

ECOLOGICAL INVENTORY OF YAMUNA RIVER IN NCT DELHI

A STUDY OF THE STREAM BIODIVERSITY AND
ECOLOGICAL PARAMETERS OF YAMUNA RIVER
IN NCT DELHI



Natural Heritage Division
INTACH
SEPTEMBER, 2015

ECOLOGICAL INVENTORY OF YAMUNA RIVER

A STUDY OF THE STREAM BIODIVERSITY AND ECOLOGICAL PARAMETERS OF
YAMUNA RIVER IN NCT DELHI

[SEPTEMBER, 2015]

Natural Heritage Division

INTACH



Indian National Trust for Art and Cultural Heritage
Natural Heritage Division
71, Lodhi Estate, New Delhi-110003
Email id : intachnhd@gmail.com
Website: www.intach.org
Phone: 011-24641304, 24692774
Fax: 91-11-24611290

ACKNOWLEDGEMENTS

This study has been carried out with supporting funds under Ministry of Culture [GoI] grant.

Thanks are due to Dr. Fayaz A. Khudsar, Scientist Incharge, Yamuna Biodiversity Park for providing his valuable inputs and suggestions.

Mr. B.P. Upadhyay, Fisheries Extension Officer, Fisheries License Office, New Delhi shared his experience and observations on Yamuna and fishing activities in the past.

Thanks are also due to Mr. Kushal of Boat Club for providing boat and all the human resources needed to carry out surveys in the River channel. Local anglers, fisherman and farmers are acknowledged for providing local site information which proved valuable in understanding landscape characteristics and people interaction with the River.

Natural Heritage Division

Team

Dr. Ritu Singh, Director, Natural Heritage Division, INTACH

Mohd. Sajid Idrisi, Project Officer, Natural Heritage Division, INTACH

Manu Bhatnagar, Principal Director, Natural Heritage Division, INTACH

Photo Credits: Sajid Idrisi

LIST OF CONTENTS

Introduction.....	11
Objective	24
Methodology	24
Observations.....	25
Study Site 1: Jagatpur Area	27
Study Site 2: Gandhi Nagar Area.....	46
Study Site 3:ITO Area.....	61
Study Site 4: Mayur Vihar Area.....	77
Study Site 5: Okhla Area.....	90
Socio- Ecological Observations.....	115
Local Narratives of the River.....	121
Discussion.....	125
Impacts of Pollution.....	132

LIST OF FIGURES

Fig. No. 1 : A Braid Of The Yamuna Flowed On Ring Road Between Red Fort & Salimgarh Fort [1955]	16
Fig. No. 2 : Yamuna As Seen From Jagatpur Bund (Looking North) Near Wazirabad [Date: 07/07/2014]	29
Fig. No. 3 : Tall Stands Of Typha And Phragmites At Jagatpur Bund Area Towards East From Jagatpur Road [Date: 01/10/2014]	29
Fig. No. 4 : Large Scale Removal Of Riparian Vegetation For Cucurbits Crops At Jagatpur Bund Area [Date: 04/02/2015]	30
Fig. No. 5 : Country Mallow [<i>Abutilon indicum</i>] Near Jagatpur Bund Towards South [Date: 07/07/2014]	30
Fig. No. 6 : Wild Sugarcane [<i>Saccharum spontaneum</i>] At Jagatpur Bund Area Towards East [Date: 22/07/2014]	32
Fig. No. 7 : Castor Oil Plant Thriving On Agricultural Field Edges Towards South	33
Fig. No. 8 : Frog Fruit [<i>Phylla nodiflora</i>] One Characteristic Plant Of Yamuna Flood Plains	33
Fig. No. 9 : Representation Of Various Tree Species At Jagatpur	35
Fig. No. 10 : Representation Of Various Herb/Shrub Species	35
Fig. No. 11 : Common Stonechat [<i>Saxicola torquata</i>] At Jagatpur Bund	38
Fig. No. 12 : Flock Of Migratory Birds During Winter Season And Typha And Phragmites In The Backdrop. [Date: 18/12/2014]	38
Fig. No. 13 : White-Browed Wagtail At Jagatpur Bund Area [Date: 04/02/15]	39
Fig. No. 14 : Black-Tailed Godwit (<i>Limosa limosa</i>) Sighted At Yamuna Biodiversity Park Phase-2 Area [Date: 04/02/2015]	39
Fig. No. 15 : Common Club Tail Dragon Fly (<i>Ictinogomphus rapax</i>) At Jagatpur Bund Area [Date: 01/10/2014]	40
Fig. No. 16 : Ladybird Beetle [<i>Menochilus sexmaculatus</i>] Attached To Flower Of Dhatura Plant At Jagatpur Bund Area [Date: 22/05/2014]	40
Fig. No. 17 : Grasshoppers on Leaf [Ventral Side] Of Water Hyacinth At Jagatpur Bund Area [Date: 22/07/2014]	41
Fig. No. 18 : Dead Assassin Bug In Water At Jagatpur Bund [Date: 01/10/2014]	41
Fig. No. 19 : Indian Grey Mongoose (<i>Herpestes edwardsii</i>) Are Common Dwellers Along Jagatpur Bund Area. [Date: 04/02/2015]	42
Fig. No. 20 : Checkered Keelback Snake [<i>Xenochrophis piscator</i>] Sighted At Yamuna Bank Near Jhangola Area [Date: 18/12/2014]	42
Fig. No. 21 : Indian Garden Lizard [<i>Calotes versicolor</i>] Spotted In Water Hyacinth Patch At Jagatpur Bund Area [Date: 01/10/2014]	43
Fig. No. 22 : Graph Showing Variation Of DO, pH, Phosphate And Nitrate Levels	44
Fig. No. 23 : Graph Showing Variation Of EC, TDS And Turbidity Levels	44

Fig. No. 24 : Yamuna As Seen From Gandhi Nagar Area (Looking North).....	47
Fig. No. 25 : Yamuna River As Seen At Gandhi Nagar [Date: 22/09/2014].....	47
Fig. No. 26 : Temporary Huts Of Inhabitants Living At Flood plain Area As Across The River From Gandhi Nagar Pushta [Date: 07/07/2014].....	48
Fig. No. 27 : Sparse Riparian Vegetation At Gandhi Nagar Pushta [Date: 22/09/2014].....	48
Fig. No. 28 : False Amaranth or Lesua [<i>Digara muricata</i>] At Gandhi Nagar Pushta.....	50
Fig. No. 29 : Gubbha [<i>Leucas cephalotes</i>] At Gandhi Nagar Floodplain.....	51
Fig. No. 30 : Asian Mazus [<i>Mazus pumilus</i>] Gandhi Nagar Floodplain.....	51
Fig. No. 31 : Wild Musk Melon [<i>Cucumis melo</i>] At Gandhi Nagar Floodplain.....	52
Fig. No. 32 : Bar Graph Showing The Representation Of Various Tree Species at.....	54
Fig. No. 33 : Bar Graph Showing The Representation Of Various Herb/Shrub Species at Gandhi Nagar site.....	54
Fig. No. 34 : Black Kite Flying Over Gandhi Nagar Floodplain [Date: 22/09/2014].....	56
Fig. No. 35 : Long-Tailed Shrike At Gandhi Nagar Floodplain [Date: 07/07/2014].....	56
Fig. No. 36 : Peacock Pansy [<i>Junonia almana</i>] Butterfly On Lantana Plant at Gandhi Nagar Flood plain Area [Date: 22/09/2014].....	57
Fig. No. 37 : Damselfly spp. At Gandhi Nagar Flood Plain Area [Date: 07/07/2014].....	57
Fig. No. 38 : Checkered Keel Snake In Yamuna Waters At Gandhi Nagar.....	58
Fig. No. 39 : Graph Showing Variation DO, pH, Phosphate and Nitrate Levels.....	59
Fig. No. 40 : Graph Showing Variation of EC, TDS and Turbidity Levels.....	59
Fig. No. 41 : Yamuna As Seen From ITO Ghat Near Rajghat Power Station (Looking North) [Date: 16/09/2014].....	62
Fig. No. 42 : Yamuna Floodplains As Seen From Ring Road Near Rajghat Power Station Towards East [Date: 05/02/2015].....	62
Fig. No. 43 : A Flock Of Pigeons Flying Over Agricultural Fields On Flood Plains Near Krishan Kunj Area [Date: 13/10/2014].....	63
Fig. No. 44 : Vegetation Stratification - 3 Layers Of Vegetation Clearly Visible At Krishan Kunj Area [Date: 13/10/2014].....	63
Fig. No. 45 : Grasses Burnt For Agriculture Activities At Flood Plain Area In Front Of Rajghat Power Station [Date: 05/02/2015].....	64
Fig. No. 46 : Water Spinach [<i>Ipomea aquatic</i>] At Krishan Kunj Area Near ITO.....	66
Fig. No. 47 : Tamarix spp. At ITO Floodplain Area [Date: 13/10/2014].....	66
Fig. No. 48 : False Daisy (<i>Eclipta alba</i>) At ITO Flood Plain Area [Date: 13/10/2014].....	67
Fig. No. 49 : Bar Graph Showing Representation Of Various Tree Species At ITO Site.....	69
Fig. No. 50 : Bar Graph Showing Representation Of Various Herb/Shrub Species At ITO Site.....	69
Fig. No. 51 : Flock Of Blue Rock Pegions At ITO Floodplain Area [Date: 13/10/2014].....	71
Fig. No. 52 : Intermediate Egret At ITO Floodplain Area [Date: 05/02/2015].....	71

Fig. No. 53 : Assassin Bug Preying On Honey Bee On Tamarix Plant And Housefly Ready To Take Upon At ITO Flood Plain Area [Date: 16/09/2014].....	72
Fig. No. 54 : Wasp Feeding On The Flowers Of Tamarix Plant At ITO Flood Plain Area [Date: 13/10/2014].....	72
Fig. No. 55 : Weevil Insect Collected From Waterbody At Krishan Kunj Area Across Yamuna River At ITO [Date: 28/10/2014]	73
Fig. No. 56 : Water Strider Insect Collected From Waterbody At Krishan Kunj Area At ITO [Date: 28/10/2014].....	73
Fig. No. 57 : Shrimps Collected From A Waterbody At Krishan Kunj Near ITO	74
Fig. No. 58 : Graph Showing Variation DO, pH, Phosphate And Nitrate Levels	75
Fig. No. 59 : Graph Showing Variation of EC, TDS And Turbidity Levels.....	75
Fig. No. 60 : Yamuna River At Mayur Vihar Ghat Near Mayur Vihar Metro Station (Looking North) [Date: 25/09/2014]	78
Fig. No. 61 : Lord Ganesh Statue Lying Unattended At Mayur Vihar Ghat.....	78
Fig. No. 62 : Levees Are Devoid Of Riparian Vegetation At Mayur Vihar Ghat Area	79
Fig. No. 63 : Kaans [<i>Sacharum spontaneum</i>] At Mayur Vihar Flood Plain Area	80
Fig. No. 64 : Flower Of <i>Cucumis melo</i> At Mayur Vihar Flood Plain Area.....	81
Fig. No. 65 : Bar Graph Showing The Representation Of Various Tree Species At Mayur Vihar Site	82
Fig. No. 66 : Bar Graph Showing The Representation Of Various Herb/Shrub Species At Mayur Vihar Site.....	83
Fig. No. 67 : Rock Pigeon In Agriculture Fields At Mayur Vihar Ghat [Date: 01/10/14]	84
Fig. No. 68 : Red-Wattled Lapwing Near Water Hyacinth Patch At Mayur Vihar Ghat.....	85
Fig. No. 69 : Dragonfly At Mayur Vihar Yamuna Flood Plains [Date: 25/09/2014]	85
Fig. No. 70 : Butterfly At Yamuna Flood Plain Area [Date: 25/09/2014]	86
Fig. No. 71 : Dragonfly At Mayur Vihar Yamuna Flood Plains [Date: 01/10/14].....	86
Fig. No. 72 : Graph Showing Variation DO, pH, Phosphate And Nitrate Levels	87
Fig. No. 73 : Graph Showing Variation Of EC, TDS And Turbidity Levels	88
Fig. No. 74 : View Of Yamuna River From Okhla Bird Sanctuary [Date: 01/07/2014]	91
Fig. No. 75 : Yamuna As Seen From Sailing Club, Okhla [Date:23/05/2014].....	91
Fig. No. 76 : Yamuna Floodplain At Dhobhi Ghat Near Jamia Nagar, Okhla [Date:23/05/2014].....	92
Fig. No. 77 : Yamuna River And Its Floodplain Area As Seen From Toll Road. Dhobhi Ghat Area Is Visible In The Backdrop [Date: 27/08/2014]	92
Fig. No. 78 : Typha Spp. Inside Okhla Bird Sanctuary [Date: 20/08/2014]	95
Fig. No. 79 : Flower Of Coat Button Plant (<i>Tridax procumbens</i>) At Okhla Bird Sanctuary [Date: 20/08/2014].....	95
Fig. No. 80 : Ivy Gourd [<i>Coccina grandis</i>] Inside Okhla Bird Sanctuary	96

Fig. No. 81 : Vegetation Communities At Yamuna Floodplains Of Okhla Bird Sanctuary [Date: 20/08/2014].....	96
Fig. No. 82 : Duckweed Collected From Yamuna At Okhla Bird Sanctuary	97
Fig. No. 83 : Bar Graph Showing The Representation Of Various Tree Species At Okhla	99
Fig. No. 84 : Bar Graph Showing The Representation Of Various Herb/Shrub Species At Okhla	100
Fig. No. 85 : Asian Pied Starling [<i>Sturnus contra</i>] On Water Hyacinth Patch At Okhla Bird Sanctuary [Date: 01/07/2014].....	102
Fig. No. 86 : Oriental Darter [<i>Phalacrocorax carbo</i>] And Water Hyacinth In Backdrop [20/08/2014]	102
Fig. No. 87 : Grasshopper At Okhla Bund Near Kalindi Kunj [Date: 01/07/2014]	103
Fig. No. 88 : Truebug On The Leaf Of Chenopodium Album Okhla Bund Near Kalindi Kunj [Date: 01/07/2014].....	103
Fig. No. 89 : Damselfly Coromandel Marsh Dart [<i>Ceriatron coromandelianum</i>] At Okhla Bird Sanctuary [Date: 01/07/2014]	104
Fig. No. 90 : Indian Bull Frog [<i>Hoplobatrachus tigerinus</i>] At Yamuna -Near DND Flyway [Date: 27/08/2014].....	104
Fig. No. 91 : Cyclops Collected From Okhla [Date: 01/09/2014].....	105
Fig. No. 92 : Insects Collected From Yamuna Waters At Okhla [Date: 01/09/2014]	105
Fig. No. 93 : Rams Horn Snails Collected From Yamuna Waters At Okhla.....	106
Fig. No. 94 : Graph Showing Variation of DO, pH, Phosphate and Nitrate Levels.....	107
Fig. No. 95 : Graph Showing Variation Of EC, TDS And Turbidity Levels	107
Fig. No. 96 : Diagram Illustrating Standard Measurements Of A Bony Fish.....	109
Fig. No. 97 : African Catfish [<i>Clarias gariepinus</i>] Collected From Yamuna At Geeta Colony Area [Date: 08/12/2014].....	110
Fig. No. 98 : Common Carp [<i>Cyprinus carpio</i>] At Wazirabad Barrage [Date: 08/12/2014]	112
Fig. No. 99 : Tilapia [<i>Oreochromis mossambicus</i>] At Wazirabad Barrage [Date: 08/12/2014].....	112
Fig. No. 100 : Tiger Fish From Yamuna At Jagatpur Bund Near Wazirabad	113
Fig. No. 101 : Glass Fish From Yamuna At Jagatpur Bund Near Wazirabad.....	113
Fig. No. 102 : Tilapia [<i>Oreochromis mossambicus</i>] From Yamuna, Jagatpur Bund Near Wazirabad [Date: 18/12/2014].....	114
Fig. No. 103 : Juvenile Eel Collected From Pond Krishan Kunj Near ITO [28/10/2014].....	115
Fig. No. 104 : Sand Beds of Yamuna Near From Wazirabad To Palla Area Are Linked With Livelihoods With Hundreds Of Fisherman And Local People [Date: 18/12/2014]	115
Fig. No. 105 : Fisherman Drying Their Fishing Nets On Flood Plains Of Jhangola Area Of Yamuna River [Date: 18/12/2014].....	116
Fig. No. 106 : A Locally Made Fishing Net Showcases The Traditional Fishing Strategy Used By Fishermen Near Jhangola Area Of River Yamuna In Delhi [Date: 18/12/2014]	116

Fig. No. 107 : Fishermen With A Dragnet And Holding Catfish Species At Jagatpur Bund Near Wazirabad [Date: 07/07/2014].....	117
Fig. No. 108 : A Fisherman Casting His Fishing Net Near Wazirabad Barrage [Date:08/12/2014]	117
Fig. No. 109 : A Fisherman Holding His Catch -Catfish Near Wazirabad Barrage	118
Fig. No. 110 : A Locally Made Structure By Garbage Collectors At Yamuna Flood Plain Near ITO Area [Date: 08/12/2014]	118
Fig. No. 111 : Obstruction Made By Using A Rope To Collect Garbage By Garbage Collectors Near Qudsia Ghat [Date : 08/12/2014]	119
Fig. No. 112 : A Child Collecting Waste From The River Near Geeta Colony	119
Fig. No. 113 : Statue Installed By Worshippers Near Wazirabad Barrage	120
Fig. No. 114 : Watermelons Grown On The Flood Plains Of Yamuna At Jagatpur Bund [Date : 08/12/2014].....	120
Fig. No. 115 : Local People Feeding Seagulls Near Temple Of Jagatpur Village	121
Fig. No. 116 : Rahim narrating the Yamuna's past while angling near toll road Mayur Vihar.....	122
Fig. No. 117 : Gaffar Ali Showing His Catch Common Carp While Fishing At Yamuna Bank Near Wazirabad.....	123
Fig. No. 118 : Chanderpal Rowing Motorboat While Surveying The Yamuna River Near Old Yamuna Railway Bridge.....	124
Fig. No. 119 : Tree with Several Nests On The Wazirabad Road Leading To.....	127
Fig. No. 120 : Tree With Nests Of Weaver Bird On Jagatpur Bund Road.....	127
Fig. No. 121 : <i>Marsilea quadrifolia</i> And <i>Potamogeton sp.</i> At Waterbody Of Yamuna Biodiversity Park Phase-2 [Date : 04/02/2015].....	129
Fig. No. 122 : <i>Marsilea quadrifolia</i> and <i>Potamogeton sp.</i> At Waterbody Of Yamuna Biodiversity Park Phase-2 [Date : 04/02/2015]	129
Fig. No. 123 : Hydrilla Verticillata Collected From Waterbody Located Floodplain Krishan Kunj Area Near ITO [Date : 29/10/2014].....	130
Fig. No. 124 :Average DO Levels In Yamuna In Jan 2012-Dec 2013.....	132
Fig. No. 125 : Average DO Levels In Yamuna In Jan 2013-Dec 2014	133
Fig. No. 126 : Average BOD Levels In Yamuna In Jan 2012-Dec 2013.....	133
Fig. No. 127 : Average BOD Levels In Yamuna In Jan 2013-Dec 2014.....	134
Fig. No. 128 : Average COD Levels In Yamuna In Jan 2012-Dec 2013	134
Fig. No. 129 : Average COD Levels In Yamuna In Jan 2013-Dec 2014	135

LIST OF MAPS

Map No. 1 : Yamuna Upstream Of Delhi.....	14
Map No. 2: Barrages In NCT Delhi	15
Map No. 3 : Migration Courses Of River Yamuna.....	17
Map No. 4 : Study Sites And Barrages On The Course Of Yamuna River In NCT Delhi	26
Map No. 5 : Yamuna River And Its Flood Plains At Jagatpur Area Near Wazirabad	28
Map No. 6 : Yamuna River And Its Flood Plains At Gandhi Nagar Area	45
Map No. 7 : Yamuna River And Its Floodplains At ITO Area Near Rajghat Power Station.....	60
Map No. 8 : Yamuna River And Floodplains At Mayur Vihar Area	76
Map No. 9 : Map of Yamuna River and its Flood plains at Okhla Area	89
Map No. 10 : Map Showing Trees With Nest Along The Wazirabad Road	126
Map No. 11 : Showing Waterbodies Formed As A Result Of Depression Along Yamuna River in NCT Delhi.....	128
Map No. 12 : Map Showing Some Popular Angling Sites On The Banks Of Yamuna River In NCT Delhi	131

LIST OF TABLES

Table No. 1 : Catchment Area Details Of Yamuna Basin	12
Table No. 2 : Distinguished Independent Segments Of River Yamuna.....	13
Table No. 3 : Water Quality Parameters In Yamuna River	19
Table No. 4 : Water Quality Parameters In Yamuna River [Post Monsoon].....	19
Table No. 5 : Water Quality Parameters In Yamuna River	20
Table No. 6 : Species Distribution In Yamuna.....	22
Table No. 7 : Seasonal Allocation Of Yamuna Water By Beneficiary States	23
Table No. 8 : List Of Trees	31
Table No. 9 : List Of Herbs/ Shrubs	31
Table No. 10 : Frequency Table For Trees.....	34
Table No. 11 : Frequency Table For Herbs/Shrubs.....	34
Table No. 12 : Water Quality Parameters At Jagatpur Bund.....	43
Table No. 13 : List Of Trees.....	49
Table No. 14 : List Of Herbs/Shrubs	49
Table No. 15 : Frequency Table For Trees.....	52
Table No. 16 : Frequency Table For Herbs/Shrubs.....	53
Table No. 17 : List Of Birds	55
Table No. 18 : Water Quality At Gandhinagar	58

Table No. 19 : List Of Trees.....	64
Table No. 20 : Frequency Table For Trees.....	67
Table No. 21 : Water Quality At ITO	74
Table No. 22 : List Of Trees.....	79
Table No. 23 : List Of Herbs/Shrubs	80
Table No. 24 : Frequency Table For Trees.....	81
Table No. 25 : Frequency Table For Herbs/Shrubs.....	82
Table No. 26 : List Of Birds	83
Table No. 27 : Water Quality At Mayur Vihar.....	87
Table No. 28 : List Of Trees.....	93
Table No. 29 : List Of Shrubs/Herbs	94
Table No. 30 : Frequency Table For Trees.....	97
Table No. 31 : Frequency Table For Herbs/Shrubs.....	98
Table No. 32 : List Of Birds	100
Table No. 33 : Water Quality At Okhla	106
Table No. 34 : Body Measurement Of The Seven Specimens Of Manghur Collected From Yamuna At Geeta Colony.....	108
Table No. 35 : List of Local and Invasive Species of Fish.....	111

LIST OF ANNEXURES

Annexure I : List Of Local Fish Species Mentioned in Delhi Gazetteer ,1976.....	136
Annexure II : Communities Of Floodplains & Okhla Bird Sancturay	138
Annexure III : List Of Yamuna River Embankments Under The Control Of Irrigation & Flood Dept.	139
Annexure IV : Classification System Of Water Bodies as per CPCB	141
Annexure V : Land Use Pattern in River Yamuna Catchment.....	142
Annexure VI : Narratives Of The Environment Of Delhi [An Extract] Meenakshi Dhawle, INTACH[2010]	143
Annexure VII : References	158