 585
- Bookbinder, Marnie P., et. al. (December 1998). Ecotourism's Support of Biodiversity *Conservation, Conservation Biology*, Volume 12 Issue 6, Page 1399
- Burgi, Matthias, Emily W. B. Russell and Glenn Motzkin (2000). Effects of Post settlement human activities on forest composition in the North-Eastern United States: a comparative approach, *Journal of Biogeography*, Department of Geological Sciences, Rutgers, University, Newark, NJ 07102, USA, Blackwell Science Ltd
- Coxhead, Ian (2002). Development and the Environment in Asia, Department of Agricultural and Applied Economics, University of Wisconsin–Madison. Agency for International Development, The Sustainable Agricultural and Natural Resource Management Collaborative Research Support Program (SANREM CRSP), USA
- Chakeredza, Sebastian et al. (2007). Managing fodder trees as a solution to human–livestock food Conflicts and their contribution to income generation for smallholder farmers in southern Africa, *Natural Resources Forum* 31 (2007) pp.286–296, Published by Blackwell Publishing Ltd., 9600 Garsington Road, Oxford, OX4 2DQ, UK and 350 Main Street, Malden MA 02148, USA.
- Cocu, N., et al (2005). Geographical Location, Climate and Land use influences on the Phenology and Numbers of the aphid, *Myzus Persicae* in Europe, *Journal of Biogeography*, 32, 615-632, Blackwell Publishing Ltd.
- Cole, Matthew A. (June 2003). Environmental Optimists, Environmental Pessimists and the Real State of the World – An article examining The Skeptical Environmentalist: Measuring the Real State of the World by Bjorn Lomborg, *The Economic Journal*, Volume 113, Issue 488, Page F362.
- Coxhead, Ian (2002). Development and the Environment in Asia, Department of Agricultural and Applied Economics, University of Wisconsin–Madison.
- CRPRID (Nov.2003). *Pakistan Human Condition Report 2003*, Centre on Poverty and Income Distribution (CPRID), Crystal Printers, Islamabad
- Deckers, B. et al (2005). Sunken Roads as Habitats for Forest Plants Species in a dynamic Agricultural land scape: Effects of Age and Isolation, *Journal of Biogeography*, 32, 99-109
- Develey, Pedro and Philip Stouffer (2001). Effects of Roads on Understory Birds in Mixed Species Flocks in Central Amazonian Brazil, *Conservation Biology* pp. 1416-1422, Vol 15, No. 5, 2001
- Dijk, Albert V. & Maliha Hussein, (1994). *Environmental Profile of North West Frontier Province- Pakistan*, PP:31,32,35,41,69, EDC (Pvt.) Limited, Enterprise and Development Consulting, Islamabad, P.O. Box, 2389, Pakistan.

- Eiser, D. and D. Roberts (2000). The Employment and Output Effects of Changing Patterns of Afforestation in Scotland, *Journal of Agricultural Economics* — Volume 53, Number 1, March 2002, PP 65-81
- ELDF (1999). *Our Forests at risk: The world Trade Organization's Threat To Forest Protection*, Earthjustice Legal Defense Fund, August 20th, 1999
- Ewing, P. & G. Tarasofsky (Dec. 1996). *The Trade and Environment Agenda: Survey of Major Issues and Proposals- From Marakesh to Singapore*, IUCN, Environmental Law Centre- D-53113 Bonn, Germany
- FAO (2003). *Trade and Sustainable Forest Management – Impacts and Interactions*, Analytic Study of the Global Project GCP/INT/775/JPN: Impact Assessment of Forest Products Trade in the Promotion of Sustainable Forest Management available at [\[http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/007/ae017e/ae017e10.htm\]](http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/007/ae017e/ae017e10.htm) (Dated 20-10-2005)
- FAO (2005). The Global Forest Resources Assessment 2005 (FRA-2000- Forest Resources of Bangladesh, Country Report, Rome 2000, FAO)
- Fisher, R.J. & Shrestha (1999). *International Experiences in Role Changes in Collaborative Forest Management: Some Lessons', Changing Roles in development: The Effects of Community Involvement on Line Agencies and NGOs*, p. 74-81, Department of Forestry, Fisheries and Wildlife NWFP, Peshawar.
- Fisher, R.J., and N.K. Shrestha, (Nov.1999). International Experiences in Role Changes In Collaborative Forest Management: Some Lessons, *Seminar Proceedings "Changing Roles In Development: The Effects of Community involvement on Line Agencies and NGO's*, Department of Forestry, Fisheries and Wildlife, NWFP'
- Food and Agriculture Organization (2005). *State of Forests 2005*, Food and Agriculture Organization of the United Nation (FAO), Rome 2005.
- Gilmour, D.A., G.C. King & R. J. Fisher (1987). Action Research into Socio-Economic Aspects of Forest Management, In M.I. Sheikh, K.M. Siddiqui, B. Strhlke and G. Stohr (eds), *Role of Forest Research In Solving Socio-Economic Problems in The Himalayan Region. Proceedings of IUFRO Symposium held at the Pakistan Forest Institute, Peshawar, Pakistan*, Oct. 17-27, 1987.
- Glasmeyer, Amy K. and Tracey Farrigan (March 2005). Understanding community forestry: a qualitative meta-study of the concept, the process, and its potential for poverty alleviation in the United States case, *The Geographical Journal*, Volume 171, Issue 1, Page 56
- GOP. (1994 b). *Eighth Five Year Plan (1993-98)*, Govt. Of Pakistan, Planning Commission, Islamabad, June, 1994, PP: 129

- Government of NWFP (1999). *NWFP Forest Policy, Government of NWFP, Pakistan.*
- Government of NWFP (2002). “NWFP Development Statistics”, Bureau of Statistics, Planning and Development Department, Peshawar
- Government of NWFP and International Conservation Union (1996), *SPCS: Sarhad Provincial Conservation Strategy*, Government of NWFP, IUCN, Pakistan.
- Government of Pakistan (2001). *Draft- National Forest Policy 2001*, Government of Pakistan, Ministry of Environment, Local Government and Rural Development, Islamabad, Pakistan.
- Government of Pakistan (August 1999). *Pakistan 1999; An Official Handbook on Statistics*, Federal Bureau of Statistics, Statistics Division, Islamabad.
- Government of Pakistan (1968). *Pakistan Statistical Year Book 1967*, Central Statistical Office, Economic Affairs Division, President Secretariat, Karachi, The Manager of Publications, Karachi.
- Government of Pakistan (1973). *Population Census of Pakistan 1972- Statistical Report of Pakistan*, Population Census Organization, Statistical Division, Islamabad.
- Government of Pakistan (1977). *Pakistan Economic Survey 1976-77*, Finance Division, Economic Advisory Wing, Islamabad.
- Government of Pakistan (1986 a). *Environmental Impact Assessment Guidelines*, Government of Pakistan, Ministry of Housing and Works (Environment and Urban Affairs Division), Islamabad, June, 1986
- Government of Pakistan (1988, 89,90, 91). *Pakistan Statistical Year Book 1988, 89, 90, 91*, Federal Bureau of Statistic, Statistics Division, Islamabad
- Government of Pakistan (1992 b). *PNCS: The Pakistan National Conservation Strategy*, PP: 175, IUCN and Environment &Urban affairs Division, Government of Pakistan, Islamabad
- Government of Pakistan (1994 a). *Pakistan Statistical Year Book 1994*, Federal Bureau of Statistic, Statistics Division, Islamabad
- Government of Pakistan (1995). *Pakistan Statistical Year Book 1995*, Federal Bureau of Statistic, Statistics Division, Islamabad
- Government of Pakistan (1996). *Pakistan Energy Year Book 1997*, Ministry of Petroleum and Natural Resources, Government of Pakistan, Islamabad, Pakistan.
- Government of Pakistan (1997). *Environmental Protection Act 1997*, Government of Pakistan, The Gazette of Pakistan. Act No. XXXIV of 1997, Islamabad, Pakistan.

- Government of Pakistan (2001). *Pakistan Statistical Year Book 2001*, Federal Bureau of Statistic, Statistics Division, Islamabad
- Government of Pakistan (2002). *National Forest Policy 2002*, Ministry of Environment, Local Government & Rural Development, January, 2002
- Government of Pakistan (2002a), *Pakistan Country Assessment Report 2002*, Government of Pakistan, Ministry of Environment, Local Govt. and Rural Development, Islamabad.
- Government of Pakistan (2003). *Mainstreaming Environment, into the Government of Pakistan's Poverty Reduction Strategy Paper*, April 2003, Ministry of Environment, Islamabad.
- Government of Pakistan (2003). *Pakistan Energy Year Book 2002*, Hydrocarbon Development Institute of Pakistan, Ministry of Petroleum and Natural Resources, Islamabad
- Government of Pakistan (2005 a). *Economic Survey 2004-05*, Federal Bureau of Statistic, Islamabad
- Government of Pakistan (2005 b). *Compendium on Environment Statistics of Pakistan-2004*, Federal Bureau of Statistics, Islamabad
- Government of Pakistan (Dec.1984). *1981 Census Report of Pakistan*, Population Census Organization, Statistics Division, Islamabad
- Government of Pakistan (Dec.2002), *Foreign Trade Statistics of Pakistan*, Federal Bureau of Statistics, Statistics Division, Islamabad
- Government of Pakistan (June1992a). *Forestry Sector Master Plan*, Volume I, United Nations Development Program, Reid Collins and Associates, Canada
- Government of Pakistan (March 1998). *50 Years of Pakistan In Statistics*, Volume I, II, III, IV (1947-1997), Federal Bureau of Statistics, Statistics Division, Islamabad.
- Government of Pakistan (March, 2001). *Household Integrated Economic Survey-1998-99*, Federal Bureau of Statistics, Islamabad
- Government of Pakistan (Nov.1999). *Pakistan Statistical Year Book 1998-99*, Federal Bureau of Statistic, Statistics Division, Islamabad
- Govt. of NWFP (1999). *Pakistan-Duch Follow-Up (Phase-III) of Social Forestry Project in Malakand Division*, NWFP, Department of Forestry, Fisheries and Wildlife, Peshawar, Pakistan
- Govt. of NWFP (2005). *NWFP Development Statistics 2005*, Federal Bureau of Statistics, Peshawar
- Guariguata, Manuel and Juan M. Dupuy (1997). *Forest Regeneration in Abandoned Logging Roads in Lowland Costa Rica*, BIOTROPICA 29(1): 15-28 1997

- Haider, Syed Waqar (2000). *Energy Pricing Policy in Pakistan, Existing prices and a proposed Framework*, Energy Consultant, Privatization Commission, Government of Pakistan, Islamabad, Pakistan, May 2000
- Hasan Shah, A. (1999). Lessons Learnt From Community Involvement in Drainage and Reclamation Projects, *Changing Roles in development: The Effects of Community Involvement on Line Agencies and NGOs*, p. 101-113, Department of Forestry, Fisheries and Wildlife NWFP, Peshawar.
- Hasan, L. (2001). *Analysing Institutional Set-up of Forest Management in Pakistan*, Report No. 182, Pakistan Institute of Development Economics, Islamabad, taken from unpublished MA Thesis entitled “From Conflict to Cooperation—The Need for a Change in the Institutional Set-up of Forest Management in Pakistan”, Institute of Social Studies (ISS), The Hague Research
- Haskell, David (2000). Effects of Forest Roads on Macroinvertebrate on Soil Fauna of the Southern Appalachian Mountains, *Conservation Biology*, pp. 57-63, Vol. 14 No,1 2000
- HDC (2002). *Human Development in South Asia 2002*, Human Development Centre, Agriculture and Rural Development, available at <http://www.un.org.pk/hdc/Overview2002.htm> (Downloaded on Nov. 14, 2005)
- Heering, Hero., Alex Sherazi & Frans Werter (eds.) (Nov1999). *Changing Roles in development: The Effects of Community Involvement on Line Agencies and NGOs*, Department of Forestry, Fisheries and Wildlife NWFP, Peshawar.
- Hill, Jennifer L. and Paul J. Curran (2003). “Area, Shape and Isolation of Tropical Forest Fragments: Effects on Tree Species Diversity and Implications for Conservation”, *Journal of Biogeography*, 30, 1391-1403,
- Hooper, Elaine., Pierre Legendre and Richard Condit (December 2005). Barriers to forest regeneration of deforested and abandoned land in Panama, *Journal of Applied Ecology*, Volume 42 Issue 6, Page 1165
- IUCN & LEAD (1999). International Conservation Union and Leadership For Environment and Development, *The Economics Of Environmental Sustainability*, Pan Graphics (Pvt.) Ltd. Islamabad.
- IUCN & LEAD Pak. (1998). *Leadership For Sustainable Development: Stakeholder Dialogue In Policy Planning for Integrated Development*, International Conservation Union and Leadership For Environment and Development, Pan Graphics (Pvt) Ltd. Islamabad.
- IUCN & LEAD Pak. (1998). *Strategic Planning For Sustainable Development: Vision, Mission and Tools*, International Conservation Union and Leadership For Environment and Development, Pan Graphics (Pvt) Ltd. Islamabad.
- IUCN (2002). *Status of the United Nations Convention on Biological Diversity (UNCBD) in Pakistan*, World Summit on Sustainable Development,

Johannesburg, June 3, 2002, The World Conservation Union, Islamabad, Pakistan

IUCN (2003). *Environmental Law in Pakistan: Description and Analysis*, vol. 1, IUCN- Environmental Law Department

IUCN (Jan. 1998). *Natural Resource Management Strategy, Environmental Rehabilitation in NWFP and Punjab Project*, IUCN, Pakistan

IUCN (Jan.1998). *Natural Resource Management Strategy*. International Union For Conservation of Nature.

Javed, A. & Fawad, M. (1998). *Changing perspectives on forest policy: Pakistan country study.*, IIED, International Union for Conservation of Nature, London

Jones, Julia, Frederick, Beverley and Kai Snyder (2000). Effects of Roads on Hydrology, Geomorphology and Disturbance patches in Stream Networks, *Conservation Biology* , pp. 76-85, Vol 14, No. 1, 2000

Knight, John (2000). From Timber to Tourism: Re-commoditizing the Japanese Forests, *Development and Change*, Vol. 31, 2000, Blackwell Publisher UK

Knudsen, Are J. (1995). *Forest Management in Pakistan: Failed Policies or Local mismanagement?*, P: 1,3,5,6,7,10,13, CHR. Michelsen Institute, Development Studies and human Rights, Fantoft- Bergen, Norway

Kohlin G. and Gregory S. Amacher (2005). Welfare Implications of Community Forest Plantations in Developing Countries: The Orissa Social Forestry Project, *American Journal of Agricultural Economics*, Volume 87, Issue 4, Page 855

Ledec, George (1987). Effects of Kenya's Bura Irrigation Settlement Project on Biological Diversity and Other Conservation Concerns, *Conservation Biology*, Volume 1, No. 3, October 1987

Marjan, G. (Nov.1999). Experience of NWFP Forest Department with Institutionalizing Community Based Approaches In Natural Resource Management, *Seminar Proceedings Changing Roles In Development: The Effects of Community involvement on Line Agencies and NGO's*, Department of Forestry, Fisheries and Wildlife, NWFP.

Marjan, Ghazi (1999). Experience of NWFP Forest Department with Institutionalizing Community- Based Approaches In Natural Resource Management, *Changing Roles in development: The Effects of Community Involvement on Line Agencies and NGOs*, p. 39-43, Department of Forestry, Fisheries and Wildlife NWFP, Peshawar.

McConnell, William J. and Sean P Sweeney (2005). Challenges of forest governance in Madagascar, *The Geographical Journal*, Volume 171, Issue 3, Page 223

McGraw-Hill Book Company, New York.

- McNeely, Jefferey (1987). How Dams and Wildlife Can Coexist: Natural Habitats, Agriculture, and Major Water Resource Development Projects in Tropical Asia, Conservation Biology, Volume 1, No. 3, October 1987
- Mehmood, Iqbal (2003). *Deforestation in NWFP* NIPA, Karachi, Vol.8, No. 3, pp: 75-101, Sep. 2003
- Michoacán, M. M. Works and Keith Hadley (March 2004), “The cultural context of forest degradation in adjacent Purépechan communities”, *The Geographical Journal*, Volume 170, Issue 1, Page 22
- Munroe, Darla and Abigail York (2003). Jobs, Houses and Trees; Changes Regional Structure, Local Land Use Pattern and Forest Cover In Southern Indiana, Change and Growth, Vol. 34, No. 3, 2003, Blackwell Publisher UK
- Murtland, R., (Nov.1999). Planning for Collaborative Natural Resource Management In NWFP”, *Seminar Proceedings “Changing Roles In Development: The Effects of Community involvement on Line Agencies and NGO’s*, Department of Forestry, Fisheries and Wildlife, NWFP”
- Murtland, Rober (1999). Planning for Collaborative Natural Resource Management in NWFP, *Changing Roles in development: The Effects of Community Involvement on Line Agencies and NGOs*, p. 145-150, Department of Forestry, Fisheries and Wildlife NWFP, Peshawar.
- Nazir, Naila, (2002). *Critical Analysis of Government Environmental Policies From 1983 to 1997 with Special Reference to NWFP*, Unpublished M.Phil thesis submitted to the Department of Economics, University of Peshawar, Pakistan.
- Nizami, A. (1999). Community Approach; Experiences and Issues, *Changing Roles in development: The Effects of Community Involvement on Line Agencies and NGOs*, p. 44-48, Department of Forestry, Fisheries and Wildlife NWFP, Peshawar.
- Nizami, A., (Nov.1999). Community Approach; Experiences and Issues, *Seminar Proceedings “Changing Roles In Development: The Effects of Community involvement on Line Agencies and NGO’s*, Department of Forestry, Fisheries and Wildlife, NWFP”
- NTDC. (2007), *Power System Statistics-2006*, National Transmission and Dispatch Co., Planning Department, WAPDA House, Lahore
- Pakistan Academy of Rural Development, (Sep.1994). *Journal of Rural Development and Administration*, Vol. XXVI, No.3, Pakistan Academy of Rural Development, Peshawar
- Pakistan Forest Institute (1981). *Forestry Development In Pakistan: A Study of Human Perspective*, Pakistan Forest Institute Peshawar.
- Pakistan Forest Institute (2002). *Pakistan Journal of Forestry*, PP: 167,171, Pakistan Forest Institute Peshawar, Volume 52(2), ISSN_0030-9818

- Pakistan Forest Institute (2003). *Annual Progress Report 2002-2003*, PP: 35, Pakistan Forest Institute, Peshawar.
- Payr, G., (Nov.1999). Joint Forest Management in State Forests In the Context of the German Supported Siran Kaghan Forest Development Project (SKFDP), *Seminar Proceedings “Changing Roles In Development: The Effects of Community involvement on Line Agencies and NGO’s*, Department of Forestry, Fisheries and Wildlife, NWFP”
- Payr, Gerhard (1999). Joint Forest Management in State Forests in the Context of the German Supported Siran- Kaghan Forest Development Project (SKFDP), *Changing Roles in development: The Effects of Community Involvement on Line Agencies and NGOs*, p.63-68, Department of Forestry, Fisheries and Wildlife NWFP, Peshawar.
- Pictorial Printers (Pvt.) Ltd, Islamabad.
- Published by Blackwell Publishing, 350 Main Street, Malden MA 02148 US
- Qazi, Masood-ur- Rehman (2001., *Resource Management Plan for Galis Guzara Forests of Galis Forest Division, Abbottabad District (2001-02 to 2015-16)*, Forest Management Centre, NWFP Forest Department , Peshawar
- Radeloff, Volker, Roger, Hammer and Susan Stewart 2005). Rural and Suburban Sprawl in the U.S. Midwest from 1940 to 2000 and Its Relation to Forest Fragmentation, *Conservation Biology*, Pages 793–805, Volume 19, No. 3, June 2005
- Rafique, M. (1990). *Guzara forest management*, Forest Development Project Siran Valley Pakistan, GTZ Eschborn.
- Rao A. Latif, and Hamid Marwat (2003). *Northern Areas Strategy for Sustainable Development*, Background Paper, Planning & Development Dept., Northern Areas, IUCN Pakistan Programme, International Union for Conservation of Nature, Pakistan, ISBN: 969-8141-57-X, Rosette Printers, Karachi
- Rauf, Rao.A., (Sep.1994). “Agro-Forestry- Conserving the Environment”, *Journal of Rural Development and Administration* , Vol. XXVI, No.3, Pakistan Academy of Rural Development, Peshawar
- Rudel, Thomas (2006). Shrinking Tropical Forests, Human Agents of Change and Conservation Policy, *Conservation Biology* Volume 20, No. 6, 1604–1609
- Saddozai, Abdul Quddus Khan (1997). *Working Plan for the Lower Siran Mansehra & Agror Tanawal Guzara Forests (1986-87 to 1995-96)*, NWFP Forestry Pre-investment Centre, Peshawar, pp- 41-56
- Sadeque, S. Zahir., (Nov. 1999). Natural Resource Management In South Asian Highlands: Changing Paradigm or More of the Same, *Seminar Proceedings “Changing Roles In Development: The Effects of Community involvement on Line Agencies and NGO’s*, Department of Forestry, Fisheries and Wildlife, NWFP”

- Sadeque, Zahir S. (1999). Natural Resource Management in South Asian highlands: Changing Paradigm or More of the Same, *Changing Roles in development: The Effects of Community Involvement on Line Agencies and NGOs*, p.31-38, Department of Forestry, Fisheries and Wildlife NWFP, Peshawar.
- SDC. (2005). Tracing impacts of the Kalam Integrated Development Project: Through memories & perceptions of local people, former project staff & other stakeholders. SDC, *Intercoperation*. 2006. p 37 available at <http://doc.intercooperation.net/doc/tracing-impacts-of-the-kalam-i-2005/?searchterm=None> downloaded on 2-12-2007
- Semlitsch, R. et al. (2007). Salamander Abandoned Logging Roads in Appalachian Forests, *Conservation Biology* Volume 21, No. 1, 159–167
- SDPI (Jan. – Feb. 2003). *Poverty and Environment: Special Issue, Sustainable Development Policy Institute, Research and News Bulletin*, Vol. 10, No. 1, [Online] Available at: <http://www.sdpi.org/help/articles/text%20only/text%20only.htm> (2-6-2005)
- Shah, A. H., (Nov.1999). Lessons Learnt From Community Involvement In Drainage and Reclamation Projects, *Seminar Proceedings “Changing Roles In Development: The Effects of Community involvement on Line Agencies and NGO’s*, Department of Forestry, Fisheries and Wildlife, NWFP”
- Shahbaz, Babar and Tanvir Ali (2003). *Participatory forest management: analysis of forest use patterns, livelihood strategies and extent of participation of forest users in Mansehra and Swat districts of Pakistan* Paper presented at 7th Sustainable Development Conference, 8-10 December, Sustainable Development Policy Institute, Islamabad, Pakistan, , Department of Agricultural Extension, University of Agriculture, Faisalabad, Pakistan
- Shetty, S. & Ijaz Nabi, (1995). *Making Polluters Pay: The Role for Presumptive Charges*, Sustainable Development Policy Institute, Heinrich- Boll- Foundation, Lahore.
- Siddiqui, K.M. (1999). ‘An Overview of Institutionalization of Technical and Social Organizations of Forestry Sector in Pakistan Since the Implementation of Forestry Sector Master Plan’, *Changing Roles in development: The Effects of Community Involvement on Line Agencies and NGOs*, p. 155-158, Department of Forestry, Fisheries and Wildlife NWFP, Peshawar.
- Siddiqui, K.M., (Nov.1999). An Overview of Institutionalization of Technical and Social Organizations of Forestry Sector in Pakistan Since the Implementation of Forestry Sector Master Plan (FSMP), *Seminar Proceedings “Changing Roles In Development: The Effects of Community involvement on Line Agencies and NGO’s*, Department of Forestry, Fisheries and Wildlife, NWFP”
- Soares, Britaldo., et. al. (May2004). Simulating the response of land-cover changes to road paving and governance along a major Amazon highway: the Santarém–Cuiabá corridor, *Global Change Biology*, Volume10, Issue 5, Page 745

- Staab M. H., (Nov.1999). Participation of Communities In Management of Natural Resources: How to Make the Vision Work?, *Seminar Proceedings “Changing Roles In Development: The Effects of Community involvement on Line Agencies and NGO’s*, Department of Forestry, Fisheries and Wildlife, NWFP”
- Staab, H. Manfred (1999). Participation of Communities in Management of natural Resources: How to Make the Vision Work?, *Changing Roles in development: The Effects of Community Involvement on Line Agencies and NGOs*, p. 114-120, Department of Forestry, Fisheries and Wildlife NWFP, Peshawar.
- Steimann, Bernd (2004). *Decentralization and Participation in the Forestry Sector of NWFP, Pakistan – The Role of the State*, Working Paper No. 7, July 2004, Development Study Group, Department of Geography, University of Zurich, Switzerland, Swiss Organization for Development and Cooperation
- Suleri A Q. (2002). *The State of Forests in Pakistan through a Pressure-State-Response Framework*, Sustainable Development Policy Institute, Islamabad
- SUNGI (1998, 2000, 2001). *Annual Report 1998, 2000, 2001*, SUNGI Development Foundation, 786 Printers Islamabad, Pakistan
- Tahir, P. (2000). *Environment and Development in Pakistan: From Planning Investment to Implementing Policies*, LEAD-Pakistan (Leadership For Environment and Development), Pakistan
- Tan, Jingzheng (1999). *Strengthening Organizational Capability for Community Forestry Management: A case Study From Lishu Village, Sichuan, China*, MSc. Thesis, Asian Institute of Technology, Bangkok.
- UNDP, (1997). *Green News- Issue*, No. 143,. United Nations Development Programme Dec. 17, 1997
- UNIC (2003). *Weekly Issue No. 36/2003 U.N. / PAKISTAN 2003 - A weekly Newsletter*, published by the UN Information Centre, Islamabad, Pakistan, 16 September 2003,
(<http://www.un.org.pk/unic/newsletters/NEWSLETTER030916.htm>(Downloaded on Nov. 14, 2005),
- USGCRP (1998). *Origin, Incidence, and Implications of Amazon Fires*, U.S. Global Change Research Program (USGCRP) Office, 400, Virginia Ave. Washington D C. INFOTERRA: March 30th, U.S. Global Change Seminar: available at (<http://lists.isb.sdnpc.org/pipermail/eco-list-old/1998-March/001060.html>) (Downloaded on Nov. 14, 2005)
- Velle, K. (1998). *Natural Forest Inventory, High Altitude Integrated Natural Resources Management Project Report No. 4*, Centre for International Environment and Development Studies, Agricultural University of Norway.
- Wani, Hakim Shah & Saliheen Khan (2004), *Forestry Statistics of Pakistan*, Pakistan Forest Institute, Peshawar

- Wannitikul, Gadsaraporn., (2005). Deforestation in Northeast Thailand, 1975-91: Results of a general statistical model, *Singapore Journal of Tropical Geography*, 26(1), , 102-118, □ Department of Geography, National University of Singapore
- Watkins, Radley et al. (2003). Effects of Forest Roads on Understory Plants in a Managed Hardwood Landscape, *Conservation Biology*, Pages 411–419, Volume 17, No. 2, April 2003
- White, Kristopher and Dean Hanink (2004). “Moderate” Environmental Amenities and Economic Change: The Nonmetropolitan Northern Forest of the Northeast U.S., 1970-2000, *Growth and Change*, Vol. 35 No. 1 (Winter 2004), pp. 42-60
- Wilkie, David et al. (2000). Roads, Development and Conservation in the Congo Basin, *Conservation Biology* pp. 1614-1622, Vol 14, No. 6, 2000
- Wright, Joseph and Helene C. Muller (2006). The Future of Tropical Forest Species, *BIOTROPICA* 38(3): 287–301 2006, Department of Ecology, Evolution and Behavior, University of Minnesota, St. Paul, Minnesota, U.S.A.

Newspapers

- Chitrali (1991, August 27). Forest Wealth Depletion, *The Daily Muslim*.
- Masood, A. (2005, June 20). Effective Policies needed for deteriorating housing sector’, *The News*, p. 20. ,
- (2004, June 13). Budget Highlights. *The News*, p.1, 17

Websites

- <http://www.mtc.com.my/publication/speech/sustainable.htm> downloaded on 10/10/2005
- <http://www.aaas.org/international/ehn/biod/cruz2.htm> downloaded on 10/10/2005
- http://www.grida.no/climate/ipcc/land_use/101.htm downloaded on 10/10/2005
- <http://forests.org/archive/general/wforest.htm> downloaded on 10/10/2005
- <http://www.odi.org.uk/nrp/10.html> downloaded on 10/10/2005
- <http://www.sdpi.org/help/articles/text%20only/text%20only.htm> downloaded on 2/03/2003

APPENDIX - 1
QUESTIONNAIRE
(For General Public)

Note:

We are collecting data from your district about forests. Kindly answer in detail, your opinion would be kept secret and used for saving forests and framing forest policies so that your problems would be solved.

- Q.1 Name.....
Age.....
Profession.....
Educational qualification.....
Residential area.....
- Q.2 Number of family members?
- Q.3 Distance of your home from the forest?
- Q.4 Who is responsible for forest cutting (give answer in order of priority)?
1 Local People
2 Forest Department
3 Timber Mafia
4 Any other
- Q.5 In your opinion who are the people called timber mafia?
- Q.6 What are the purposes for which forest wood is used by people (give answer in order of priority)?
1 For cooking
2 For heating
3 For construction
4 For furniture
5 Any other
- Q.7 Is there gas facility in your area?
- Q.8 After cutting forest, what is the use of that land (give answer in order of priority)?
1 For construction
2 For cultivation
3 Any other
- Q.9 What facility you need in your area to save forest from further cutting (give answer in order of priority) also mention reason?
1 Gas
2 Coal
3 Electricity
4 Any other

- Q.10 Have you permission of grazing in forest areas?
 1 Free permission
 2 By paying fee to the government
 3 Any other
- Q.11 What you use for cooking and heating?
 1 Gas 2 Coal 3 Electricity
- Q.12 Are you the owner of forest land?
- Q.13 If yes, what type of forest it is? Guzara Forest or any other?
- Q.14 What is your source of income?
 1 Cultivation 2 Forest wood 3 Drought animals
 4 Any other
- Q.15 Do you own land?
- Q.16 If yes, what is the purpose of that land; cultivation, for keeping animals or any other?
- Q.17 Do you cultivate others' land?
- Q.18 Do you plant trees on your land?
- Q.19 If yes, what type of trees you plant; fruit trees, firewood or construction wood?
- Q.20 Have you access to Forest Department, if no why?
- Q.21 Do the local people make efforts to increase forests, if yes what type of effort it is?
- Q.22 Who is responsible for forest fire?
- Q.23 What you do to extinguish fire?
- Q.24 What are the arrangements with the Forest Department to extinguish fire?
- Q.25 Do you need permit to use forest wood?
- Q.26 If yes, then, do you use permit?
- Q.27 If no, what are the reasons?
- Q.28 People are destroying forests, what are the reasons; give answer in order of priority?
 1 For cultivation 2 For construction
 3 Lack gas, coal and electricity 4 Population is increasing
 5 Any other

- Q.29 What is the main purpose for which wood is used?
- 1 As Firewood
 - 2 For construction
 - 3 For furniture
 - 4 For industry
- Q.30 Do you think that for the last couple of decades there is an increase in the cultivated area?
- Q.31 If yes, how, if no why?
- Q.32 Do you think that for the last couple of decades there is an increase in the forests?
- Q.33 If yes, how, if no why?
- Q.34 Do you think that for the last couple of decades there is an increase in the grazing area?
- Q.35 If yes, how, if no why?
- Q.36 Number of animals you are keeping?
- 1 Milk animals
 - 2 Other animals
- Q.37 Do you think that for the last couple of decades there is an increase in the number of animals?
- Q.38 If yes, how, if no why?
- Q.39 Is there gas cylinder in your area, do you use, if no why?
- Q.40 Do you earn income from forests?
- Q.41 Do you think that for the last couple of decades there is any change in the kind of fuel you are using in your home, if yes what is that change?
- Q.42 Is there any change during the last 10, 20 years in the material used as a substitute of construction wood?
- Q.43 Why people do not use goods other than wood in the construction?
- Q.44 Is there any increase in wood prices, how much?
- Q.45 Have you any complaint against Forest Department?
- Q.46 How one can increase forest area?
- Q.47 Why people don't take interest in planting?
- 1 Land is joint property
 - 2 Water scarcity
 - 3 Forest Department is not cooperating
 - 4 Any other

- Q.48 In case you are fined for illicit cutting, do you pay the fine and how much?
- Q.49 Is there any government, non-government and local organization working for forests in your area, if any what are the outcomes of their efforts?
- Q.50 Have you any knowledge about forest policies, if no why?
- Q.51 What kind of trees people prefer to plant, what change has occurred in the choice of trees and why?
- Q.52 Any other thing you want to share?

APPENDIX – 2

Macro Economic Data

Years	FAP	RAV	RMV	RG	RC	RPCI	TCA	AI	P
1972-73	2.81	17934	8030	54673	1763	865	19.12	13.06	61.7
1973-74	2.85	19971	9082	61527	2094.9	939.9	19.38	13.64	63.45
1974-75	2.8	19697	9541	61793	2184.1	916.7	19.55	13.34	65.25
1975-76	2.84	18558	8795	61532	2765	888.3	19.82	13.63	67.1
1976-77	2.86	27221	12647	92560	4784.8	1312.8	19.76	13.83	69.02
1977-78	2.89	43535	20188	148274	7439.1	2067.5	20.1	14.22	70.99
1978-79	2.77	46450	22010	161976	7967.7	2259.7	19.98	14.47	73.04
1979-80	2.76	46645	23555	167909	8327.6	2285.4	20.23	14.74	75.13
1980-81	2.85	48370	25911	182216	9264.1	2414.5	20.3	14.84	77.31
1981-82	2.81	52907	25932	192653	8023.4	2485.4	20.42	15.3	79.04
1982-83	2.87	91859	44026	322904	13121	4027.4	20.36	15.48	81.41
1983-84	2.96	94577	47774	346777	13005.6	4312	20.33	15.46	83.85
1984-85	3.16	92742	53577	372391	13054	4435.3	20.61	15.28	86.37
1985-86	3.12	101824	56746	396371	14368.7	4524	20.67	15.79	88.96
1986-87	2.92	103616	61043	413922	15326.6	4579	20.92	16.31	91.63
1987-88	3.46	105070	66664	444543	17478	4695.6	20.66	15.68	94.38
1988-89	3.43	114239	73724	493401	18343.2	4957.5	21.02	16.64	97.21
1989-90	3.38	121817	75124	509404	18335.4	4932.3	20.94	16.89	100.13
1990-91	3.46	123221	82585	534186	20003.4	5048.9	20.96	16.75	103.23
1991-92	3.47	129145	87991	565371	21145.7	5085.3	21.06	16.85	106.43
1992-93	3.48	282604	186984	1212371	43847.7	10441.5	21.4	17.33	109.73
1993-94	3.45	271380	188875	1222545	45386.1	10193.1	21.51	17.13	113.02

1994-95	3.6	293114	202334	1288254	45242.5	10377.5	21.55	17.2	116.41
1995-96	3.61	191376	126511	824155	26705.2	6868.9	21.68	17.58	119.74
1996-97	3.58	321651	202566	1386677	46285.7	11157.3	21.98	17.85	123.12
1997-98	3.6	347813	206838	1420559	47582.6	11105	21.96	18	130.56
1998-99	3.6	367633	213325	1452913	48466.7	11077.3	21.93	17.95	133.48
1999-00	3.78	379524	217339	1507885	45361.6	11237.9	21.96	18.11	136.69
2000-01	3.77	457567	259002	1879312	43292	13454.9	22.13	17.82	139.67

FAP Forest Area Pakistan (m hec.)
RAV Real Agri value (m rupees)
RMV Real Manufa value (m. Rs.)
RG Real GDP (MP) (m. rupees)
RC Real Construction (m. rupees)
RPI Real Per capita Income at MP (R.)
TCA Total Cultivated Area (m hec)
AI Area Irrigated (m hec)
P Population (m.)

(Continued)

HEC	HCC	OOT	OOF	LP	PPP	PCH	TRL	FAN
740	33	565	377	87.7	47436	23000	35750	658.1
852	33	582	301	95.5	46504	21133	38983	681.6
943	55.9	346	223	104.4	36956	20899	38632	662.6
1128	40.6	290	228	115.4	30916	19145	49773	721.7
1296	40.9	317	281	119.6	32794	18336	51123	722.2
1706	38.9	195	230	125.8	34463	16624	93415	721.3
2091	29.4	367	294	132.4	59266	31720	95222	665.5
2357	26.4	384	204	139.8	59175	29717	95660	665.5
2696	7.8	255	230	146.8	67661	40211	96436	687.6
3223	22.7	295	251	154.9	73586	41707	98582	822.19
3752	22.2	309	249	173.2	76211	36117	99332	869.13
4535	21.6	420	191	186.6	73491	39840	111916	870.02
5076	16	503	198	202.2	82722	44300	118471	965.43
5845	14.4	424	202	200.4	75894	35890	126243	968
6806	5.6	519	185	222.5	63723	41303	133953	890.91
7900	20.2	547	164	540.8	65457	46203	142941	1263.9
8660	14.9	482	234	260.2	69851	43336	151449	1300.64
9360	7.1	440	187.6	255.1	60163	46691	162345	1257.93
10409	3.8	458	158	250.8	56245	46739	170823	1303.91
11458	6.8	426	170.3	263.8	47369	49606	182709	1304.69
13170	3.2	470	136.7	292.4	48857	49517	189321	1305.06

14133	3.3	408	119.5	362.8	362000	47909	196817	1255.81
15584	3.2	400	116.3	434.8	403000	46955	207645	1305.06
17116	3.1	215	111	460.2	420000	49700	218345	1306.33
17757	9.7	250	145.9	494.7	447000	46000	229595	1317.32
18750	2.3	216	274	391	500000	48260	240885	1315.2
19394	1.3	184	199	396	345040	49780	247484	1328.4
21455	1	425	443	403.3	192231	50655	248340	1327.998
22765	1	380	425	416.6	434247	53100	249972	1279.44

HEC Household Electricity Consumption (GWh)
 HCC Household Coal Consumption (000 M tones)
 OOT Out-turn of Timber (000 cubic m)
 OOF Out-turn of Firewood (000 cubic m)
 LP Livestock Population (million n)
 PPP Production of Paper and Paperboard (tones)
 PCH Production of Chipboard & hard board (tones)
 TDL Total road Length (kilometers)
 FAN Forest Area of NWFP (000 hec.)

(Continued)

Timber Consumption (tonnes/m3)	HGC
656300	2983
787500	3917
423000	5065
301600	6206
328600	7498
245900	9813
408000	12110
438700	14283
328500	17738
354800	24037
361000	28357
447400	32246
532600	37372
442700	42512
536400	45761
565300	47443
513800	51278
476400	60140
487900	66797
460700	70741
537523	75783
499982	82461
477275	97045
322900	110103
370000	115488
341000	134500
709000	131656
1144900	139973
937800	140899

TC Timber Consumption of Pakistan (tonnes/m3)

HGC Household Gas Consumption of Pakistan (mm c)

APPENDIX 3

The Regression equation (timber production inclusive)

The Overall Regression Model Equation is:

$$\hat{Y} = 2.12 - 0.912 X_1 + 0.189 \log X_2 + 1.04 X_3 - 0.202 X_4 - 0.071 X_5 - 3.60 X_6 + 0.705 X_7 + 1.07 X_8 + 0.074 X_9 - 0.384 X_{10} + 0.0049 X_{11} - 0.0366 X_{12} + 0.0352 X_{13} + 0.110 X_{14} - 0.0203 X_{15} - 0.0800 X_{16} + 0.0872 X_{17}$$

Predictor	Coef	StDev	T	P	Significant
Constant	2.118	1.164	1.82	0.096	
LOG rea Agri prod	-0.9122	0.3427	-2.66	0.022	*
LOG real Manu prod	0.1886	0.2392	0.79	0.447	
LOG real GDP	1.0390	0.5259	1.98	0.074	
LOG construction	-0.20164	0.08105	-2.49	0.030	*
LOG per capita income	-0.0712	0.3489	-0.20	0.842	
LOG cultivated area	-3.599	1.279	-2.81	0.017	*
LOG irri area	0.7046	0.6328	1.11	0.289	
LOG population	1.0734	0.6095	1.76	0.106	
LOG gas consumption	0.0745	0.1024	0.73	0.482	
LOG elec consumption	-0.3840	0.2839	-1.35	0.203	
LOG coal consumption	0.00488	0.01307	0.37	0.716	
LOG timber production	-0.03661	0.03168	-1.16	0.272	
LOG firewood prod	0.03517	0.03440	1.02	0.329	
LOG live stock	0.10993	0.05043	2.18	0.052	*
LOG paperboard	-0.02033	0.01342	-1.51	0.158	
LOG chipboard	-0.08002	0.04518	-1.77	0.104	
LOG road length	0.08716	0.08351	1.04	0.319	

S = 0.009603 R-Sq = 98.5% R-Sq(adj) = 96.1%

F= 41.16 P=0.000

Durbin-Watson statistic = 2.45

Y^{\wedge} =log Forest area Pakistan (m hec.)

X1= log Real Agriculture value (m Rs.)

X2= log Real Manufacturing value m Rs.)

X3= log Real GDP (MP) (m. rupees)

X4=log Real construction (m. rupees)

X5= log Real Per capita income at MP (Rs.)

X6=log cultivated area (m hec)

X7=log irrigated area (m hec)

X8=log population (Mln.)
X9=log Household Gas Consumption (mm cft)
X10=log Household electricity consumption (mm c)
X11=log Household Coal Consumption (000 M tons)
X12= log Timber production (000cubic m)
X13= log Firewood production (000 cubic meter)
X14=log Livestock population (million no.)
X15=log paper and paperboard production (tones)
X16=log chipboard and hardboard production (tones)
X17= log Total road length (kilometers)