

## M.SC FORESTRY THESIS RESEARCH AT PAKISTAN FOREST INSTITUTE, PESHAWAR 2000-2002 COURSE

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**Silvicultural research review of economically important tree species of NWFP by Aneela Tabassum (Advisor: Dr. Sardar Muhammad Rafique)**

NWFP emerged as an administrative entity of Pakistan in 1901. It comprises of seven civil divisions. Provincially Administered Tribal Area (PATA) and Federally Administered Tribal Area (FATA). The climate of the regions varies from the gentle winter and the harsh summer in the South to the freezing cold of the Northern Mountains covered with everlasting snow. Rainy months are December and March in winter and July to August in summer.

The climate pattern of NWFP is an important factor to determine silvicultural activities in the Province. Hazara and Malakand divisions are rich in forest resources. The people daily perform silvicultural operations of varied nature in forest areas. The masses have some tacit wishes to have quick access to the ongoing silvicultural research and to be benefited with it.

The study was selected to review silvicultural research undertaken in the past and to identify the gaps. The Pakistan Journal of Forestry (PJF), Annual Progress Reports (APR) of Pakistan Forest Institute and Journal of Pakistan Agriculture Research Council (PARC) have been reviewed as a source of material for the accomplishment of this work. However time limitation confined review to a few economically important tree species of the Province.

The study revealed that among conifers, Chir (*Pinus roxburghii*) and Kail (*Pinus wallichiana*) were given more attention for evaluating the silvicultural characteristics. Among broad-leaved species, a little research on Poplars and Eucalyptus was conducted. Based on literature revelation the study has suggested need for proper research work on Fir, Deodar, Shisham die-back, Mulberry, Babul, and growth and improvement of other valuable timber, fuelwood and fodder species grown in NWFP. The need for establishment of more research stations and seed centers in each locality was also emphasized by the study.

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## **Study of ethnomedicinal plant use in Totalai valley by Rehana Mohammad Khan (Advisor: Raja Muhammad Zarif)**

The plants as such or its ingredients have been regularly used and considered to be effective and without any side effect. The natural regeneration of plants having medicinal and commercial values was adversely affected by grazing and indiscriminate harvesting over longer period of time. The study undertaken had the main objective of identifying interaction of local communities with the prevailing ecosystem balance and uses of medicinal plants. For this purpose five villages were randomly selected in the Totalai valley and in all 79 households and 27 practitioners and dealers were interviewed through questionnaire to collect primary data.

The data analysis indicated that majority (54%) had knowledge of medicinal plants from parents. They were facing problems in raw material collection due to scarcity of resource. The majority (56%) had no skill to grow medicinal plants whereas equally important numbers of respondents (44%) were not growing these because of time constraints. In spite of all these difficulties the collection of medicinal plants in the study area was not bounded by the age of collectors and source. However, people in the study area prefer to buy finished herbal plant from the vendor rather than self-collection. The choice of treatment through medicinal plants was made because of low prices and ease in availability. The majority (76%) were of the opinion that the use of medicinal plants is increasing.

People of the study area whether young or old do have the knowledge of using plants. The people have knowledge about medicinal plants irrespective of age, sex and source. Females mostly visit forest area to collect herbal plants whereas male population collects these while working on their farmlands. Cultivation of medicinal plants can be influenced significantly if government provides the requisite resources. The local population has different reasons not to grow medicinal plants.

The market analysis revealed that there is no relationship between prices and quantity demanded in the local market. The demand trend was not found significantly related with the perception of increasing use. The supply side was also not found related to the perception of increasing use as believed by the household. Based on market analysis, one can softly conclude that the people are using medicinal plants irrespective of reasons.



## Impact of establishment of Manglot wildlife park on local people by Neelofar Iqbal (Advisor: Raja Muhammad Zarif)

Manglot Wildlife Park (MWP) provides natural and needed habitat for the survival and sustenance of *Gazella gazella* (Chinkara) and *Ovis orientalis* (Urial). Human interference with the ecosystem of Chinkara and Urial reduced the population of wild animals from these areas. To conserve experimented wildlife species; MWP was established as a reserve area under Wildlife Act, 1975.

The study area before declaration as park was under great pressure to meet needs of local people for fuelwood collection and cattle grazing. After declaration as wildlife sanctuary, the whole area was fenced to stop illegal biotic interference by the surrounding population. Enclosure of the area had greatly affected the local people who since long were in habit of freely exercising their wills to collect fuelwood, grass and graze their cattle.

The proposed study has been undertaken to investigate the perception of local population about MWP and its impact on stakeholders. As per objectives, a social survey was designed and conducted in the study area comprising of villages surrounding MWP. A pre-tested questionnaire was used to collect the socio-economic data. All the 60 respondents were randomly selected and interviewed. Out of these 36 were males and 24 females. Collected data were then subjected to statistical analysis to arrive at reliable conclusions.

The study revealed that 100 percent of the sample population used to exercise non-authenticated rights of fuel wood collection, grazing and grass cutting. After the establishment of park, all non-documented rights were withdrawn from the local population. Statistical analyses revealed that majority (86.7%) of respondents were not in favour of Manglot Wildlife Park. Minorities of respondents (13.3%) were of the view that park was beneficial.

The enclosure of the area greatly affected those local people who were depending on this area for fuel wood collection, grass cutting and grazing of cattle. Legal provisions have been extended for prevention of all external disturbances and to put shackles to any violation made by the local people. The stakeholders demand provision of area for free collection of fuelwood and cattle grazing at all the sides of enclosures.



## **Impact of block plantation on women in district Haripur by Abida Begum (Advisor: Raja Muhammad Zarif)**

This study deals with the impact of plantations on women in three selected villages of district Haripur. Randomly selected respondents were female heads of the families. It included both landless and owners. Block plantation has been raised during 1970s and 1980s. Data were collected with the help of a pre-tested questionnaire.

The results show that education level of female members of landowners families was more than landless families. The females belonging to landless families were engaged in collection of fuel and fodder. Before project fuelwood was collected from planted areas, shamelat, own farms and even purchased from market. Landless were heavily dependent on areas under plantations, shamelat and market. Farm owners in addition to above areas were also using their own farm for procuring fuelwood. After implementation of project, the area was closed and ban was imposed. Shamelat and market were the only sources of fuelwood for landless.

The types of fuel used by less affluent families were fuelwood, LPG and dung, while farm owners used the above mentioned fuels along with agricultural waste. The use of dung and agricultural waste decreased with the increase of farm size. Area, currently under plantation was also used as source of grazing before project, but after the introduction of project, the area under plantation has been closed for grazing. Grazing pressure became more intense on farmlands after the introduction of project.

The majority of landless respondents consider these plantations as less useful contrary to farm owners who foresee it as a useful activity. The perception of benefits increases with increase in farm size. Most of the landless perceive these plantation a source of dried fuelwood, while landowners perceive plantations environmental improvement, now job opportunity and beautification of the area in addition to fuel.

There are many reason for liking and disliking plantation. The main reason for liking were increased fuelwood production and improvement of resource. Esthetic consideration and job opportunity were othe reasons for liking. The objections to plantations were related to decrease in grasses and grazing land, decrease in water, dependence on market and reduction in livestock number. Lack of grasses and grazing land are also equally important reasons for disliking. Landless respondents were of view that workload has increased as a



result of raising plantation, while farm owners perceive no change in workload.

**Women dependency on Mazri leaves in district Kohat by Bushra Khattak  
(Advisor: Raja Muhammad Zarif)**

Kohat forest division extends over an area of about 702 thousand hectares. It has been estimated that the mazri crop is growing over 24.2 thousand hectares of communal (private) lands. The management of these areas is regulated through special law named as Kohat Mazri Control Act, 1954.

Mazri collection and processing of raw material into useful products are major source of income for rural poors, especially women belonging to landless families. Mazri processing is the only source of personal income for these women.

Involvement of women is traditionally confined to home-based mazri cottage industry. They are engaged in doing everything from collection of raw material to the selling of the products. Usually women of old age are involved in these activities. The major reason to believe this is that they have experience, knowledge and time for the processing of mazri leaves into finished products and can market the products without social restrictions.

The annual harvest of mazri leaves from 24 thousand hectares resource is around 2000 tons. This product is sold by the forest department through open auction and highest bidder is awarded the contract. The income generated by the sale of mazri leaves is around 0.8 million.

To meet the ever-increasing demand of mazri products, the existing mazri plants are excessively exploited. The huge cuttings by the Afghan immigrants was considered to be the major reason of mazri resource degradation.

The study concludes that community involvement in the natural resource management of communal lands is call of the day. The sharing of experiences and knowledge between locals can make the resource sustainable for the longer time. One can make this process as an income generating activity by developing mazri cottage industry in the area. As a first step, measurers be taken to relax unwanted restriction on transportation of mazri leaves.



## **Socio-economic suitability of multi-purpose forest tree species in rainfed areas of district Haripur by Fakiha Zafar (Advisor: Raja Muhammad Zarif)**

Pakistan is one of the most populous countries of the world, with population increasing at 3% annually and forest area per capita is declining. One possibility to meet present demands is to intensify the forest management practices for better yield per unit of area.

The study considers growing of short rotation Multi-Purpose Tree Species (MPTS) as a new discipline in the field of Pakistani forestry. This aims at increasing the income of farmer, arrest the environmental degradation and repair the damage already done to scarce biological resource for generations to come. The potential for tree planting on private land might bridge the gap between demand for and production of forest products. In order to have in-depth knowledge about perception of tree farmers, their socio-economic conditions and feasibility of growing multipurpose tree species in a specific area, the present study was designed.

The sample size of the randomly selected survey respondents was composed of 60 observations. Out of these 18 were women respondents and the remaining 42 observations were covering male population in the project area. The majority respondents (75.3%) plant seedlings on their farmlands to have future tree crop. Raising trees through seedlings appear to be the preferred method of planting on farmlands in the study area.

The major reason for planting trees by the sample respondents was to have additional income. They mostly used such trees for obtaining fodder, fuel wood and timber for domestic consumption. Only 3.4% of the respondents planted trees for additional income. *Olea cuspidate* and *Acacia modesta* were commonly grown for timber and firewood and *Zizyphus mauritiana* for fruit, fodder and timber. These trees were planted in scatter form. Block plantations are usually not liked by the farmers because they occupy more land. Long rotation periods also discourage plantation in blocks. Majority of the sample population (53.3%) was of the opinion that the crop production was declining due to trees.

Farmers generally operate cultivated land for growing food crops either to meet domestic demand or earn income by selling crop produce in the open market. However, people who own more cultivated land have more trees.



**Gender role in existing agroforestry practices of district Haripur by Faiza Hamid Lodhi (Advisor: Raja Mohammad Zarif and Mamoon Wali Muhammad)**

The present study was designed to identify the gender role in agroforestry practices of district Haripur and pinpoint perception of growing trees on farmlands. Data were collected using stratified random sampling for 40 households. Respondents of either sex were interviewed with the same set of questions. The results of the study indicates that both the genders were involved in agroforestry activities spending two to eight hours depending upon their nature of jobs.

Analysis of data revealed that trees grown on farmlands are based on perceived benefits by the farmers. The project do influence the choice of species for planting on farmlands. The farmers also keep in view the intangible benefits in addition to commonly perceived benefits.

The study unfolds that people plant trees irrespective to consequential effects on crop production and do not consider environmentalist opinion. It was also observed that growing of trees on farmlands are independent to the number of adult female or male in the household.

Un-cultivated areas are the major source of grazing as well as planting trees. The growing of Eucalyptus on farmlands had no relationship with the education level of respondents. Eucalyptus is the specie which has long range of survival and desist grazing and browsing pressure.

The future of Eucalyptus trees on farmlands is not very promising. However, the farmers were determined to continue growing traditional species on farmlands. Out of these Shisham (*Dalbergia sissoo*), Melia (*Melia azadarach*) and Tut (*Morus alba*) are the preferred one. Fruit trees being of great commercial value had more chance for future planting in the study area.

**Farmers' perception about growing poplar in Peshawar and Mardan district by Sohail Ahmad (Advisor: Raja Muhammad Zarif)**

The study was conducted in the form of survey of Peshawar and Mardan districts to find farmers attitude and perception towards Poplar planting. Two stage random sampling technique was applied to obtain requisite data and information. The study is based on random selection of 100 respondents and their interview through structured questionnaire.



The study concluded that the majority of the population owned sufficient area to grow trees. The average monthly income of the sampled population was Rs.7726. The highest monthly income was earned by those who had business in addition to agriculture. However, agriculture still remains the dominant source of income in the area. About one third of the sampled population was found living below poverty line. Farmers believed that Poplar trees are increasing on the farmlands of Peshawar and Mardan districts. Majority of the farmers (87%) were willing to continue tree-growing business. However, equally large numbers (23%) were found not willing to purchase seedlings in future.

The study also indicated that most of the farmers (79%) preferred selling trees in standing form while remaining (21%) marketed trees after felling. Most of these expressed their apprehension of less agriculture crop production due to hindrance by trees. But contrary to this, majority still preferred to grow Poplar trees. They also demanded incentives in terms of free of cost provision of seedlings and financial assistance.

The relationship between perception of farmers about Poplar planting and reasons for increasing Poplar shows that majority grows Poplar for income reason. Relationship between rotation and price showed that poplar price is strongly influenced by rotation. Recommendations made in the study includes expansion of extension services, introduction of fast growing multipurpose trees, free of cost supply of planting material and establishment of functional linkages between agriculture and forestry research.

### **Recreational value of Daman-e-Koh in Margalla hills by Tabassum Gul (Advisor: Raja Muhammad Zarif)**

The objective of the study was to determine a recreational value of Daman-e-Koh (Islamabad), an area suitable for outdoor recreation. Larger number of people from all walks of life including foreigners visit the area with the prime objective of outdoor recreation.

A sample size of 50 respondents was selected in a duration of one week, including almost equal numbers of both the sexes. The study revealed that the area is though suitable for outdoor recreation, lacks certain structural and social service facility. Simple and chi-square analyses revealed that visit cost per trip to the recreational spot on average was Rs.50.00. The average house holds size of the visiting group was 4.04 persons. However, less number of people were visiting with children up to 5 years of age.



The larger number of visitors were having income between 12,000 to 25,000 per month. Equally large numbers of people belonged to highest income group of Rs.30,000 – 60,000 per month. The common visitors of the area belonged to services group including professionals and defence employees. The analysis clearly indicates that income level significantly influenced the perception of visitors about recreational activities and related problems.

The study lacked the number of observations, time frame and seasonal variation. The study could not establish recreational value in monetary terms for the site through regression analysis on account of less number of observed variables.

**Socio-economic impacts of joint forest management (JFM) on Mouza Fateh Bandi (key area-I), Siran forest division, NWFP by Mazhar Iqbal (Advisor: Ghayyas Ahmad)**

The traditional Forest Management did well as long as the large forest resources were available. However, after independence in 1947, population increased rapidly and their requirements for timber, fuel wood and fodder also increased. The situation resulted in the deterioration of Guzara Forest and then the pressure diverted to reserved forests.

Some countries in our neighbour (India, Nepal, Thailand etc.) realized quite earlier that the state forests can't be protected without the active involvement of the local population. Joint Forest Management (JFM) was introduced in 1996 in the designated forests of Hazara of Fateh Bandi and Methal in Siran Forest Division. This study was conducted to know the socio-economic impacts of JFM on the locals of Mouza Fateh Bandi of Siran Forest Division. Random sampling technique was adopted and information from respondents were obtained through interview schedule.

The study concluded that the local population fulfilled their needs after JFM. The community was also benefited from indirect employment, training and skill improvement and additional income. The quantum of forest damage increased because of loose check on smuggling of wood. The reasons for failure of JFM enumerated by the respondents were less protection, disparity in distribution of benefits, political influence and favoritism. The attitude of forest officials was negative after JFM because of loss of authority and vested interests. However, the respondents were in favour of JFM over traditional system of management.



The study concludes that JFM can be implemented more effectively by making the process of accountability essential, increasing cooperation between Forest Department and Community by arranging training, seminar and workshops to create awareness among community members and discouraging the political involvement in decision making against the forest officials or locals.

**Effect of different soil conservation measures on infiltration capacity of soil at experimental watershed, Faiza Gat, Swat by Syed Kamran Hussain (Advisor: Abdul Khaliq Chaudhry)**

The study considers that land use optimization through watershed management approach is the best tool for the natural resource managers. Knowledge about the effect of different soil conservation measures on the water budget is very important. In mountainous area loss of water from the watershed is one of the major problem. The reduction in infiltration capacity is the major factor of water loss.

Pakistan Forest Institute, Peshawar initiated a study to determine the effect of different land uses/bio-technical treatments on runoff and sediment yield in the sub-tropical pine zone of the head water catchments. At Faiza Gat, Swat (NWFP), five contiguous sub-watersheds (having almost similar slopes and soil characteristics) were selected and instrumented in 1985-86 to measure stream flow, sediment yield, precipitation and other atmospheric and soil parameters. The objectives of present study was to assess the effect of different soil conservation measures (Biological plus Engineering) on infiltration capacity of soil at experimental watersheds.

Soil infiltration capacity was studied in the field using double ring infiltrometer with a constant head of 2.5 cm maintained in each ring. At each point total ten readings were recorded at different interval of time and this process was repeated thrice for accuracy in each land use. The statistical analysis of the data was carried out, using F-test. A probability level of 5% was used for rejecting or accepting the hypothesis.

The average maximum (9.16 cm/hr) infiltration rate was recorded from sub-watershed (SW1) treatment one (mixture of tree species + check dams + on grazing) followed by (6.40 cm/hr) from sub-watershed (SW2) treatment two (Chirpine + check dams + on grazing). The lowest (2.5 cm/hr) infiltration rate was recorded from sub-watershed (SW5) where no treatment was applied.

The infiltration rate of sub-watershed (SW3) was 1.34 times higher than



sub-watershed (SW4). Grazing was excluded from both sub-watersheds (SW3) when treated. The analysis of data revealed that planting mixture of tree species (conifers and broad-leaved) with check dams and control to grazing was the best treatment for watershed management and soil conservation as compared to others applied in the project area.

**Evaluation of soil conservation techniques applied in Hilkot watershed, district Mansehra by Anwar Ali (Advisor: Syed Zain-ul-Arifeen)**

Hilkot watershed lies in the North of Mansehra district of NWFP. People and Resource Dynamics Project (PARDYP) started its activities in this area during April 1998. The main objectives of the project was to provide basic information on natural resource management, improve socioeconomic conditions of the people, increase farm production, decrease soil erosion and utilize run-off for irrigation.

To control the process of erosion both vegetative and engineering measures have been applied in the area either by the farmers themselves or under PARDYP initiative. These include fast growing, multipurpose tree species and various engineering structures, drainage channels etc. To evaluate the perception of these conservation techniques, primary data were collected by interviewing farmers. In all 60 respondents were randomly selected from the whole area. Most of the respondents were aware and applied various soil conservation measures.

Majority of the respondents were of the opinion that soil conservation techniques applied in the area have been successful in controlling the process of erosion and increasing crop and grass production. They also viewed that there is need for more activities in the area especially technical and financial support to adopt soil conservation measures.

The conservation through vegetative and engineering measures proved very useful to improve ecological conditions, biodiversity conservation, increase in crop and grass production and rehabilitation of degraded lands. In addition these measures also provided more job opportunities to local people and helped them to increase their total income. The study also concludes that the proposed activities if adopted in the long run will help in poverty alleviation of the target population.



## **Survey of *Dalbergia sissoo* die-back along canal sides in Charsadda, Mardan and Dargai area by Sultan Muhammad (Advisor: Dr. Mirza Hakim Khan)**

*Dalbergia sissoo* is native to the foot hills of the Himalayas of India, Pakistan and Nepal. It is growing in Nepal, India, Bhutan, Bangladesh and Pakistan. *Sissoo* die-back is now a common problem in these countries. Large scale damage due to die-back were reported in some parts of districts Charsadda, Mardan, Peshawar, Rustam, Swabi and Katlang area.

During the survey heavy infestation rate was noted from 20-50% due to die-back in the mentioned sites. Severe infestation rate was observed in the Katlang, Harichand, Michi Canal and Rustam. The infestation was due to the causal organism known as *F. solani* a root disease and soil born fungi. *Ganoderma lucidum* and *Polyporus gilvus* in various grades. It was noted that root injury is one of the main cause of the disease of *F. xysporum*. In addition root rot nematodes known as *Meloidogynae javanica* was noted to form galls in *D. sissoo* in Katlang sides. In addition it was noted that pinhole borer larvae of family Buprestidae could be one of the reason causing top dying. Termites and borers were mostly recorded on dead mature trees.

Recommendations were made for healthy seed collection from plus trees, site selection, sanitary precautions, deep planting, avoidance of root injury removal of over aged trees along with their stumps and complete ban on debarking.

## **Habitat use by Ibex (*Capra ibex sibirica*) in Khunjerab National Park Gilgit, Northern Areas by Khadim Abbas (Advisor: Mian Muhammad Shafiq)**

Khunjerab covering an area of 226913 ha was declared and established in 1975 as a National Park for the conservation of endangered wild ungulates especially the Marcopolo Sheep (*Ovis ommonplii*) and Ibex (*Capra Ibex siberica*). The area falls in dry Temperate Zone on the basis of climate. The wildlife census was regularly conducted at 5 years interval since 1975. The park stretches from 3500 m to 6000 m elevation and is grazed/browsed by the domestic livestock and wildlife throughout the year.

The study was conducted in the month of September 2002 at Khunjerab National Park Gilgit, Northern Areas to collect information on Ibex's status and food problems faced by the animal. For that purpose 36 quadrates of size 1 m × 1 m were laid out at different places randomly across the contours. Average air-



dried weight from 1 m<sup>2</sup> quadrat was calculated and multiplied with 10 to find out the air-dried forage in kilograms per hectare. A proper use factor of 50% was used to calculate the useable air-dried forage production and grazing capacity. The population of domestic livestock converted into animal units was 5872 and of Ibex was 3190 in September 2002.

The grazing capacity of the National Park for Ibex was calculated by subtracting the feed requirements of 5872 domestic animals (animal units). Based on the existing useable air-dried forage of National Park the grazing capacity came out 2560 Ibex per year. The Khunjerab National Park is an important habitat of other wildlife animals like Marco Polo Sheep (*Ovis montanus*), Snow Leopard (*Uncia uncia*), Brown Bear (*Ursus arctos*), Blue Sheep (*Pseudois nayaur*), Golden Marmots (*Marmota caudata aurca*), Wolf (*Canis lupus*) and Lynx (*Felis lynx*). The present population of Ibex in the Park is 3190 which was 395 at the time of establishment of the Park. The wild ungulates including the Ibex use the National Park through spatial and temporal adjustments during different seasons of the year for shelter and feed. The current carrying capacity data show that wild ungulates and domestic animals are in competition for feed.

In order to maintain the Khunjerab National Park in a good condition for wild ungulates and domestic livestock it is recommended that the surplus Ibex be shifted to other places or allow trophy hunting of Ibex at 5 animals yearly as a special case. This will lead to the economic uplift of the local inhabitants and effective management of the Park. It is also emphasized that the prescriptions of management plan prepared by World Wildlife Fund (WWF) be followed to reduce the competition among wild animals and domestic livestock.

### **Medicinal plants as a source of income for women in Chagharzai valley (district Buner) by Zinat Saba (Advisor: Raja Muhammad Zarif)**

The main objective of this study was to determine household income and expenditures on herbal medicines, and state of trade in Chagharzai valley (district Buner). In order to achieve the study objectives, a field survey of 50 households was conducted. The respondents were interviewed from randomly selected five villages of the valley. A questionnaire was designed to collect data of the target population through multistage random sampling technique.

The analysis of data indicated that income from medicinal plants was influenced by the location of the household. Women living in the hamlets earn more income from sale of medicinal plants as compared to the women of main



villages. The data also indicated that average household size of the respondent population was about 10 heads.

The Chi-Square test was applied to analyze different variables related to the collection, consumption and trade of medicinal plants. According to the results income was one of the main reasons for collection of medicinal plants, in addition to self-consumption.

Monthly expenditures of the household to purchase medicinal plants were independent of the household size. The results also show that the income of household from sale of medicinal plants is independent of zone. The monthly expenditures of the household to purchase allopathic medicines depend on the location as well as on the size of the household.

Women of all age classes were involved in collection of medicinal plants. The study results suggest that in majority households (62.2%) both children and women collected medicinal plants and in 37.8% households only children were involved to collect for self use and or for sale.