



for a living planet®



BOUNDARY DELINEATION OF AYUBIA NATIONAL PARK



Boundary Demarcation and
Renotification of Protected Areas Project

May 2008

GIS Laboratory WWF - Pakistan



Cover page design: Communications Division, WWF – Pakistan
Photo Credits: Hassan Ali and Hammad Gilani, WWF – Pakistan

CONTENTS

LIST OF FIGURES	II
LIST OF TABLES	II
LIST OF ABBREVIATIONS/ACRONYMS	III
ACKNOWLEDGEMENT	IV
1. INTRODUCTION	1
1.1. BACKGROUND	1
1.2. STUDY AREA.....	2
2. MATERIALS	3
3. METHODOLOGY	4
3.1. PREPROCESSING	4
3.2. TOPOGRAPHIC MAPPING	5
3.3. GROUND TRUTHING AND FIELD DATA COLLECTION	5
3.4. LANDCOVER MAPPING.....	8
3.5. HABITAT MAPPING OF WILDLIFE SPECIES	12
3.6. BOUNDARY DELINEATION	15
4. RESULTS AND DISCUSSION	18
4.1. ANP BOUNDARY.....	18
4.2. DRAFT NOTIFICATION FORMAT.....	19
5. CONCLUSION AND RECOMMENDATIONS	26
ANNEXURE 1 (FIELD OBSERVATION POINTS)	27
ANNEXURE 2 (ANP NOTIFICATIONS)	28
ANNEXURE 3 (REFERENCES)	30

List of Figures

FIGURE 1. SEVEN PRIORITIZED PROTECTED AREAS.....	2
FIGURE 2. LOCATION MAP OF AYUBIA NATIONAL PARK	3
FIGURE 3. FLOW CHART INDICATING PROJECT WORK	4
FIGURE 4. HIGH RESOLUTION MERGE OF QUICKBIRD SATELLITE IMAGE.....	5
FIGURE 5. TOPOGRAPHIC LAYERS OF ANP	5
FIGURE 6. TRACKS AND FIELD OBSERVATION POINTS	6
FIGURE 7. FIELD MAP AT 1: 10,000 SCALE.....	6
FIGURE 8. CONIFER FOREST (A) DIGITAL PHOTOGRAPH OF FIR AND DEODAR (B) DIGITAL PHOTOGRAPH OF BLUE PINE	6
FIGURE 9. CONIFER FOREST MIXED WITH BROADLEAVED, SHRUBS AND GRASSES	7
FIGURE 10. PASTURE LAND, DIGITAL PHOTOGRAPH (LEFT) AND SATELLITE DATA (RIGHT).....	7
FIGURE 11. FLOW CHART OF SUPERVISED CLASSIFICATION	8
FIGURE 12. LANDCOVER/LANDUSE MAP	10
FIGURE 13. RECODED LANDCOVER MAP	11
FIGURE 14. DISTRIBUTION OF SOME BIRD SPECIES WITHIN ANP.....	13
FIGURE 15. DISTRIBUTION OF SELECTED MAMMAL AND REPTILES SPECIES WITHIN ANP	14
FIGURE 16. PHOTOGRAPHS OF (A) ASC MEETING, (B) BOUNDARY PILLAR AND (C) MEETING WITH WILDLIFE OFFICIALS	16
FIGURE 17. ANP BOUNDARY OVERLAID WITH GDA POINTS.....	17
FIGURE 18. DIFFERENT SECTIONS OF ANP	18

List of Tables

TABLE 1. SATELLITE DATA CHARACTERISTICS.....	3
TABLE 2. AREA COVERED BY LANDCOVER/LANDUSE CLASSES	9

List of Abbreviations/Acronyms

ANP	Ayubia National Park
ASC	Area Specific Committee
DFO	District Forest Officer
ERDAS	Earth Resources Data Analysis System
FCC	False Color Composites
Ft	Feet
GCP	Ground Control Point
GDA	Galliat Development Authority
GIS	Geographical Information System
GPS	Global Positioning System
GR	Game Reserve
Ha	Hectare
IUCN	International Union for Conservation of Nature
MLC	Maximum Likelihood Classifier
MoE	Ministry of Environment
NP	National Park
N.W.F.P	North Western Frontier Province
PPEPCA	Pakistan Petroleum Exploration & Production Companies Association
RF	Reserve Forest
RS	Remote Sensing
SPOT	Satellite pour l'Observation de la Terre
SUPARCO	Space and Upper Atmospheric Research Commission
UC	Union Council
WS	Wildlife Sanctuaries
WWF	World Wide Fund for Nature

Acknowledgement

This report has been developed by the GIS team of WWF – Pakistan. Special thanks are due to the following GIS colleagues for their hard work and cooperation;

Hammad Gilani, RS Analyst
Hassan Ali, GIS Analyst (Species)
Kaif Gill, GIS Analyst
Tanzil-ur-Rehman, RS Intern
Usman Akram, GIS Analyst

I wish to express my gratitude to Dr. Muhammad Mumtaz Malik (Chief Conservator Wildlife, N.W.F.P), Mr. Safdar Shah (DFO Nathiagali), Mr. Dul Ahmed (Director GDA) and Mr. Mohammad Waseem for their support and cooperation throughout the boundary delineation process of Ayubia National Park.

We would like to offer our sincere thanks to Mr. Muhammad Javed (Deputy Range Officer Wildlife Department) and Ms. Sabiha Zaman (WWF - Nathia Gali office) who helped in carrying out the field work.

I am greatly indebted to Deputy Director General of WWF-P, Dr. Ejaz Ahmed and Manager Conservation Ms.Uzma Khan for their cooperation and guidance throughout the formulation of this report. I would also like to pay my gratitude to Ms. Nadia Aine for designing the title.

Urooj Saeed
GIS Coordinator

This study is funded by Pakistan Petroleum Exploration and Production Companies Association (PPEPCA) for the project “Boundary Demarcation and Renotification of Protected Areas”. Report deals with GIS based boundary delineation of Ayubia National Park (ANP). SPOT (2.5m) image, Quickbird (0.6m) image, DEM, TIN and bio-physical GIS layers such as roads, ridges, settlements, nullahs, forest etc were used for the boundary delineation. Field survey of the area was conducted to collect reference landmarks of with geographic coordinates with reference to the boundary.

Area Specific Committee was formulated which comprises of major stakeholders i.e. Wildlife and Forest Department, Revenue Department and Galliat Development Authority. Extensive discussion sessions with ASC members significantly helped to resolve major issues regarding NP boundary. ANP boundary layer is developed by excluding the GDA area in close peripheries of the National Park. Final ANP boundary covers an area of 3372 ha, whereas the area given in the notification is 3312 ha. An area of 60 ha has been included while delineating the boundary. As a recommendation, a draft notification format with ANP boundary was developed which define ANP extent with geographic reference.

1. INTRODUCTION

1.1. Background

Protected Areas are defined as “An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources and managed through legal or other effective means” (IUCN).

There are almost 230 Protected Areas (PAs) in Pakistan of different categories such as National Parks (NPs), Wildlife Sanctuaries (WSs) and Game Reserves (GRs), covering around 11% land (2,753,357 hectares) of the country. These PAs represent almost every ecological, terrestrial and aquatic ecosystem and are considerably important for their ecological and socio-economic services. In Pakistan very few organizations are working in the field of conservation. WWF - Pakistan has been involved in different conservation activities for more than three decades.

Currently available information about Protected Areas (PAs) boundaries is only in the form of notifications and sketch maps. Most of the notifications are without any reference whereas in some notifications localities, roads, water channel or any other landmark is considered as a reference. Such references are not reliable in the long run as the land conditions change with passage of time i.e. shift in water channel or migration of certain locality. These references are much generalized and hence cause inaccuracies in position as well as in areas. On the other hand, GIS provides an opportunity to define boundary of certain region with geographic information. Hence a need of PA notifications with proper geo-information of boundaries was identified so that ambiguities and errors could be avoided.

Considering all these issues, WWF – Pakistan (WWF – P) in collaboration with the Federal Ministry of Environment (MoE) and with financial assistance of Pakistan Petroleum Exploration & Production Companies Association (PPEPCA) organized a three day Consultative National Workshop on Boundary Demarcation and Renotification of Protected Areas”. Participants of the workshop included government officials, representatives of relevant civil society organizations, Petroleum exploration and production companies and independent consultants.

As an outcome of this workshop, WWF – P and PPEPCA launched the second phase of the “Boundary Demarcation and Renotification of Protected Areas” Project. Under phase-II, WWF - P will be delineating boundaries of seven selected Protected Areas (Figure 1). In this report GIS based boundary delineation of Ayubia National Park has been discussed.

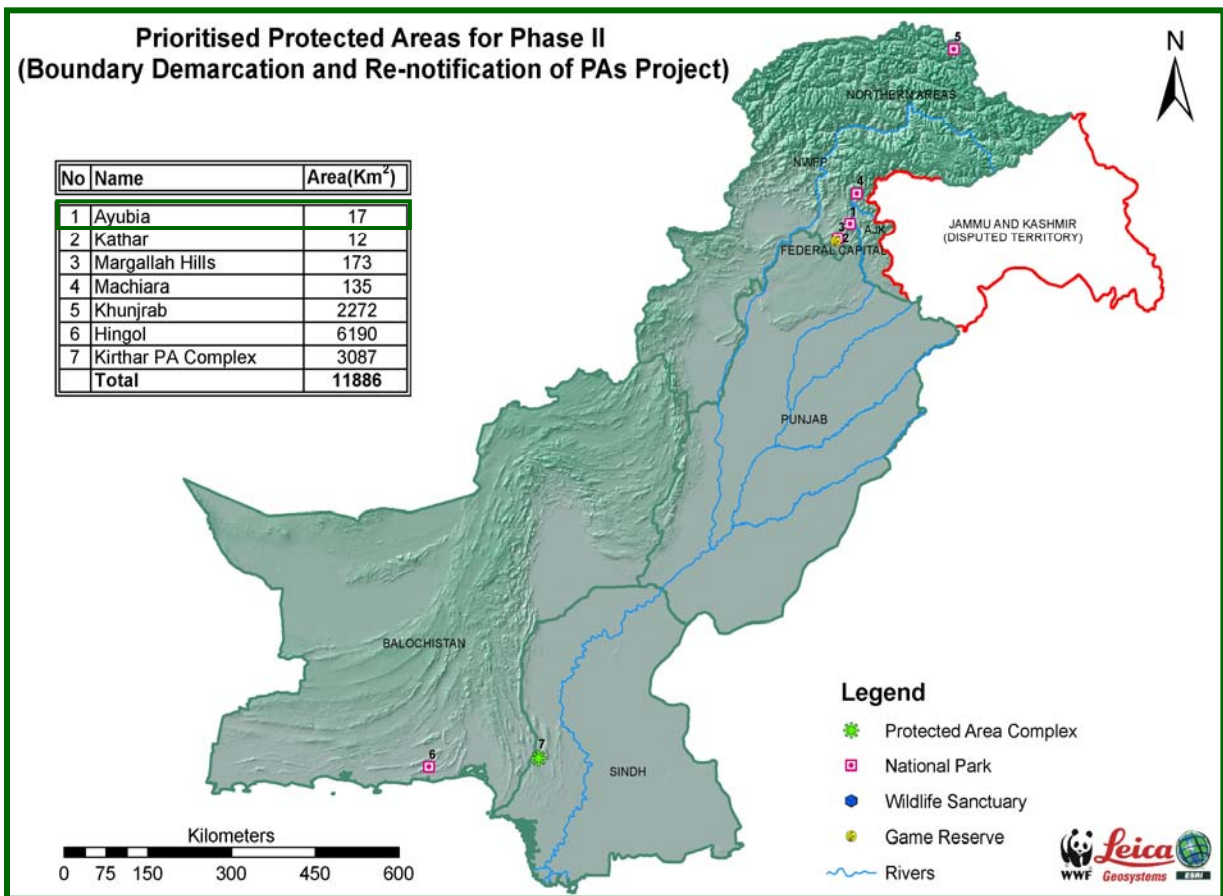


Figure 1. Seven prioritized protected areas

1.2. Study Area

The Ayubia National Park (ANP) is one of the fourteen declared National Parks in the country that falls in the IUCN-Category V. ANP is placed in the North West Frontier Province (NWFP) of Pakistan. It lies in between 73.40E, 34.11N to 73.41E, 34.01N with elevation ranges from 2682 to 2822m. It is surrounded by Nathiagali, Ayubia and Khanaspur towns. ANP with an area of 1684 ha was declared as a Protected Area in 1984. Later in 1998 ANP area was extended and renotified with an overall area of 3312 ha.

ANP forest lies in Himalayan mountains Range with moist temperate and moist dry temperate Forest zone. Some aspects were present in moist temperate while others were in the moist dry temperate

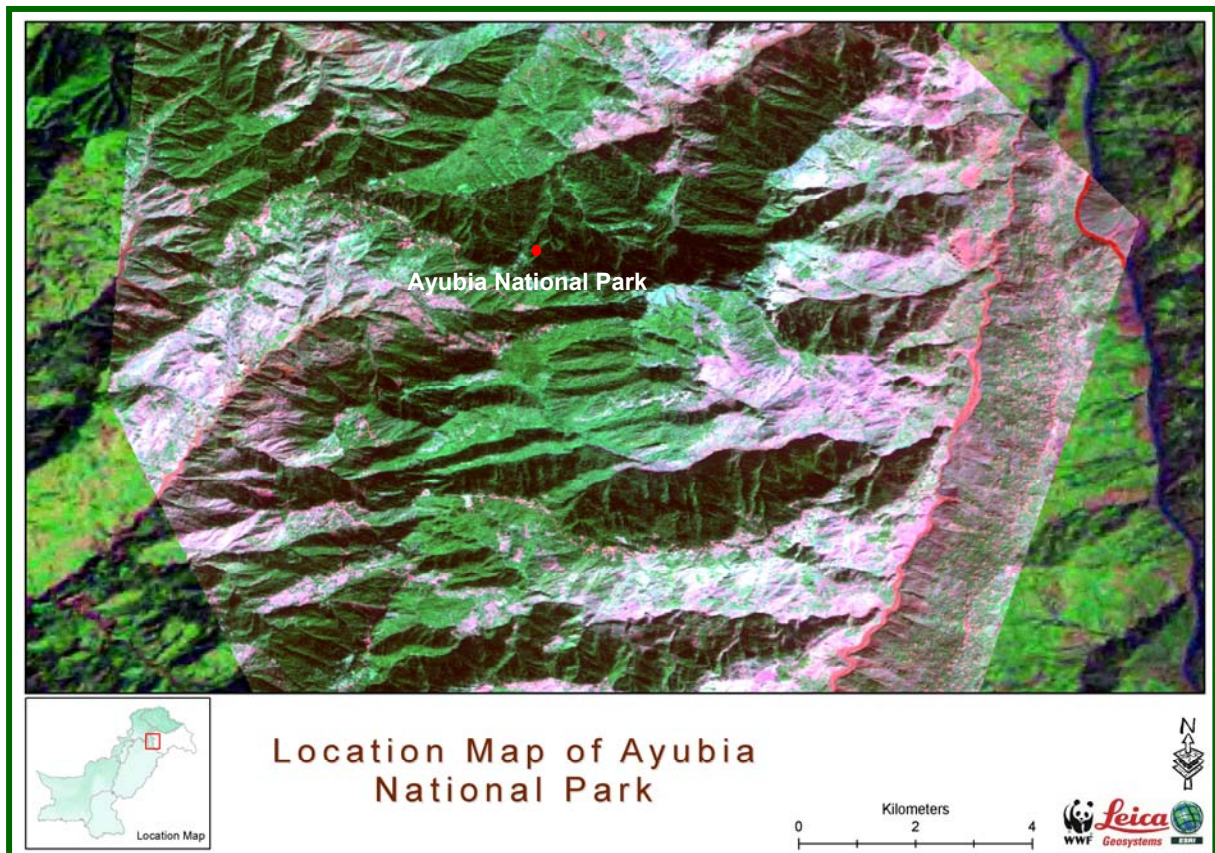


Figure 2. Location map of Ayubia National Park

2. MATERIALS

For landcover mapping SPOT-5 Satellite image was acquired by the Space and Upper Atmospheric Research Commission (SUPARCO) for Landcover mapping whereas Quickbird (0.6m) imagery was used for boundary delineation. 1:50,000 scale topographic sheet was also used as ancillary data for boundary delineation. Characteristic of satellite data used is given in Table 1.

ERDAS IMAGINE 8.7, ArcGIS 9.0 and Map Source 4.0 were used in image processing and GIS mapping. GPS Garmin 76, digital camera and A2 size satellite image based maps were used for navigation and data recording.

Table 1. Satellite data characteristics

No	Satellite	Acquisition Date
1	SPOT-5	20-10-2005
2	QuickBird	19 10-2005 and 22-10-2005

3. METHODOLOGY

Field data, Habitat mapping, topographic layers and Landcover maps were used to delineate the draft ANP boundary. Project workflow is shown in Figure. 3.

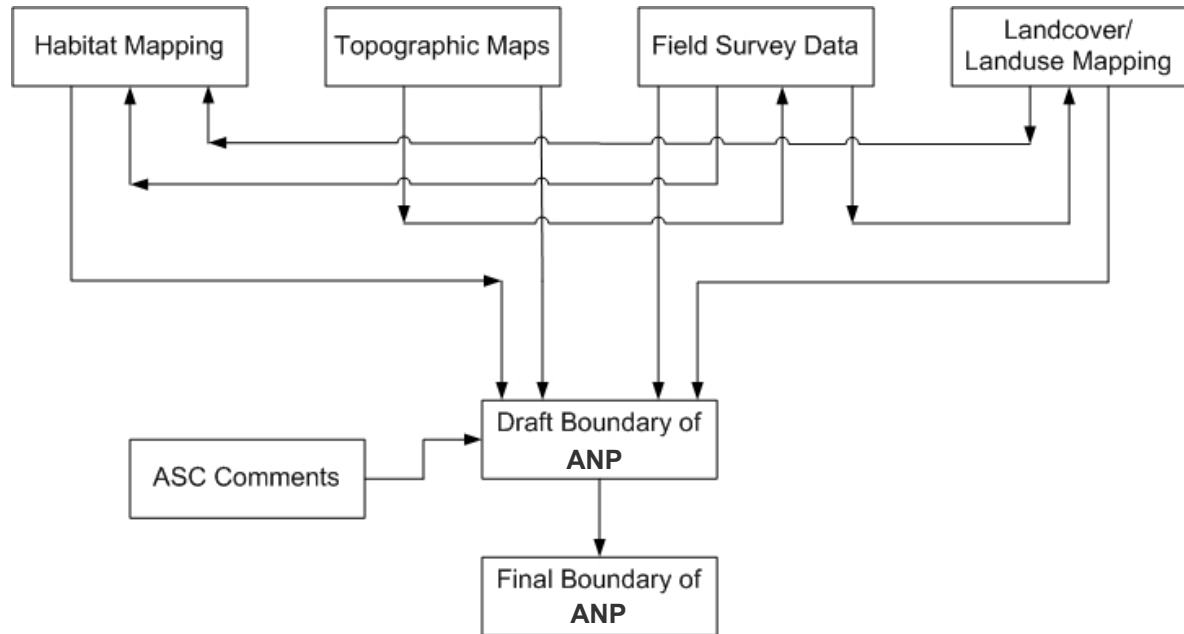


Figure 3. Flow chart indicating project work

3.1. Preprocessing

Satellite images were geometrically corrected to transform in real world coordinates. Multispectral (2.4m) and panchromatic (0.6m) image were merged to get 0.6m multispectral image (Figure 4).

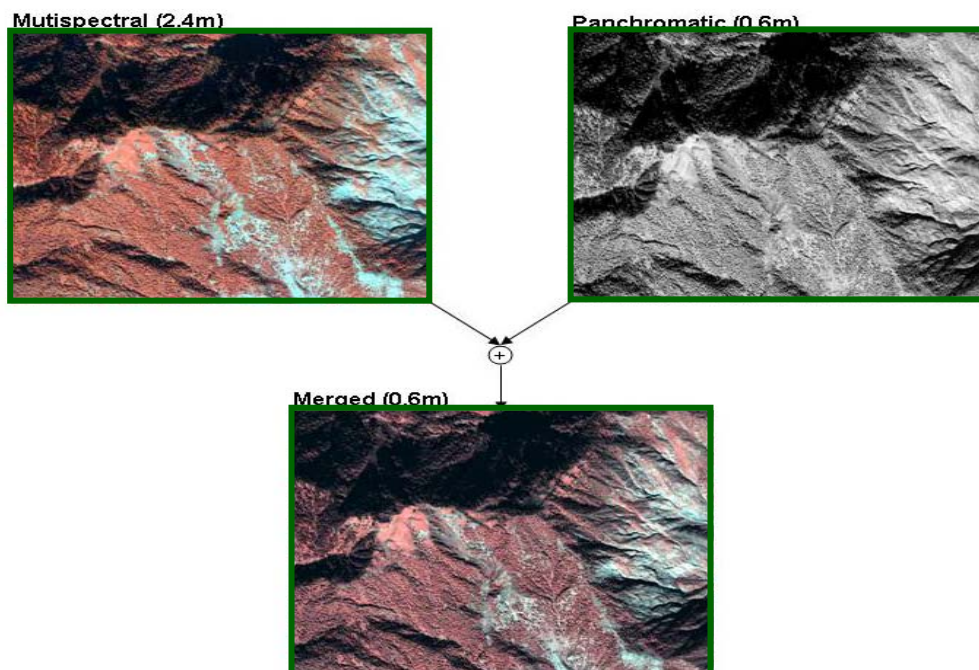


Figure 4. High resolution merge of Quickbird Satellite image

3.2. Topographic Mapping

The GIS layers of spot heights, populated places, canals, drainages, roads, catchment areas and forest boundaries were digitized from Survey of Pakistan (SoP) 1: 50,000 topographic sheets (Figure 5). The attribute information was attached with each feature and output file was saved in GIS format. These layers were very helpful in field navigation and boundary delineation.

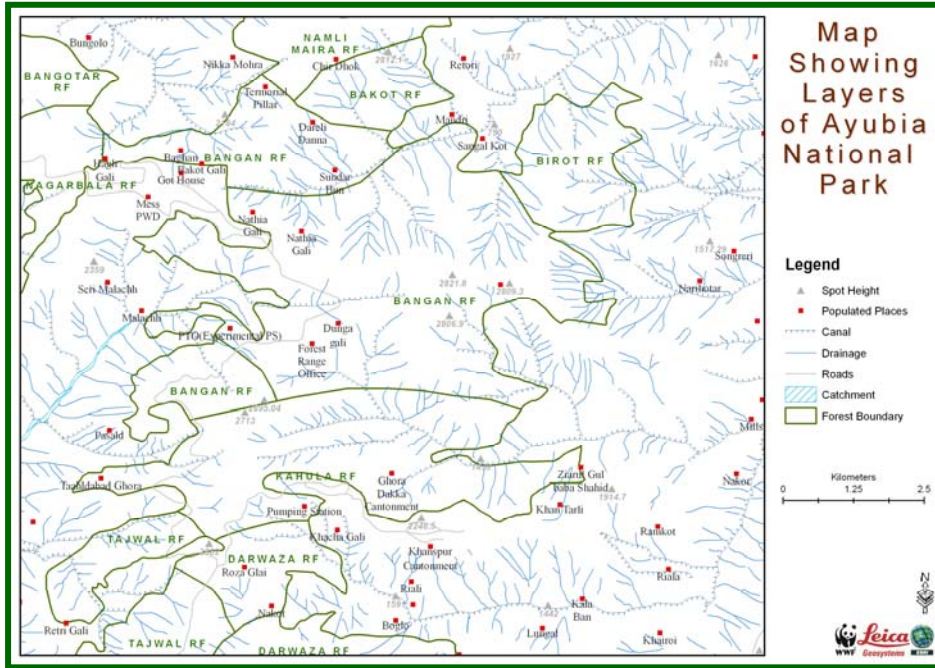
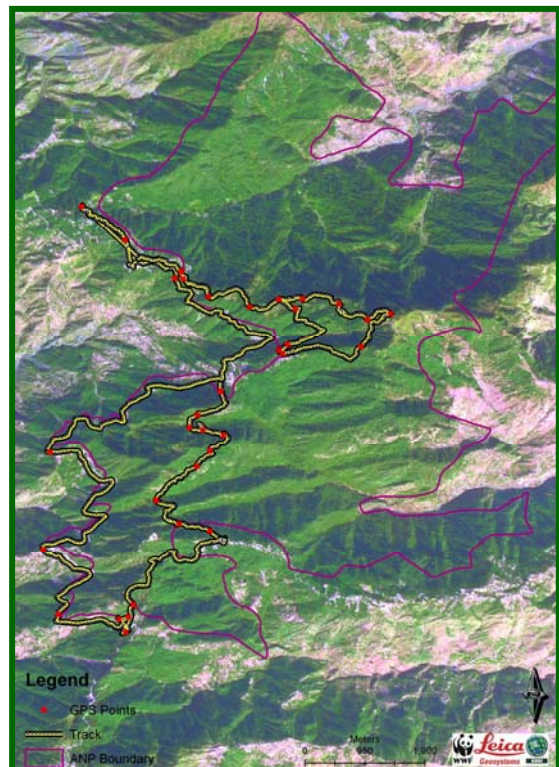


Figure 5. Topographic layers of ANP

3.3. Ground Truthing and Field Data Collection

A field visit of ANP was arranged from 6th to 9th November, 2007. High resolution satellite image based maps were prepared at 1:10,000 scale (Figure 7). Thirty-six Ground Control Points (Figure 6) were collected for Landcover classification and boundary delineation.



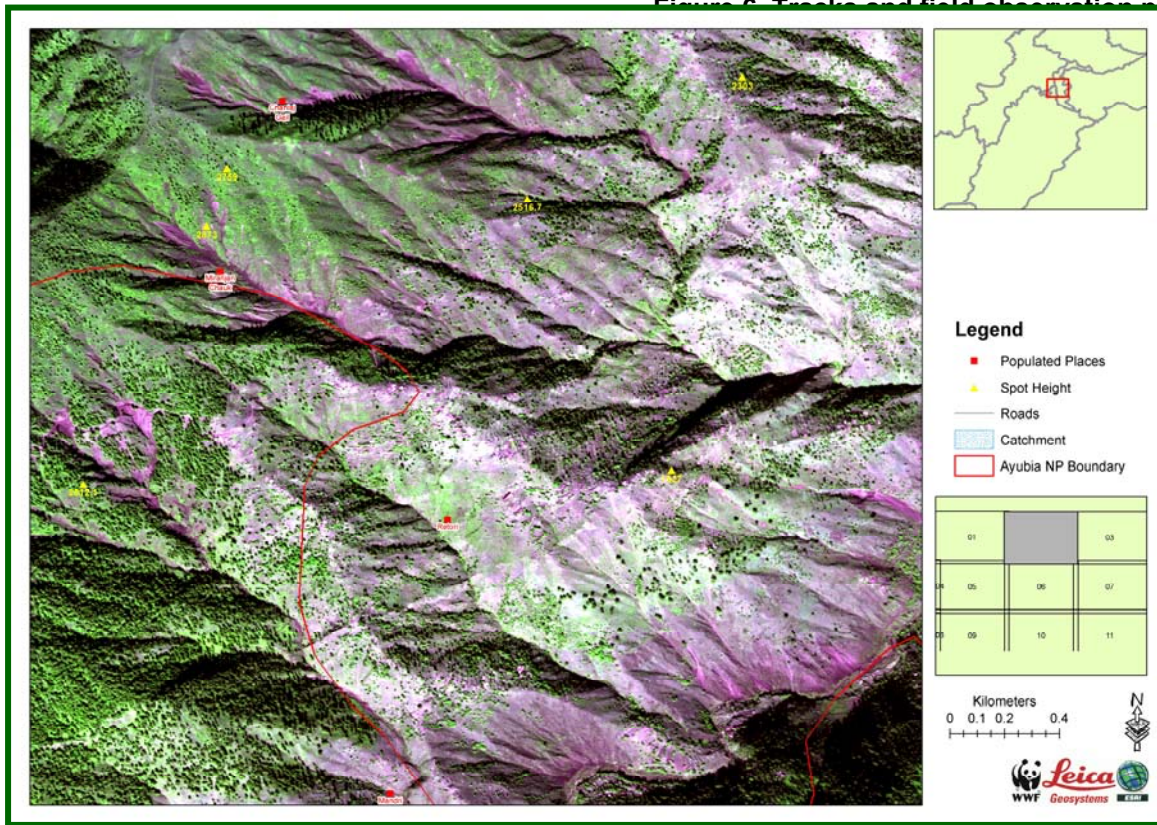


Figure 7. Field Map at 1: 10,000 scale

Some of the field observations are as follows;

- Conifer forest was the main forest type in Ayubia National Park. Three main species of conifer forest were present i.e. Fir, Deodar and Blue Pine. Figure 8 shows the digital photographs of conifer forest which were taken during the field survey.

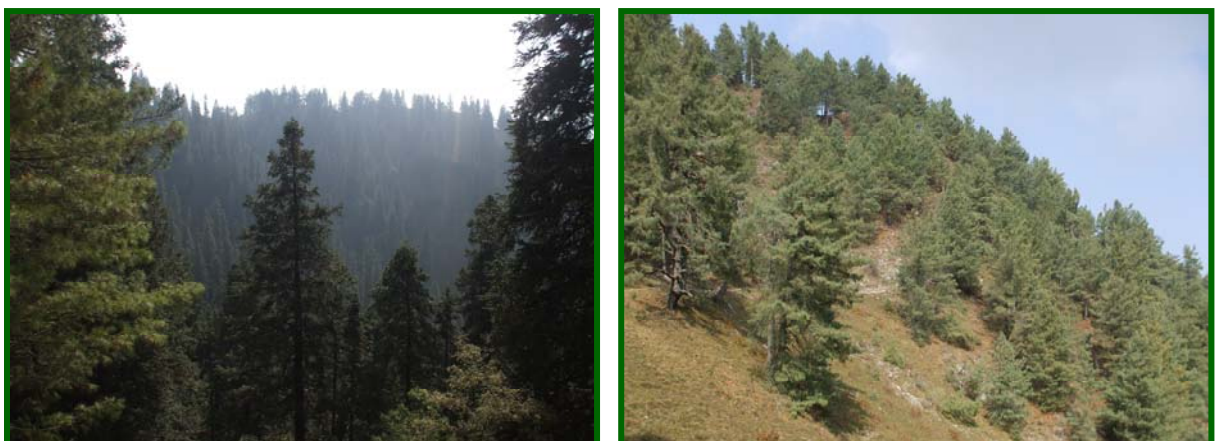


Figure 8. Conifer Forest (a) Digital photograph of Fir and Deodar (b) Digital photograph of Blue Pine

- At low elevation, conifer forest was mixed with broadleaved forest, different types of shrubs and grasses. There were very few patches of pure broadleaved forest in ANP. A digital photograph of mixed forest is shown in Figure 9.



Figure 9. Conifer forest mixed with broadleaved, shrubs and grasses

- Some large patches of pasture and grasslands are also present in ANP. In summer season locals and visitors come to enjoy natural beauty and weather. Pasture and grassland appear bright green in Quickbird satellite image when displayed as FCC 241 (Figure 10).

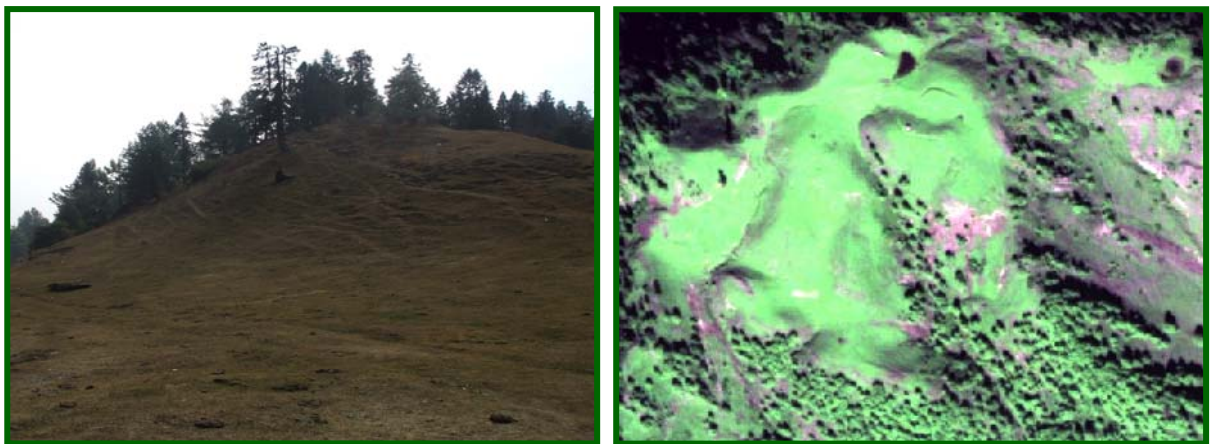


Figure 10. Pasture Land, Digital Photograph (left) and satellite data (right)

3.4. Landcover Mapping

Multispectral Classification is the process of sorting out pixels into a finite number of individual classes, or categories of data, based on their data file values. If a pixel satisfies a certain set of criteria then it is assigned to a class that corresponds to that criterion. In this study thematic map of ANP was developed by using a technique called 'supervised classification'. In this technique a small area, called a training site, which is a representative of each terrain category or class on the image is defined by the analyst. Spectral values for each pixel in a training site are used to define decision space for each class

Once a seed pixel has been chosen of a known class, it is further developed in region with many pixels of closely related spectral characteristics based on spectral euclidean distance. The developed or grown region is called a training site and the number of pixels selected depends upon homogeneity between seed pixel, neighboring pixels and Euclidean distance. 108 training areas were selected on the SPOT-5 Satellite data. Parameters such as spectral signatures scatter plot and ground truth data are used to define decision rule for the selection of training class.

Maximum Likelihood classification (MLC) algorithm is used for thematic mapping of satellite imagery. The Landcover map will be truncated on the final ANP boundary.

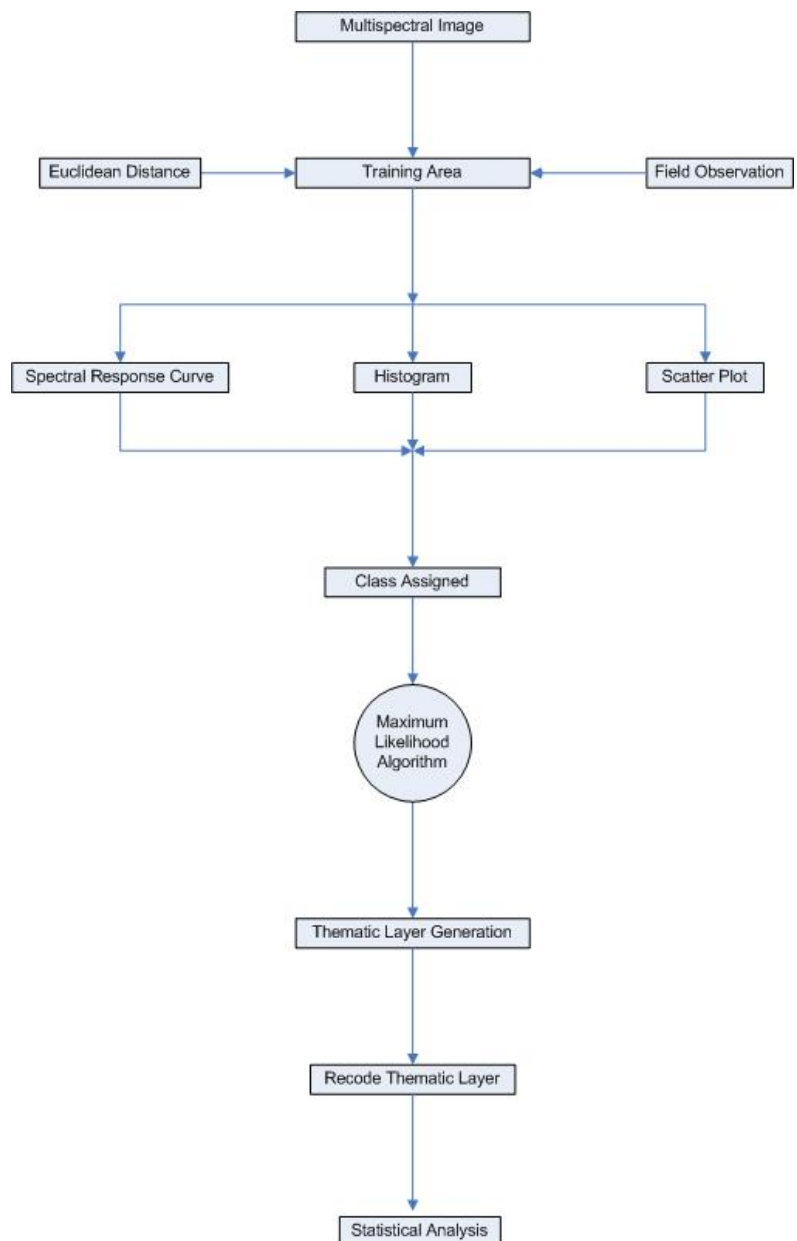


Figure 11. Flow Chart of Supervised Classification

The output landcover classes along with areas are described as follows;

Conifer Forest is classified as a dominating vegetation type of ANP, covering an approximately 1679 ha. Blue Pine, Fir and Deodar have been selected as a single Landcover class.

Shadow Conifer Forest covers an approximate area of 1103 ha. In mountainous terrain, shadow has a great impact on the satellite imagery. To avoid misclassification, shadowed areas were visited to observe vegetation types in the steep areas. According to the ground truth data most of the areas were covered with different species of conifer forest.

Above two mentioned classes represent conifer forest classes. One is pure conifer forest class and other one is conifer forest under shadow. For better interpretation, areas covered by these two classes were merged into a single class that covers an overall area of 2782 ha.

Mixed Forest class represents a mixture of conifer forest and broadleaved forest. This class represents the transition zone of forest that covers 380 ha.

Conifer Forest, Shrubs and Grasses class represents a mixing of shrubs and grasses with sparse conifer forest. Total area covered by this class is 137 ha.

Pasture Lands / Grasses covers an approximate area of 4.67 ha. During the field survey of ANP one pasture land of Mushkpuri was visited which is visible in output landcover map.

Water / Wet Soil class covers an area of 3.98 ha approx. In ANP no permanent water body exists only seasonal drainages are found. The reflectance of wet soil and water body in the satellite imagery was almost same therefore this class represents water or wet soil.

Land Soil / Settlement class covers landsoil or settlement areas. Most of the ANP area is surrounded by settlements. Area covered by this class is 89 ha.

Statistical analysis of output Landcover classes are shown in Table 2.

Table 2. Area covered by landcover/landuse classes

Landcover/Landuse Classes	Area (ha)	Percentage Area
Conifer Forest	1678.59	49.42
Shadow Conifer Forest	1103.12	32.48
Mixed Forest	379.65	11.18
Conifer Forest, Shrubs and Grasses	136.99	4.03
Pasture Lands / Grasses	4.67	0.14
Water / Wet Soil	3.98	0.12
Land Soil / Settlement	89.24	2.63

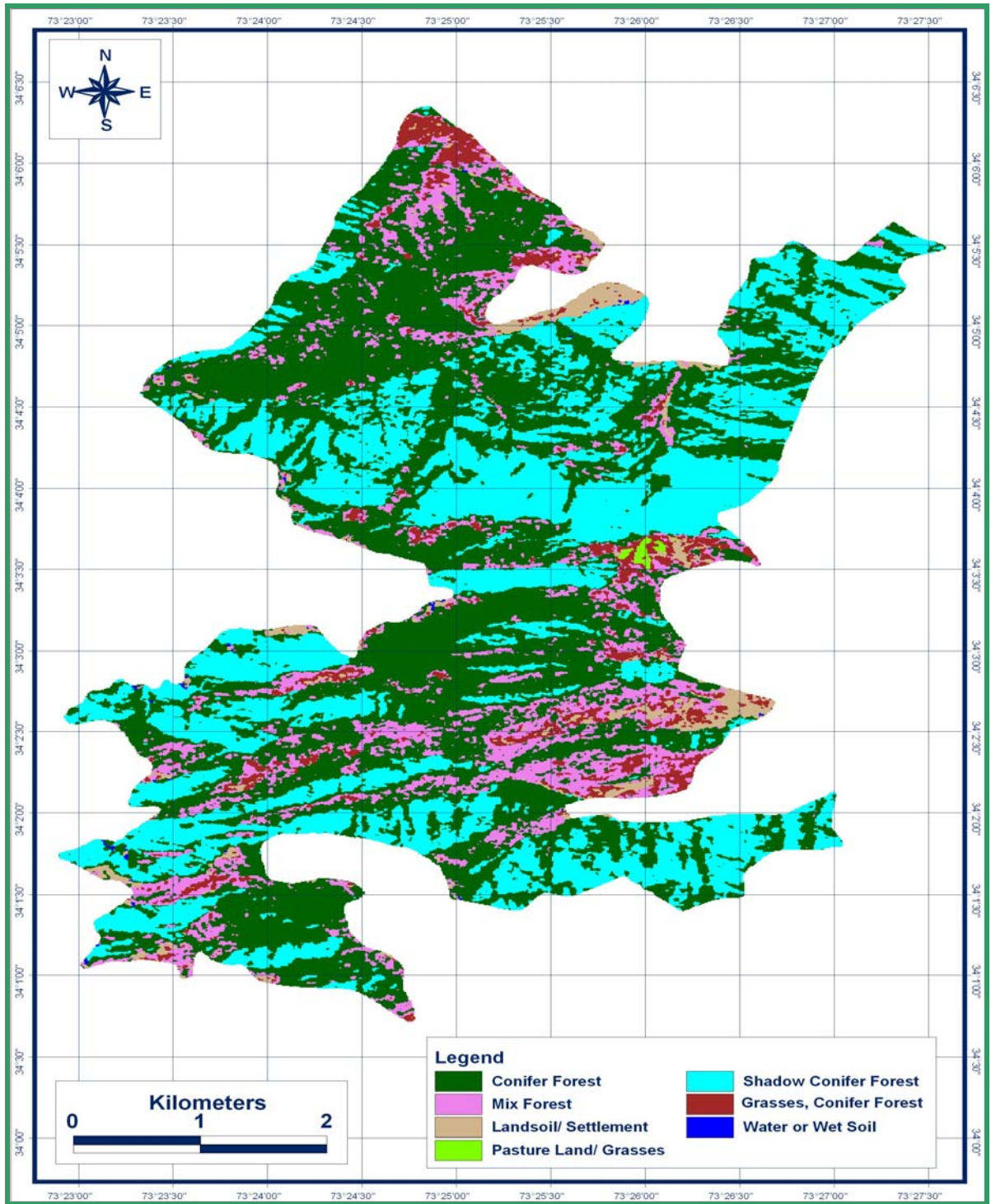


Figure 12. Landcover/Landuse Map

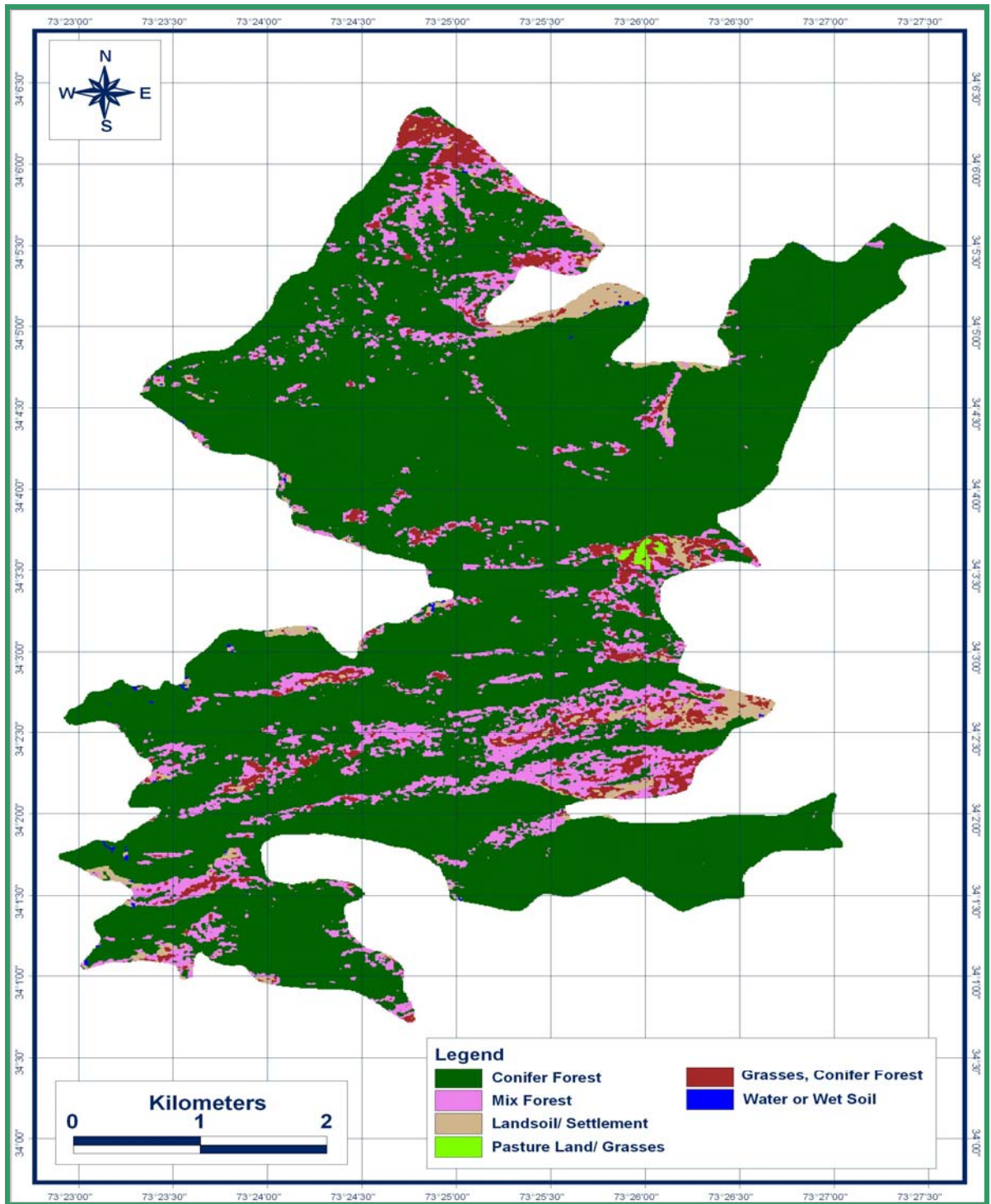


Figure 13. Recoded landcover map

3.5. Habitat Mapping of Wildlife Species

ANP is internationally known as a hotspot in the moist-temperate West-Himalayan mountainous Range because many endangered or threatened species inhabit the Park. ANP is part of the Western Himalayan Ecoregion, which is globally recognized ecoregion for biodiversity conservation. This ecoregion is also included in Global 200 ecoregions of international significance. The Western Himalayas is also the catchment area of 70 - 80% water from the melting of snow and glaciers to the Indus Delta. Its significance in watershed management is critical, deforestation in the area will have far reaching consequences that will have impact in the Indus and Ganges deltas (Wikramanayake *et al.* 2002). Conservation of the Western Himalayas thus has important linkages with climate change.

The important fauna of Ayubia National Park includes *Pucrasia macrolopha* (Koklass pheasant), *Lophura leucomelana* (Kalij pheasant), *Macaca mullata* (Rhesus monkey), *Petaurista petaurista* (Giant Indian Flying Squirrel), *Panthera pardus* (Common Leopard), *Martes flavigula* (Yellow-throated Marten), and *Hyperacrius wyneii* (Murree Vole). Besides unreported extinctions in the tract in distant past, the recent extirpations during the last 40-50 years are primarily attributed to the direct persecution and habitat change. The extirpations from ANP include *Selenarctos thibetanus* (Black Bear), *Moschus moschiferus* (Musk Deer), *Naemorhedus goral* (Grey Goral), *Muntiacus muntjak* (Barking Deer) and Monal pheasant. A total of 22 species of Mammals, 154 species of birds and 08 species of Herps (Reptilians & Amphibians) have been recorded from ANP (Shafique, 2003). There is need of more comprehensive studies of fauna and flora in ANP.

There is limited research available on the biodiversity of the Ayubia National Park and also not much effort has been done for the exploration of flora and fauna. Consequently a limited number of reports are available on species distribution in ANP. Up till now proper maps based on the geographical distribution and habitats of these species have not been developed.

Data and information on the occurrence and distribution of wildlife species were collected from different sources. Wildlife survey reports were obtained from the NWFP Wildlife Department and WWF - Pakistan office in Abbottabad. There are no comprehensive data/maps available on the spatial distribution of the wildlife within ANP also there are a limited number of wildlife ecologists and biologists who have studied and surveyed. The data for mapping the spatial information of wildlife species was obtained from different data sources namely:

- "Some Aspects of Bio-ecology of Ayubia National Park, NWFP, Pakistan. (2003) by Chaudhary Muhammad Shafique.
- "Management plan of Ayubia National Park 2002-2007 by Mohsin Farooque, Natural Resource conservation project Galiat, Abbottabad.

The acquired reports did not specify GPS points of the species sightings instead the sighting records were mentioned with the name of forest compartments lying within the park area. It was, therefore, difficult to plot these data in a systematic way. To

overcome this difficulty a Digital Elevation Model (DEM) and land cover classification was used to predict the habitat of the species within the Park.

Information about the habitat extent of some key fauna species within the ANP region was also collected from the NWFP Wildlife Department staff of ANP. This was primarily based on their field experience. They identified different species habitat on the map within ANP. These areas were manually delineated on the map and displayed for development and analysis. Developed maps indicate the known distribution of wildlife species within ANP.

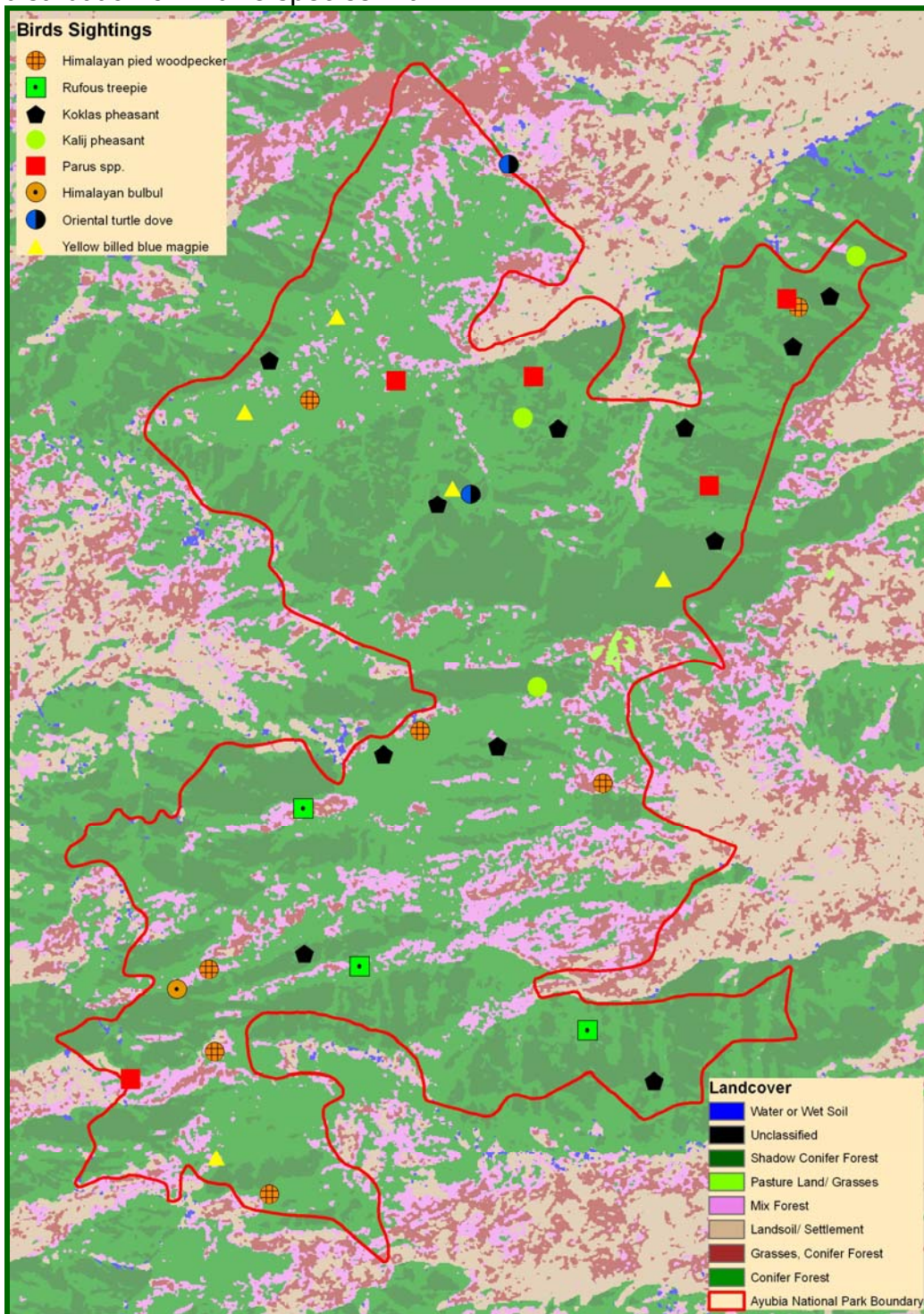


Figure 14. Distribution of some bird species within ANP

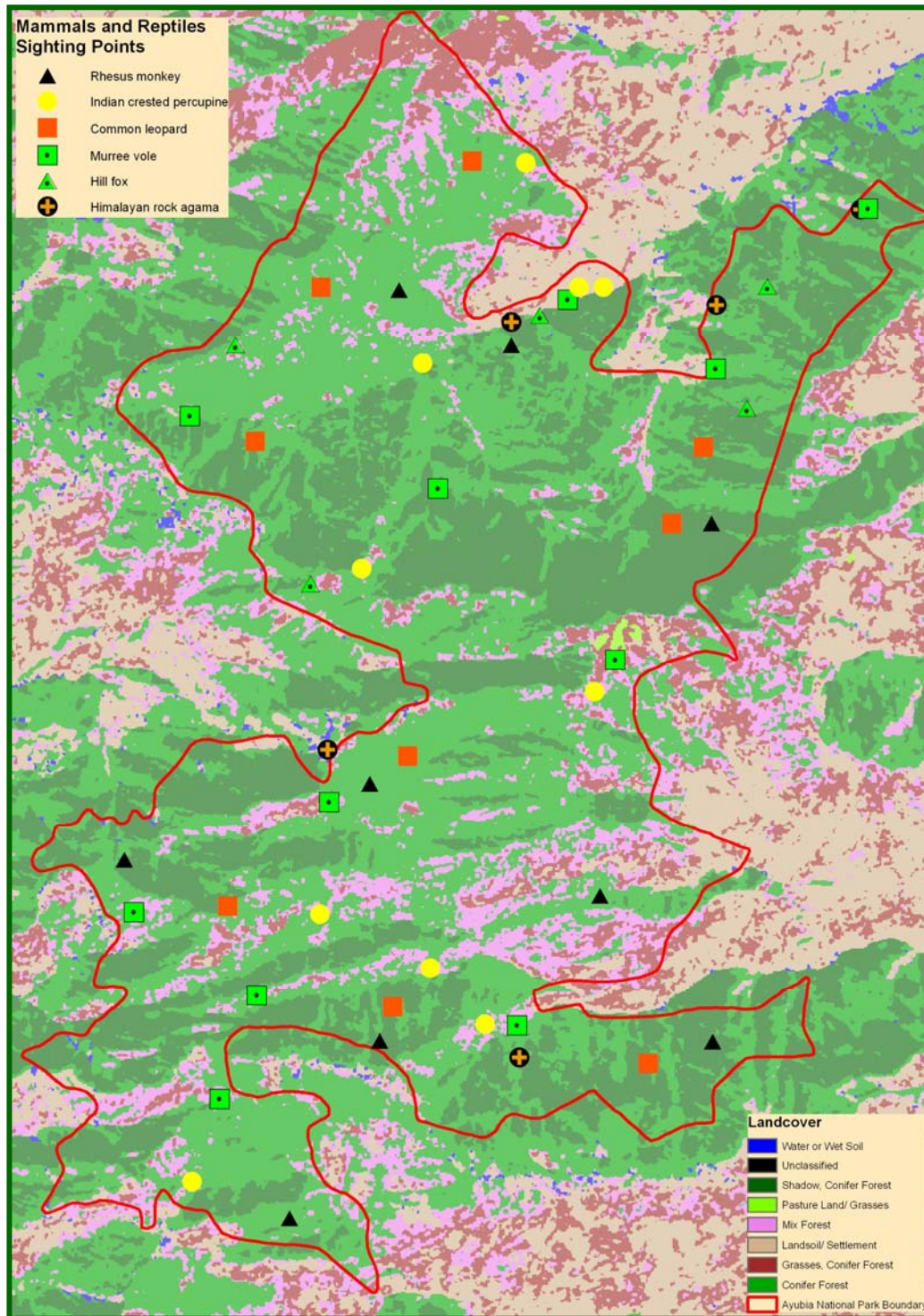


Figure 15. Distribution of selected Mammal and Reptile species within ANP

3.6. Boundary Delineation

The Ayubia National Park was legally notified as a National Park under the notification number SOST – 1 (FaD) VIII – 10/97/98/vol;X II – 708 – 16 dated 10th February, 1998 covering an area of 3312 ha (8184 acres). The boundary of ANP is situated in the Bakot, Nathiagali, Birot and Palak Union Councils (UCs).

Team members involved in the boundary delineation and field data collection were Mr. Muhammad Javed (Deputy Range Officer NWFP Wildlife Department), Mr. Usman Akram, Mr. Hammad Gilani and Mr. Hassan Ali from the GIS Laboratory of WWF - P, and Ms. Sabiha Zaman and Mr. Waseem from WWF – Pakistan Nathiagali office.

GPS points and tracks collected during the field visit were very helpful in the boundary delineation process.

For the accurate boundary delineation, an Area Specific Committee (ASC) for ANP was formulated which comprises of following members;

- Dr. Muhammad Mumtaz Malik, Chief Conservator Wildlife
Ayubia National Park, Government of N.W.F.P
- Mr. Safdar Shah, DFO
Ayubia National Park, Government of N.W.F.P
- Mr. Muhammad Waseem, Project Officer
Nathiagali Field Office, WWF – Pakistan
- ¹Mr. Dul Ahmed, Director
Galliat Development Authority, Abbottabad
- Mr. Muhammad Riaz, District Officer Revenue and Estate
Revenue Department, Abbottabad

Main Issues discussed in the meetings are as follows;

- Murree Road is the reference boundary line in the South Western and Western side of the NP boundary.
- The main encroaching villages in NP are Tauhidabad, Chanda and Murti.
- GPS points of the boundary pillar (if any) should be recorded. The coordinates of the pillars will be helpful in the delineation process.
- Names of villages in the database were corrected.

¹ Mr Dul Ahmed and Mr. Riaz were included in the ASC after the first Project Steering Committee (PSC) meeting. PSC asked WWF to share ANP boundary with the Land Record authority of the area to avoid conflicts in future

Another meeting with the N.W.F.P Wildlife Department officials was arranged at the Wildlife Information Centre Dunga Gali. This meeting did not raise any major issues regarding ANP boundary.



Figure 16. Photographs of (a) ASC meeting, (b) Boundary pillar and (c) meeting with wildlife officials

In order to delineate boundary of the NP, GPS points of the villages (identified by ASC), pillar and localities around the park boundary were collected. Boundary in the western side was digitized by using ArcGIS 9.0, considering Murree Road as a reference. The Reserve Forest (RF) boundary in GIS format was digitized from 1: 50,000 topographic sheet. There were some parts where ANP boundary did not follow ridge or road; RF boundary was considered as reference. On the basis of ASC meetings, ground truth data and other ancillary information a draft boundary was delineated which contained some problematic sections (due to lack of reference) to be resolved.

Draft GIS boundary report of ANP was presented to the Project Steering Committee (PSC). One of the main comments on the report and delineated boundary was its relation with land records. It was suggested by PSC that before submitting the report to National Demarcation Committee on Protected Areas (NDCPA), the delineated boundaries should be shared with the Revenue Department of respective Provincial Government.

To modify the draft boundary and to incorporate the comments of PSC, GIS Lab. staff i.e. Usman Akram and Irfan Ashraf met with Mr. Muhammad Riaz, District Officer Revenue and Estate, Abbottabad. During the meeting, issues regarding ANP boundary were discussed. An official application was submitted addressing DRO, Abbottabad requesting to share the latha maps of the area. Maps were in poor condition and it was not possible to scan and process it for GIS mapping.

It was identified during the meeting that the Revenue Department does not have any records related to the forest and Galliat. The area of Revenue records starts far outside the forested land and the Park area is under the ownership of Forest Department. Galliat Development Authority (GDA) was identified as the main information source about the land records as the land in close vicinity of ANP are managed / owned by the GDA.

A meeting with Mr. Dul Ahmed, Director GDA was held at GDA office in Abbottabad. GDA shared the boundary coordinates of localities situated in the outer peripheries of the Park. The data provided by GDA significantly helped to filter out errors from the

draft ANP boundary by excluding GDA localities. Furthermore it was discussed that involvement of GDA as a partner in the boundary demarcation process would help to complete the process smoothly.

A meeting was also arranged with Dr. Mumtaz Malik in the Wildlife Office, Peshawar. He suggested few changes in the draft boundary according to notification. According to the discussions, boundary should touch Namlimaira RF, Phalkot RF and Bakot RF compartment - 6 on the northern sides. Whereas on southern side the park boundary lies along the boundary of Kuzagali locality, Darwaza RF Compartment-3 (ii) and Khanaspur locality. On the eastern side park boundary follows the Birot RF boundary and Lahur Village. On the western side, reference is Bagan RF Compartment - 10 boundary and outer boundaries of the localities of Kalabagh Nathiagali, Kundla and Tauhidabad. The staff of GIS Lab. of Peshawar Wildlife Department shared the GIS data (shape file) of Forest Compartments.

Draft ANP boundary was modified in the GIS lab. of Peshawar Wildlife Department in correspondence with their GIS Lab Staff. Final boundary was approved by Dr. Mumtaz Malik.

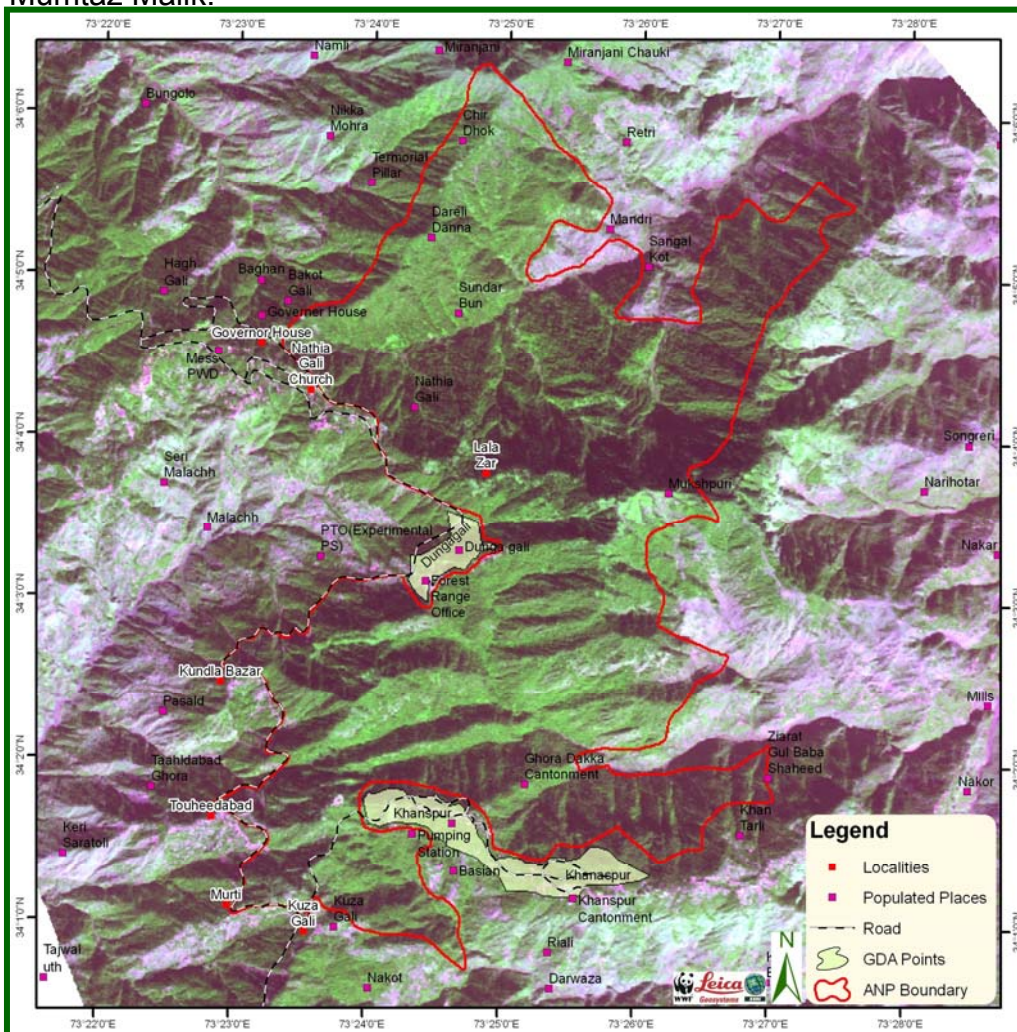


Figure 17. ANP boundary overlaid with GDA points

4. RESULTS AND DISCUSSION

4.1. ANP Boundary

Final boundary delineated after discussions and meetings with revenue officials, forest officials and with the staff of Peshawar Wildlife Department. Boundary is further divided into four sections (Figure 18) for the discussion and understanding.

Section A

Forest compartment boundaries are taken as reference in Section A. It consists of most of the compartments of Bakot RF e.g. compartment No. BK 2, BK 3ii, BK 4ii, BK 4iii, BK 5, BK 5i, BK 5ii. This section describes the Northern boundary of the park whereas the Northeastern side of the Park boundary follows the boundaries of Forest Compartments.

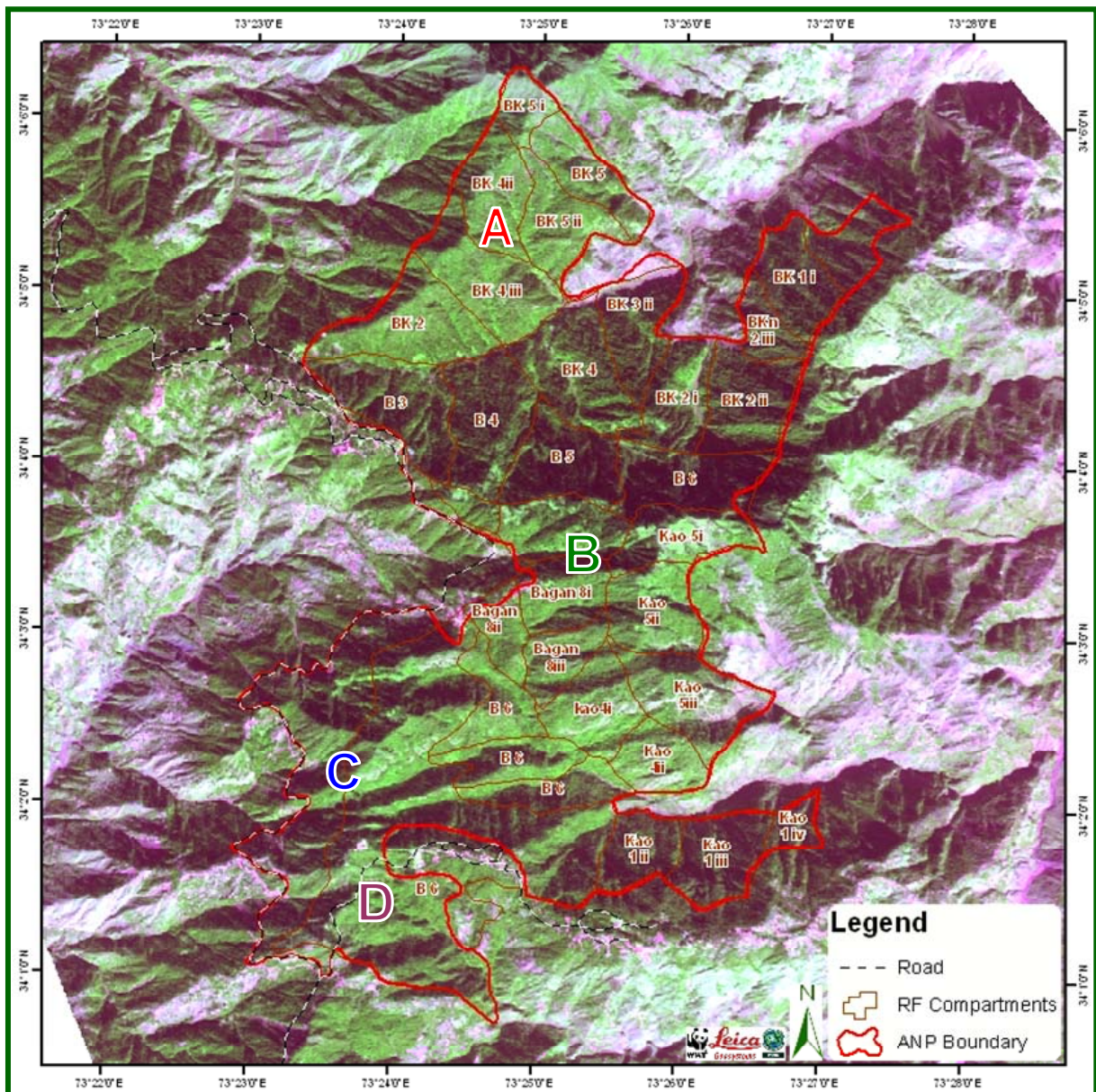


Figure 18. Different sections of ANP
Section B

This section of the boundary passes through the forest on the northeastern side and some compartments of Bakot RF, Bagan RF and Kao RF define its eastern boundary e.g. BK 1i, BK 2ii, BK 2iii, B 6, Kao 4ii, Kao 5i, Kao 5ii, Kao 5iii. In Western side it follows the road as final boundary. Boundary of Dunga Gali locality is excluded from the boundary. Whereas in the north of this section there exist Bakot RF and in Southern side it covers some areas of Bagan RF and Kao RF.

Section C

On the northeastern side the boundary follows the Kao RF compartments Kao 1ii, Kao 1iii, kao 1iv. On the southern side park boundary follows the Khanaspur location boundary. On western side, the road is considered as final boundary of the park.

Section D

Darwaza RF mainly traces the park boundary in this section. On the Northeastern side, the NP boundary is along the Khanaspur location covering some areas of the Darwaza RF, whereas road is boundary line on the western and southwestern side.

4.2. Draft Notification Format

On the basis of delineated boundary, a draft notification format was developed. During the drafting process almost 30 notification formats of PA lying in different provinces of Pakistan were reviewed. In addition to that information about the PA notification available on the World Wide Web was also consulted. Recommended draft notification of ANP is given below;

**GOVERNMENT OF NWFP
FOREST, WILDLIFE & FISHERIES DEPARTMENT**

Dated: 05-05-2008

NOTIFICATION

No. Soft-I (FFD) VIII-10/2008

In exercise of the powers conferred by section 18 of the North West Frontier Province Wildlife Act 1975, the Government of NWFP is pleased to revise the boundaries of Ayubia National Park specified in the schedule given below with immediate effect.

SCHEDULE

- | | |
|-----------------------|---|
| 1) District(s) | : Abbottabad |
| 2) Tehsil(s) | : Abbottabad |
| 3) Locality | : Ayubia National Park |
| 4) Area | : 3372 hectare |
| 5) Coordinates | : 73°22'53.436" to 73°27'34.56" E and 34°0'43.26" to 34°6'18.9"N |

REFERENCE

Satellite Image SPOT-5 (2.5 m)
1: 50,000 Survey of Pakistan Maps
Projection: Geographic
Spheroid & Datum: World Geodetic System (WGS) 84

BOUNDARIES

North:

It starts from a grid reference point N1 (73°23'19.68"; 34°4'34.2") and moves towards the northeastern side along the boundary of forest compartment BK2 up to grid reference point N2 (73°24'4.32"; 34°5'14.82"). From N2 it runs along the boundary of compartment no. BK4iii, BK4ii and BK5i reaching the grid reference point N3 (73°24'50.688"; 34°6'18.9"). Here it bends towards the south eastern side and runs along the boundary of compartment no. BK5i, BK5 up to grid reference point N4 (73°25'46.02"; 34°5'28.92"). From this point it bends towards southwestern direction along the boundary of BK5 and BK5ii compartment. From grid reference point N5 (73°25'9.012"; 34°5'0.42") to N8 (73°26'25.116"; 34°4'44.64") it runs along the compartment boundaries of BK4iii, BK4, Bk3ii, BK2i and BK2ii. It further move along the compartment boundaries of BK2iii and BK1i up to grid reference N11 (73°27'34.56"; 34°5'27.48") (Grid reference points between point N5 and N8 and between N8 and N11 are N6 (73°25'59.952"; 34°5'4.8"), N7 (73°25'48.936"; 34°4'46.5"), N9 (73°26'45.708"; 34°5'29.52") and N10 (73°27'17.928"; 34°5'36.6")).

East:

Eastern boundary start from grid reference point E1 (73°27'34.56"; 34°5'27.48") and moves southward along the boundaries of forest compartments BK1i, BK2iii, BK2ii, B6, Kao5i, Kao5ii up to the grid reference point E4 (73°26'40.488"; 34°2'40.5") (Grid reference points between point E1 and E4 are: E2 (73°27'0.036"; 34°4'51.48"), and E3 (73°26'21.984"; 34°3'49.74")). From here it bend in the southwestern direction and moves along the boundaries of Kao5iii, Kao4ii and B6 forest compartments up to grid reference point E5 (73°25'33.132"; 34°2'2.46"). From point E5 running eastward along the boundaries of Kao1ii, Kao1iii and Kao1iv forest compartments it reaches the point E6 (73°26'59.208"; 34°2'7.44") and here it bends towards southern direction ending at grid reference point E7 (73°27'1.296"; 34°1'47.7")).

South:

Starting from grid reference point S1 (73°27'1.296"; 34°1'47.7") , southern boundary runs in western direction along the boundaries of Kao1iv, Kao1iii, Kao1ii and B6 forest compartment up to point S5 (73°23'56.868"; 34°1'44.76") (Grid reference points between point S1 and S5 are: S2 (73°26'10.968"; 34°1'23.76"), S3 (73°25'52.284"; 34°1'37.08") and S4 (73°24'57.168"; 34°1'29.4")). From point S5 it bends towards the southeastern direction and after reaching point S6 (73°24'45.108"; 34°0'43.26") it further bends in towards western direction ending at grid reference point S7 (73°23'0.528"; 34°1'3.18").

West:

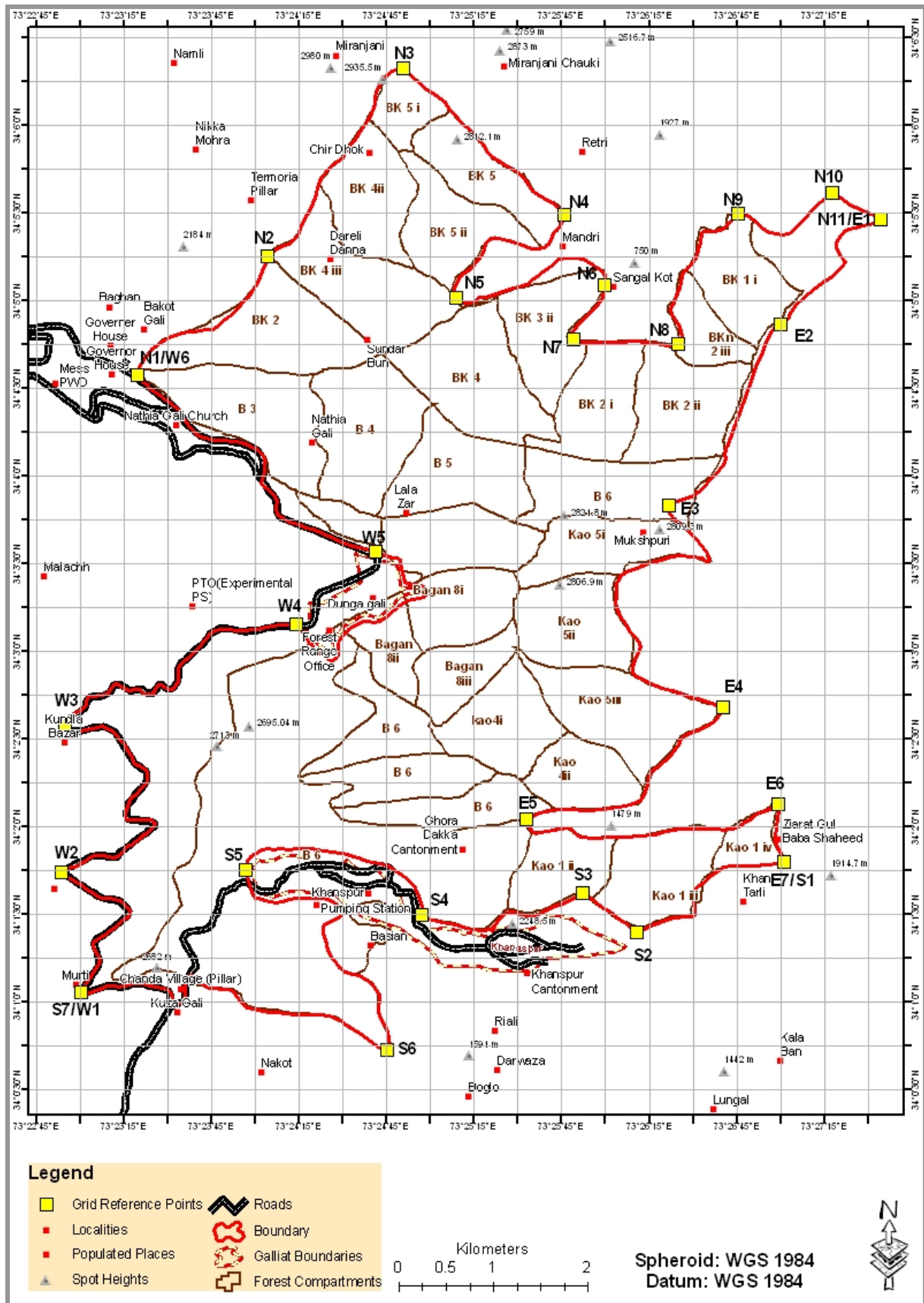
Western boundary starts form grid reference point W1 (73°23'0.528"; 34°1'3.18") and runs along the road up to grid reference point W4 (73°24'14.112"; 34°3'9") (Grid reference points between point W1 and W4 are: W2 (73°22'53.436"; 34°1'44.16") and W3 (73°22'54.912"; 34°2'34.5")). At grid reference point W4 it run along the dunga gali boundary reaching up to grid reference point W5 (73°24'41.148"; 34°3'33.72"). From

W5 it again follows the road ending at grid reference point W6 (73°23'19.68"; 34°4'34.2").

(Authority)
Government of NWFP

A copy is forwarded to the:-

1. _____
2. _____
3. _____
4. _____



(Map Page: GIS map (with Grid) of the Protected Area showing extent of boundary with GPS coordinates)

List of boundary coordinates

No	Longitude	Latitude	No	Longitude	Latitude
1	34°1'44.28"	73°22'53.148"	116	34°5'23.82"	73°26'39.264"
2	34°1'49.68"	73°23'4.02"	117	34°5'29.64"	73°26'45.852"
3	34°1'49.8"	73°23'13.092"	118	34°5'28.62"	73°26'49.2"
4	34°1'53.22"	73°23'16.116"	119	34°5'23.04"	73°26'56.4"
5	34°1'59.1"	73°23'24.576"	120	34°5'22.62"	73°27'2.808"
6	34°2'0.9"	73°23'25.62"	121	34°5'36.6"	73°27'18.216"
7	34°2'2.1"	73°23'24.576"	122	34°5'32.64"	73°27'23.688"
8	34°2'2.88"	73°23'15.432"	123	34°5'27.78"	73°27'34.308"
9	34°2'8.82"	73°23'16.872"	124	34°5'26.04"	73°27'31.896"
10	34°2'14.1"	73°23'22.02"	125	34°5'23.4"	73°27'21.636"
11	34°2'18.3"	73°23'22.884"	126	34°5'19.56"	73°27'19.152"
12	34°2'22.02"	73°23'18.24"	127	34°5'17.82"	73°27'19.152"
13	34°2'31.56"	73°23'11.976"	128	34°5'13.26"	73°27'22.212"
14	34°2'34.08"	73°23'7.62"	129	34°5'12.24"	73°27'21.636"
15	34°2'32.34"	73°22'58.368"	130	34°4'57.9"	73°27'5.004"
16	34°2'33.84"	73°22'55.632"	131	34°4'53.58"	73°27'2.376"
17	34°2'36.72"	73°22'55.812"	132	34°4'50.28"	73°26'57.552"
18	34°2'40.32"	73°23'0.852"	133	34°4'44.64"	73°26'54.492"
19	34°2'44.46"	73°23'3.084"	134	34°4'9.12"	73°26'41.208"
20	34°2'45.18"	73°23'8.664"	135	34°4'3.54"	73°26'40.524"
21	34°2'48.72"	73°23'12.264"	136	34°3'53.1"	73°26'30.156"
22	34°2'46.32"	73°23'16.512"	137	34°3'50.52"	73°26'22.344"
23	34°2'46.68"	73°23'20.4"	138	34°3'47.28"	73°26'21.948"
24	34°2'45.18"	73°23'22.884"	139	34°3'45.66"	73°26'22.884"
25	34°2'45.78"	73°23'25.08"	140	34°3'36.78"	73°26'32.28"
26	34°2'48.66"	73°23'26.88"	141	34°3'33.48"	73°26'34.692"
27	34°2'46.86"	73°23'29.904"	142	34°3'30.6"	73°26'35.196"
28	34°2'47.28"	73°23'32.028"	143	34°3'32.34"	73°26'29.292"
29	34°2'55.68"	73°23'34.62"	144	34°3'32.34"	73°26'22.524"
30	34°3'5.76"	73°23'44.268"	145	34°3'27.36"	73°26'7.872"
31	34°3'7.56"	73°23'48.12"	146	34°3'25.74"	73°26'5.208"
32	34°3'6.9"	73°23'56.544"	147	34°3'23.04"	73°26'3.588"
33	34°3'8.76"	73°24'13.788"	148	34°3'14.16"	73°26'3.948"
34	34°3'1.08"	73°24'19.872"	149	34°3'1.56"	73°26'11.904"
35	34°2'58.56"	73°24'22.572"	150	34°2'55.62"	73°26'9.672"
36	34°2'56.88"	73°24'26.46"	151	34°2'51.66"	73°26'9.852"
37	34°2'58.74"	73°24'28.152"	152	34°2'47.34"	73°26'19.284"
38	34°3'2.94"	73°24'28.368"	153	34°2'41.04"	73°26'40.164"
39	34°3'7.32"	73°24'31.752"	154	34°2'39.18"	73°26'39.84"
40	34°3'10.2"	73°24'36.972"	155	34°2'35.82"	73°26'37.428"
41	34°3'10.2"	73°24'42.624"	156	34°2'30.12"	73°26'26.196"
42	34°3'15.84"	73°24'49.392"	157	34°2'23.64"	73°26'21.84"

43	34°3'18.78"	73°24'58.392"	158	34°2'18.06"	73°26'15.684"
44	34°3'21.9"	73°24'57.78"	159	34°2'8.82"	73°26'11.904"
45	34°3'23.46"	73°24'51.12"	160	34°2'6.96"	73°26'6.756"
46	34°3'30.18"	73°24'49.716"	161	34°2'5.76"	73°25'58.548"
47	34°3'31.68"	73°24'48.528"	162	34°2'5.34"	73°25'41.736"
48	34°3'36.66"	73°24'31.068"	163	34°2'2.58"	73°25'33.456"
49	34°3'46.26"	73°24'7.848"	164	34°2'0.12"	73°25'33.852"
50	34°3'52.5"	73°24'6.624"	165	34°1'57.6"	73°25'36.192"
51	34°3'57.48"	73°24'2.016"	166	34°1'59.4"	73°25'47.82"
52	34°4'1.08"	73°24'3.132"	167	34°1'56.58"	73°25'50.736"
53	34°4'5.7"	73°24'2.952"	168	34°1'56.76"	73°26'11.832"
54	34°4'7.86"	73°24'1.656"	169	34°1'59.1"	73°26'25.332"
55	34°4'11.1"	73°23'55.32"	170	34°1'59.22"	73°26'43.692"
56	34°4'12.66"	73°23'42.648"	171	34°2'7.62"	73°26'58.848"
57	34°4'14.52"	73°23'39.228"	172	34°2'6.78"	73°26'59.712"
58	34°4'22.14"	73°23'33.648"	173	34°1'55.14"	73°26'57.984"
59	34°4'34.26"	73°23'19.5"	174	34°1'47.58"	73°27'1.584"
60	34°4'39.72"	73°23'21.552"	175	34°1'46.02"	73°26'40.344"
61	34°4'45.78"	73°23'27.6"	176	34°1'38.28"	73°26'30.588"
62	34°4'48.78"	73°23'34.872"	177	34°1'29.22"	73°26'29.976"
63	34°4'50.58"	73°23'46.536"	178	34°1'28.02"	73°26'20.652"
64	34°5'1.08"	73°23'57.408"	179	34°1'24.18"	73°26'10.86"
65	34°5'5.76"	73°24'0.684"	180	34°1'37.02"	73°25'52.968"
66	34°5'14.1"	73°24'4.284"	181	34°1'29.64"	73°25'35.652"
67	34°5'17.34"	73°24'7.344"	182	34°1'30.6"	73°25'27.084"
68	34°5'19.02"	73°24'11.808"	183	34°1'29.94"	73°25'25.212"
69	34°5'22.08"	73°24'14.58"	184	34°1'24.96"	73°25'20.244"
70	34°5'31.98"	73°24'19.26"	185	34°1'24.48"	73°25'17.076"
71	34°5'41.58"	73°24'22.428"	186	34°1'28.8"	73°24'57.564"
72	34°5'48.72"	73°24'29.736"	187	34°1'40.02"	73°24'54.108"
73	34°5'56.82"	73°24'35.568"	188	34°1'47.04"	73°24'44.28"
74	34°6'5.76"	73°24'40.68"	189	34°1'52.44"	73°24'19.44"
75	34°6'11.28"	73°24'41.328"	190	34°1'52.32"	73°24'4.032"
76	34°6'15.12"	73°24'43.272"	191	34°1'50.82"	73°24'0.108"
77	34°6'18.36"	73°24'46.836"	192	34°1'46.56"	73°23'56.832"
78	34°6'18.9"	73°24'50.868"	193	34°1'39.78"	73°23'57.948"
79	34°6'7.68"	73°25'4.764"	194	34°1'35.52"	73°23'59.964"
80	34°5'48.84"	73°25'21.468"	195	34°1'34.02"	73°24'7.164"
81	34°5'43.44"	73°25'30.36"	196	34°1'35.58"	73°24'15.084"
82	34°5'37.38"	73°25'35.076"	197	34°1'35.28"	73°24'22.932"
83	34°5'33.06"	73°25'42.492"	198	34°1'34.08"	73°24'27.036"
84	34°5'29.4"	73°25'46.092"	199	34°1'31.56"	73°24'29.628"
85	34°5'24.48"	73°25'43.86"	200	34°1'29.4"	73°24'29.376"
86	34°5'17.88"	73°25'38.892"	201	34°1'25.56"	73°24'23.22"
87	34°5'17.88"	73°25'33.528"	202	34°1'17.94"	73°24'24.696"

88	34°5'21.24"	73°25'23.16"	203	34°1'11.76"	73°24'28.692"
89	34°5'20.46"	73°25'20.28"	204	34°1'7.38"	73°24'38.304"
90	34°5'12.24"	73°25'15.06"	205	34°1'3.54"	73°24'41.796"
91	34°5'7.14"	73°25'9.588"	206	34°0'55.2"	73°24'42.408"
92	34°5'4.02"	73°25'8.292"	207	34°0'47.88"	73°24'45.756"
93	34°5'1.38"	73°25'8.472"	208	34°0'43.38"	73°24'44.892"
94	34°4'58.98"	73°25'11.28"	209	34°0'54.6"	73°24'27.252"
95	34°4'58.98"	73°25'13.332"	210	34°0'58.14"	73°23'56.94"
96	34°5'0.78"	73°25'16.86"	211	34°1'3.78"	73°23'52.044"
97	34°5'4.8"	73°25'31.944"	212	34°1'4.74"	73°23'44.232"
98	34°5'13.8"	73°25'44.184"	213	34°1'9.18"	73°23'38.292"
99	34°5'13.8"	73°25'52.14"	214	34°1'6.72"	73°23'35.808"
100	34°5'9.6"	73°25'59.16"	215	34°1'0.36"	73°23'35.448"
101	34°5'6.42"	73°26'0.204"	216	34°0'59.16"	73°23'33.144"
102	34°4'58.8"	73°25'57.72"	217	34°0'59.34"	73°23'31.452"
103	34°4'48.78"	73°25'48.468"	218	34°1'4.2"	73°23'30.048"
104	34°4'47.4"	73°25'48.288"	219	34°1'6.12"	73°23'21.66"
105	34°4'45.84"	73°25'49.836"	220	34°1'5.52"	73°23'9.6"
106	34°4'45.84"	73°26'9.456"	221	34°1'2.76"	73°23'1.212"
107	34°4'44.16"	73°26'23.244"	222	34°1'4.5"	73°23'0.42"
108	34°4'44.94"	73°26'25.8"	223	34°1'14.16"	73°23'6.684"
109	34°4'50.64"	73°26'25.548"	224	34°1'20.16"	73°23'4.452"
110	34°4'57"	73°26'22.128"	225	34°1'28.98"	73°23'16.008"
111	34°5'4.08"	73°26'25.548"	226	34°1'31.26"	73°23'16.8"
112	34°5'9.06"	73°26'26.592"	227	34°1'34.68"	73°23'13.452"
113	34°5'14.22"	73°26'30.948"	228	34°1'36"	73°23'6.252"
114	34°5'22.56"	73°26'32.856"	229	34°1'44.28"	73°22'53.148"
115	34°5'23.46"	73°26'33.792"			

5. CONCLUSIONS AND RECOMMENDATIONS

The GIS approach adopted in this report is to develop and manipulate different information layers such as topography, landcover and species distribution. Extensive discussion sessions with wildlife officials and ASC members, significantly helped to resolve major issues regarding NP boundary.

Final ANP boundary is developed by excluding the GDA area in close peripheries of the National Park. ANP boundary covers an area of 3372 ha, whereas the area given in the notification is 3312 ha. An area of 60 ha has been included while delineating the boundary.

This exercise is a first ever attempt to translate ANP notification by incorporating field data and in close consultation with main stakeholders. As GIS boundary and draft notification format is developed by using scientific measures, it is recommended to demarcate and renotify it with spatial reference.

ANNEXURE 1 (Field observation points)

No	Latitude	Longitude	Height	Description
1	34.05000	73.40617	7731 ft	<i>Pinus wallichiana</i>
2	34.04667	73.40286	7730 ft	<i>Pinus wallichiana, Cedrus deodar</i>
3	34.04490	73.40173	7727 ft	<i>Pinus wallichiana, Broadleaved</i>
4	34.04458	73.40362	7718 ft	Rock, <i>Populus ciliata</i>
5	34.04382	73.40655	7727 ft	<i>Pinus wallichiana, Cedrus deodar</i>
6	34.04147	73.40463	7724 ft	<i>Pinus wallichiana, Cedrus Deodar, Broadleaved</i>
7	34.03927	73.40272	7716 ft	<i>Pinus wallichiana, Broadleaved</i>
8	34.03446	73.39695	7696 ft	<i>Pinus wallichiana, Cedrus deodar, Grasses</i>
9	34.03112	73.40019	7686 ft	<i>Pinus wallichiana, Cedrus deodar, Grasses</i>
10	34.03013	73.40461	7699 ft	<i>Pinus wallichiana, Cedrus deodar, Grasses</i>
11	34.01952	73.39371	8100 ft	Addition of compartment near DARWAZA RF
12	34.01752	73.39169	8100 ft	Malkiat
13	34.01787	73.39300	8123 ft	Pillar
14	34.01567	73.39262	8023 ft	Kura Gali
15	34.01826	73.38299	7818 ft	Murti
16	34.02741	73.38092	7707 ft	Tauhidadabad
17	34.04128	73.38187	7790 ft	Kunda bazar
18	34.06602	73.39959	7856 ft	Road goes upward towards Kot Gali
19	34.07146	73.39252	7980 ft	Nathia Gali Church
20	34.07628	73.38634	7886 ft	Governor House Nathia gali
21	34.06702	73.40054	8021 ft	Nathia gali track
22	34.06591	73.40082	8140 ft	<i>Pinus wallichiana</i> +Rock
23	34.06351	73.40440	8308 ft	<i>Picea smithiana, Pinus wallichiana, Grasses, Rock</i>
24	34.06204	73.41025	8381 ft	<i>Picea smithiana, Pinus wallichiana, Grasses, Rock</i>
25	34.06314	73.41448	8507 ft	<i>Picea smithiana, Grasses, Rock</i>
26	34.06323	73.41780	8746 ft	<i>Picea smithiana, Grasses, Rock</i>
27	34.06251	73.42301	8805 ft	<i>Picea smithiana, Grasses, Rock</i>
28	34.06031	73.42705	9136 ft	Pasture Land Mushkpuri Top
29	34.06111	73.43037	9229 ft	Pasture Land Mushkpuri Top
30	34.05633	73.42610	8987 ft	<i>Pinus wallichiana</i> (blue pine), <i>AB Spindron</i>
31	34.05667	73.41566	8176 ft	<i>AB Spindron</i>
32	34.06177	73.41673	8495 ft	<i>AB Spindron</i>
33	34.06314	73.41440	8520 ft	Lala Zar

ANNEXURE 2 (Notifications)
(ANP Notification, 1984)

GOVERNMENT OF NWFP,
 AGRICULTURE DEPARTMENT.

33

NOTIFICATION.

Dated Peshawar the 17th January, 1984.

NGSOFT.I(FAD)VIII-10/76/Vol.III- In exercise of the powers conferred by section 16 of the North-west Frontier Province Wildlife (Protection, Preservation, Conservation and Management) Act, 1975 (NWFP, Act V of 1975), the Government of the North west Frontier Province is pleased to declare the area specified in the Table below, which is the property of Government to be a National Park with immediate effect:

T A B L E

Locality	District	Tehsil	Area in acres	East	West	North	South
Ayubia National Park.	Abbotabad.	Abbotabad	4160	Musakpuri Lahurkas and Khana- spur ridge and the bound- aries of Reserved forests.	Met- tala road bet- ween Donga Gali Kooza Gali.	Watershed line between Musakpuri top and Donga Gali with a portion of metalled road between Donga Gali and Kooza Gali.	Metalled road between Kooza Gali and Khansour.

File No 127
24.1.84

Secretary to Government
 NWFP, Agriculture Department

NGSOFT.I(FAD)VIII-10/76/2387-99

Copy forwarded to :-

1. Managing Director, Forest Development Corporation, NWFP.
2. Chief Conservator of Forests, NWFP.
3. P.S. to Governor NWFP.
4. P.S. to Minister for Food & Agriculture, NWFP.
5. P.S. to Chief Secretary, NWFP.
6. All Commissioners in NWFP.
7. Section Officer (Legis.) Law Department, NWFP, with reference to his S.O letter No. Legis. 2(1)/76/1406 dated 15-9-1983.
8. Conservator Wildlife, NWFP, Peshawar.
9. Manager Government Printing Press, NWFP, for publication in the next issue of the official gazette and supply 30 printed copies to this department for official use.
10. File No. VIII-22/79/Vol. II.

Section Officer (Forests-I)

No. 1084-98/III(CF), dated Peshawar the 22-1/1984.

Copy forwarded to all Divisional Forest Officers, Wildlife, in NWFP, for information and necessary action.

CONSERVATOR OF FORESTS,
 WILDLIFE, NWFP, PESHAWAR.

(ANP Notification, 1998)

458
17-2-98

(129)
GOVERNMENT OF NWFP
FORESTRY, FISHERIES AND WILDLIFE
DEPARTMENT
DATED PESHAWAR THE 3rd February 1998.

NOTIFICATION.

NO. SOFT-I(FPD)VIII-10/97 Vol XII. In exercise of the powers conferred by section 18 of the North - West Frontier Province Wildlife (Protection, Preservation Conservation and Management) Act, 1975 the Government of NWFP is pleased to add the following area within the boundary of Ayubia National Park already declared as such vide this Department, Notification No. SOFT-I(FPD)-VIII-10/75/Vol-III dated 17-01-84, consequently, the new boundaries and area of the National Park are specified in table below :-

T A B L E

Locality	District	Area (hectare).	North	South	East	West
Ayubia National Park	Abbottabad	3312	Namlimakra reserved Forest, Phalkot reserved Forest & Sakot reserved Forest Compartment-6	Kuzagali Location reserved Forest, Lahur Village. Compartment 3(ii) Khanispur Location.	Birotd reserved Forest, Ved Village. Compartment-10	Bagan reserved Forest, Ved Village. Compartment-10 Kalabagh Nathiagala location Kandle chidabad

put up as file

SD/-
SECRETARY TO GOVT. OF NWFP
FORESTRY, FISHERIES & WILDLIFE
DEPARTMENT

Copy of Endst: No. SOFT-I(FPD)VIII-10/97-98 Vol XII 708-16 Dated 10-2-1998, from Section Officer Forests-I Govts of NWFP Forestry, Fisheries and Wildlife Department addressed to this office and others.

SD/-
SECTION OFFICER (FORESTS-I)

NO. 2567-73/WL, Dated Peshawar the 11 - 2 - 1998.

Copy forwarded for information and necessary action to the :-

1. All Divisional Forest Officers Wildlife in NWFP.
2. Divisional Forest Officer Extension Wildlife Division Peshawar. He is requested to give suitable news through information Department.

ANNEXURE 3 (References)

Shafique, C. M. (2003). Some Aspects of Bio-ecology of Ayubia National Park, NWFP, Pakistan. PhD Dissertation.

Farooque, M. (2002). Management Plan of Ayubia National Park 2002-2007. Natural Resource conservation project Galiat, Abbottabad.

Wikramanayake, E., Dinerstein and E, Loucks. C.J (2002) Terrestrial Ecoregions of the Indo-Pacific, A Conservation Assessment. Island Press, Washington, pp – 340 - 360