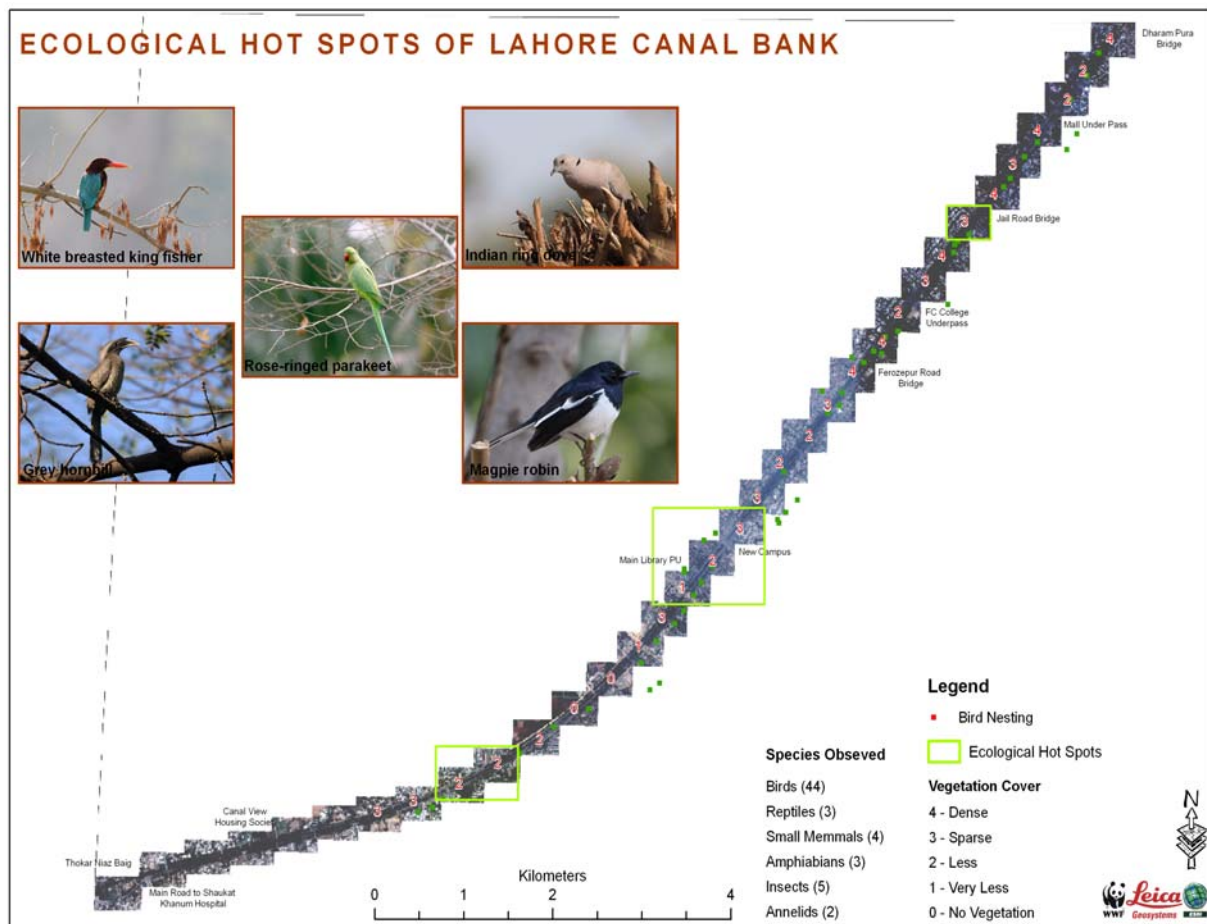


THE STUDY OF ECOLOGY AND ECOLOGICAL LINKAGES OF THE LAHORE CANAL BANK

FROM MUSTAFAABAD BRIDGE TO THOKAR NIAZ BAIG



November 2008

World Wide Fund for Nature – Pakistan

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“The Study of Ecology and Ecological Linkages of the Lahore Canal Bank from Mustafaabad Bridge to Thokar Niaz Baig”

WWF – Pakistan 2008

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I. ACKNOWLEDGEMENTS

Special thanks to Mr. Ali Hassan Habib, Director General, WWF - Pakistan for giving us an opportunity to submit our project proposal to the Scientific Committee, WWF - Pakistan.

We are grateful to Dr. Abdul Aleem Chaudhry and Prof. Z.B. Mirza, project supervisors for guidance. We would also like to thank Mr. Hammad Naqi Khan, Director Freshwater and Toxics Programme (FTP), WWF - Pakistan for guidance in collecting the secondary data.

Credit is given to:

Mr. Rizwan Mahmood, Project Coordinator, FTP, for guidance and analysis of the NESPAK Environmental Impact Assessment (EIA) report;

Mr. Shakeel Ahmed, former Project Officer, WWF - Pakistan, in providing sample data sheets of the previous projects from which we developed our thoughts;

Hira Hashmey, Sadia Ayesha Hassan and Mohsin Saeed for help and guidance in survey and developing methodology;

Hassan Ali, GIS analyst (Species) of WWF - Pakistan for identification of small mammals, reptiles, amphibians and insects;

Urooj, Kaif and Hammad Gillani, GIS, WWF - Pakistan, for providing maps of the Lahore Canal Bank and making maps in the GIS Lab;

Humaira Ayesha and Muhammad Shafiullah (late), Scientific Committee Coordinator;

We also thank: Mr. Irfan Rana, Scientific Committee Financial Coordinator, for his guidance related to financial issues of this project; Mr. Shahid Iqbal, Field Assistant and his helpers in collecting data in the field for this report and Mr. Alam, Head Gardener, Jinnah Garden and his assistant for identification of several tree and shrub species in the field.

We are grateful to: Chaudhry Asghar, Parks and Horticulture Authority (PHA); nurserymen and Mr. Niaz Mohammad, Jallo Park Office for giving the list of tree and shrub species of the Lahore Canal Bank.

Lastly, we would like to pay our gratitude to Dr. Nawaz Chaudhry for allowing us to select six volunteer students of M.Sc. Environmental Science Part I (1st Semester) from the College of Earth and Environmental Science, Punjab University, Lahore, for conducting the socioeconomic survey of the household and the commuters in the field.

II. STATEMENT OF PROBLEM

The Lahore Development Authority (LDA), along with the Traffic Engineering and Transport Planning Agency (TEPA), City District Government of Lahore (CDGL) has planned to widen the Lahore Canal Road from Mustafaabad Bridge to Thokar Niaz Baig. This proposed development project will result in the cutting of about one thousand eight hundred and fifty (1,850) trees on the green belts on both banks of the canal, in order to extend the road by 18 feet and about five thousand, two hundred and ninety nine (5,299) trees if additional 6 ft earthen shoulders are added (i.e. 24 ft on both sides). The main argument presented by the authorities is in favour of this project which is to facilitate the ever-increasing vehicular traffic and the widening of the road, therefore, reducing the traffic pressure on the road and the travel time from Mustafaabad to Thokar Niaz Baig to about 7 minutes. (*Rafay Alam*)

In this respect, the “*Darakhat Bachao, Lahore Bachao*” (Save Trees, Save Lahore) committee was formed under the umbrella of “Lahore Conservation Society” to deal with issues related to tree cutting for development projects. The committee involved members from the civil society such as architects, environmentalists, artists and engineers. Under the Pakistan Environmental Protection Act (PEPA) 1997, the government is legally bound to fulfill the requirements of carrying out an Environmental Impact Assessment (EIA) and asking for public opinion before initiating such a project. The Lahore Bachao committee submitted pleas to the court invoking the above clause to look into the matter. The court took notice of the continuous pleas submitted by the citizens and stopped the proposed development project on the Canal road, and ordered an EIA before commencement of work on the project.

According to Section 12 (1) of the Pakistan Environmental Protection Act (PEPA 1997), “No proponent of a project shall commence construction or operation unless he has filed with the Federal Agency an Initial Environmental Examination or, where the project is likely to cause an adverse environmental effect an Environmental Impact Assessment and has obtained from the Federal Agency approval in respect thereof”. Also, Section 12 (3) of Pakistan Environmental Protection Act (PEPA 1997) states that “Every review of the Environmental Impact Assessment shall be carried out with public participation.”

The City District Government of Lahore (CDGL) announced its intentions to conduct an EIA of the proposed project as well as its intention to have the Environmental Protection Department (EPD), Government of the Punjab, conduct a public hearing to review the EIA before making the final decision on whether to grant the proposed project a no-objection certificate. The EIA has been conducted and the public hearing was held on the 14th of March 2007 at the Hotel Sunfort, Lahore. During the public hearing, the technical committee of Lahore Bachao Tehrik and public at large rejected the misleading and biased EIA report prepared by National Engineering Services Pakistan (NESPAK). The EIA report has lots of technical and information flaws, therefore, does not meet the requirements of an effective and best practice EIA report.

III. LITERATURE REVIEW

Currie (1916) listed birds of Lahore and the vicinity. Whistler (1914, 1922, and 1930) reported the birds of Jhelum, Jhang and Rawalpindi districts. Ahmad (1965) published a checklist of birds of Lahore and listed 240 species. Mirza (1965) added more species to the recorded list of birds of Lahore. Ali (1979), Ali and Ripley (1983) described birds in the Punjab including Lahore. Chaudhry and Bhatti (1989) described the bird species occurring in Changa Manga forest plantation in the months of February to April. Chaudhry *et al.*, (1992) recorded 101 bird species from the parks of Lahore. Of these, 22 species were migratory. Chaudhry and Bhatti made breeding records of 16 bird species.

There are recent study reports on birds by Roberts (1992) and Mirza (1965-2005). Yaqub (1996) conducted a survey of the birds of Jinnah Gardens with special reference to roosting trees. Shehzad (1997) studied avian fauna of the Punjab University Campus, Lahore. Mehmood (2000) and Muzaffar (2000) studied birds in urban Lahore with special reference to the species of concern; Lahore Canal Bank was part of their study area. Mehmood (2000) counted the trees on both sides of the Lahore Canal Bank.

Mehmood (2000) further divided the Lahore Canal Bank into three sections starting from Jallo to Thokar Niaz Baig. The first section was from Jallo to Dharampura, the second from Dharampura to Campus Bridge and the third section from Campus Bridge to Thokar Niaz Baig. The trees from Jallo to Dharampura were 253 Simal, 239 Eucalyptus, 170 Shisham, 23 Pipal, 449 Poplar, 60 Arjun and 152 others, that remained unidentified. The trees from Dharampura to Campus Bridge were 666 Eucalyptus, 153 Simal, 201 Jaman, 77 Arjun, 775 Poplar, 49 Mango, 26 Neem, 27 Pipal, 205 Shisham and 119 others, which were unidentified. The trees from Campus Bridge to Thokar Niaz Baig were 1088 Poplar, 273 Shisham, 419 Jaman, 692 Eucalyptus, 225 Mango, 144 Simal and 107 others, which were unidentified. Mehmood also counted 1,358 Eucalyptus, 297 Simal, 620 Jaman, 1,893 Poplar, 274 Mango, 478 Shisham, and 226 unidentified ones.

The Canal Bank area, from where the trees are to be cut for the widening of the Canal Bank Road, is divided into three sections as mentioned in NESPAK's EIA report of the "*Remodeling of Canal Bank Road Lahore (Dharampura underpass to Canal View Bridge)*":

- Group-1 Dharampura underpass to Ferozepure Road underpass;
- Group-2 Ferozepur Road underpass to Jinnah Hospital underpass;
- Group-3 Jinnah Hospital underpass to Canal View Bridge;

According to NESPAK's EIA, a total of 914 trees will be cut, including 544 Eucalyptus, 48 Simal, 105 Shisham, 18 Kikar, 29 Mulberry, 24 Mango, 28 Jaman, 5 Pipal, 8 Neem, 2 Banyan, 30 Alstonia, 1 Mulsary, 7 Bottlebrush, 28 Fancy, 26 Siris and 11 other tree species. It also presents a summery of the total number of trees (including their species) with more than one (1) foot diameter to be cut as a result of widening of the Canal Bank Road. However, information regarding species of trees with less than one (1) foot diameter is not available. About 60% of the trees to be cut comprise Eucalyptus.

Moreover, number of nests of vultures at Lahore Canal noted by Mehmood (2000) on 23rd March 2000 was 5 and that of Pariah kites 46. Nesting of Magpie robin and Golden oriole

was also observed and Bay backed shrike, Roufous backed shrike and Plain leaf warbler were observed at the Lahore Canal Bank (Mehmood, 2000).

Likewise, Masood (2004) observed the Lahore Canal Bank area as a breeding habitat of Yellow-footed Green pigeons. Additionally, Alexandrine parakeets were observed breeding in the cavities of Arjun and Simal at a height of 20-35 feet at the Railway Colony, Canal Bank Extension. The researcher also observed 28 nesting cavities of Bank myna on the crevices on side walls of the Lahore Canal in June 2004.

Fatima *et al* (1998) reported that a dense green belt with thick canopy trees and shrubs can give as much as 5 to 8 dBA truck/car noise reductions per 100 feet of planting depth. Natural growth of deep forests was also measured which gave 3-to 5 dBA attenuation per 10 feet of planting depth. Planting depth of at least 100 feet is required to give reliable results, with the tree heights of 40-50 feet for reduction of noise pollution.

IV. EXECUTIVE SUMMARY

The Ecology of the habitat and its ecological linkages were studied. All trees and shrubs in the green belt and along the canal were identified and numbers were counted. The dominant tree species were Eucalyptus, Poplar, Weeping Willow, Mango and Jaman.

The dominant shrub species were Citrus, Kanair and Marwa. Total vegetation comprising trees and shrubs on the Lahore Canal Bank is twenty-one thousand, four hundred and thirty (21,430). Three thousand, seven hundred and twenty-eight (3,728) trees will remain after the cutting of trees on the 24 ft width of the green belt; five thousand, two hundred and ninety nine (5,299) trees will be cut on 24 ft width of both green belts due to the Canal Bank Road widening project of TEPA, City District Government Lahore (CDGL).

Forty-four (44) bird species have been identified and observed in the field. Moreover, small mammals such as stray dogs, feral cats, Small Indian mongoose and Indian Palm squirrel have been observed. Among flying insects, Dragonflies, Damselflies, Fireflies, different types of Butterflies such as Peacock pansy and Honeybees were also observed along with annelids including earthworms. Amphibians found in the study area were Tiger frog, Common frog and Indus Valley toads whereas in reptiles Indian Monitor lizard and Chitra Dhoobi Snake were also observed.

Furthermore, birds were found ecologically linked to Gul-e-Nashtar, Mulberry and Pipal trees for food. House crows, Rose-ringed parakeets, Bank mynas and Common mynas were ecologically linked to Poplar, Alstonia, Eucalyptus, Shisham and Beerli Patta trees for roosting. Many cavity nesters such as Rose-ringed parakeets, Common mynas, Spotted owl and Copper smith barbet were observed nesting on Poplar, Eucalyptus and Pipal trees. Pariah kites mostly prefer this habitat for nesting due to the presence of tall trees such as Eucalyptus, Poplar and Simal etc. Thirty-one (31) nests of Pariah kites were observed on the Canal Bank habitat in March 2007.

Many vendors such as meat and fruit sellers depend on this habitat for earning their livelihoods. Meat sellers were observed throwing away sadqa meat on the green belts. House crows and Pariah kites eat the meat thrown; however, four (4) or five (5) crows were found dead on the roadside and green belt daily. After conducting an opinion survey, it was found that ninety-five percent (95%) of the residents were against tree cutting.

In the Canal Bank area, trees act as sinks to air pollution especially carbon. Canal Bank is an ecologically balanced and important area possessing diversity of flora and fauna, with various socioeconomic activities and trees acting as strong air pollution buffers.

1. INTRODUCTION

Champion *et al* (1965), Dr. Siddiqui, (1986) and Chaudhry (1990) remarked that Lahore City has expanded at the expense of the original ecozone of Sub Tropical Thorn Forest. This ecozone has been drastically modified ever since the canal irrigation system in the Punjab was developed. Mehmood (2000) further explained the habitat change in the environs of Lahore.

During the Mughul and the Sikh eras, Lahore was confined to the walled city. Under the British regime many new buildings with lawns and gardens were built. The development of the canal irrigation system gave rise to extensive agricultural areas and gardens. Population expansion further brought urbanization. Indigenous trees were grown along the roadsides and canals. Mostly, these trees were Mulberry, Pipal, Banyan, Jaman, etc. Thus due to changes in vegetation structure in the towns and suburbs, a new type of habitat developed which attracted particular indigenous birds such as Yellow-footed Green pigeon, Grey hornbill, Alexandrine parakeet, Rose-ringed parakeet, Copper smith barbet, etc. These birds depended on the trees for shelter, food, nesting and roosting. High roofed buildings with verandahs with ventilators, projections, and sometimes by spaces in the building structures for making nests and to seek shelter, attracted birds such as Blue-rock pigeons, Little brown doves etc. Different other bird species were adapted to feeding upon the fallen grains such as Blue-rock pigeons, Common mynas and Little brown doves etc. Due to the development of new bridges, underpasses and widening of the roads, numbers of the indigenous trees have been cut, ultimately destroying the habitat of birds such as Yellow-footed Green pigeon, Grey hornbill, Alexandrine parakeet, etc. The large indigenous trees became fragmented into small pockets of habitats thus bird populations remained confined to these fragmented habitats. These indigenous trees were replaced by new and exotic varieties of trees, which changed the horticulture pattern of flora in Lahore (Masood, 2004).

1.1 OBJECTIVES OF THE STUDY

The research was carried out with the main aim of studying ecology and ecological linkages of the Lahore Canal Bank area ranging from Mustafaabad Bridge to Thokar Niaz Baig. Depending on the aim of the research, the following specific objectives can be derived:

1. To find out the species of trees/shrubs and count their populations accurately on both sides of the green belts and along the banks of the Lahore Canal;
2. To observe and list species of birds, small mammals, amphibians, reptiles and important insects inhabiting the area;
3. To find out ecological linkages of birds of the Lahore Canal Bank habitat;
4. To collect the opinion of people such as vendors, residents and commuters regarding the tree cutting issue through conducting a socio-economic survey;
5. To review the EIA report of NESPAK *Remodeling of Canal Bank Lahore* (Dharampura underpass to Canal View Bridge);

6. To find out the impact of trees on air pollution of the area;
7. To study the effects on ecology and health of people of the area due to cutting of trees;
8. To highlight the importance of trees in the Lahore Canal Bank area for preservation and maintenance of ecology of the habitat

1.2 SURVEY METHODS (MATERIALS AND METHODS)

The fieldwork for the research project was conducted in the breeding season of birds from 1st March 2007 to 30th April 2007 at the Canal Bank study area from Mustafaabad Bridge to Thokar Niaz Baig. Furthermore, the fieldwork was conducted again from 6th August 2007 till 19th September 2007 for calculating the extent of ecological loss. In addition, observations for the behavior of birds were made with Nikon binocular of power 16X50 4.1°. Coordinates of different locations in the study area were taken from the Global Positioning System (GPS) receiver Magellan GPS 315 obtained from GIS Laboratory of WWF - Pakistan. Field identification of bird species was performed by taking help from the *Field Guide to Birds of Pakistan* by Z.B Mirza. Four-wheel drive car was used to reach the study area. However, major field work was conducted on foot. GOOGLE EARTH software was used in the GIS Lab for analysis of vegetation cover of the study area. Since no specific legal tree definition exists in Pakistan Environmental Protection Act (PEPA 1997), the definition as given in the Forest Act 1927, was used to define tree in this research. According to the Forest Act of 1927, tree is defined as "Trees include palm, bamboos, stumps, brush-wood and canes".

1.2.1 Socioeconomic Surveys

Vendors Survey

A socioeconomic survey was conducted by interviewing and filling in the socioeconomic questionnaires for the vendors who earn their livelihood standing on the existing earthen shoulder of both the green belts. Ten (10) vendors were selected for the interview, which were selected from the total population of 20 on the road. (*Annex-4, Map 4.*)

Household Survey

Four (4) volunteers from the College of Earth and Environmental Sciences, Punjab University, Lahore were selected for the socioeconomic household survey of the residential community along the green belts of the Lahore Canal.

The study area was divided into seven (7) sections on the basis of bridges for the household survey. Each residential community between the bridges on both sides along the Canal was selected for the survey. These residential communities include Zaman Park, GOR, Gulberg-II, Garden Town, Muslim Town, Wafaqi Colony and Johar Town. A taxi was arranged for the students in order to conduct the survey. (*Annex-4, Map1 and Map 5.*)

Four (4) houses were selected from each section randomly in the residential areas. There were total of one hundred and fifty three (153) houses lining both sides of the green belt from Mustafaabad Bridge to Thokar Niaz Baig on the Canal Bank. The sample size was taken as 20 out of 153 houses.

Commuters' Survey

Two (2) volunteer students from the College of Earth and Environmental Science, Punjab University, Lahore conducted the commuters' socioeconomic survey on the Canal Bank road on their motorbikes. The road was divided into seven (7) sections on the basis of bridges. The area of road in between the bridges was selected for the commuter's survey.

1.2.2 Identification and Counting of Trees and Shrubs along the Lahore Canal

The left green belt and left bank along the canal was studied first and then the right green belt and right bank along the canal for identification and counting the numbers of trees and shrub species. The total length of the right and left green belts and banks along the canal was 14 km on each side.

The left and right green belts were divided into 28 sections of 0.5 km length, cumulatively, the length of green belt is found as fourteen (14) km. (*Annex-1, Table 1*). The field man demarcated each section writing WWF 1, WWF 2 and WWF 3 and so on till the last section; WWF 28 on the side of the footpath along canal on both sides for identification of each section.

Tree and shrub species in each section of the green belt were identified and counted one by one. The Head Gardener of Jinnah Gardens, Mr. Alam, and his assistant identified the tree and shrub species in the field. Small branches from the trees and shrubs were broken to collect samples for correct identification. The samples were taken to the Jinnah Gardens and were matched with the trees with plates bearing common names and botanical names. They were then preserved using the herbarium sheets.

Tree species and shrubs on both green belts were counted and summed up for the total population of each tree and shrub species. The lists of trees and shrubs at the left and the right greenbelts of Lahore Canal were prepared. The list comprises the common and local names of the tree and shrub species, their scientific names, total population of tree species and their relative abundance is also reported.

Similarly, the list of trees and shrubs at left side and right banks along the Lahore Canal was also prepared. The list comprises the common and local names of trees and shrub species, their scientific names, total population of tree species and their relative abundance. (*Annex-1, Tables 6,7,8,9,10,11,12 and 13.*)

The trees were categorized under three categories depending upon their height:

- | | |
|------------------------|------------------|
| 1. Tall trees | 40-100 feet tall |
| 2. Medium height trees | 20-40 feet tall |
| 3. Small trees | 12-20 feet tall |

Woody vegetation less than 12 feet and more than 3 feet was described as shrubs.

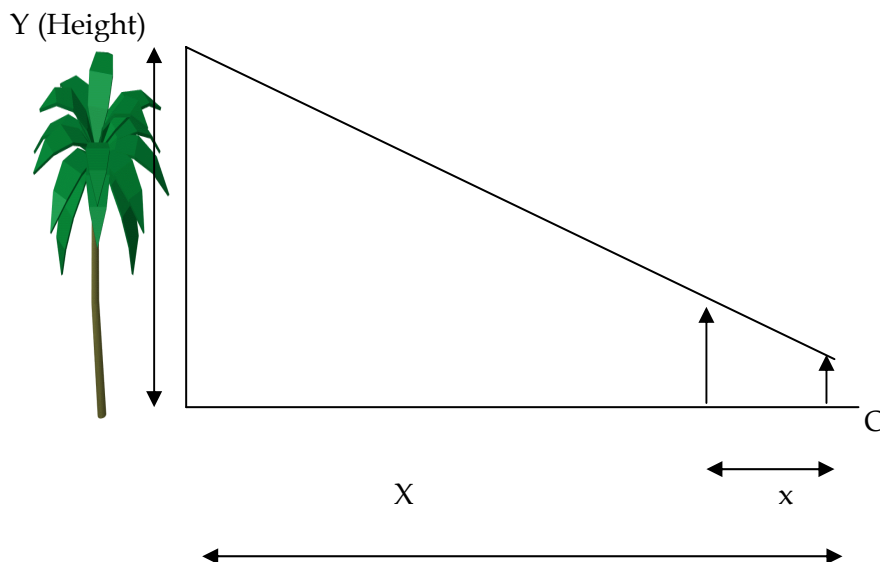
Triangle method was used to estimate the height of the tree, described below:

Moreover, observations were made from measured 150-200 feet available distance. The field man was designated as “y”. The observer sat at a distance of 100 feet from the base of the tree on the ground the observer is expressed as O. In order to measure the tree’s height the observer closed one eye and matched the tip of the field man’s head with the tip of the tree. The field man moved for a distance between the observer and the tree. When his head synchronized with the upper tip of the tree and the parallax was removed then the distance where he was standing from the observer was measured. This was calculated as “x”. In this distance, the point where the tip of the field man head met the tip of the tree was measured and added to find the “X”. The following formula was used to determine the height of the tree.

$$Y/X = y/x$$

$$Y = (y/x) X$$

X, x and y are known and Y is calculated i.e., the height of the tree. (Diagram is given below)



The trees that will be cut on the proposed area of eighteen (18) feet width + 6ft earthen shoulder on both sides of the green belt were demarcated by marking the green belt ground with the small red flag. The trees outside the 24 feet width of the green belt were counted together with the tree species identified in the field. The left green belt was taken first for the counting starting from section L1 till section L28. Similarly, the right green belt was taken for counting starting from section R1 till section R28.

SOME PICTURES OF THE STUDY AREA



Row of Mango trees at the green belt



Trees on the green belt earthen shoulder



View of the Canal



View of the Canal Road



House crows gathered around meat seller



View of the left bank green belt

2. THE STUDY AREA

Lahore Canal Bank starting from Dharampura Bridge, which has now been renamed Mustafaabad Bridge to Thokar Niaz Baig was selected as the study area. This area presents landscape symmetry and aesthetic appeal.

Lahore Canal is an offshoot of the Lower Bari Doab Canal. Irrigation from the Lower Bari Doab Canal began in 1860's. Total length of the main and branch canals is three hundred and sixty nine (369) miles. The main branch after twenty-five (25) miles gives off the Lahore branch (*Imperial Gazetteer of India, Provincial series 1998*). Canal Bank area tree plantation was raised and maintained by the Forest Department. However, nearly a decade ago, its management was transferred to Parks and Horticulture Authority (PHA).

Metallic roads have been constructed along the canal to facilitate motorized traffic. Trees and shrubs of different species were planted along the canal's bank and the green belts of varying width flanking the roads. A footpath has also been constructed in between the roads and the canal bank within the city limits of Lahore to facilitate pedestrians. Lawn grass provides a green mat along the banks and in the green belt.

The Canal Bank study area comprises vegetation, which varies from dense cover to sparse or less and at some locations very little vegetation cover exists. Moreover, at one point there is no vegetation cover. Starting from Mustafabaad Bridge until a distance of 0.5 km there is dense vegetation cover, which becomes less after 0.5 km at the Mall Bridge then again after constant distance of 0.5 km it, becomes dense near Kinnaird College for Women.

At the Jail Road Bridge there is sparse vegetation, near FCC Gulberg it becomes dense then at FC College it again becomes sparse and near Punjab College of Commerce it becomes dense patch. At Ferozepur Road there is sparse vegetation, which becomes even sparser near University of Central Punjab. After that there are dense patches of vegetation, at the Punjab University New Campus underpass it becomes sparse and less. At the Jinnah Hospital Underpass, there is very less vegetation cover. At the Doctors Hospital, there is no vegetation cover. After Jinnah Hospital until Thokar Niaz Baig there is little/sparse vegetation cover.

**Satellite Image1:
Dense Patch of Vegetation on the
Lahore Canal Bank from Google
Earth**



**Satellite Image 2:
Sparse Patch of Vegetation on the
Lahore Canal Bank from Google
Earth**



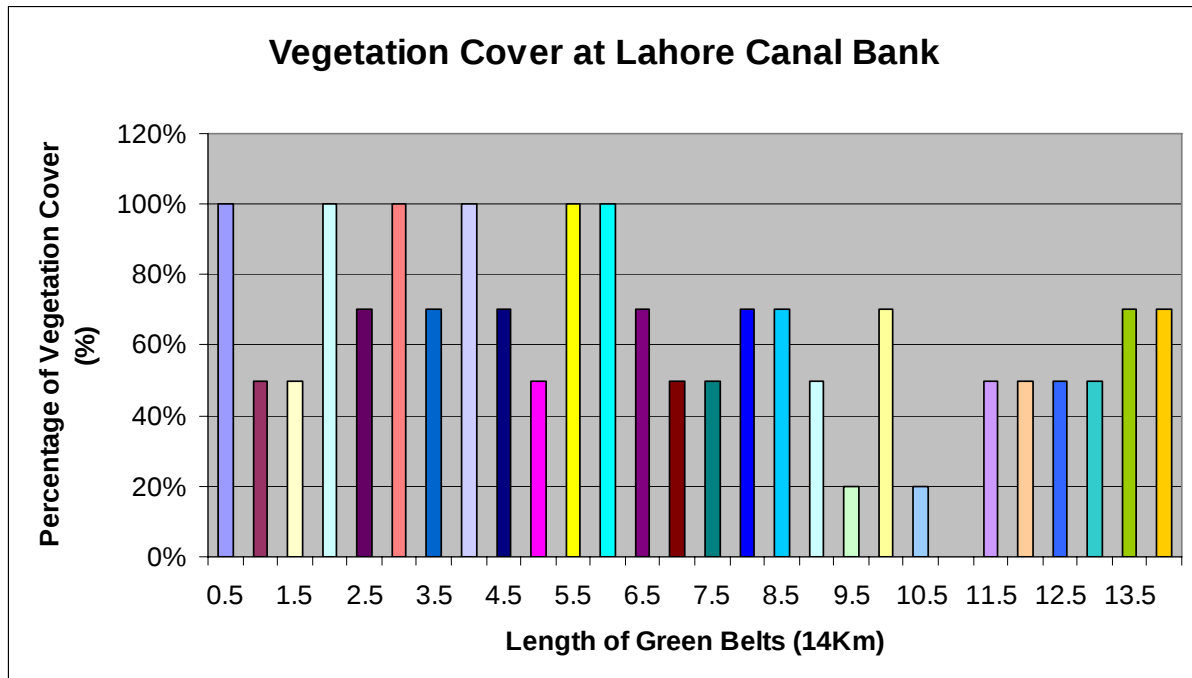
**Satellite Image 3:
Very Sparse Vegetation on the
Lahore Canal Bank from Google
Earth**



Table 1
**Vegetation Cover of the Lahore Canal Bank Green Belts from Mustafaabad Bridge to
Thokar Niaz Baig on a Total Length of 14 km Stretch**

Standard
Eye Altitude: 700m
Length: 1/2 km

Sr No.	Length of Green Belts	Location	Vegetation Cover Rating
1	0.5km	Mustafaabad Bridge	4
2	0.5km	Mall Bridge	2
3	0.5km		2
4	0.5km	Kinnaird College	4
5	0.5km	Jail Road Bridge	3
6	0.5km	FCC Gulberg	4
7	0.5km	FC College	3
8	0.5km	Punjab College of Commerce	4
9	0.5km	Ferozepur Road Underpass	3
10	0.5km	University of Central Punjab	2
11	0.5km		4
12	0.5km	Muslim Town Underpass	4
13	0.5km		3
14	0.5km	Punjab University Campus Bridge	2
15	0.5km	PU Mosque	2
16	0.5km	Hailey College of Commerce	3
17	0.5km	PU Islamic Centre	3
18	0.5km		2
19	0.5km	Jinnah Hospital Underpass	1
20	0.5km		3
21	0.5km	Doctors Hospital Underpass	1
22	0.5km	Doctors Hospital	0
23	0.5km	Sichuan Chinese Restaurant	2
24	0.5km		2
25	0.5km		2
26	0.5km		2
27	0.5km	Canal View Housing Society	3
28	0.5km	Thokar Niaz Baig	3



Vegetation cover:

Rating

Dense	80-100%	4
Sparse	60%-70%	3
Less	30%-50%	2
Very less	10%-20%	1
No vegetation	0%-5%	0

2.1 ECOLOGICAL DESCRIPTION OF THE CANAL BANK HABITAT

2.1.1 Vegetation of the Canal Bank Habitat

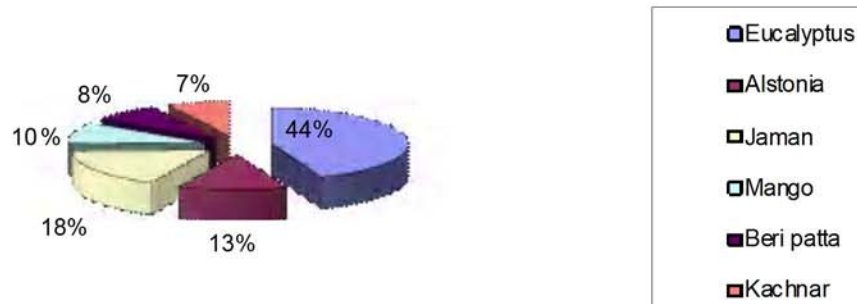
As observed on the Lahore Canal Bank presents a diverse variety of vegetation and tree cover in the green belts on both sides of the Canal as well as on the canal banks. The dominant tree species are Eucalyptus, Poplar, Weeping Willow, Jaman and Mango. The trees are of varying heights in the Canal Bank, the ones that can be categorized as tall trees are greater than forty (40) feet, whereas medium height trees varies between twenty (20) to forty (40) feet. Small trees, on the other hand, ranges from twelve (12) to twenty (20) feet and shrubs less than twelve (12) feet tall.

A total of thirteen (13) Banyans and twenty-four (24) Pipal, furthermore, one thousand nine hundred and twenty-seven (1,927) Eucalyptus, one thousand three hundred and twenty-four (1,324) Poplar, one thousand one hundred and forty-one (1,141) Jaman, nine hundred and thirty-four (934) Mango trees were counted in the green belts on both sides of the Canal as well as on the banks of the Canal.

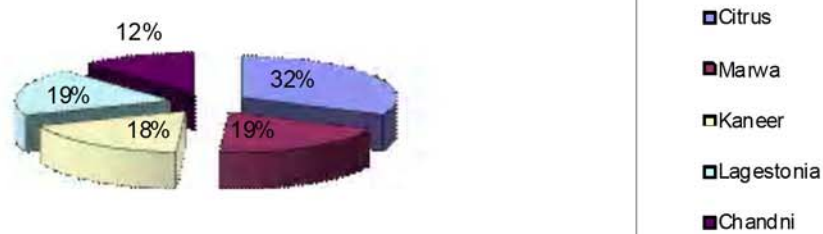
Moreover, research has shown the presence of one thousand nine hundred and seventeen (1,917) Eucalyptus, one thousand twenty-two (1,022) Jaman, nine hundred and nine (909) Amaltas, four hundred and seventy-seven (477) Alstonia, four hundred seventy-seven (477) Shisham and two hundred and eighty-one (281) Bottle brush on both the green belts of the Canal Bank habitat. Further, there are Bamboo thickets, which were counted as one hundred and ninety-five (195) in the green belts. In addition to above-mentioned trees other tree species found at the study area are: Tun, Gullar, Pilkan, Beerli Patta, Longwood tree, Ulta Ashok, Gold Mohr, etc. There are 70 trees which are old and dead in the green belts. (Annex - 1, Tables 6, 8, 10, 12). Similarly, the shrubs in the study area are Harsinghar, Lagestonia shrub, Gul-e-Farang, Peeli Kanair, etc. (Annex-1, Tables 7, 9, 11, 13).

The relative abundance of trees and shrubs on both left and right bank greenbelt of Lahore Canal Bank are depicted in pie-charts below.

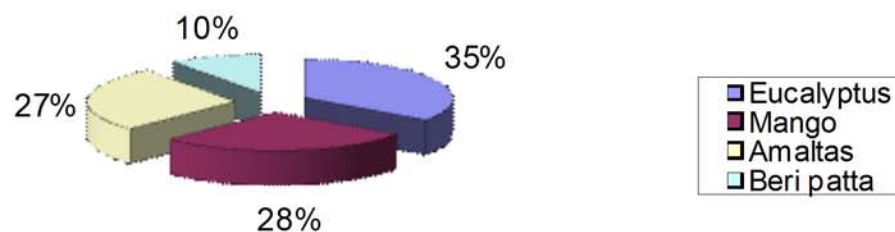
Pie-chart 1: Relative Abundance of Trees at the Left Bank Green Belt



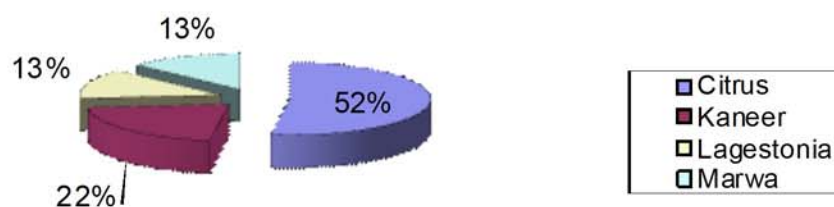
Pie-chart 2: Relative Abundance of Shrubs at the Left Bank Green Belt



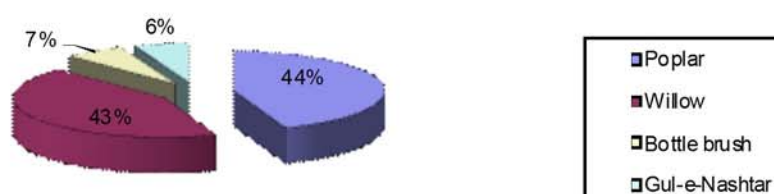
Pie-chart 3: Relative Abundance of Trees at the Right Bank Green Belt



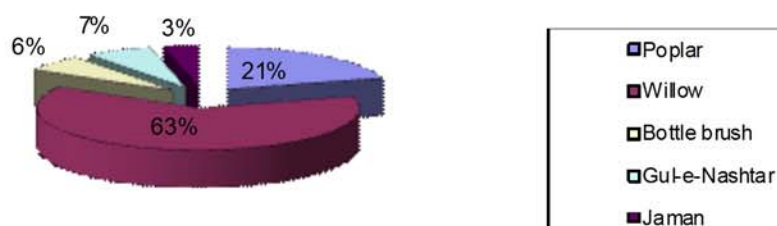
Pie-chart 4: Relative Abundance of Shrubs at the Right Bank Green Belt



Pie-chart 5: Relative Abundance of Trees Left Side along the Canal



Pie-chart 6: Relative Abundance of Trees at the Right Side along the Canal



FLORA OF CANAL BANK HABITAT



Mulsary, *Mimosa elengi*



Marwa, *Murraya exotica*



Hibiscus, *Hibiscus muotabilis*



Lantana, *Lantana indica*



Peeli Kanair *Thavetia modifolia*



Bottle Brush *Callistemon viminalis*

Photographs: Guhlam Rasool

2.1.2 Fauna of the Canal Bank Habitat

Small mammals observed in the area were stray dogs, feral cats, Small Indian Mongoose, Indian Palm Squirrel and among insects, Dragonfly, Damselfly, different types of Butterflies such as Peacock Pansy, Honeybee and fireflies were observed at night in the months of June and July in annelid Earthworms. Eight (8) Honeybee hives were observed on the left green belt and six (6) on the right bank green belt in April 2007. There were many insects after the rain showers in August 2007 but they were not identified.

Reptiles observed were Indian Monitor Lizard and Chitra dhoobi Snake and in amphibian's Common Frog, Tiger frog and Indus valley toad were observed (*Annex-1, Table 20*). The EIA report of NESPAK mentions that birds such as Wood pigeon, Indian jungle Nightjar, Brown throated spine tail swift were present in the habitat. Whereas the birds observed in the habitat are mentioned in (*Annex 1, Table 19*) Prominent among them are: Yellow-footed Green Pigeon, Grey Hornbill, Little-brown Dove, Ring Dove, Rose-ringed Parakeet, Alexandrine Parakeet and Little-green bee eater.

BIODIVERSITY OF LAHORE CANAL BANK



Monitor Lizard



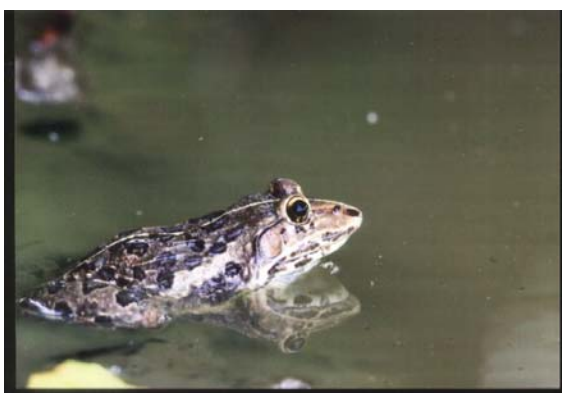
Peacock pansy



Dragonfly



Damselfly



Indus Valley Bullfrog



Indian Palm Squirrel

Photographs: Ghulam Rasool

2.2 SOME OBSERVATIONS ON BIRD BEHAVIOUR

2.2.1 Roosting of Bank Mynas and Common Mynas along the Canal

On 11th April 2007 at 6:30 pm roosting of Bank Mynas and Common Mynas was observed on ten (10) Poplar trees along the Canal at the left and right greenbelts at an average roosting height of 50-60 feet. The Mynas were emitting noise and were gathering on the branches of the trees. The GPS coordinates of the Poplar trees were 3129.37° North and 07418.07° East.

2.2.2 Roosting of House Crows and Rose-ringed Parakeets on the Green Belts

On 11th April 2007 at 6:37 pm roosting of House crows and Rose-ringed Parakeets was observed on Shisham, Alstonia and Eucalyptus at an average roosting height of 50-60 feet, 45 feet and 70 feet, respectively. The Rose-ringed Parakeets were coming from four sides of compass North, South, East and West towards the Alstonia tree on the left bank green belt. The GPS coordinates of the Alstonia tree were 3129.30° North and 07418.01° East.

Moreover, they were observed emitting a lot of noise and adjusting their perch on the trees for roosting. They start roosting from the top most branch of the tree and slowly and gradually come down to lower branches, then the roosting stops and they become silent. Some parakeets were also roosting on the Beeri Patta trees. The roosting came to an end at 7:05 pm on the green belt.

2.2.3 Feeding of Birds on the Nectar of Gul-e-Nashtar Flower

On 10th April 2007 at 10:00 am several birds were observed feeding upon the nectar of Gul-e-Nashtar flower such as House crows, Rose-ringed Parakeets, Red-vented Bulbuls, Purple Sunbirds and Common Mynas on the green belts near the Punjab University New Campus bus stop. The tree height was 55 ft and the GPS coordinates of the Gul-e-Nashtar tree were 3130.25° North and 07420.43° East.

2.2.4 Feeding of Birds on the Mulberry Fruit

On 12th April 2007, at 7:00 am Rose-ringed Parakeets, Copper smith barbets, Red-vented Bulbuls, Common Mynas and Bank Mynas were observed feeding upon the fruit of Mulberry tree on the green belt.

2.2.5 Feeding of Birds on the Pipal Figs

On 22nd April 2007, at 8:30 am Yellow-footed Green Pigeon, Common Koel, Bank Myna, Rose-ringed Parakeet, Copper smith barbet, Grey Hornbill and Red-vented Bulbul were observed feeding upon the half ripe figs of the Pipal tree on the green belts.

2.2.6 Nesting of Little Bown Dove and Indian Ring Dove

On 15th March 2007 at 11:30 am nests of Little-brown dove and Indian ring dove were observed on Ulta Ashok and Mulberry tree at a nesting height of 5 feet and 10 feet respectively on the green belts.

2.2.7 Nesting of Rose-ringed Parakeet and Common Myna

On 23rd March 2007 at 1:00pm nesting cavities of Rose-ringed Parakeet and Common Myna were observed on Poplar trees at a nesting height of 10-20 feet for both.

Table 2
Nesting Coordinates of Birds at the Canal Bank Habitat

Sr. No.	Birds	Nesting tree	Nest height ft	GPS coordinates	
				N	E
1	Grey hornbill	Poplar	30ft	3132.44°	7421.05°
2	Common Myna	Eucalyptus	20ft	3131.57°	7420.21°
3	Rose-ringed Parakeet	Eucalyptus	20ft	3131.27°	7419.53°
4	Rose-ringed Parakeet	Simal	25ft	3130.47°	7419.15°
5	Rose-ringed Parakeet	Poplar	25ft	3130.4°	7419.07°
6	Red-vented bulbul	Poplar	10ft	3130.4°	7419.07°
7	Rose-ringed Parakeet	Eucalyptus	25ft	3130.34°	7419.02°
8	Common Myna	Eucalyptus	20ft	3130.28°	7418.57°
9	Rose-ringed Parakeet	Pipal	15ft	3130.28°	7418.57°
10	Common Myna	Poplar	25ft	3130.06°	7418.35°
11	Rose-ringed Parakeet	Poplar	20ft	3129.4°	7418.11°
12	Rose-ringed Parakeet	Poplar	30ft	3132.53°	7421.12°
13	Rose-ringed Parakeet	Poplar	25ft	3129.04°	7417.19°
14	Common Myna	Poplar	15ft	3129.19°	7417.43°
15	Rose-ringed Parakeet	Poplar	20ft	3128.38°	7418.06°
16	Spotted owlet	Poplar	15ft	3129.44°	7418.18°
17	Rose-ringed Parakeet	Poplar	10ft	3130.08°	7418.35°
18	Copper smith barbet	Poplar	25ft	3130.24°	7418.49°
19	Common Myna	Poplar	10ft	3130.36°	7419.01°
20	Rose-ringed Parakeet	Poplar	15ft	3131.08°	7419.32°

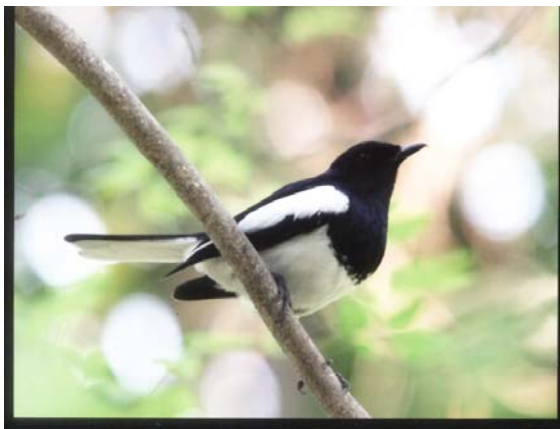
AVI-FAUNA OF THE CANAL BANK HABITAT



Little Green Bee Eater, *Merops orientalis*



Copper Smith Barbet, *Megalima haemecephala*



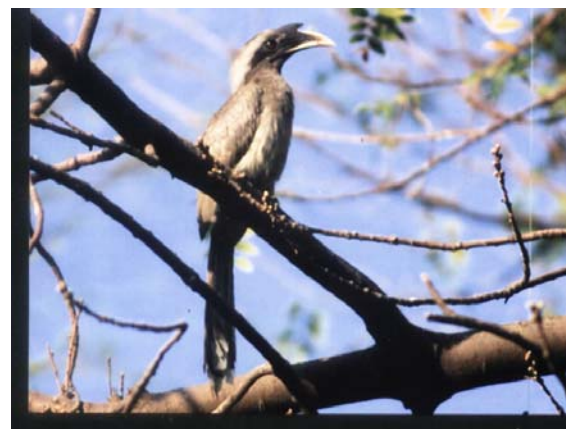
Magpie Robin, *Copsychus saularis*



Purple Sunbird, *Nectarinia asiatica*



Yellow-footed green Pigeon, *Treron phonicoptera*



Grey Hornbill, *Tockus nasutus*

2.3 ECOLOGICAL LINKAGES OF BIRDS OF THE CANAL BANK HABITAT

2.3.1 TREES

Roosting trees:

Common Mynas and Bank Mynas are ecologically linked to Poplar trees at a height of 50-60 feet for Roosting along the left side of the Lahore Canal.

Rose-ringed Parakeets and House Crows are ecologically linked to Alstonia, Eucalyptus, Shisham and Beri Patta trees at a height of 70-40 feet at the left green belt of the Lahore Canal Bank. This habitat provides sites for roosting to these birds and the area of the green belt having thick canopies provide shelter to many other tired birds such as Grey Hornbills, Yellow-footed Green Pigeons, Little green bee-Eaters, Ring Doves etc.

Feeding trees:

Copper smith Barbets, Rose-ringed Parakeets, Red-vented Bulbuls, Common Mynas, Bank Mynas are ecologically linked to Mulberry tree fruit for feeding at the Lahore Canal Bank.

Yellow-footed Green Pigeons, Common Koels, Bank Mynas, Rose-ringed Parakeets, Copper smith Barbets, Red-vented Bulbuls and Grey Hornbill are ecologically linked to Pipal and Banyan trees figs for feeding at the Canal Bank.

House Crows, Rose-ringed Parakeets, Red-vented Bulbuls, Purple Sunbirds, and Common Mynas are ecologically linked to 15 Gul-e-Nashtar and 20 Simal trees at a height of 55 feet and 75 feet, respectively, for sucking nectar of its flowers for food. Rose-ringed Parakeets are also ecologically linked to Beeri tree for food.

Nesting trees:

Little-brown Doves and Ring Doves are ecologically linked to Ulta Ashok at nesting height of 5 feet and Mulberry tree at nesting height of 10 feet. Rose-ringed Parakeets are ecologically linked to Poplar, Eucalyptus and Simal at a nesting height of 10-25 feet.

Common Mynas are ecologically linked to Poplar, Eucalyptus and Pipal at a nesting height of 15 -30 feet. Also, Red-vented Bulbuls, Grey Hornbills, Copper smith Barbets and Spotted Owlets are ecologically linked to Poplar trees at a nesting height of 10 feet, 20-35 feet and 15 feet, respectively.

2.3.2 SHRUBS

Red-vented Bulbuls, Common Mynas, Rose-ringed Parakeets are ecologically linked to *Lantana indica* shrub for sucking nectar for food in green belts.

Table 3
Ecological Linkages of Birds with the Trees at the Canal Bank Habitat

Sr. No	Birds	Trees												
		Poplar	Eucalyptus	Simal	Pipal	Gul-e-Nashtar	Mulberry	Shisham	Alstonia	Beeri Patta	Ulta Ashok	Banyan	Lantana indica	Beeri
1	Common Myna	R&N	N	F&N	F&N	F&N	F	-	N	N	-	F	-	-
2	Bank Myna	R&F	-	-	F	F	F	-	-	-	-	-	-	-
3	Rose-ringed Paraket	N	R&N	F&N	F	-	F	R	R	R	-	F	-	F
4	House Crow	-	R	-	F	-	F	-	R	R	-	F	-	-
5	Red-vented Bulbul	N	-	F	F	F	F	-	-	-	-	F	F	N
6	Copper smith Barbet	N	N Dead Tree	N	F	N	F	-	-	-	-	-	-	-
7	Purple Sunbird	-	-	F	-	F	-	-	-	-	-	-	F	-
8	Little brown Dove	-	-	-	-	-	-	-	-	-	N	-	N	-
9	Ring Dove	-	-	-	-	-	N	-	-	-	-	-	-	-
10	Spotted owl	N	N	N	N	-	-	-	-	-	-	-	-	-
11	Grey hornbill	N	N	N	F	-	F	-	-	-	-	F	-	-
12	Yellow footed green pigeon	N	-	-	F&N	N	F	N	N	-	-	F	-	F

F Feeding
R Roosting
N Nesting

2.3.3 Mortality of House Crows and Pariah Kites due to Socioeconomic Activity on the Canal Bank

During the research, numbers of meat sellers were observed standing beside the green belts at the Lahore Canal Bank. These meat sellers sell meat which is actually the meat of the cows and buffalos. The commuters buy this meat for *Sadqa* purpose (to defend against evil spirits) and the meat sellers throw this meat in the green belts. As a result of this, House crows and Pariah kites gather around and eat this meat. It was observed that after two-three days, they fail to fly, fall vertically downwards and die in upside down position. Three to four dead House crows, observation was encountered on daily basis during the research.

Afterwards the stray dogs and feral cats come by sniffing the dead House crows and Pariah kites and eat them on the green belts. Whether the stray dogs and feral cats also die by eating the dead crows and kites was not observed. During the last week of October 2007 when the field man went to collect the sample of dead crows and kites for post-mortem, many old dead crows and kites were found at the site; however, no fresh dead crow or kites were observed on the green belts. This happened because policemen had driven the meat sellers away.



Dead House crows lying on the side of Lahore Canal Road

This happens on a regular basis: when the situation gets better for the meat sellers they again come to sell meat.

Thus, it can be stated that the reasons for mortality of the House crows and Pariah Kites are eating meat that contains some toxic poison.

2.4 SOCIOECONOMIC ASPECTS

Three types of socioeconomic surveys were conducted.

- i. Vendors' survey, which includes the meat, fruit and toy sellers etc;
- ii. Household survey, which includes the socioeconomic assessment survey of houses along the Canal Bank Road regarding the tree cutting issue;
- iii. Commuters' survey, which includes all the transportation on the Canal Bank Road such as motorbikes, bicycles, rickshaws and cars.

2.4.1 Vendors' Survey

At the Lahore Canal the vendors earn their livelihoods in the green belts under the shades of the thick canopy trees. They have different professions such as meat, fruit, sugarcane juice, toy, gloves sellers, newspaper hawkers and barbers (*Socioeconomic survey coordinates Annex-1, Table 22*).

The interviews were conducted for ten (10) vendors who were two (2) meat, four (4) fruit, two (2) sugarcane juice, one (1) glove and one (1) toy sellers.

The vendors stand on the existing earthen shoulder of both the green belts and earn their livelihood. Some had been doing this for 15-25 years: others had been there only for 3-5 days. Most of them reported that Eucalyptus trees were there on the Canal Bank green belts. They also reported the researchers the existence of Pipal, Shisham, Poplar, Mulberry, Dhreek and Jaman trees in the canal area.



Interviewing a strawberry seller under the shade of a tree

Even though they were illiterate, most of them knew that the trees play an important role in the environment providing them shelter and shade to stay and earn their living. They were also well aware of the fact that the trees provide fruits as well as soothe the mind.

Moreover, they knew that the trees provide nesting sites to birds as they often observed the parent Rose-ringed Parakeet feeding their nestlings inside the nesting cavities. Only two of the vendors did not know that trees were an important biotic component in the environment. Those who had no knowledge regarding the importance of trees were given information on the subject.

The maximum income generation of the vendors in summers is Rs 500 per day and minimum generation is Rs 100-200 per day. In winters, some sugarcane juice vendors switch from sugarcane juice to other products, so in winter their income generation drops to Rs 250 per day. The annual total revenue generated from the Canal Bank area is about Rs 12

million. Trees present in this habitat are contributing to the socioeconomic sustainability of the area.

Two people knew that the trees would be cut in the near future and those who did not know became worried when they heard about it. The people who were aware about the cutting of the trees came to know it because of the socioeconomic survey that was conducted for the *EIA of Remodeling of Lahore Canal Bank Road by NESPAK for Traffic Engineering and Transport Planning Agency (TEPA), Lahore Development Authority (LDA)*.



Interviewing a fruit seller

The people were found to be against the tree cutting on the Canal Bank; furthermore, they had no income generating options except standing under the shade of the trees to sell their goods and products. Most of them expressed their concern that tree cutting would adversely affect their economic stability. Some expressed their fear that if the trees were cut they will have to stand on the grassy green belts without shade. In this way, they will have to bear the burning sun; they have no other option as they have to earn their livelihoods.

2.4.2 Household Survey

A household survey was conducted on both sides along the canal bank area in order to collect the response of people living along the Canal. In this respect, four (4) volunteer students of the College of Earth and Environmental Science, Punjab University, Lahore surveyed twenty (20) houses out of one hundred and fifty-three (153) houses for obtaining the opinion of the residents about the tree cutting issue.

The residential areas surveyed, were Zaman Park, Gulberg II, Garden Town, Muslim Town and Johar Town. Forty percent (40%) residents were businessmen and fifteen percent (15%) had private jobs. Twenty-five percent (25%) residents belonged to high class and forty percent (40%) belonged to high middle class.

Eighty-five percent (85%) were aware of the tree cutting issue and only fifteen percent (15%) were unaware regarding the issue. Fifty-five percent (55%) of the residents said that the trees provide shade and shelter, twenty-five percent (25%) gave their opinion that trees gave aesthetic beauty, provide shelter and protection to biodiversity, fifteen percent (15%) said that trees decrease air and noise pollution and fifteen percent (15%) said that they protect biodiversity, provide shelter aesthetic beauty, and calmness. Eighty percent (80%) residents answered that major risk due to tree cutting would be an increase in air and noise pollution. Ten percent (10%) said it would cause respiratory problems and fifty percent (50%) said noise, dust, air pollution, and respiratory problems.

Seventy-five percent (75%) of the residents were aware of the biodiversity of the area including rare species of birds such as Yellow-footed green pigeon; Alexandrine Parakeet and Grey hornbill and only fifteen percent (15%) were unaware whereas five percent (5%)

did not answer. Forty-five percent (45%) expressed that effects on weather due to cutting of trees would result in prolong summers whereas fifteen percent (15%) answered that it would increase humidity. Thirty-five percent (35%) said that it might result in shorter winters. Five percent (5%) of the people in the study area did not answer.

When asked if the trees and birds were greater in number ten (10)-fifteen (15) years ago, eighty percent (80%) said yes; only twenty percent (20%) said no. Ninety-five percent (95%) residents gave their opinion that trees should not be cut and only five percent (5%) gave their opinion in favour of tree cutting. When asked why the trees should not be cut thirty percent (30%) answered that there would be an ecological loss, twenty-five percent (25%) said loss of aesthetic beauty, ten percent (10%) said loss of protective function and thirty-five percent (35%) were not aware of the importance of trees. The newspapers provided thirty five percent (35%) information while the television (TV) gave twenty percent (20%) and the remaining twenty percent (20%) was from other sources. Fifteen percent (15%) did not give any answer, five percent (5%) said they were eyewitness to workers cutting trees along the canal, on the side of the houses. Another five percent (5%) came to know from the Non Governmental Organizations (NGO). (*Annex-3, Table 23 Socioeconomic survey assessment of residents along the green belts of Lahore Canal Bank.*)

2.4.3 Commuters' Survey

The survey was started from Mustafaabad Bridge, Mall Road Bridge, Jail Road Bridge, FC College Bridge, Ferozepur Road Bridge, Punjab University Bridge, Jinnah Hospital Bridge and then ended at Doctors Hospital Bridge. Twenty (20) commuters on different vehicles were interviewed for survey to get an idea about their opinion.

When asked if tree numbers were larger ten (10)-fifteen (15) years ago compared to the number today, sixty percent (60%) said yes and forty percent (40%) said no. Twenty percent (20%) had awareness about the cutting of trees and eighty percent (80%) were unaware. Fifty-five percent (55%) commuters answered that trees should be chopped off and forty-five percent (45%) said that trees should not be cut. When asked why the trees should be chopped off, the reasons that people gave were that trees slow down traffic. Those who said no, had reasons such as the fact that trees provide shade and shelter and add to the aesthetic beauty of the area. Seventy-five percent (75%) commuters travel daily on the Canal Bank Road. Fifty-five percent (55%) were found concerned about the health hazards due to heavy traffic which could be respiratory and cardiovascular problems. Only thirty percent (30%) said respiratory problems and fifteen percent (15%) did not know. (*Annex-3, Table 24 Socioeconomic survey assessments of commuters on the Lahore Canal Road*)

3. EFFECT ON AIR POLLUTION, ECOLOGY AND HEALTH OF PEOPLE DUE TO CUTTING OF TREES ON THE LAHORE CANAL BANK

Trees, through the leaf surfaces, absorb harmful pollutants produced by vehicular traffic, including Nitrogen Dioxide (NO₂), Sulfur Dioxide (SO₂), Carbon Monoxide (CO) and Small Particulate Matter (PM₁₀) such as dust, smoke and vehicular exhaust are trapped and filtered by leaves and branches.

In the EIA Report of Remodeling of Canal Bank Road, Lahore from Dharampura Underpass to Canal View Bridge at Thokar Niaz Baig, SGS Lab conducted the Ambient Air Monitoring of CO, NO₂, SO₂, and PM₁₀ on four (4) designated locations at the Canal Bank area as depicted in the Table 5.4 Ambient Air Quality Test Result. These four (4) locations were:

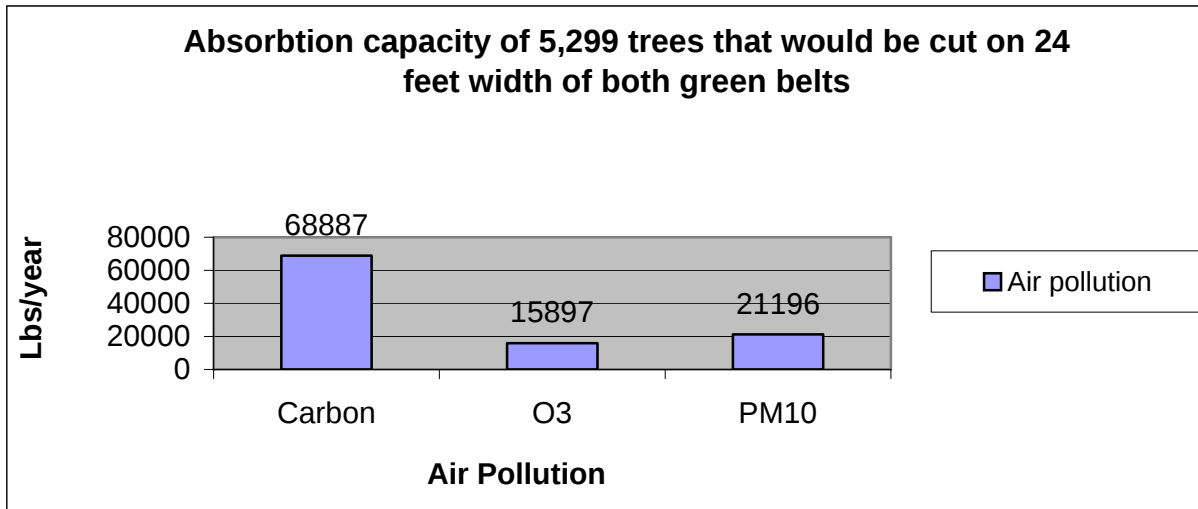
1. Zaman Park, Near WASA Tubewell
2. Canal Bank Ferozepur Road, near irrigation flood zone office
3. Jinnah Hospital underpass, near Allama Iqbal Medical College
4. Canal View Housing Society, near Meezan School

Table 4
Impact of Trees on the Level of Air Pollution around Lahore Canal Bank
at 21,430 total vegetation

			Sampling Locations				US EPA Standards
SR. NO.	PARAMETER	UNIT	Zaman Park	Ferozepur Road	Jinnah Hospital	Canal View Society	
1	Carbon monoxide (CO)*	ppm	1.17	1.17	1.04	1.29	9
2	Nitrogen Dioxide (NO ₂)*	ppm	0.01	0.01	0.01	0.01	0.053
3	Sulphur Dioxide (SO ₂)*	ppm	0.01	0.01	0.01	0.01	0.14 (24 hours average)
4	Dust (PM ₁₀)*	µg/m ³	359.8	454.35	320.1	448.9	150
5	No. of Vehicles		89,918	181,908	97,497	93,763	

Source: EIA Report National Engineering Services Pakistan (NESPAK) January 2007, Environmental Impact Assessment of Remodeling of Canal Bank Road, Lahore (Dharampura Underpass to Canal View Bridge), Traffic Engineering and Transport Planning Agency (TEPA), Lahore, Lahore Development Authority Government of the Punjab).

A single mature tree can absorb carbon dioxide at a rate of forty eight (48) lbs/year and release enough oxygen back into the atmosphere to support two (2) human beings. Some estimates conclude that hundred (100) trees remove up to five (5) tons of CO₂, four hundred (400) pounds of ozone, and three hundred (300) pounds of small particulate matter. (*Benefits of trees in urban areas, Greg McPherson, PhD. USDA Forest Service, PSW c/o Dept of Environmental Horticulture, University of California.*)



The above graph shows that the carbon sequestration is more i.e., sixty eight thousand eight hundred and eighty seven (68,887) lbs/year i.e., 25.7 metric tons /year than Small Particulate Matter (PM₁₀) 21,196 lbs/year i.e., 8.0 metric tons /year and ground level Ozone 15,897 lbs/year i.e., 6.0 metric tons /year in the Canal Bank area, where trees are acting as sinks to air pollution especially carbon. The amount of carbon will rise dramatically if 5,299 trees are cut.

Major health and environmental impacts of various air pollutants due to tree cutting are depicted in Table 25 in Annexure 1.

Toxic gases due to burning of garbage on the green belts

It was also observed that green belts are piled up with dried leaves and household garbage, spoiling the beauty of the landscape. Moreover, these dried leaves and the garbage are burned in the green belts. The atmosphere gets polluted, generating toxic gases that threaten the habitat of avifauna, reptiles, small mammals, amphibians and flying insects.

4. DISCUSSION

The total trees on the Canal Bank are fourteen thousand eight hundred and seventy-three (14,873). There are six thousand five hundred and fifty-seven (6,557) shrubs. However, EIA Report *Remodeling of Canal Bank Road, Lahore from Dharampura Underpass to Canal View Bridge at Thokar Niaz Baig* mentions a total of twelve thousand three hundred and thirty-eight (12,338) trees and seven thousand two hundred and fifteen (7,215) small plants.

In the tree inventory data, the EIA report counted a total of two thousand three hundred and sixty-eight (2,368) Eucalyptus in the both green belts whereas total number of Eucalyptus on both green belts was one thousand nine hundred and seventeen (1,917). Similarly, the EIA report counted a total of one thousand five hundred and sixty-seven (1,567) Mango trees whereas total Mango trees on the whole green belts were eight hundred and seventy two (872). Furthermore, EIA report mentions a total of one thousand and fourteen (1,014) Simal whereas the actual number of Simal as observed by WWF - Pakistan on the left and right green belt was two hundred and forty three (243). EIA report further mentions total of one hundred-ninety (190) Neem, however, there were twenty-six (26) Neem trees observed on the green belts.

According to EIA there are thirty (30) Banyan trees whereas there were thirteen (13) Banyan trees on the green belts as observed by the researchers. Banyan tree is ecologically important because several kinds of birds use this tree for nesting, roosting, feeding, security and shelter such as Yellow-footed Green pigeon, Grey hornbill and Alexandrine parakeet. The tree inventory data as prepared by the consultants mentions zero (0) Bottle Brush on the green belts whereas there are two hundred and eighty one (281) Bottle Brush. The difference in results of tree species counting as presented by the NESPAK and WWF - Pakistan is presented in the table below:

Table 5
Comparisons of Tree Species Counting on Both Sides of the Lahore Canal Bank Green Belts between EIA Report of NESPAK and WWF - Pakistan Project

Sr. No	Tree species	EIA report tree inventory data TEPA, LDA,2006	WWF - P tree counting data on the total area of green belts, 2007	Difference
1	Eucalyptus	2368	1917	451
2	Mango	1567	872	695
3	Simal	1014	243	771
4	Neem	190	26	164
5	Banyan	30	13	17
6	Pipal	41	24	17
7	Bottle Brush	0	281	-281

No EIA methodology of the tree inventory was given in the EIA report. The EIA mentions one hundred and sixty-one (161) Eucalyptus, eighteen (18) Mango, six (6) Jaman, seventy-

five (75) Simal, fifty-three (53) Mulberry, eleven (11) Neem, one thousand twenty-one (1,021) Poplar, zero (0) Arjun, one thousand one hundred and fifty-nine (1,159) Bottle Brush, and twenty-three (23) Date trees along the bank of the canal. However, according to the study conducted by WWF - Pakistan, there are ten (10) Eucalyptus, sixty two (62) Mango, one hundred and nineteen (119) Jaman, eleven (11) Simal, only one (1) Neem, one thousand three hundred and five (1,305) Poplars, four (4) Arjun, two hundred and fifty-seven (257) Bottle Brush and nine (9) Date trees along the banks of the canal.

Table 6
**Comparisons of Tree Species Counting on Both Sides along Banks of the Lahore Canal
between EIA report of NESPAK and WWF - Pakistan Project**

Sr. No	Tree species	EIA report tree inventory data, TEPA, LDA,2006	WWF - P tree counting data, 2007	Difference
1	Eucalyptus	161	10	151
2	Mango	18	62	-44
3	Jaman	6	119	-113
4	Simal	75	11	64
5	Mulberry	53	107	-54
6	Neem	11	1	10
7	Poplar	1021	1305	-284
8	Arjun	0	4	-4
9	Bottle Brush	1159	257	902
10	Date	23	9	14

Likewise, forty-four (44)-bird species were identified and recorded in 2007 while in 1992 Abdul Aleem Chaudhry recorded fifty-five (55) bird species in this habitat. This means that there has been a decline of ten (10) bird species in the last fifteen (15) years. Birds fly to safer habitats with dense patches of vegetation comprising tall trees with thick canopies. Mehmood (2000) counted total of forty-six (46) nests of Pariah kites at the Lahore Canal Bank habitat in the year 2000; the total nests of Pariah kites counted in 2007 was thirty-one (31). The Pariah kite nests have declined by fifteen (15) in this habitat. When calculated from the last field surveys it was found that the total trees that will be cut due to Canal Road widening on 24 ft width on both sides of greenbelts are five thousand two hundred and ninety-nine (5,299) as per the cross-sectional map in the EIA Report. However, when conducted a joint survey of trees with NESPAK it was learnt that 2,353 trees are to be cut on the 18 feet road widening on both sides of Canal, area of 18ft was told by the Nespak official. (Annex-6 Joint tree counting of WWF - Pakistan and NESPAK.)

5. CONCLUSION

The Lahore Canal Bank area is an old habitat of urban Lahore comprising a diversity of flora and fauna on the green belts and along the banks of the canal. The Canal Bank habitat is abode to several kinds of birds for nesting, roosting, feeding, security shelter and territory whereas small mammals, reptiles, amphibians and flying insects are also inhabitants. This area is contributing in the socioeconomic sustainability. It also provides scenic beauty and is a barrier to air pollution for the residents living in the vicinity lining both sides of the green belts. Even motorists benefit from the shade of the thick canopy trees on the Lahore Canal Road. They soothe the minds of people and calm their nerves in rush and heavy traffic.

Trees are the lungs of an urban environment; trees absorb carbon dioxide and emit life-giving oxygen during photosynthesis. They lower temperatures of the surroundings as they transpire by the leaf surfaces and produce a cooling effect. Trees provide shade to pedestrians and vendors and even to the traffic plying underneath. They trap pollutants like carbon, ground level ozone, sulfur dioxide, nitrogen dioxide and particulate matter such as dust, smoke and dirt on the leaf surfaces that can cause respiratory problems to the residents.

The EIA report states that a total of **one thousand eight hundred and fifty (1,850)** trees will be cut due to the proposed project. However, at another place in the report they say that only trees more than one (1) foot diameter will be cut, and there are nine hundred and fourteen (914) of these. List of trees less than one (1) foot diameter is not given in the EIA report. In the Flora section 6.1.9 of the EIA Report "The Table 6.6 presents group wise summary of the total number of trees (including their species) with more than one (1) ft diameter to be cut as a result of widening of the Canal Bank Road. The information about species of the trees with less than one (1) ft diameter is not available".

On the contrary, WWF - Pakistan found that the total number of trees that would be cut due to Lahore Canal Road widening project is **five thousand two hundred and ninety-nine (5,299)** in proposed 24 ft width of both greenbelts out of which 1,600 trees are 1 foot and above diameter at breast height DBH and 3,699 trees are below 1 foot diameter at breast height DBH.

After the socioeconomic assessment of the household survey at the Lahore Canal Bank, the following opinion of the people about the tree cutting issue was obtained:

95% residents gave their opinion against tree cutting.

Removal of five thousand two hundred and ninety-nine (5,299) trees will result in the "heat island effect" which is a major problem in urban areas. The heat island effect is defined as "the temperatures of urban areas are 2-10 degrees (F) warmer than areas having trees. This is due to the prevalence of concrete, asphalt and tall buildings and the absence of trees". (*Plans along the Canal, Auon Sahi, Shehr, the News, April 15th, 2007.*)

The quality of life of residents will be affected due to the cutting of these five thousand two hundred and ninety-nine (5,299) trees. Their health and well being will be at constant risk, as there will be respiratory problems among the residents living along the vicinity of canal due to vehicular dust and exhaust from increasing traffic. Moreover, the shade and shelter

would vanish from the heads of pedestrians and commuters such as motorbikes, rickshaws, bicycles, etc.

The road widening would destroy the habitat of birds, small mammals, reptiles, amphibians and several insects. It would also affect the means of earning of the vendors who ply their goods along the roadside of the Lahore Canal.

There are one thousand three hundred and twenty-four (1,324) Poplar trees and one thousand nine hundred and seventeen (1,917) Eucalyptuses at the Lahore Canal Bank; Golden-backed Woodpecker makes holes in them for nesting. Many cavity nesters occupy the hole and enlarge it according to their needs such as Grey hornbill, Alexandrine parakeet and Rose-ringed parakeet. There will be a loss of cavity nesters (birds) from the cutting of these trees. It will also have a negative impact on the nesting sites of many birds both cavity nesters and nest builders. (*Pers.comm. Abdul Qadeer Mahal, Director Parks and Wildlife, Lahore.*)

The trees should not be cut in this habitat as it would degrade the whole habitat, centuries old ecological linkages would be broken and a permanent and irreversible ecological loss from the habitat would ensue. In the Canal Bank area, trees are acting as sinks to air pollution. The amount of carbon in the air would dramatically rise on the Lahore Canal Bank Road if five thousand two hundred and ninety-nine (5,299) trees are cut.

6. RECOMMENDATIONS

Based on the results of the study, conclusion drawn from the research and discussion, following recommendations are proposed by the researchers to enhance environmental sustainability and sustainable development.

DECLARE THE LAHORE CANAL BANK AS A GREEN CORRIDOR

The overall study indicates that the Canal Bank area is the only long green corridor in Lahore if we look at the Satellite Image of Lahore from Google Earth. It provides environmental and socioeconomic benefits in addition to providing a safe and serene passageway to the heavy traffic. This pristine habitat is necessary because this is a natural asset for our future generations.

DISCOURAGE GARBAGE BURNING WITHIN THE VICINITY OF THE LAHORE CANAL BANK GREEN BELTS

The schools and environmental clubs should be involved in composting activities instead of burning garbage on the green belts. Aitchison College, Lahore plays an active role in leaf composting inside their premises; they would be able to supervise composting on the green belts.

DETERMINE CAUSES OF MORTALITY OF HOUSE CROWS AND PARIAH KITES

More research and chemical laboratory tests need to be done to assess the cause of death of the House crows and Pariah kites in the Canal Bank area.

FIND ALTERNATE MEASURES TO REDUCE TRAFFIC PRESSURES

Better traffic management, high volume bus service should be introduced and alternate routes should be identified for reducing the traffic pressure on roads.

EDUCATION/AWARENESS REGARDING THE ECOLOGY OF LAHORE CANAL BANK

Awareness regarding ecology and ecological linkages of Lahore Canal Bank should be imparted through media and different practical activities in schools and colleges such as indigenous tree plantation, distribution of Canal Bank habitat pamphlets in the houses and colonies and the general public passing by on the Canal Road, and presentations in different forums such as Lahore Bachao Tehrik and different institutions, etc.

TREE PLANTATION IF THE ROAD IS WIDENED

Trees such as Poplar, Simal, Pipal, Gul-e-Nashtar, Mulberry, Alstonia, Beerli Patta and Neem should be planted in the empty spaces in the remaining extent of the green belts to raise full density plantation. (In the opinion of Dr Abdul Aleem Chaudhry, retired Director General, Punjab Wildlife Dept.)

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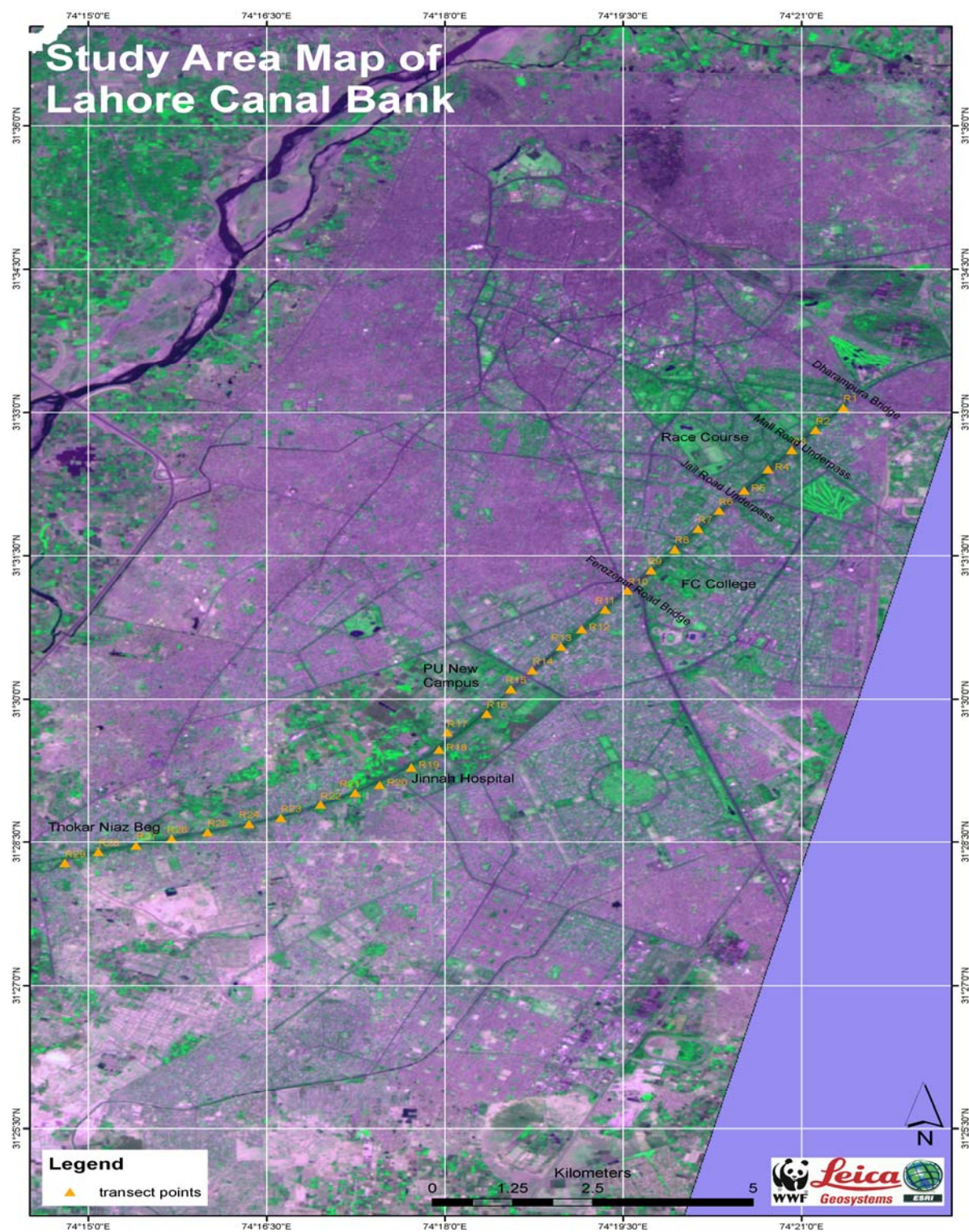
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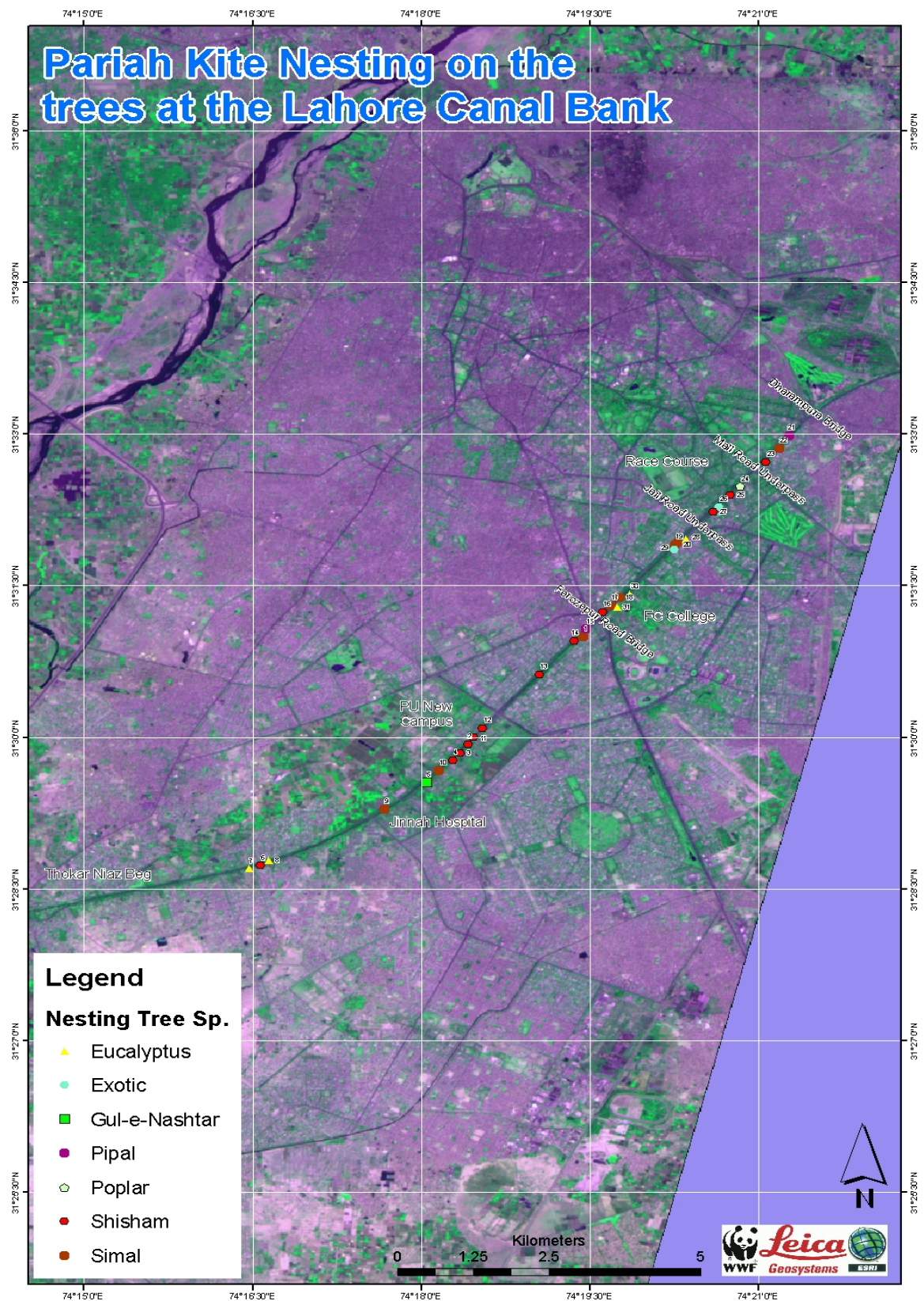
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SATELLITE AERIAL MAPS

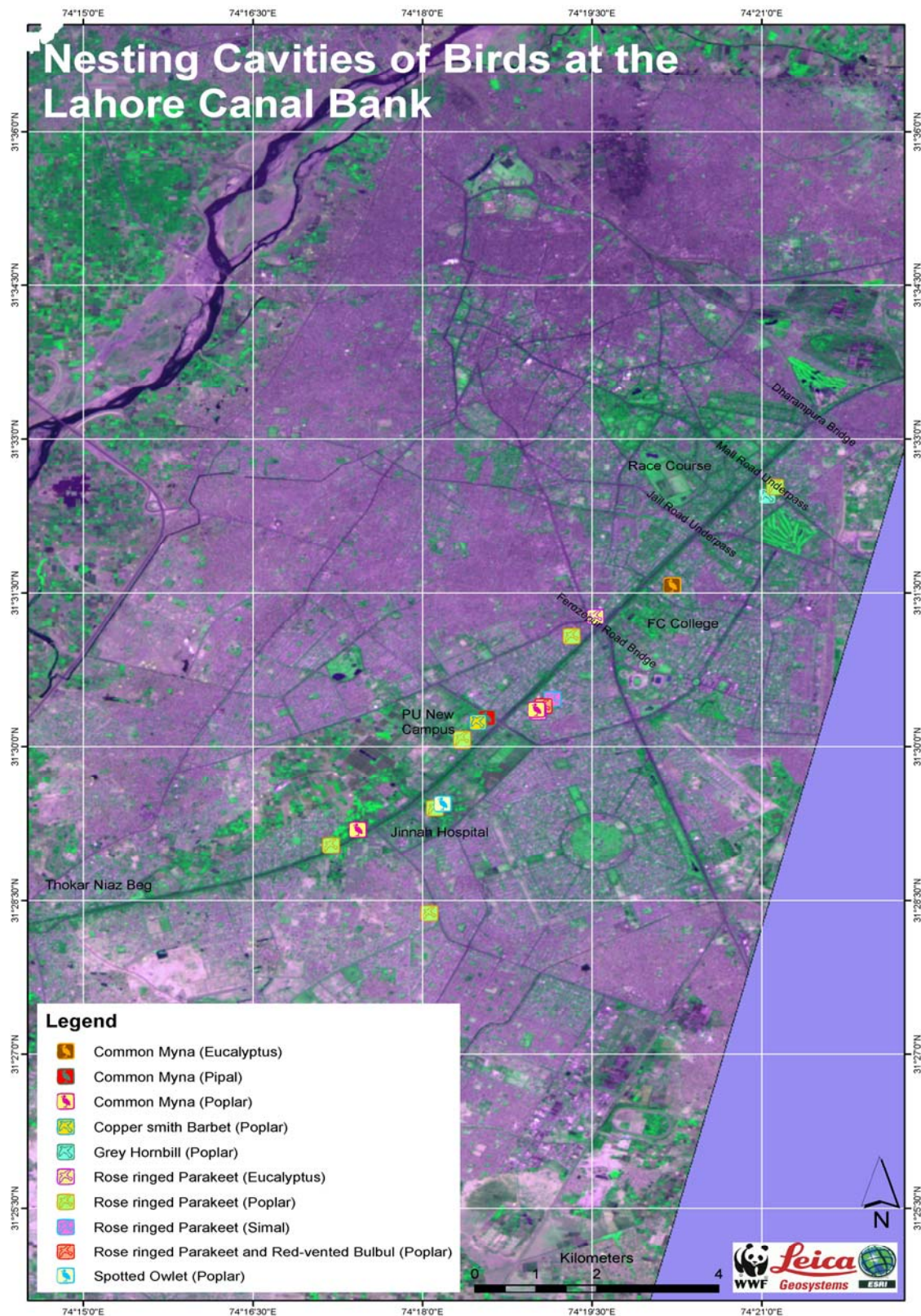
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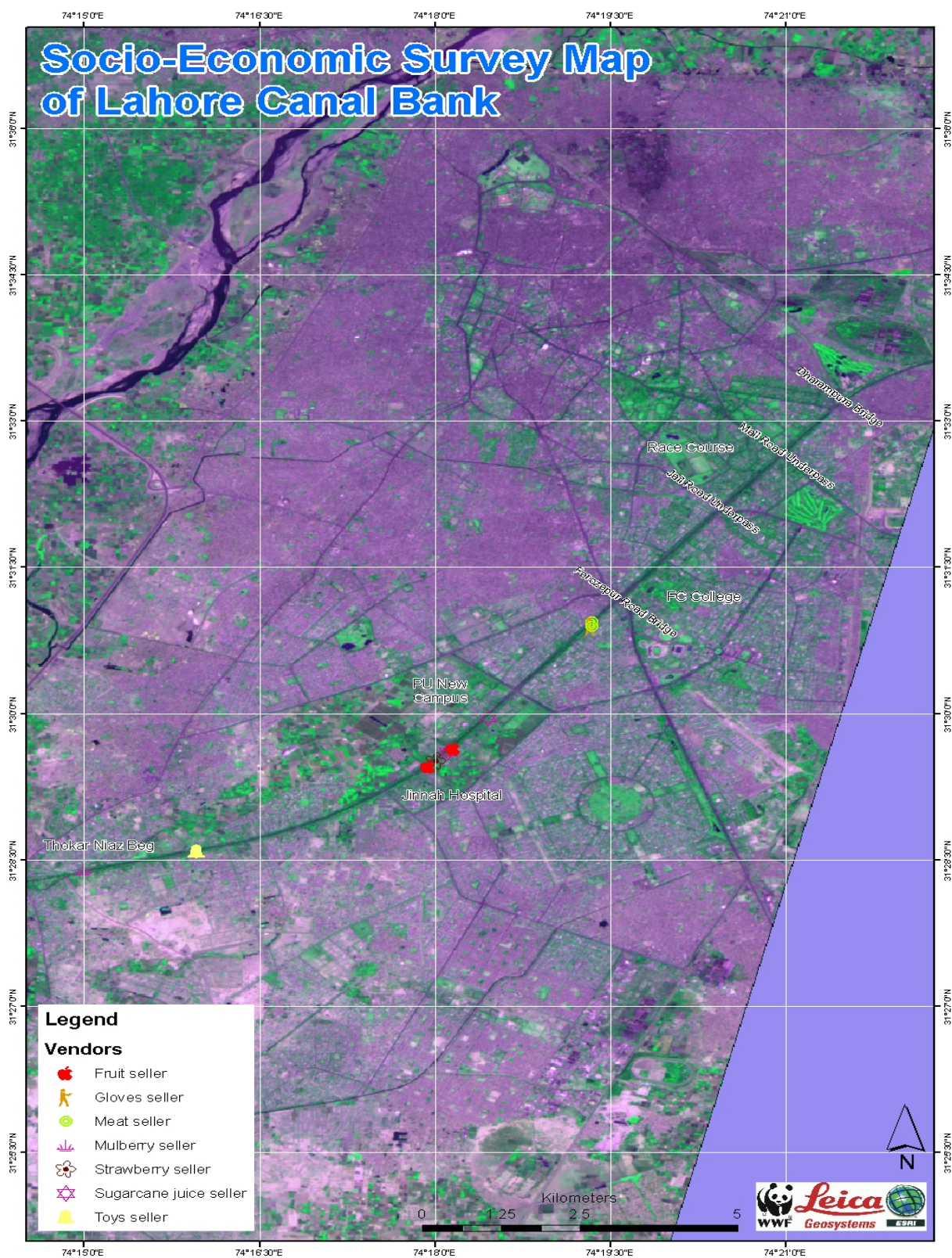
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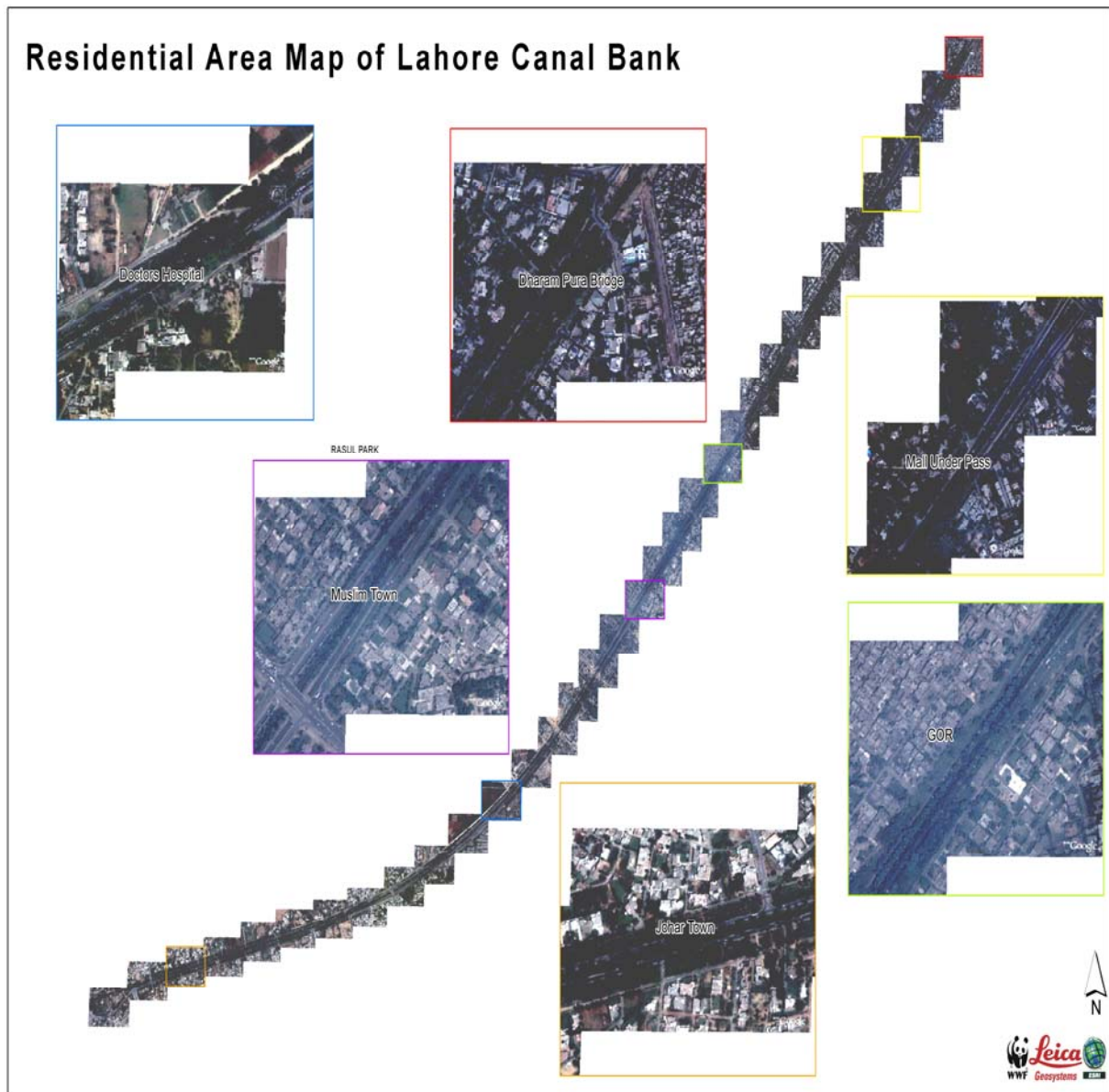
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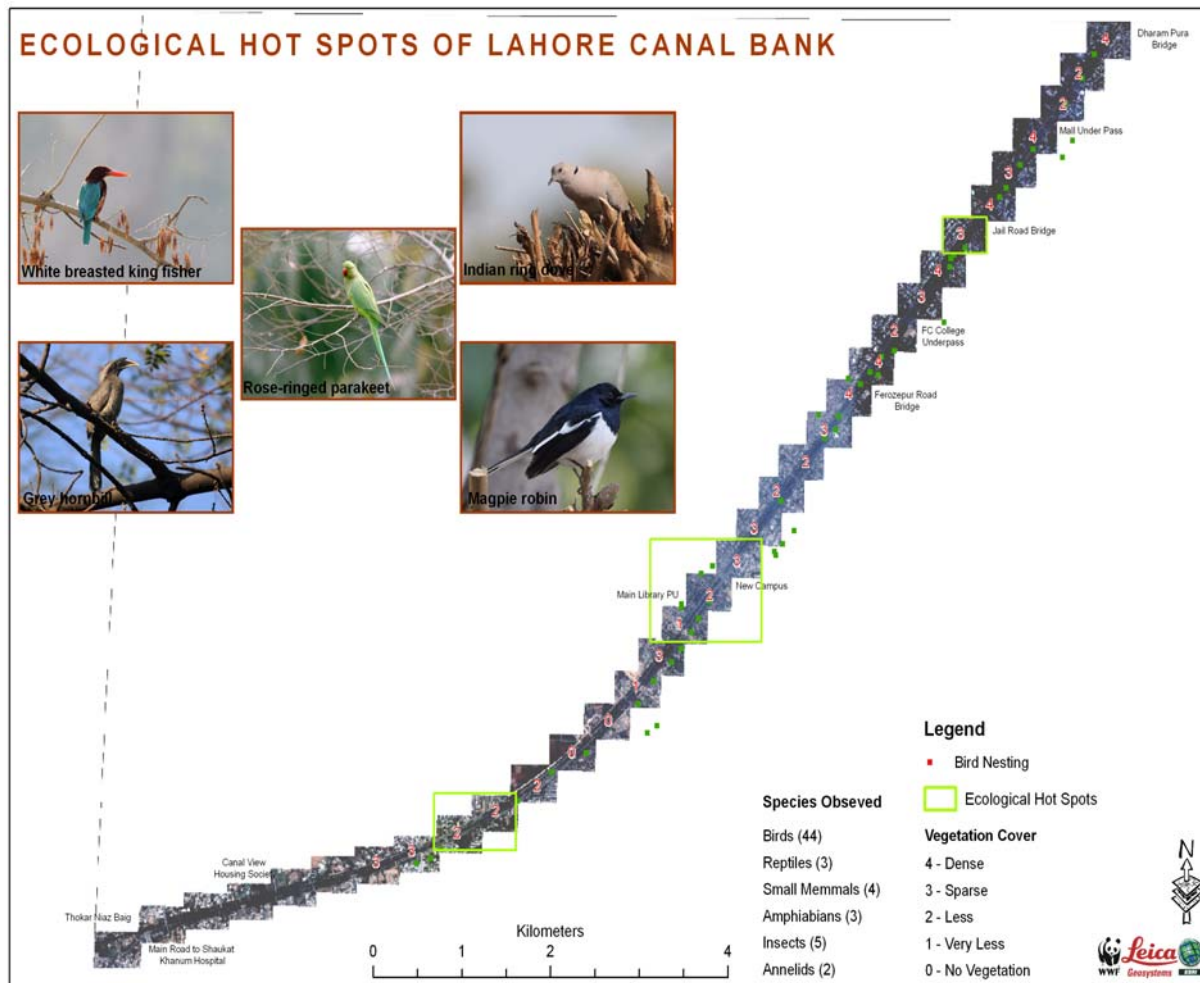
Map 4



Map 5



Map 6



Map 7

