822 PKNO94

ENVIRONMENTAL PROFILE

NORTH WEST FRONTIER PROVINCE

Pakistan

822-PK NO94-12245

ENVIRONMENTAL PROFILE

OF

NORTH-WEST FRONTIER PROVINCE

Pakistan

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RN: 12245
LO: 822 PK NO94

May 1994

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Islamabad, P.O. Box 2389, Pakistan

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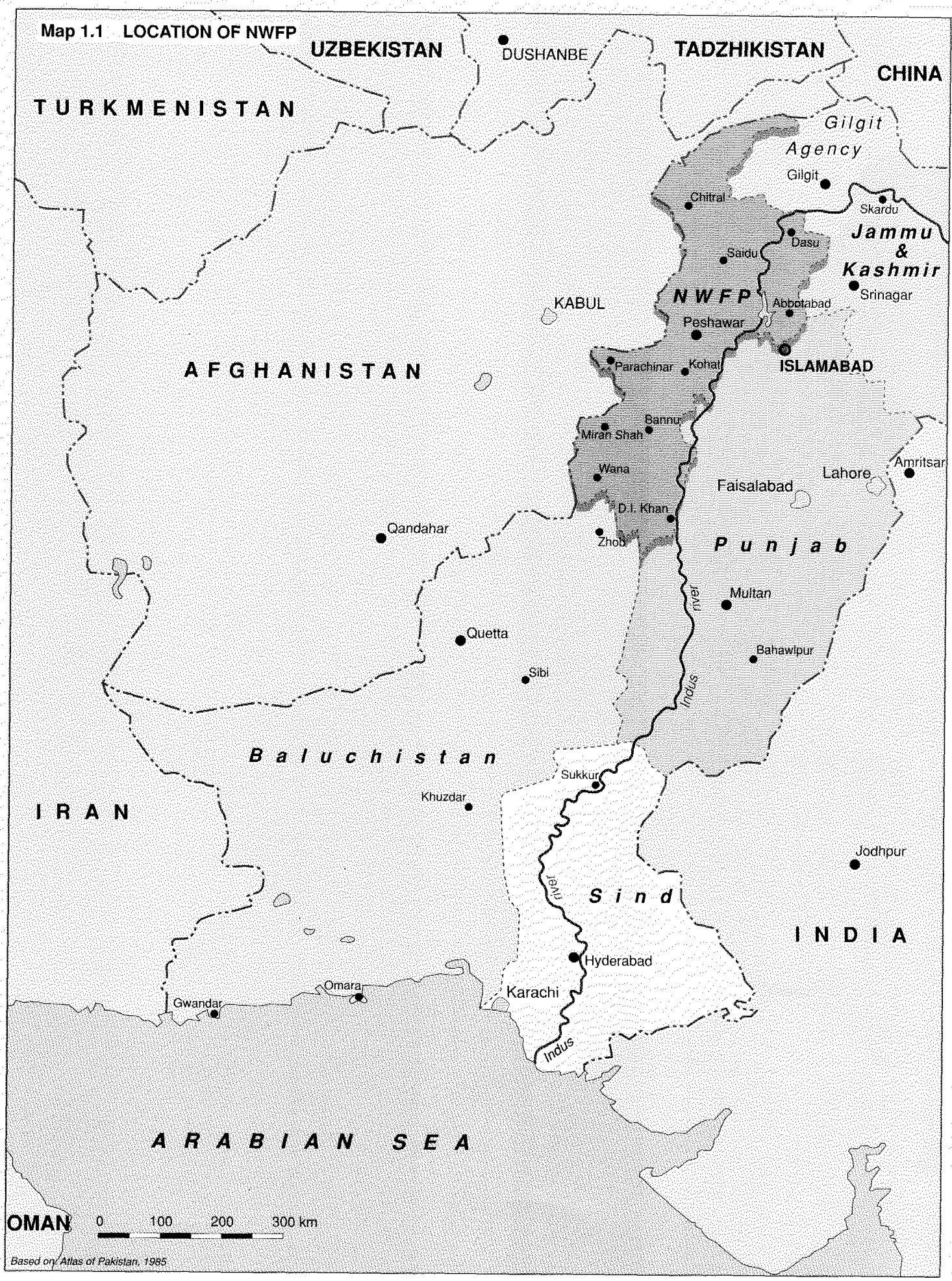

Map 1.1 LOCATION OF NWFP
UZBEKISTAN
DUSHANBE
TADZHIKISTAN
CHINA
TURKMENISTAN
Gilgit Agency
Gilgit
Chitral
Skardu
Jammu & Kashmir
Dasu
Saidu
Srinagar
KABUL
NWFP
Abbotabad
Peshawar
ISLAMABAD
AFGHANISTAN
Parachinar
Kohat
Bannu
Miran Shah
Wana
Amritsar
Lahore
Faisalabad
D.I. Khan
Qandahar
Zhob
Punjab
Multan
Quetta
Bahawlpur
Sibi
Indus River
Baluchistan
Sukkur
Khuzdar
IRAN
Jodhpur
Sind
INDIA
Hyderabad
Omara
Karachi
Gwandar
Indus River
ARABIAN SEA
OMAN
0 100 200 300 km
Based on: Atlas of Pakistan, 1985

EXECUTIVE SUMMARY

The principal environmental issues in North West Frontier Province (NWFP) are population pressure, poverty, poor quality of the natural-resource base, breakdown in social institutions and the common property regimes vested with collective management, the lack of land use plans, narrow resource base and lack of enforcement of existing legislation. A World Bank Appraisal report (May 1992) on environmental protection and resource conservation reported that "policy makers and farmers have focused almost exclusively on questions related to agricultural production and have given insufficient consideration to developing sustainable resource use systems." This has led to the indiscriminate deforestation of mountains and hill sides, overgrazing of rangelands and overwatering of crops on the irrigated plains (Mardan, Peshawar) overtapping of groundwater (Kohat, Bannu) and inadequate drainage with the resulting problems of severe soil erosion, silting of reservoirs, degradation of natural pastures,lowering groundwater table, waterlogging and soil salinity.

The population increase is due mainly to natural growth rate and the large influx of Afghan refugees. Rural to urban migration is not a serious issue in NWFP. The population increase has exerted enormous pressure on the natural resource base of NWFP. Population increase has led to overcrowding not only in the villages but within each household as well, placed an added burden on civic amenities, led to an overuse of natural resources and to epidemics of various diseases.

Income levels in NWFP are low. Figures which allow a comparison of provincial and national averages are not available. However, it is generally believed that income levels in NWFP are below the national average. In real terms, wage rates have declined over the last ten years. The lack of access to basic social services, low coverage of water supply facilities, poor sanitation and overuse of natural resources is due primarily to the low economic development in the Province, high unemployment and low wage rates. The low economic level forces people to seek cheaper alternatives and overuse natural resources for which they have use rights. In the absence of commercial fuels, people use local resources like wood, shrubs, grasses, crop residue and cow dung. Studies have determined that the current growth in demand for domestic energy use is unsustainable. The increased pressure on the natural resource base as a result of poverty and a greater population has placed tremendous stress on the social traditions that play a key role in environmental conservation and management.

The problem for NWFP is compounded by the fact that more than 60 per cent of the land in NWFP is under some form of common property ownership or use. The breakdown of traditional institutions which enforced a system of use rights, the increased population pressure and poverty have led to a lack of enforcement at village level. There is also a lack of political will to formulate and enforce the existing legislation on natural resource management, air pollution and industrial pollution. This leads to deforestation, inadequate waste management and disposal. Weak environmental protection institutions, inadequate legislation, a low level of public awareness, policy distortions and insufficient short-term incentives to encourage poor farmers and stock owners to adopt activities with long-term benefits all contribute to natural resource mismanagement.

Among the elements causing the poor quality of natural resource base are factors like waterlogging and salinity, lowering of groundwater level, soil quality, the state of urban pollution. As the land use is unsustainable and grazing of livestock uncontrolled, the regeneration of natural vegetation is prevented. The denuded mountain slopes are the cause of massive soil erosion and siltation of dams, reservoirs and river beds. Over 60 per cent of the Province's land area is mountainous and therefore highly susceptible to soil erosion.

Among the urban environmental problems are the lack of effluent and waste management. Most industries in NWFP dump their untreated effluent either in the rivers or on open land, NWFP has virtually no sewage treatment facilities. There is no effective mechanism for collection, sorting or disposal of solid waste. The drinking water and air are badly polluted. There is ample evidence that the urban pollution has had a detrimental effect upon both human and animal health in the Province.

Recommended actions:

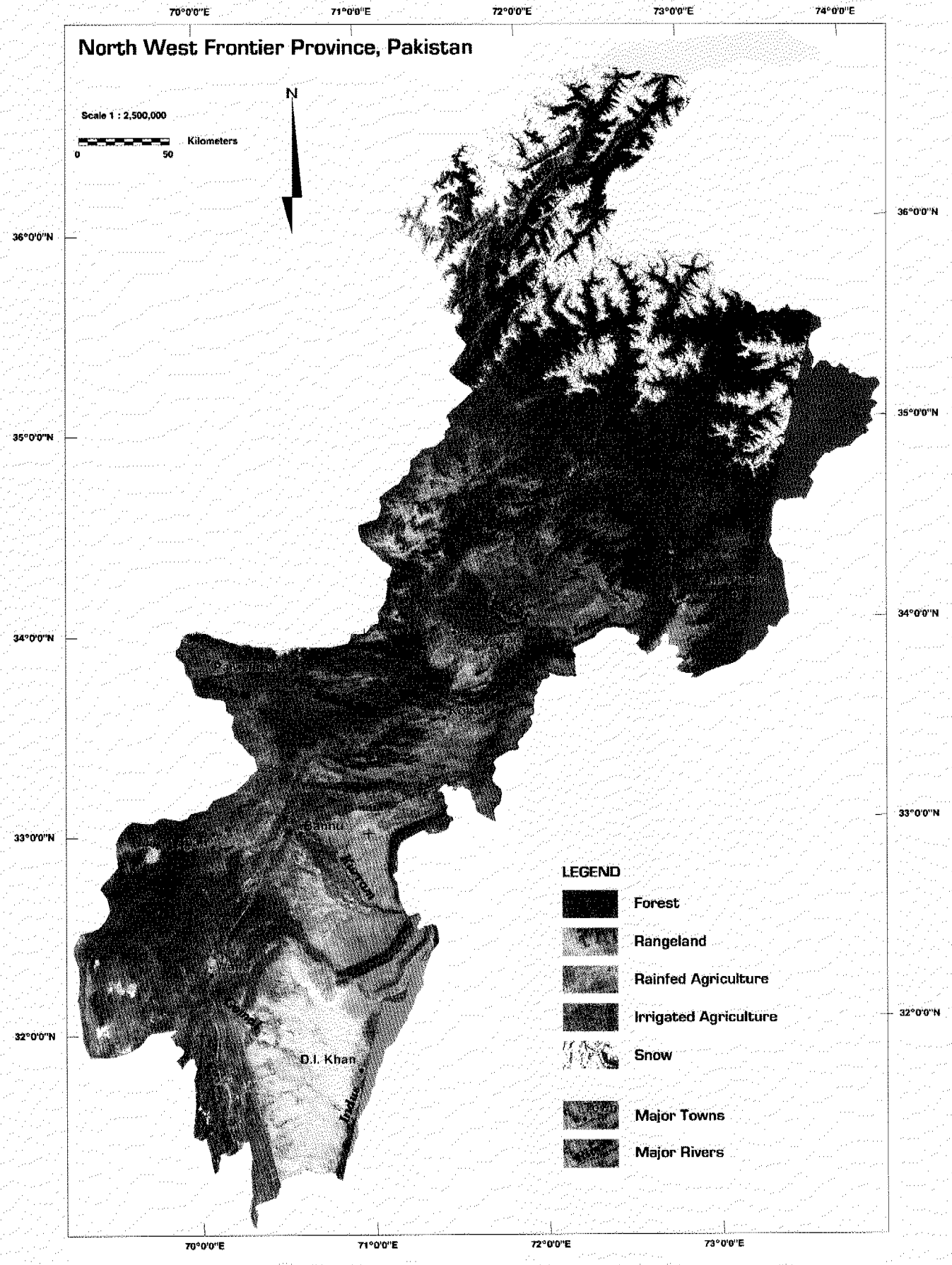
NWFP has one of the most beautiful landscapes on Earth. To preserve NWFP, the environmental degradation should be reduced or preferably stopped. Through the adoption of the National Conservation Strategy (NCS), the Government of Pakistan has committed itself to reorienting its development efforts towards sustainable development. The Government of NWFP (GoNWFP) has made a start with the formulation of the Sar- had Provincial Conservation Strategy (SPCS).The SPCS is the response of the GoNWFP to the need to implement the NCS. The SPCS should result in a comprehensive policy for management of the environment in NWFP. Organizations responsible for initiating environmental management have been created and are being strengthened. Besides existing projects, donor organizations are actively involved in the formulation of environmental studies and the identification of projects that contribute to the improvement of the environment.

Both the NCS and the SPCS are action oriented and their policy formulation is linked to the implementation of pilot projects. Twelve priority areas of action have been identified under the SPCS: environmental legislation; business-government round table; Kabul River clean up; urban waste; cleaner air programme; sustainable agriculture; community development; cultural heritage; forests, watersheds, grazing lands, fisheries and wildlife; population; clean drinking water; and education and communication.

Sustainable development is a long-term process, which will require a fundamental reorientation in attitudes, institutional structures and policies of many actors. The recommended direction of the SPCS, and other environment management oriented policies can be summarized in a series of long-term (over 5 years) and short-term (3-5 years) goals.

The long-term goals are:

- ***Sound and effective environmental management*** depends on the availability of a strong environmental institutional capacity. Therefore the GoNWFP should continue, to assist donor organizations, to strengthen the Environment Section of Planning, En-


North West Frontier Province, Pakistan
Scale 1 : 2,500,000
Kilometers
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50
N
70°0'0"E
71°0'0"E
72°0'0"E
73°0'0"E
74°0'0"E
36°0'0"N
35°0'0"N
34°0'0"N
33°0'0"N
32°0'0"N
Peshawar
Kohat
Bannu
Tochi
Kurram
Gomal
Zam
Indus
D.I. Khan
LEGEND
Forest
Rangeland
Rainfed Agriculture
Irrigated Agriculture
Snow
Major Towns
Major Rivers

vironment and Development Department (PE&D) and the Environmental Protection Agencies (EPA).

- ***Successful environmental management*** relies on the appropriate distribution of environmental management functions over different types of non-governmental organizations. (NGOs) and the private sector should play a significant and permanent role in environmental management in NWFP.

- ***Appropriate and effective management of natural resources*** needs a strong partnership at the different levels. From the divisional, district and council level down to the level where the problems are situated: the village or watershed. Attempts should be made to broaden the capacity through the establishment of Village Development Committees (VDCs) or other forms of community-based initiatives. These groups play an important role in environmental awareness raising at the village level.

The short-term goals can be divided into five categories: research; training; policy formulation; policies; and policy instruments:

1) To establish a network of environmental research organizations in NWFP to generate reliable discriminative information for policy makers.

2) To train environmental professionals.

3) To formulate environmental policies and management procedures through process approach involving a wide audience of experts.

4) To develop and implement comprehensive environmental management strategy, sectorial and regional policies. It is Important to define the fields where immediate action is needed and to assign capacity that can act effectively. For instance, the following issues should be addressed:

- *forestry and watershed management*
  Methods are developed. But how can local NWFP (governmental and non-governmental) organizations take over the developed approaches so that full regional coverage is achieved and the quality maintained?

- *agriculture*
  More research projects in the barani (rainfed) areas to solve the problems of declining soil fertility and erosion are required.

- *industry*
  Review and enforcement of environmental standards are needed so that the industrial pollution will be reduced to acceptable limits.

- *job opportunities*
  Economic growth and environmental protection are two processes that are strongly related. A lack of economic growth in NWFP will make it difficult to finance environmental protection activities. People living at the subsistence level are not inclined to bother with environmental issues. One way to achieve economic growth is to create jobs. Most promising are the small-scale industries. The Government should stimulate small-scale industry but also control the pollution of these industries.

- *air pollution*
  A major part of air pollution in urban centres in NWFP is caused by traffic. Implementation of already developed traffic circulation plans and enforcement of car gas exhaust standards should reduce the air pollution.

- *urban development*
  Priorities in urban development should be: low-cost housing projects; increase of sewerage systems; treatment of sewerage; improvement in solid waste collection; clean drinking water for everybody. Technologies in this field are well-developed and proven. Financing the improved services is a problem due to the limited revenue generation.

- *population*
  Environmental degradation is closely related to population pressure. The population pressure in NWFP is high and increasing. There is a demand for fertility control: a third of Pakistani women want no more children and a large additional number want the means to space the birth of children. The level of modern contraceptive use is very low (only 5 % of couples). Requirements to reduce population growth are: consistent political support for family planning (rural health network), to augment the low status of the women, to reduce poverty and increase the literacy rate.

- *biodiversity*
  Protection of the biodiversity in NWFP will depend on a more stringent adherence to Environmental Impact Assessment (EIA) procedures. Considering the weak capacity that exists, it is recommended that the GoNWFP select a few priority areas, both in terms of areas and types of ecosystems and species. In addition, awareness raising activities need to be intensified to convince the (local) population of the economic and cultural importance of biodiversity. The pilot projects of the World Wildlife Fund (WWF), in which tourism, hunting and a sustained use of fragile ecosystems are combined need to be continued and expanded.

5) Environmental policy instruments that are effective in NWFP

The success and effectiveness of environmental management policies will depend on the availability of effective policy instruments, e.g. EIA procedures, environmental legislation. Effective enforcement will depend on a well-defined system of penalties and fines, and on economic policy instruments to regulate environmental behaviour of the main economic actors.

1. INTRODUCTION

1.1 Background

This environmental profile of the North-West Frontier Province (NWFP) was prepared for the Government of NWFP at the request of the Planning, Environment & Development Department. The purpose of the profile is to evaluate the current state of natural resources and environmental management in the Province, to identify the overall trends in resource use and development and to assess the impact of the trends on the future environmental status. This document highlights the critical environmental issues for the Province and is designed to assist as a reference and planning guide. This profile is not intended to specify an action plan or give a list of recommendations to counter the environmental problems of the Province. It is designed to give an analytical assessment which points to the current situation so that policy makers can infer

their own action plan and recommendations.

The environmental profile was prepared in July-September 1993 by a combined DHV and EDC team. The profile is based on secondary data sources.The only primary data collected was to determine the air pollution levels in selected cities of NWFP. During the data-collection process, the team assessed that a large number of data was available in the Province regarding different aspects of the environment and natural resources. However, this data was not present in a consolidated manner and it was therefore difficult to form an overall impression of the environmental situation. The first task in the preparation of this profile was to collect the data and collate it to provide a comprehensive view of the state of the environment in the Province. The reference section provides details of all resource materials used in preparing the profile.

The profile is organized in five main components. The first component describes the natural resource base, the second component analyses the interaction between the environment and the human factor, the third component contains an analysis of the main environmental issues, the fourth component provides an institutional overview and the fifth component proposes a means towards a more effective environmental management. This report structure was chosen because it provides a good descriptive and analytical basis on which NWFP government can conduct its task of formulating recommendations and policy analysis.

NWFP government has taken the lead in studying its environmental problems and preparing a comprehensive action plan for dealing with its environmental concerns. This initiative has led to the formulation of the Sarhad Provincial Conservation Strategy (SPCS) in collaboration with IUCN. This report provides the starting point for an environmental benchmark for the Province and gives a working first draft on which the SPCS can be developed over time. It is expected that this report will assist in building a solid database for helping to protect and develop the natural resource base of the Province. The report also identifies the gaps in existing environmental data.

1.2 Introduction to NWFP

The North-West Frontier Province is the smallest province in terms of area of the four provinces of Pakistan and the third largest in terms of population. The area is very diverse, comprising the high mountains of the Hindu Kush in the north and the Indus plain in the south (Maps 1.1, 1.2 and 2.5). NWFP covers richly diverse ecological systems. From snowy, forest-covered mountains to arid rangelands. From the barren hills of the tribal areas to the fertile agricultural Peshawar valley.

NWFP is regarded as the western border of the subcontinent and was the traditional trade route from Asia to India. Through its passes have travelled many conquerors and explorers like Mahmud of Ghazni, Cyrus, Alexander the Great, Tamburlane, Emperor Babur, Nadir Shah and Ahmad Shah Abdali. It has been the cradle of the Buddhist Gandhara civilization (sixth century BC). Afghanistan forms the western boundary of NWFP. In the east it borders with the Punjab Province and in the far south it has a short border with Baluchistan. In the north, only a narrow corridor separates it from Central Asia and China.

The province of NWFP was created as an administrative entity in 1901. It comprises administrative units called divisions, districts and Provincially Administered Tribal Areas (PATA). NWFP occupies approximately 100 200 km^2, of which 74 521 km^2 are under provincial administration. The remainder is covered by the Federally Administered Tribal Areas (FATA), which are under the political control of the Federal Government[1]. NWFP currently comprises seven divisions and 22 districts. The number of districts has gradually increased and the size of each district has consequently decreased.

2. THE NATURAL ENVIRONMENT

2.1 Climate

The diversity in geographical conditions cause likewise climatic conditions in NWFP (see Diagram 2.1 and Table 2.1). The Division of Dera Ismail Khan in the south is one of the hottest in Pakistan, with maximum temperatures of between 46 °C and 50 °C, while summers are temperate and winters often extremely cold in the mountainous region of the north. The air is generally dry, therefore daily and annual temperatures may differ considerably.

There is wide variation in precipitation, both in amounts and in distribution over the year. Rainfall over NWFP mainly occurs in two distinct crop-growing seasons, viz: Rabi (winter, December to March) and Kharif (summer, June to September). Almost no rainfall occurs in lower NWFP and relatively very little in the hills of upper NWFP in the intermediate periods, i.e. April to May and October to November.

In Rabi, frontal systems from the west cause widespread rains over NWFP (see Map 2.1). The main Rabi precipitation ranges from 1100 mm in the northwestern part of the Province to below 100 mm in the southern tip. In Kharif, the southeast Monsoon is primarily responsible for rainfall activity over the Province (see Map 2.2). Monsoon onset takes place over the subcontinent in the first or second week of June. The main Kharif precipitation ranges from 900 mm in the area around Mansehra to around 100 mm in the southern and northern part of the Province.

2.2 Geography and topography

Land-forms in the northern parts of NWFP reach their greatest altitude with elevations averaging 3000 metres above sea level and peaks of more than 7000 metres, including the mighty Tirich Mir (7750 metres) near Chitral City (see Map 2.5). Dividing Chitral from the Wakhan corridor of Afghanistan is the Hindu Kush range with its equally impressive southern extension, the Hindu Raj or Shandur Range.

Coming down from the hills are a series of very productive agricultural basins; Peshawar, Kohat-Bannu and the Derajat. Most are fringed by hills which are steep on the northern sides and with gentle slopes towards the southern side. Basins and plains comprise roughly one quarter of the Frontier's total surface area.

All the dense forests are located in the moist north and northwestern mountainous regions. They accommodate a

great deal of biodiversity. The major perennial rivers of Pakistan also originate and pass through these areas. The mountains would have been impenetrable without the gateways gorged out by the streams. The Province's western and southwestern mountain ranges are dry and have scanty vegetation. Agricultural activities are found more in the rainfed and irrigated plains and valleys of the Province.

2.3 Geology

The North-West Frontier Province can be subdivided into four broad geological units (see Map 2.3):

The metamorphic and igneous rocks of the northern mountains:
The area north and west of the Peshawar valley consists of metamorphic rocks associated with intrusions of igneous rock. It consists mainly of black amphibolites of the Upper Swat Hornblendic group. The dioritic rocks are widespread in Bajaur Agency, and in the southwest of the Dir District. Further north, Tertiary volcanic rocks are present in the form of a very thick series of andesite and dacite tuffs interbedded with fossiliferous metasedimentary rocks.

The Mesozoic rocks of the southern and southwestern part of NWFP
Mesozoic sediments occur in the western part of the Khyber Agency, the Orakzai area, the Kurram Agency, North Waziristan, and South Waziristan. They also extend into the Kohat range. The east-west Safed Koh range also comprises Jurassic and cretaceous limestones.

The Tertiary rocks of the central and southeastern part of NWFP
The rocks of Tertiary era are mainly found in the centre and south of the Province. Dark grey Palaeocene shale and limestone are found along the crest of the Kohat range and between the Peshawar valley and the Kohat plain and in the adjacent part of Orakzai Agency. A broad belt of Eocene and Miocene formations is found south of the Kohat range, between Kohat town and Banda Daud Shah.

The Upper Tertiary and Quaternary sediments
These sediments occur in the Peshawar valley, D.I. Khan, Bannu and the intermontane basins. The basins are filled with deposits, mainly alluvium, consisting of sand, gravel, boulders, silt and clay. These are the erosion products of the surrounding mountains and have been transported by the streams and rivers both from the hills and from more distant source areas. Not only river water but also wind is an active transport medium and has deposited thick layers of loess, which is well-sorted, fine windblown silt.

2.4 Hydrology

Both surface water and groundwater are important for the natural environment, drinking and irrigation in NWFP. Most of the surface and groundwater available in the Province is classified as

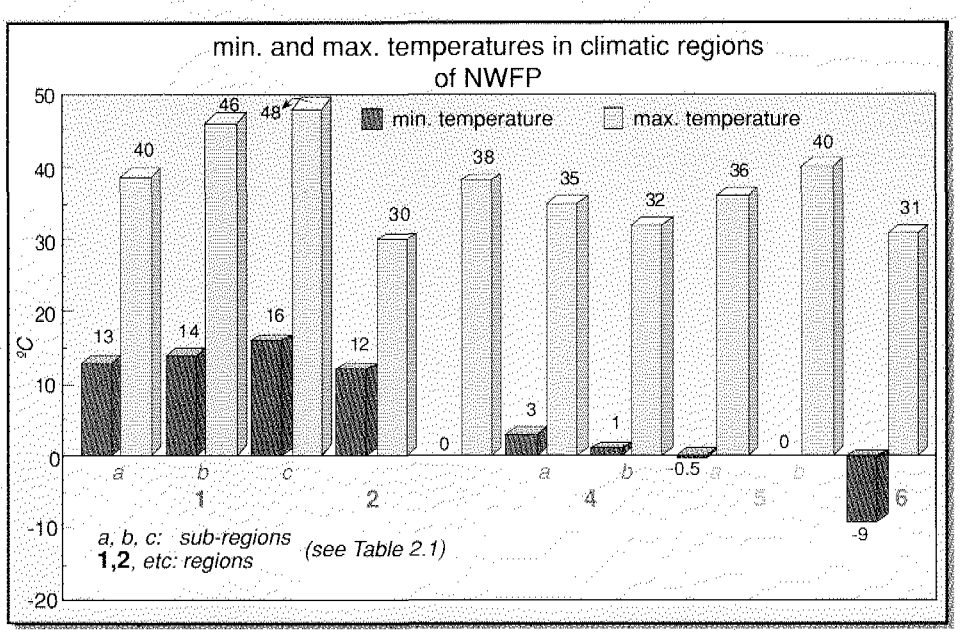
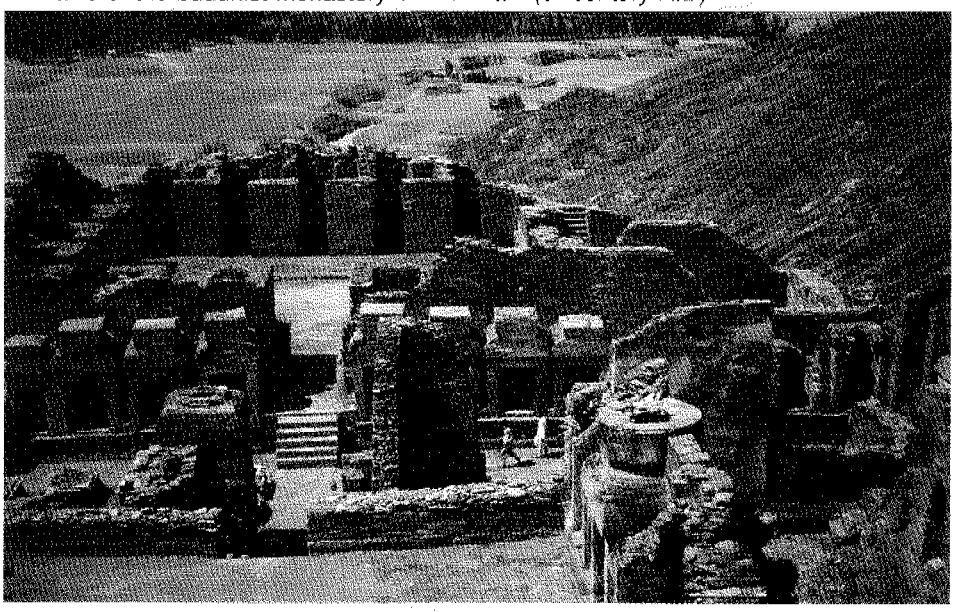


Diagram 2.1

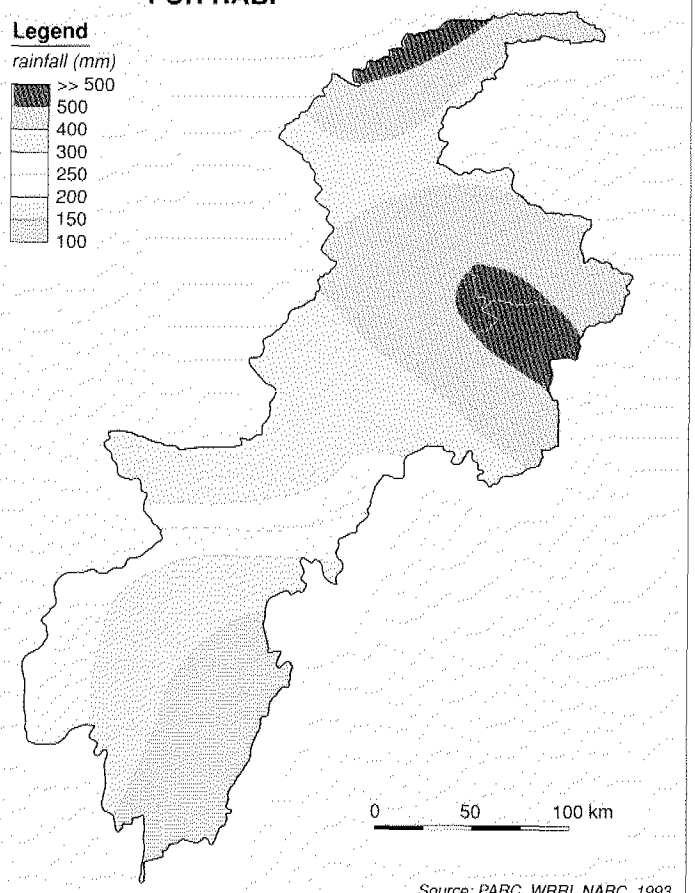
Region	Sub-region	Location
1	a	Peshawar vale west
	b	Bannu Basin
	c	Dera Ismail Khan
2	-	Parts of Swat, Dir, Abbotabad & Peshawar vale
3	-	Spur of outer Himalayas
4	a	Hills of Swat, Dir and Kohistan
	b	Hills of Kohat and Karak
5	a	Northern Swat, Southern Chitral, Bajour & Khyber agencies
	b	Waziristan and southern parts of Kohat and Karak districts
6	-	Northern part of Chitral district

Table 2.1: Climatic zoning in NWFP

Remains of the buddhist monastery Takht-i-Bahi (3rd century A.D)

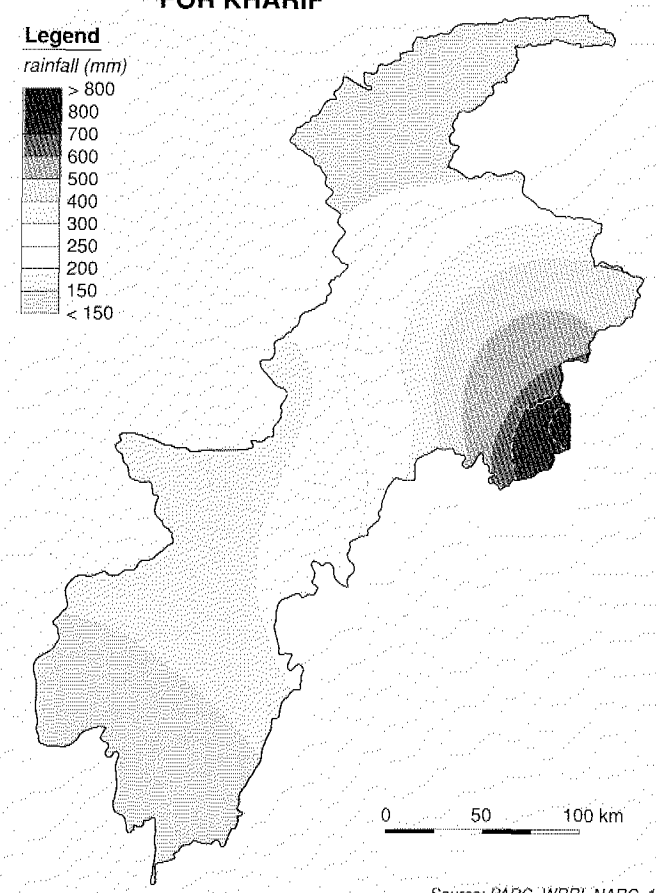


Map 2.1 MEAN SEASONAL RAINFALL (mm) FOR RABI



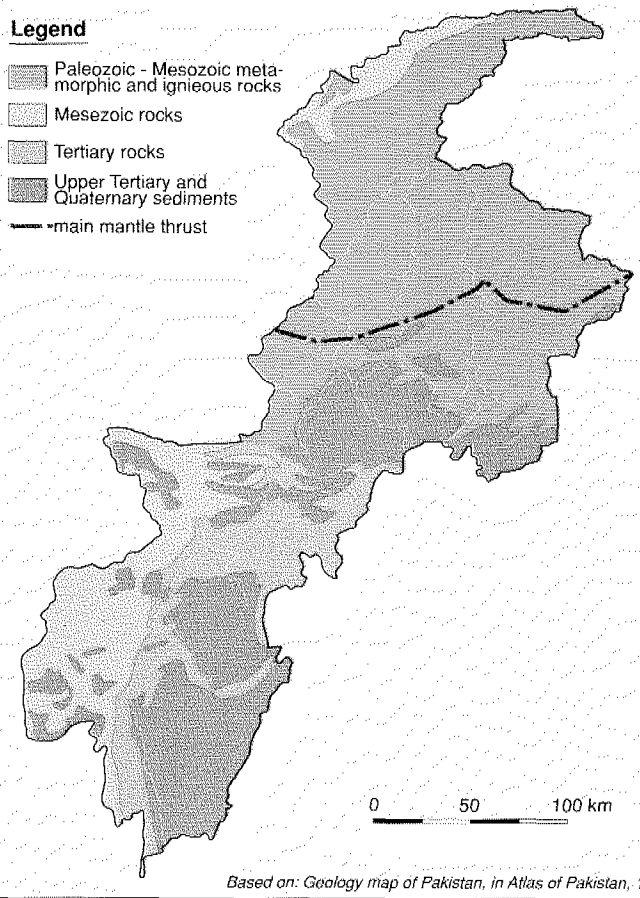
Source: PARC, WRRI, NARC. 1993

Map 2.2 MEAN SEASONAL RAINFALL (mm) FOR KHARIF



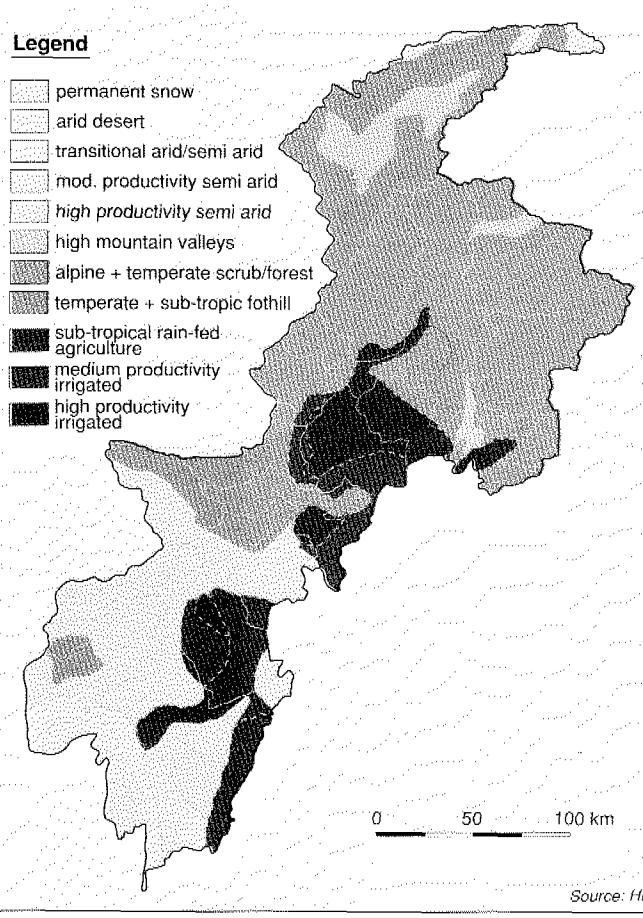
Source: PARC, WRRI, NARC. 1993

Map 2.3 GEOLOGICAL MAP OF NWFP

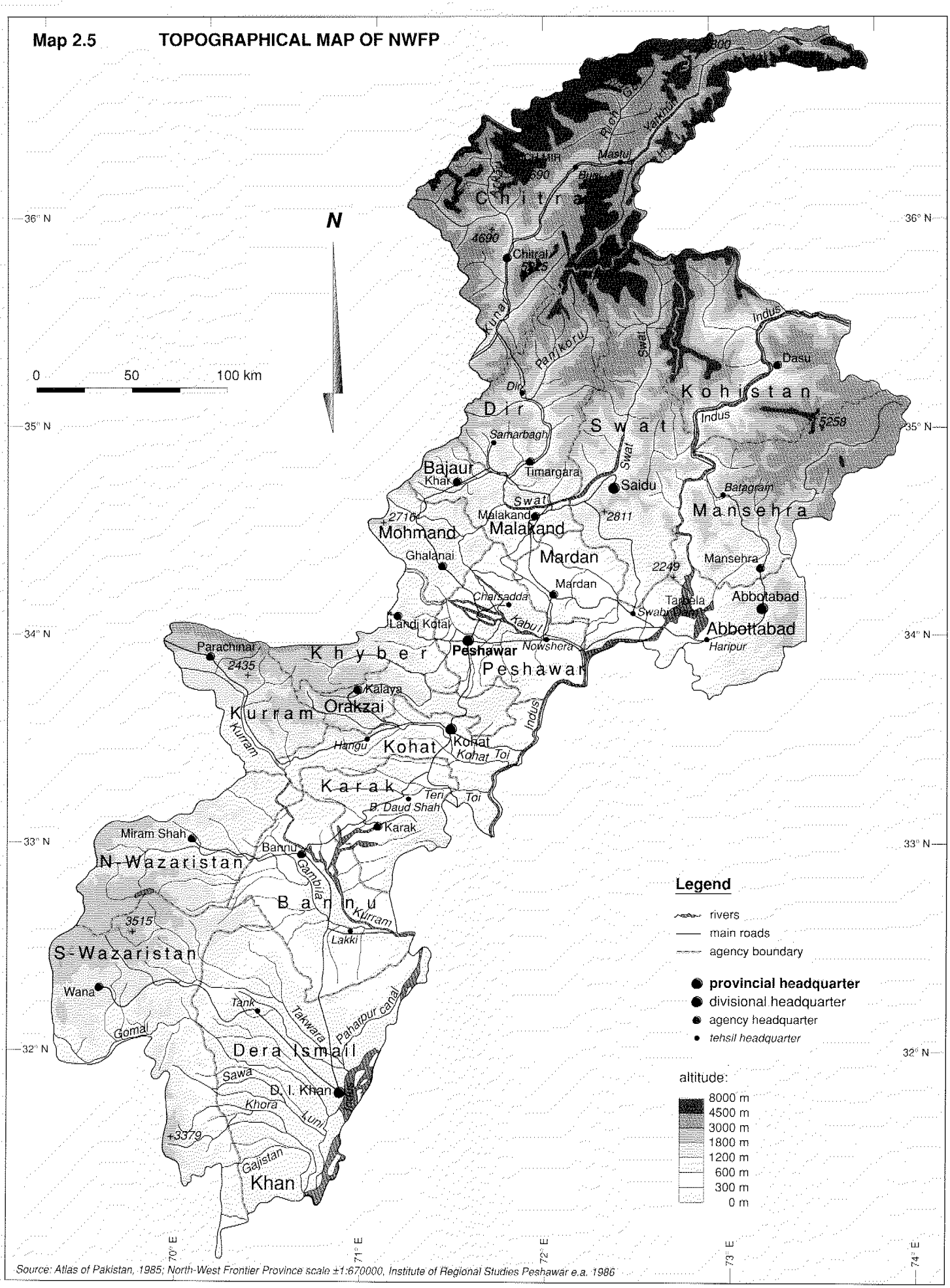


Based on: Geology map of Pakistan, in Atlas of Pakistan, 1985

Map 2.4 NWFP AGRO-ECOLOGICAL ZONATION



Source: HESS



Source: Atlas of Pakistan, 1985; North-West Frontier Province scale ±1:670000, Institute of Regional Studies Peshawar e.a. 1986

Summer landscape

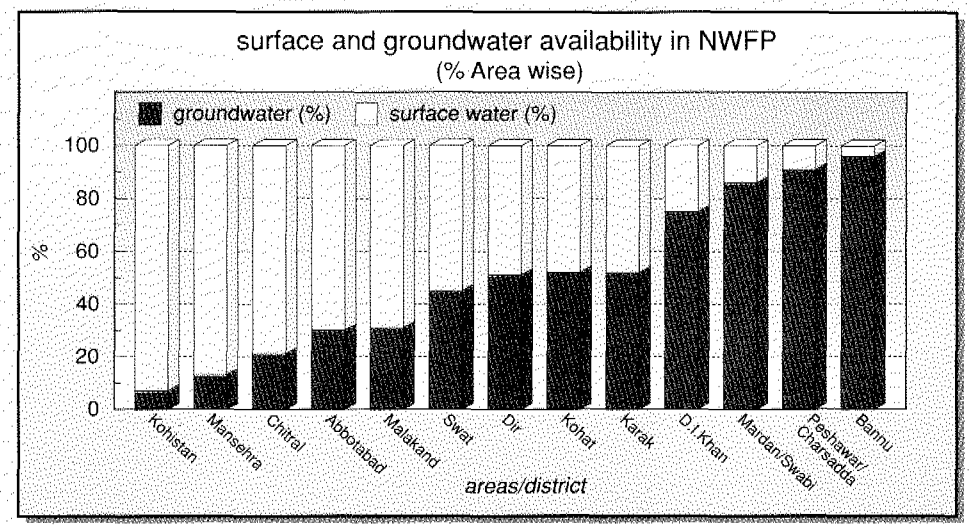


Diagram 2.2[1]

Kathas, the traditional gravity irrigation system

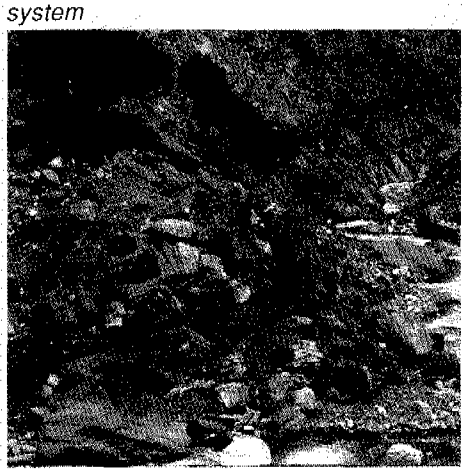
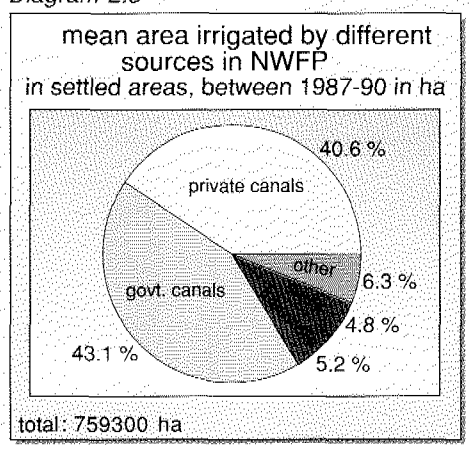


Diagram 2.3[2]



sweet with the exception of brackish water zones in D.I. Khan, Bannu and Karak districts. Surface and groundwater availability in NWFP Province are presented in Diagram 2.2.

In NWFP, surface water is generally in abundance in the form of springs, rivers and khwars (water from melted snow). Most of Pakistan's groundwater resources exist in the Indus Plain extending from the Himalayan foothills to the Arabian Sea and are stored in alluvial deposits. The areas of significance for groundwater exploration and development in NWFP are the valleys of Peshawar, Mardan, Kohat, Bannu and some areas of D.I. Khan.

The use of river water for crop irrigation is an ancient practice. The oldest method is the construction of small diversions called kathas that carry water when the river is high. Canal irrigation started during the Moghul rule (16th and 17th centuries) and increased considerably after Pakistan's independence. In addition to the use of canal water for irrigation, tubewells, wells and tanks are also sources of irrigation water in the Province (see Diagram 2.3).

The development of groundwater through tubewells has been the most significant factor in increasing water supplies during the last 28 years. The area irrigated by tubewells in NWFP is 47,700 ha and the reported irrigation efficiency is better due to negligible conveyance losses through the canals and better control to match the crop water requirements.

2.5 Soils

The soils of NWFP may be divided according to their physiography into the following groups[3].

Residual-colluvial soil of mountain slopes, fans and terraces

These soils are shallow to moderately deep, gravelly loams formed on slopes ranging between four and 80 per cent. More than 40 per cent of the soils on steep slopes are shallow due to extensive water erosion. Organic matter in the soil is around one per cent. In most places, the soil is not deep enough to cultivate crops.

Alluvial plains

Alluvial deposits occur extensively in Peshawar, Bannu Valleys, Dera Ismail Khan District and in the intermontane valleys in the form of narrow elongated strips along the major streams. The alluvial soils are generally deep, have a sandy to clayey texture and are moderately alkaline and calcareous. In most regions however the soils are low in organic matter. The alluvial soils have a high agri-

culture potential. In many regions they are exposed to frequent floods due to the proximity of rivers, resulting in waterlogging and a decline in agricultural productivity.

Loess plains

Loess deposits are found extensively in the Peshawar Valley, the Haripur plain and in the intermontane valleys in northwestern parts of Province. They comprise thick deposits of calcareous silt sediments. In some areas very severe truncation and dissection have resulted in gullied land or badlands. These soils are deep and moderately alkaline and calcareous with a very high agriculture potential. Water shortage, steep slopes and water erosion are the main limitations.

2.6 Vegetation, (plant geography, vegetation structure)

Vegetation zones of NWFP according Roberts (1977) can be briefly described as follows:

1. Permanent snowfield and cold desert.

The highest parts, mainly above 4000 m, of the Himalaya and Hindu Kush Ranges in Hazara, Swat and Chitral Divisions. Consists of glaciers, permanent snowfields, high-altitude cold desert with low vegetation cover including species such as dwarf *Salix* spp., and forbs *Mertensia tibetica, Potentilla desertorum.*

2. Alpine zone.

Areas above the tree-line in Hazara, Swat and Chitral Divisions.

a) *Alpine meadows*; Occur below glaciers and areas where snowmelt provides more mesic conditions. Often good growth of grasses and sedges, with forbs such as Saxifrage *sibirice, Potentilla* spp., *Primula* spp., *Polygonum* spp.

b) *Sub-alpine scrub and birch forest*; Consists of narrow belts at the lower edge of the alpine zone (c.3000 m - 3500 m), descending to lower altitudes in ravines. Characteristic tree species are *Betula utilis, Salix* spp., *Myricaria germanica, Rhododendron anthropogon, Junipers communis* and *Hippophae rhamnoides*, with a ground layer of grasses and herbaceous plants.

3. Dry temperate coniferous forest.

Found on the drier inner ranges of the Himalaya with less monsoon influence, in Hazara (upper Kaghan valley, Siran and Alai valleys, and District Kohistan), upper Swat (Dir and Swat Kohistan) and Chitral, Main tree species are *Picea smithiana, Pinus wallichiana* and *Cedrus deodara*, with an understorey of *Indigofera gerardiana, Sambucus ebulus, Sorbaria tomentosa* and *Plecanthrus rugosus.*

4. Himalayan moist temperate forest.

Found on slopes receiving high monsoon rainfall in Hazara (notably in the Galis, lower Kaghan valley, and southern parts of the Palas valley, District Kohistan). There is a mixture of deciduous and coniferous tree species including *Pinus wallichiana, Abies pindrow, Quercus dilatata, Acer caesium, Populus ciliata, Prunus padus, Taxus baccata, Aesculus indica,* with a dense understorey of *Berberis* spp., *Lonicera* spp., *Viburnum* spp., and *Skimmia anquetilia.*

5. Subtropical pine forest.

A fairly narrow zone between 900 m to 2000 m along the southern flank of the Himalaya in Hazara (lower Galis, Mansehra) and the lower Swat valley. The trees *Pinus roxburqi* and *Quercus incana* dominate, with an understory of *Berberis* spp., *Clematis qouriana, Carrisa* spp., *Cotoneaster* spp., and clumps of grasses.

6. Tropical deciduous forest.

Restricted in NWFP to the Margalla Hills bordering the federal capital territory. In the shadier ravines there is an association of tropical Indo-Malayan tree species, including *Bauhinia variegata, Shorea robusta, Ficus caria, Cassia fistula, Salmalia malabarica*, and *Lannia coromandelica*, with an understorey of *Dodonea viscosa, Woodfordia fruticosa* and *Carissa spinarum.* A number of Indo-Malayan bird and mammal species are associated with this zone.

7. Alpine dry steppe.

a) *Steppe forest in northern latitudes*; Typified by valleys of lower Chitral, Dir and northern District Kohistan. Vegetation consists of scattered trees of *Junipers macropoda, J. polycarpos, Pistacia integrimma, Quercus ilex*, and *Pinus wallichiana*, with a ground layer of woody shrubs *Artemisia maritima, Ephedra intermedia*, and *Berberis* spp.

b) *Steppe forest of intermediate latitudes*; Found in the far south of NWFP around the Takht-i-Sulaiman and the western border of Waziristan, and further north in parts of Safed Koh (Kurram Agency), Malakand and Swat. These areas are sparsely covered with trees *Juniperus macropoda, Fraxinus xanthoxyloides, Pinus gerardiana* and *Pistacia mutica*, with shrubs such as *Artemisia maritima, Ephedra nebrodensis* and *Rosa webbiana.*

8. Arid subtropical habitat.

Rocky and hilly areas from sea level to around 900 m.

a) *Slight monsoon influence*; Regular winter frosts and dry, hot summers. Hill areas of eastern Waziristan. The area is overgrazed with a degraded vegetation of trees *Acacia modesta, Olea cuspidata*, and shrubs *Dodonea viscosa* and *Monotheca buxifola.*

b) *Baluchistan desert scrub*; Very cold winters and no monsoon influence. Extends throughout most of Waziristan and the lower areas of NWFP. Degraded scrub vegetation: *Reptonia buxifolia, Olea cuspidata, Pistacia integerrima, Nannorhops ritchieana* and *Bromus* spp.

9. Riverine tract.

Restricted in NWFP to the immediate vicinity of the River Indus south of Tarbela. Characteristic plants are *Tamarix dioica, T. aphylla, Populus euphratica* and *Acacia arabica* and reed grass *Sacharum spontaneum.*

The major forest zones are indicated in Map 2.6.

2.7 Land use zoning: Relief, climate and vegetation integrated

In areas like NWFP there is a strong effect of relief on climate, vegetation and soils. Cross section 2.1 shows this integration schematically. This cross section forms the basis for agro-ecological zoning. Several different agro-ecological zone maps of NWFP exist. All maps are made by different agencies for different purposes. Table 2.2 compares the agro-ecological zonings of the Province. The large number of zones reflects the great diversity of this province.

This profile has adopted the agro-ecological zoning of SSOP, PARC (WRRI, NARC) and of HESS. The Soil Survey of Pakistan (SSOP) classifies the country's agro-ecological zones according to variations in topography, climate, water availability and soils. Given the variations in soil type and water availability, the SSOP has computed the average yields of food staples at the current levels of agriculture inputs. From these yields, 1981 population-support capacities have been computed. The population-support capacities for NWFP are analysed in Section 9.1.

The agro-ecological zones of the PARC (1980) and the Agricultural University of Peshawar (1993) indicate suitability of the different zones for crops. They are based on annual data. However, NWFP has two distinct agricultural seasons, namely Kharif (Summer) and Rabi (Winter), and the suitability of a crop to grow should be classified according to these two seasons. Therefore, a fifth agro-ecological zoning was developed by PARC (WRRI, NARC) especially for this profile. This zoning will evaluate crop suitability in Section 6.7.

HESS developed agro-ecological zones for purposes of sampling fuelwood biomass throughout the country[4]. This demarcation of zones is based on vegetation types and cycles, interpreted from satellite imagery for each month of the year, which is a good indicator of land productivity. HESS's agro-ecological zones are shown in Map 2.4 and are described as follows:

Zone 1: Permanent snow

This zone lies above 4800 m elevation, well above the tree line and alpine pastures, and supports no plant growth.

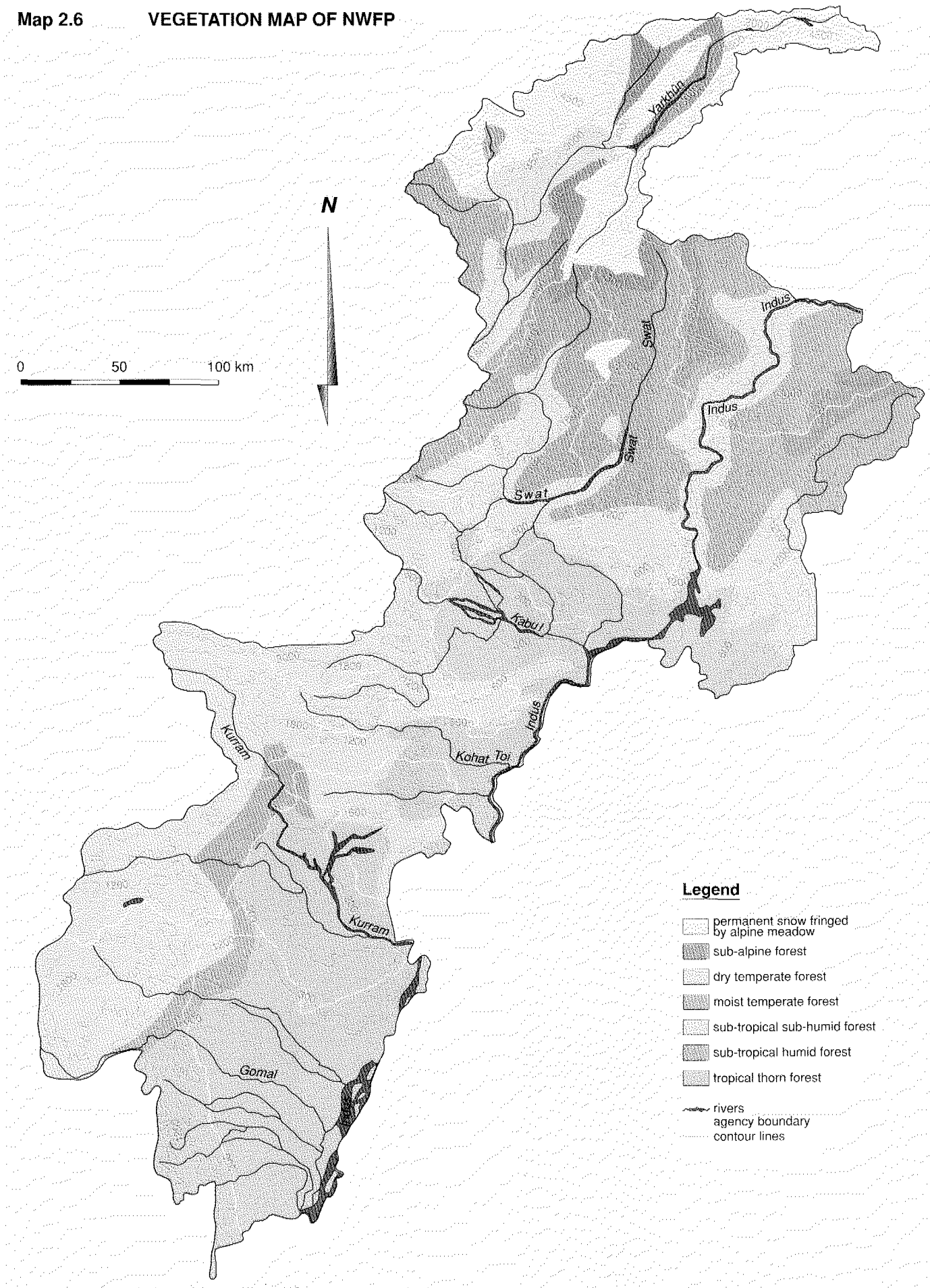
Zones 2 and 3: Arid desert and transitional arid/semi-arid

The climate is continental with high annual and diurnal temperature ranges. Mean annual rainfall is around 250 mm. Summer temperatures are 30 °C to 40 °C, but winter temperatures can drop to below zero. Vegetation is closely related to soil moisture: open woodlands, grass along stream beds and on piedmont slopes. Livestock production is one of the main land uses, along with some cultivation.

Zone 4: Moderate productivity semi-arid

The main difference between this zone and its

Map 2.6 **VEGETATION MAP OF NWFP**

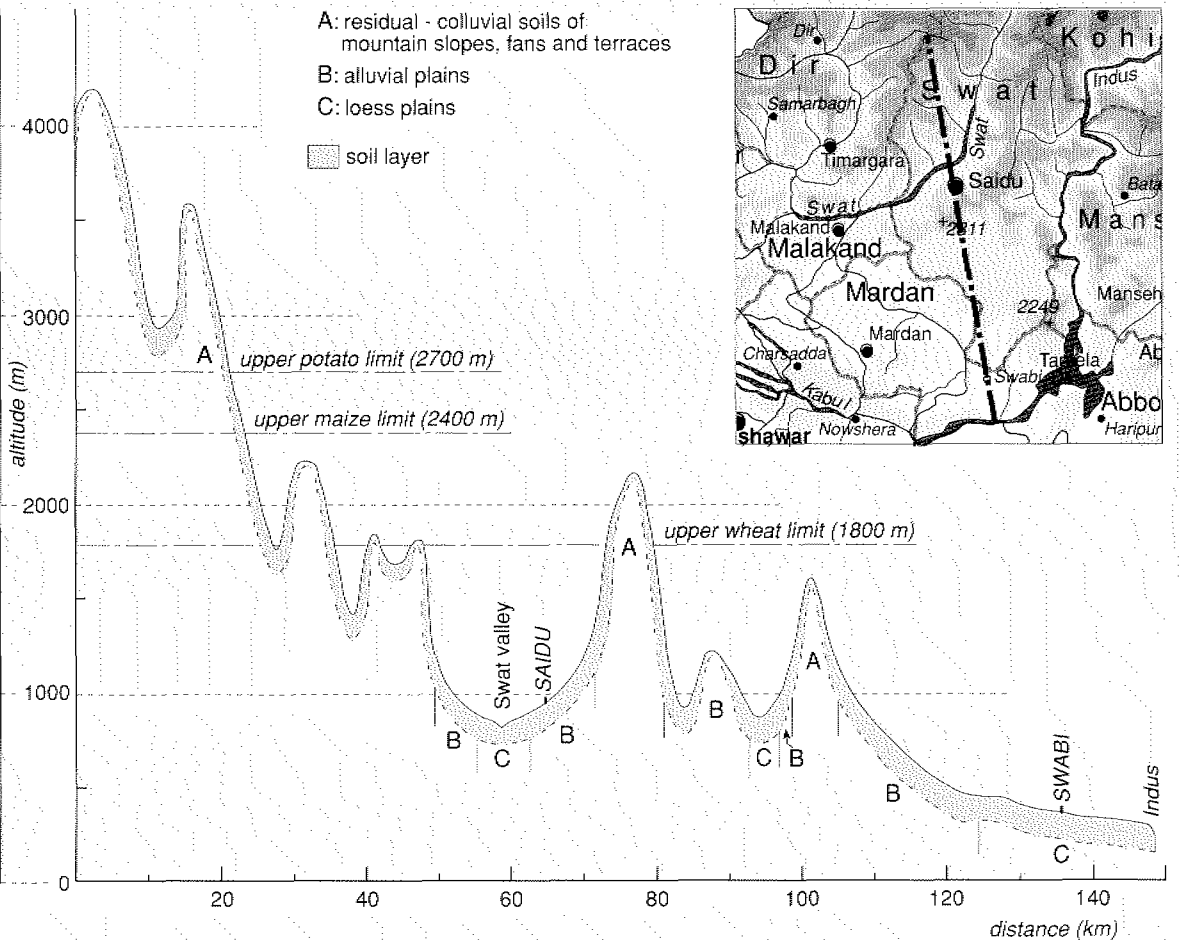


Source: Forest department Peshawar; Atlas of Pakistan, 1985

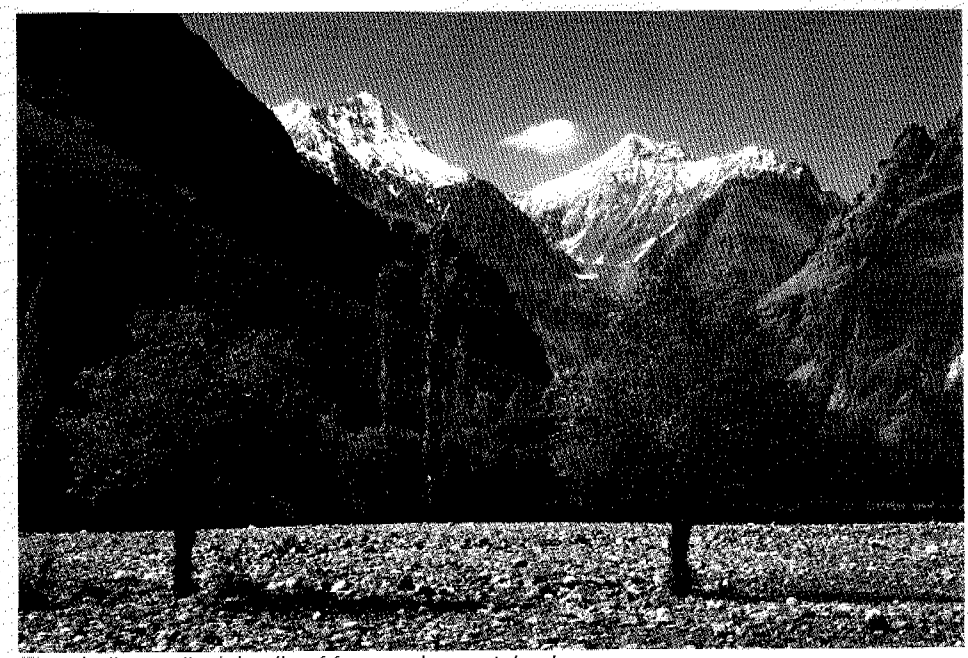
Cross-section 2.1

CROSS SECTION NWFP ALONG THE LINE *SAIDU - SWABI,*
indicating main soil types and characteristic vegetation types

(m)	Rangeland species	Forest type	Major tree species
4000			no trees
	Alpine Pasture	subalpine	Silver fir, Blue pine
3200	Plantago himalaica Poa alpina	dry temperate	Deodar, Blue pine, Chilghoza pine, Dry oak
2400	Cenhrus Ciliaris Eragrostis spp. Heteropogon contortus Panicum turgidum	moist temperate	Silver fir, Blue pine, Deodar, Spruce
1200	Chrysopogon aucheri	subtropical pine	Chir pine
600	Medicago polymorpha Vicia Sativa / Triticum aes tivum	dry subtropical broad-leaved	Wild olive, Acacia



Winter landscape in the north



The shallow colluvial soils of fans and mountain slopes

adjacent Zone 3 is an increase in moisture and vegetation. The main land uses are livestock and agriculture.

Zone 5: High productivity semi-arid

This zone is more productive as it falls in the well-watered valleys. Forests in this zone are the main utilization of land.

Zone 6: High mountain valleys

Upper mountain slopes have poor soils, but valleys have rich, deep soils overlying colluvium. The climate is cold and dry and winters are severe. Mean daily temperatures are often less than 0 °C, with daily minimums down to -13 °C. The region receives only 125 to 500 mm precipitation, most as snow. Energy demands are high due to the cold winters. Villagers cut their fuelwood from nearby forests or rely on wood imports if there are none.

Zone 7: Alpine and temperate scrub/forest

Climate is dry, cool-temperate with mainly winter rainfall. Snowfall can range from two to six metres. Summer temperatures are usually below 15 °C and mean monthly temperatures are below 0 °C for more than half the year. The vegetation is strongly determined by altitude. High alpine scrub is important for grazing. Cultivation is being extended further up the steep slopes as good land becomes scarce below. This zone still has large supplies of wood, but the rate of exploitation makes their future uncertain.

Zone 8: Temperate and subtropical Himalayan foothills

The annual precipitation reaches 1400 mm at higher altitudes, 1000 to 1400 mm at middle elevations, and is less than 1000 mm at lower elevations. The landscape at high altitude is rugged. Valleys at lower altitudes have deep alluvial deposits. Slopes once covered by dense forest are now patchy due to clearing for timber, fuelwood and agriculture. HESS's prognosis for these forests is poor.

Zone 9: Subtropical rainfed agriculture

This zone is an undulating plain at altitudes between 700 and 1000 m. The area is hot and semi-arid with mainly summer monsoonal rainfall. Summer mean maximum temperatures are around 38 °C and winter temperatures range from 4 °C to 7 °C. The area has little natural vegetation and is intensively farmed, mainly for rainfed cereals. Many trees are planted on farm boundaries. HESS estimates a decline in wood stocks due to a high demand from Peshawar and other large towns. However, social forestry programmes have been

Table 2.2: Agro-ecological zoning of NWFP

S. No	Agency	Year	No. of Zones	Purpose
1	Pakistan Agricultural Research Council (PARC)	1980	6	To divide the Province into various zones as to their suitability for raising various agricultural crops. Basis of classification is physiography
2	Soil Survey of Pakistan	1985	9	To classify the area as to suitabilty of its various zones for different types of vegetation. This zoning is based on climate and type of native vegetation
3	Agricultural University, Peshawar	1993	5	To divide the Province into various zones based on their suitability for following various cropping patterns. It is mainly based on rainfall, temperature and presence or absence of irrigation
4	Household Energy Strategy Study (HESS)	1992	11	To sample fuelwood biomass. It is based on vegetation changes and cycles interpreted from satellite imagery for each month of the year as indicator of land productivity
5	PARC (WRRI, NARC)	1993	40	To divide the Province into zones based on crop suitabilty. Basis of the classificatiion is seasonal rainfall, aridity index and growing degree days.

initiated and are expected to have a positive impact.

Zones 10 and 11: Medium and high productivity irrigated land

As with Zone 9, social forestry programmes have encouraged tree planting on these highly productive sites. Nevertheless, demand in Peshawar is so high that wood is imported from northern NWFP and the Northern Areas.

2.8 Species diversity in NWFP

Mammals

No definitive checklist of the mammals of NWFP has been prepared. However, Roberts (1977) provides a detailed description of the mammals of Pakistan and their distribution from which such a list might be compiled. For all Pakistan, Roberts lists 158 species of mammal in ten out of the eighteen known orders: *Insectivora*, 11 species; *Chroptera*, 36; *Pholidota*, 1; *Lagomorpha*, 6; *Rodentia*, 43; *Primates*, 2; *Carnivora*, 31; *Perissodactyla*, 1; *Artiodactyla*, 18; *Cetacea*, 9. Of these orders, *Cetacea* and *Perissodactyla* are absent from NWFP.

Palearctic mammal species probably reached NWFP from Central Asia through the Himalaya and Hindu Kush (Mallon 1991). They include brown bear, stoat, greater white-grey long-eared bat and ibex. Indo-Malayan mammal species probably reached NWFP along the Himalayan foothills. These include leopard cat and goral. The mingling of these two species in NWFP has produced some distinctive mammal communities. The far north of Chitral and Kohistan have characteristic high Himalayan fauna such as snow leopard, brown bear, altai weasel, and long-tailed marmot.

The Himalayan moist and semi-moist temperate forests of NWFP have perhaps the richest mammalian communities of any ecosystem in Pakistan, with species including Kashmir grey langur, rhesus macaque, grey wolf, Kashmir red fox, Himalayan black bear, stone marten, yellow-throated marten, leopard, leopard cat, musk deer, grey goral, Royle's pika, Indian giant flying squirrel, small Kashmir flying squirrel and Indian crested porcupine.

Endemic mammals; Of the 6 mammal species endemic to Pakistan, two may occur in NWFP:

- Woolly flying squirrel: a little-known and extremely rare and local species of steppic mountain areas. May occur in northeast Chitral, northern Swat Kohistan and northern District Kohistan (Kandia and Jalkot valleys).
- Murree vole: abundant in the Himalayan moist temperate forests zone in the Murree Hills, Hazara and Swat.

No endemic subspecies of mammal are noted for NWFP (Mallon 1991).

Threatened mammals; The Moghul Emperor Babar gives accounts (c.1526) of hunting rhinoceros in the vale of Peshawar. This must have been the Indian one-horned rhinoceros, now extinct throughout Pakistan (Roberts 1977).

Internationally threatened mammals occurring in NWFP are: grey-wolf (V), European otter (V), smooth-coated otter (K), leopard (T), snow leopard (E) and markhor (V) (E = endangered, V = vulnerable, T = threatened, K = insufficiently known: see IUCN [1990a] for definitions of categories of threat).

Of these, NWFP is perhaps most important for its population of markhor. The best known population is protected in the Chitral Gol National Park.

No objective checklist of nationally or provincially threatened mammal species has been prepared. However, in addition to the above-listed species, a list of such species for NWFP would probably include the following: Kashmir grey langur, brown bear, Himalayan black bear, leopard cat, Palas's cat, lynx, caracal, Himalayan ibex, and Himalayan musk deer.

Birds

No definitive checklist of the birds of NWFP exists. However, Roberts (1991, 1992) provides a detailed description of the birds of Pakistan and their distributions from which such a list might be compiled. Roberts lists 666 species of birds for all Pakistan. Breeding birds are a mixture of Palaearctic and Indo-Malayan forms, and the occurrence of many species at one or other geographical limits of their range is illustrative of the diverse origins of the avifauna (Mallon 1991). A number of important migration routes, particularly of cranes, ducks, raptors and passerines, pass through NWFP.

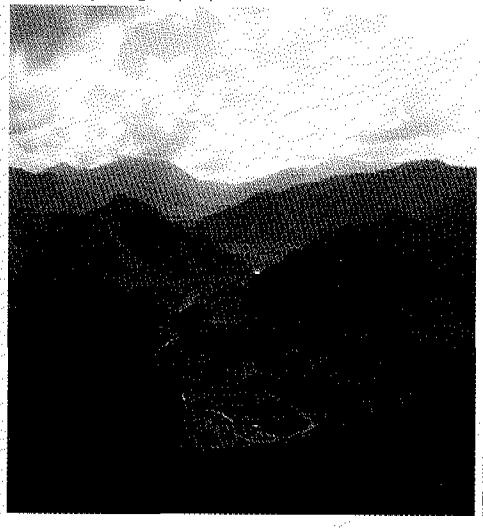
Endemic birds. ICBP (1992) identify two areas in Pakistan - the Indus valley wetlands, and the Western Himalayan forests - as Endemic Bird Areas (EBAs). EBAs are areas with a concentration bird species having restricted ranges. EBAs are good indicators of overall biodiversity, and they can be regarded as biodiversity, 'hotspots' NWFP contains a large part of the Western Himalayan EBA. A small part of the Indus valley wetlands occur in NWFP.

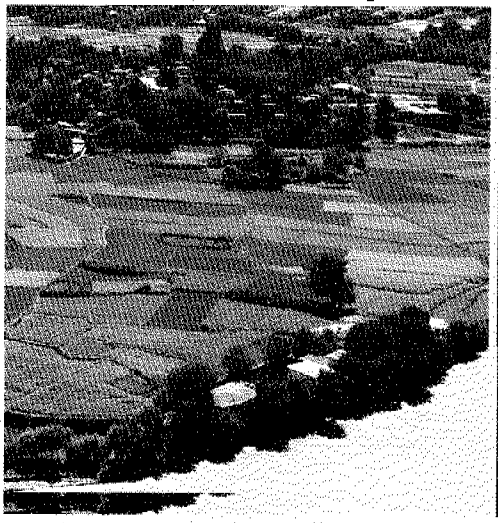
Seven of the eight bird species endemic to the Western Himalaya occur in NWFP, namely: western tragopan, cheer pheasant, Tytler's leaf warbler, Brook's leaf warbler, white-cheeded tit, white-throated tit, orange bullfinch, and red-browed finch.

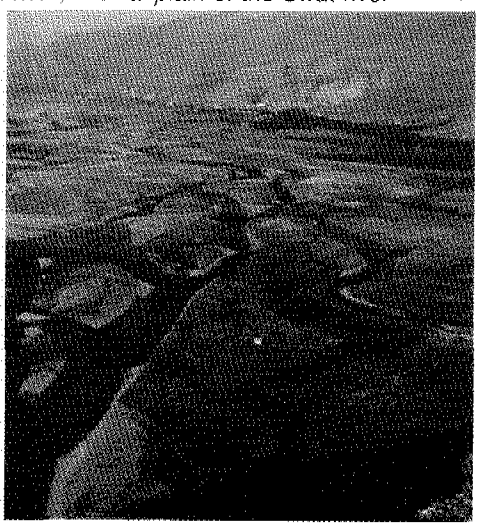
Threatened birds. 12 internationally threatened bird species occur in NWFP (Collar and Andrew 1988; Roberts 1991, 1992), namely: Dalmatian pelican (migrant, V), lesser white-fonted goose (rare vagrant, K), white-headed duck (wintering, K), Palas's fish eagle (K), black vulture (K) western tragopan (E), cheer pheasant (E, extinct in NWFP?), houbara bustard (migrant, K), sociable plover (migrant and occasional wintering, K), wood snipe (single record, K), large-billed bush warbler (K), long-tailed prinia (K) (see under mammals for categories of threat).

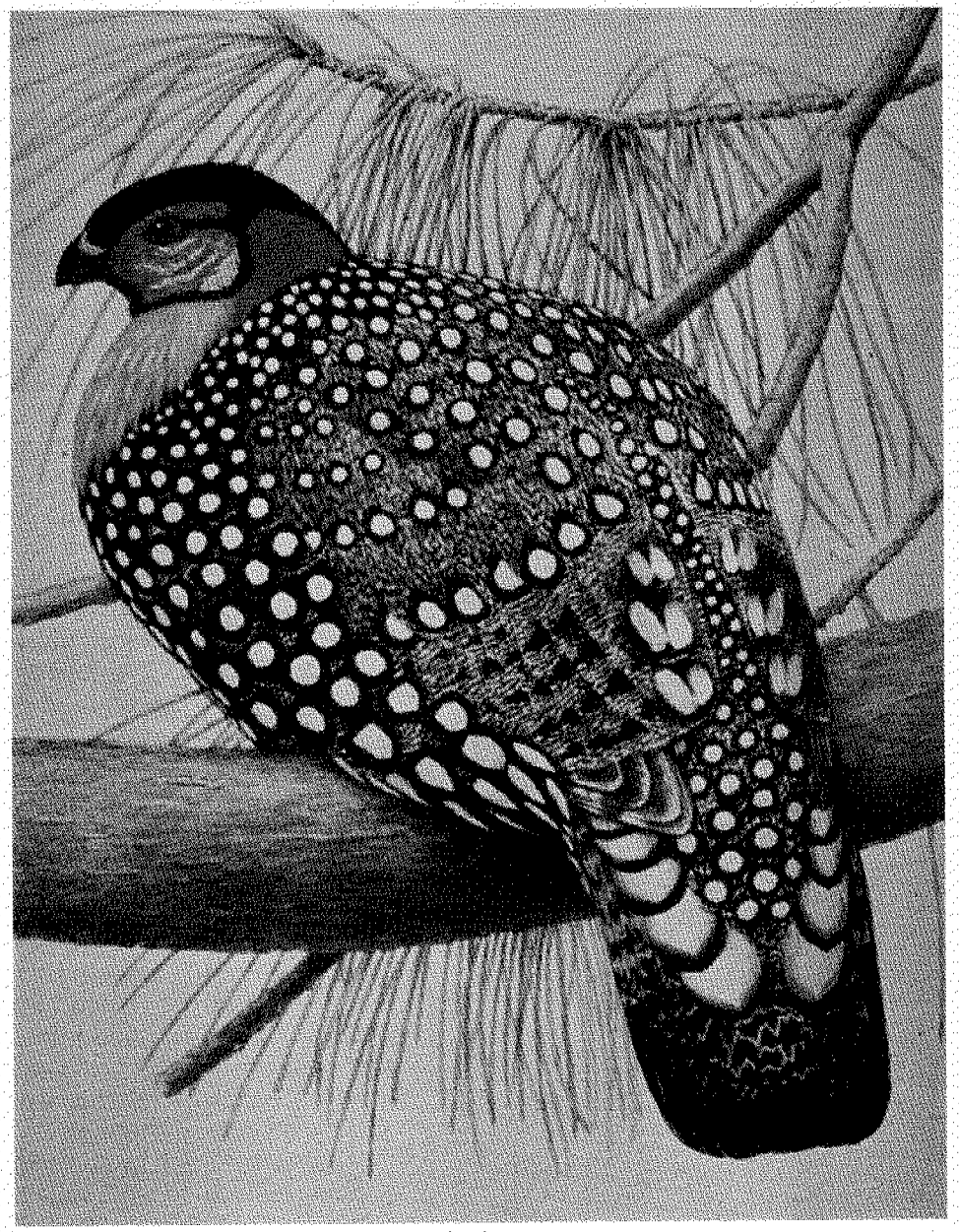
Of these species, NWFP is probably most important for the western tragopan. The world's largest

Diversity in geography: the mountains of the Hindu Kush, the river banks along the Chitral river, alluvial plain of the Swat river



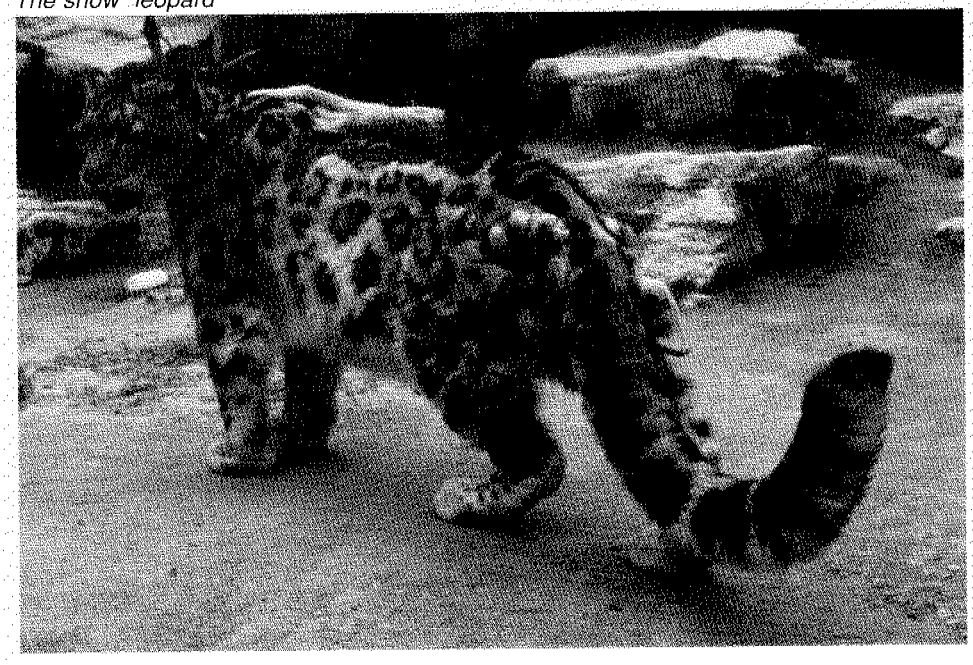






The western Tragopan, never photographed

The snow leopard



known population of this species occurs in the Palas valley, District Kohistan. This beautiful bird is used as a 'flagship species' for the Himalayan Jungle Project in Palas.

The threatened western population of the Siberian crane, a part of which winters in Rajasthan, India, may migrate through NWFP. However, this population has declined and no birds arrived at the usual wintering site at Keoladeo in 1993.

Reptiles and amphibians

One hundred and seventy-four species of reptile have been recorded in all Pakistan and checklists are probably available for NWFP. As with other groups, these species are also a blend of Palaearctic and Indo-Malayan forms.

Mallon (1991) does not list any reptile species endemic to NWFP, but states that current research on the herpetofauna of Pakistan may identify new endemics. Of the seven internationally threatened reptiles of Pakistan, only one, the central Asian cobra, occurs in NWFP. Its status is poorly known.

No information was immediately available on the amphibians of NWFP.

Fish

Mallon (1991) reviewed the fish diversity of Pakistan and information relevant to NWFP is reproduced here. Pakistan has 156 native freshwater species (plus several species introduced for sport fishing). The fish fauna is predominantly south Asian, with some west Asian and high Asian elements. There are seventeen endemic species (11% of the total) and five endemic subspecies. Also noteworthy are the nine species of snow trout of mountain barbels (subfamily Schizo-thoracinae) which occur in the rivers of the northern mountains. They are representative of an ecologically interesting group of fish endemic to snow-fed rivers and lakes of the high Asian sub-region.

The Indus river system contains a mainly south and southeast Asian fish fauna, while NWFP has mainly central and west Asian fish species. The mountain ranges along the Afghan-Pakistan border form a contact zone between these two faunas. Fish species diversity is high in the Himalayan foothills in Hazara, Malakand, Swat and around Peshawar. Diversity is lowest in the montane zone of the northern mountains.

Invertebrates

Mallon (1991) reviewed the invertebrate diversity of NWFP. There has been little research on the invertebrates of Paki-

stan. A number of butterfly species are endemic to the northwest Himalaya and Hindu Kush mountains and several occur in Chitral, namely: *Aporia nabellica hesba, Colias alpherakyi chitralica, Maniola davendra chitralica, Hipparchia boloricus chitralica,* and *Erebia kalinda chitralica.* At least four species of Apollo butterfly occur in Chitral: *Parnassius tianshanica baroghila, P. actius sulla, P. delphius chitralica,* and *P. charltonius ducalis.*

Flora

Mallon (1991) reviewed floral diversity in Pakistan and information relevant to NWFP is reproduced here. 5,500-6,000 species of vascular plant have been recorded in Pakistan to date. Around 300 species are endemic to Pakistan, 90% of which occur in the northern and western mountains at altitudes over 1200 m. Chitral has 39 endemic species. Recent collections from the Palas valley, District Kohistan (Rafiq, in pre.), have identified about 100 species as being endemic to the northwest Himalaya (not necessarily to Pakistan) out of some 500 species collected. Plants in Palas show affinities to no fewer than four floral regions, the Irano-Turianian, central Asian, Sino-Himalayan and Indo-Malayan. The Palas checklist is still far from complete. Much more intensive historical and contemporary collecting in Swat and Kaghan yielded around 1500 species from each valley.

The only plant in Pakistan to be listed in the red data book is the west Himalayan elm. A large reproducing population of this species, probably the world's largest, was recently discovered in the Palas valley, District Kohistan.

There are an estimated 2000 medicinal plant species in Pakistan though few are exploited, and 90% of the country's medicinal herb requirement is imported. Many of these medicinal plants occur in the northern montane areas.

Genetic resources

Northern Pakistan is a Vavilov centre of crop genetic diversity. Mallon (1991) reviews the crop and livestock diversity of Pakistan, but gives no specific information on NWFP.

[1]*Source: Contribution of Primary Tubewells in the Development of Water Potentials (1991). Ministry of Planning and Development — Government of Pakistan*

[2]*Source: Director of Agriculture statistics NWFP, Peshawar.*

[3]*Source: Mr. Ourangzeb Khan, Deputy Director, Soil Survey of Pakistan.*

[4]*Source: Forestry Sector Master Plan, North West Frontier Province 1992.*

3. THE HUMAN FACTOR

3.1 Race, language and religion

Pukhtoon designates a person who speaks Pukhtu. Pathan is a Hindi term adopted for them by the British. The racial composition of the Pukhtoons is less than clear. The tribes who dwelled in the area in the days of the Greek historians are believed to be part of the great Aryan horde which had moved down from Central Asia a millennium earlier. Over the course of centuries, the Greek, Persian, Turk, and Mongol invaders who passed through the Frontier have added their blood.

According to Pukhtoon legend, the race was founded by Qais in the seventh century, and the three main branches trace their origin to his three sons. The Sarbani Pukhtoons claim descent from Sarban, the Ghilzai Pukhtoons are the descendants of Baitan and the Ghurghusht Pukhtoons are the descendants of Ghurghusht.

Nearly one-third of the population of NWFP is non-Pukhtoon. The non-Pukhtoon population consists largely of landless artisans and peasants who are mainly *Gujars* and *Awan* by caste. In the tribal areas, they are called *Hamsaya* or *Kadwal.* In the border areas of Hazara and Derajat, social norms more closely resembling those in Punjab and Kashmir may be discerned. *Biradiris* or clan groups remain important, but mainly as social networks, particularly for marriages. Chitral has a separate language and culture of its own; a visible difference crossing over from Dir is that the carrying of arms is uncommon. Most distinct are the indigenous Kalash, people now confined to three small valleys in Chitral. Their way of life is rooted in the worship of ancestral spirits and trees. Their unique customs attract a lot of attention from visitors. However, due to the conversions of the Kalash to Islam, their age old traditions are rapidly becoming extinct.

Around 68 per cent of the households in NWFP are Pukhtu speaking, eighteen per cent are Hindko speaking, while Seraiki is the mother tongue of four per cent. Around eight per cent of households speak local languages, such as Kohwar in Chitral district, while Urdu and Punjabi speaking migrants account for only two per cent of the households.

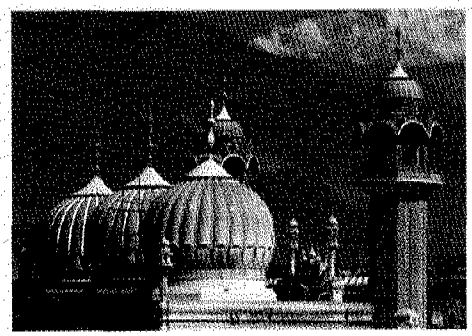
With the exception of Sindh, Islam came to NWFP earlier than to any other part of South Asia. Since the Pukhtoons received their religious instructions from Sunni Turk dynasties, the majority are Sunni of the Hanafi school. Non-muslim minorities form less than 0.5 per cent of the population.

3.2 Pukhtoon society

The Pukhtoon society comprises both the people of the tribal areas and the settled districts of NWFP. The tribal society has been the focus of many studies as it has kept alive the true Pukhtoon ethos. The Pukhtoons of the settled districts have however been subject to external influence and have moderated some of the more traditional aspects of their culture and customs. The Yusufzai, Muhammadzai and Khalil tribes belong to the settled districts and have limited links in the tribal areas. All other Pukhtoon tribes of the settled districts have extensive affinal and consanguninal ties with the tribal Pukhtoons (see Map 3.1).

The Pukhtoon society is individualistic despite the rigid behaviour prescribed by clan membership. While Pukhtu speaking people constitute one cultural and social entity, Pukhtoon society is divided into tribes, based on geneaologies. The tribes are sub-divided into Khels, which may be equated with clans. Within the Khels, the basic division is the expanded family group. The leader of each family group is called a Malik, and the most important of a group of Maliks is designated as the leading Malik of the Khel. The usual object of allegiance is the Malik, and in settled districts, a Khan.They gain their title by their ability to lead followers in public affairs. A Pukhtoon Malik is however no more than a first among equals, and acquires the status through personal merit and the ability to inspire fellow tribesmen. Primogeniture is not recog-

The daredevil horsemanship and the roaring spectators during a polo game



Islam came to the NWFP earlier than to any other part of South Asia

A pukhtoon

Weapons play an important role in the lives of pukhtoons

nized, and leadership is accorded to the most capable.

The social structure in the settled districts has altered a great deal from the tribal order. The Khans have lost much of their original leadership role in the settled districts. Agriculture is a notable characteristic of the culture of both the settled and tribal areas. In the former, it is however more developed in terms of irrigation, cultivation of cash crops and utilization of modern technology. The literacy rate is higher in the settled districts, especially for women. The trend towards having nuclear rather than extended families is also more pronounced in the settled districts.

The *jirga* is the Pukhtoon assembly in which all public and private affairs are settled. The jirga, of which the Khan is the head, now contends with the state judiciary in the settled districts. Rules of the federal and provincial governments are enforced through state intervention. The decisions of the village jirga in the districts have to be reinforced by the court of law if the case has also been registered by the law enforcement authorities. Unlike in the tribal areas, a legal permit is required for the manufacture and possession of arms and ammunition. The *hujra* is traditionally a male club and social centre, which exists in every village of the tribal as well as settled areas. It is the focus of community opinions and actions. While Hujras exist in the villages of the settled districts as well, they have lost much of their functional importance.

Traditionally, the conduct of Pukhtoons was guided by a code of honour called the *Pakhtunwali*. The foremost commandment of the *Pakhtunwali* is *Badal* or revenge (revenge is a dish which tastes better cold, Pukhtoon proverb). The obligations to take revenge for a wrong falls not only upon the man who has suffered it, but also upon his family and tribe. Insults and retaliation hence involve clans and perpetuate blood feuds. The most frequent causes of trouble are money, women and land (*zar, zan, zamin*). In rare instance, feuds are terminated when the weaker party throws itself on the mercy of its enemy, called *Nanawati* or acceptance of a bonafide truce, when blood money may be accepted in lieu of revenge. The third component of Paktunwali is *Melmastia*, or hospitality towards a guest, stranger, or an enemy if he seeks it. A formal escort or assurance of safety to a guest or enemy is called *Badragga*. The *Pakhtunwali* provides for law and order in a harsh environment, and is still a strong force in the tribal areas.

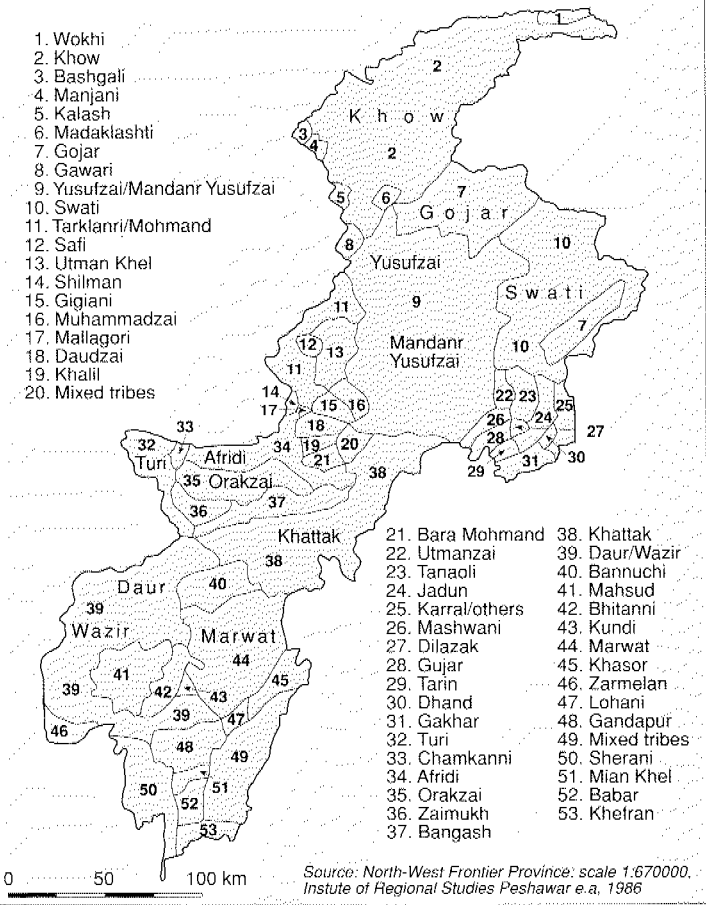
Pukhtoon women take little part public affairs, and usually observe strict Purdah. Purdah is a complex system of rules, requirement and prohibitions, which excludes women from public life and confines them to the house[1] (a woman's place in the home or in the grave, Pukhtoon proverb). Women are intelligent and aggressive within the limits prescribed by custom. They play an important role in arranging marriages and alliances between families. Women also provide the practical means of implementing *Melmastia*. Women of the working classes are responsible for domestic work, some outdoors. They do not observe *Purdah* in the same way as the affluent classes. Female visibility in both the settled and tribal areas is hence an indicator of poverty. At marriage, a brideprice is paid by the groom's family to the bride's father either in cash or kind.

3.3 Population growth

NWFP has experienced rapid population growth, specially since the 1960's. According to the 1981 census, the population of the Province was eleven million. It was estimated to have grown to 16.7 million by 1993, excluding refugees. Map 3.2 displays the population increase per district from 1951 to 1981. During 1951-1961, the Province had a relatively modest growth rate (2.3 per cent per annum). After 1961, mortality rates, especially of infants and children, declined, primarily as a result of the wider availability of modern medicines. However, fertility did not decline, owing to low levels of birth control, associated with widespread illiteracy, specially of females, persistence of the extended family norm, and religious interpretation. The average family size is still six children. From 1961 to 1981, population has grown at 3.3 per cent, which is slightly higher than the national average. The population growth after 1981 is estimated at three per cent.

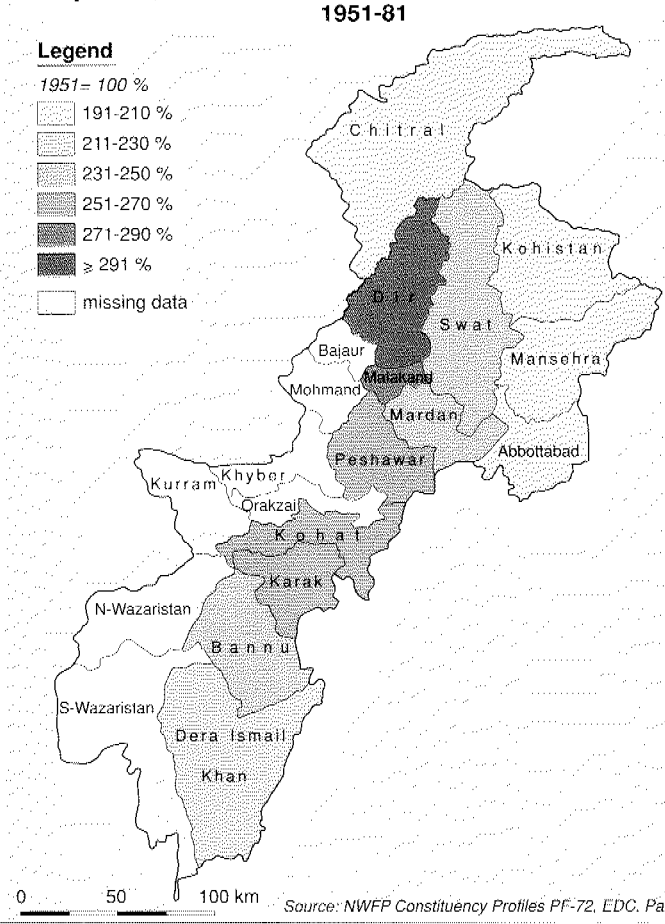
However, the population pressure is high (see Map 3.3 and 3.4). Due to its

Map 3.1 NWFP TRIBES



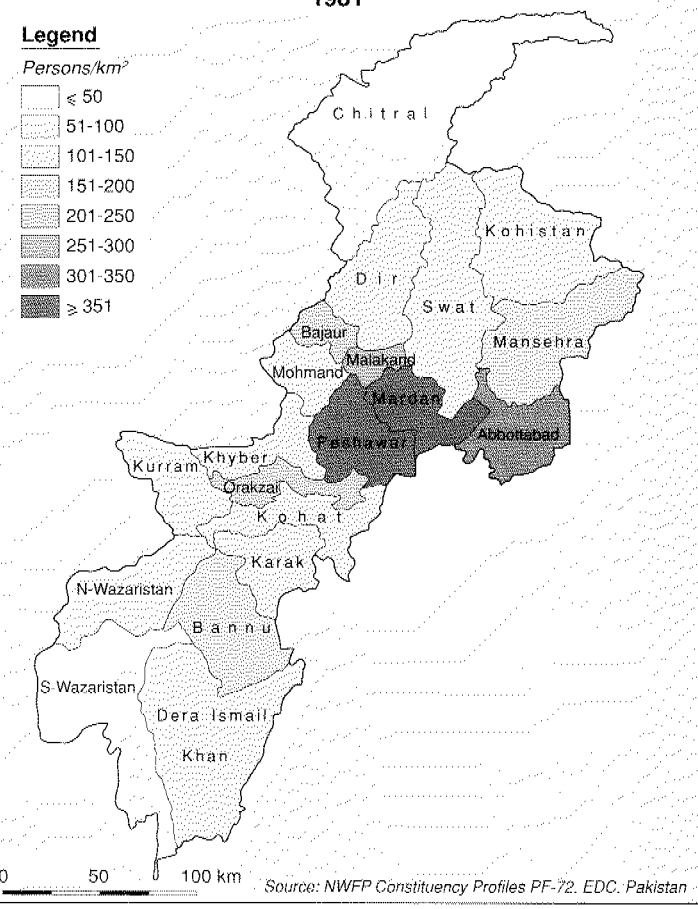
Source: North-West Frontier Province: scale 1:670000. Instute of Regional Studies Peshawar e.a, 1986

Map 3.2 POPULATION INCREASE NWFP 1951-81



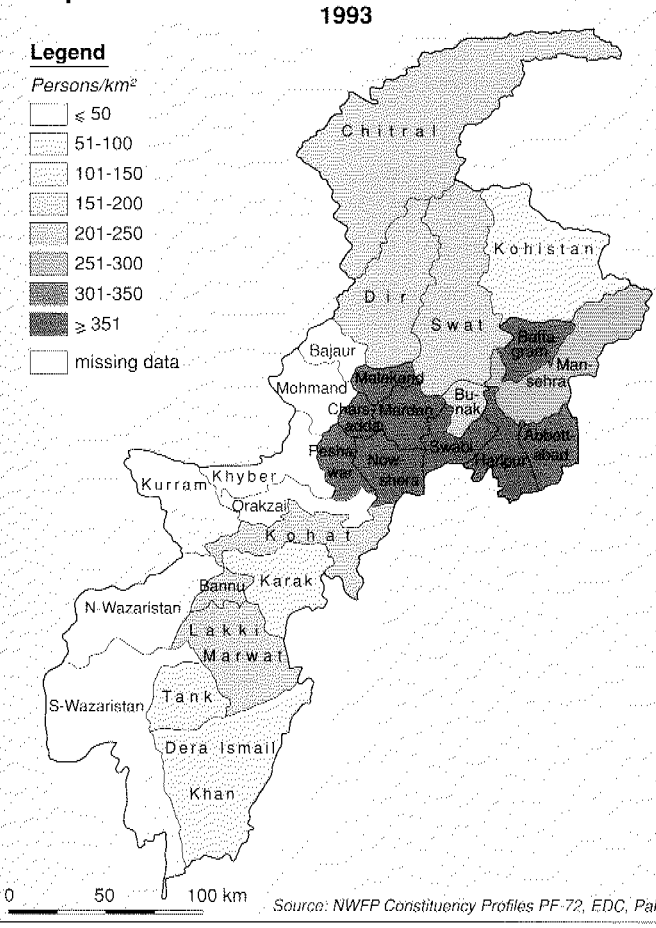
Source: NWFP Constituency Profiles PF-72, EDC, Pakistan

Map 3.3 POPULATION DENSITY NWFP 1981



Source: NWFP Constituency Profiles PF-72, EDC, Pakistan

Map 3.4 POPULATION DENSITY NWFP 1993



Source: NWFP Constituency Profiles PF-72, EDC, Pakistan

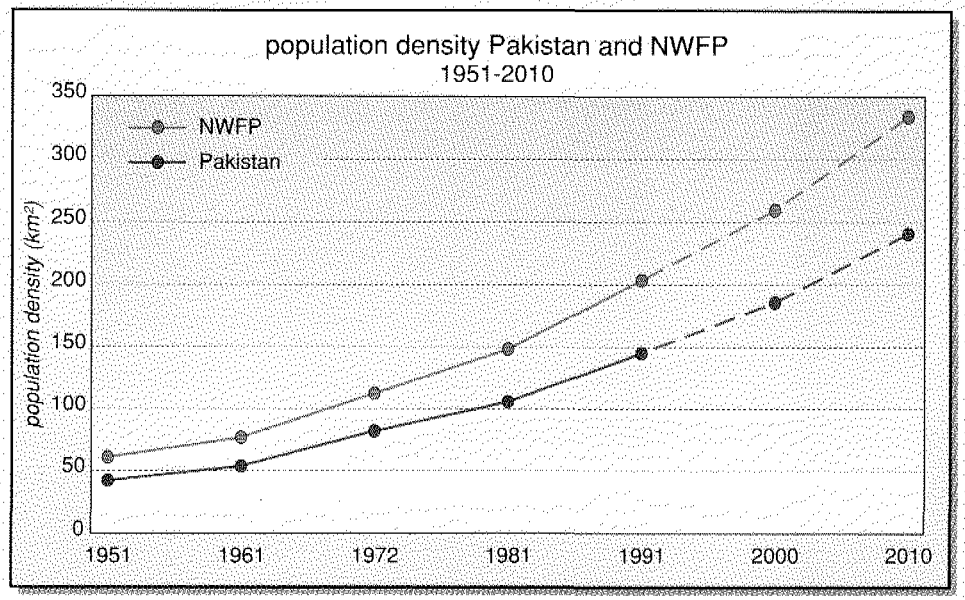


Diagram 3.1

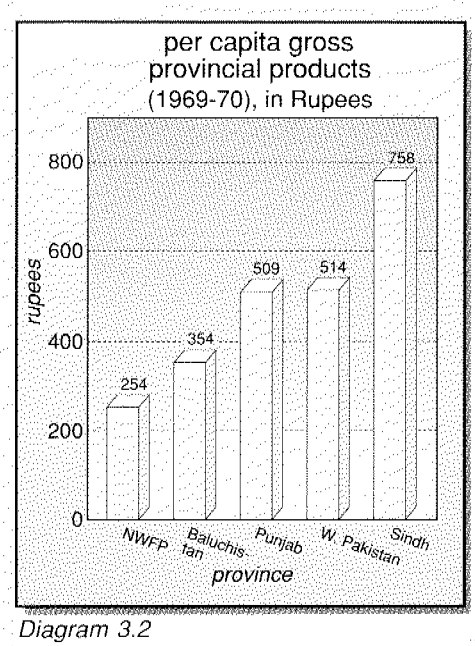


Diagram 3.2

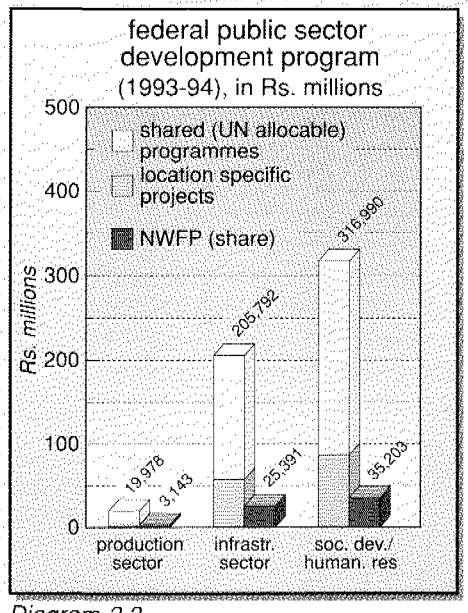


Diagram 3.3

Pukhtoon women in burga take little part in public affairs

A girl representing one of the 3000 Kalash people

hilly terrain, NWFP's cultivated area is only nineteen per cent. Most of the people live in the cultivated areas. The population pressure in the Province on cultivated land is 910 persons per square km and on irrigated land 2080 persons per square km.

The Eighth Five Year Plan projects the population of NWFP to be nineteen million by the year 2000 and 25 million by 2010. The population density in NWFP is projected considerably higher than elsewhere in Pakistan (see Diagram 3.1). It assumes that the annual growth rate will fall to 2.7 per cent and drop further to 2.5 per cent after 2000. These targets will require a concerted effort. In 1981, 47 per cent of the population was below fifteen years of age. It is estimated that this had fallen to 42 per cent by 1990. However, this is still a high dependency ratio and implies a huge demographic momentum with a very large number of people entering reproductive age.

In 1981, the gender ratio was 109 males to 100 females. The surplus males could be due to high maternal mortality, higher mortality of infant girls (owing to poorer feeding and health care than for boys), and under-enumeration of females. Census under-reporting (probably four per cent in the 1981 census) results in a larger present and future population than projected on the basis of the last census.

Afghan war refugees have become a significant component of NWFP population. Around 2.5 million Afghans migrated to NWFP during the period from 1979 to 1992. It is estimated that about one million have returned to Afghanistan since 1992. But peace has still not come to Afghanistan. Refugees continue to arrive. In 1992, NWFP accommodated 160 000 new refugees from its war-torn western neighbour[2].

Effect of modern influences on society

Better communications such as radio, TV, construction of asphalt roads will influence the way of life. In the NWFP, agriculture has changed from subsistence to market production, workers have migrated to the Gulf states and a tourist industry is emerging. This has resulted in change of values. The old wooden mosques with carved pillars and houses are replaced by new concrete structures in a standard Pakistan style. The traditional silver jewellery in the women's dowry has been replaced by coarse mass-produced gold jewellery. Etnologists often speak of a collapse of culture. In the NWFP the outer appearance of the culture changes without fundamental change in the minds of the people, in their values and norms.