



ECOLOGICAL STUDY GUIDE OF THONDAMANARU LAGOON

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Compiled by:
Research team for IUCN/ MFF/138 grant
Department of Zoology, Faculty of Science, University of Jaffna,
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ECOLOGICAL STUDY GUIDE OF THONDAMANARU LAGOON

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FOREWORD



Conservation of natural resources and sustainable developments are the key phrases of the present world. After the end of a prolonged civil war, the northern Sri Lanka witnesses many infrastructural developments. Scientists and researchers are assigned to ascertain the impacts of these developmental projects and to propose viable alternatives to safeguard the environment and biodiversity.

Thondamanaru lagoon is once again one of the current focal points of the northern region. The lagoon is associated with socio economics and ecotourism. Although the importance of lagoon utility and its conservation has long been felt, the present conducive environment provided a platform for the researchers to undertake various studies.

This field guide is one of the outcomes of an intensive research undertaken by researchers of the Department of Zoology, University of Jaffna. The book is mainly structured into three chapters viz. Vegetation of Thondamanaru lagoon, Birds of the Thondamanaru lagoon and Fin fishes and Shell fishes of Thondamanaru lagoon. The description of each aspect is considered to be valuable for all sorts of readers - University students, ordinary public, tourists and policy makers. This is a remarkable achievement!

I am confident that readers of this book while validate the economic essence of Thondamanaru lagoon they will also equally appreciate the importance of conservation of its fauna and flora. This is the message and the task of the authors. The book is truly a treasure and an eye opener for many including policy makers.

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July 14, 2015

PREFACE



Thondamanaru lagoon is one of the three lagoons in the Jaffna Peninsula, Sri Lanka where the other two are Uppaaru lagoon and Jaffna lagoon. The area of the Thondamanaru lagoon is about 30 sq miles which origin from the mouth, connecting the lagoon with marine environment directly into the Park strait of the Indian Ocean and the mouth is naturally closed and opens time to time according to the tidal wave's action. Originally by geo evolution it was a natural lagoon before 1953. After 1953, when the man made Barrage was built, it was no more a purely a natural lagoon. The Barrage is a man-made barrier which was constructed in less than a kilometer from the sea mouth and has a Gate-valve system which does not allow sea water into the lagoon usually, so that the natural sea water flow into the lagoon is restricted. The sluice gate-valve system is put up to control the flood in the adjacent villages of the lagoon. In a typical lagoon the physical and chemical parameters such as salinity gradient, zonation pattern and the dependent biological parameter show a pattern according to the distance from the sea.

But in Thondamanaru lagoon such patterns are not observed. There were number of studies carried out during the 1960s and early 1970 by eminent scientists and numbers of proposals based on Jaffna lagoon scheme were proposed by Senior Public Administrative staffs and Engineers from Irrigation Department and Professors of University of Jaffna since 1879 to 2003. But due to the war eruption there were no studies done on the ecosystem level by either University of Jaffna or any other institutions. After the normalcy has returned in the Northern Province, investigators of Department of Zoology, University of Jaffna have conducted a study on “Baseline analysis of development opportunities of Thondamanaru lagoon” under the Mangrove for Future grant project from June 2014 to June 2015.

This guide book is one of the outcomes of this one year research project in Thondamanaru lagoon under a small grant project of the Mangrove for Future through

International Union of Conservation of Nature (Ref: IUCN/MFF/138) carried out by Department of Zoology, University of Jaffna. In this book, the distribution of the vegetation, details of the migratory & non-migratory birds of Thondamanaru lagoon and the diversity of fin fishes and shellfishes of lagoon are described briefly in three chapters respectively.

We hope that the updated information's given in these chapters will be very much useful to undergraduate students, researchers, tourists, ecologists and school students. This book reflects the concerns from growing pressure on socio economic and ecotourism. We find this document to be very useful both informative and thought provoking. We are sure this document will lead to a guideline that makes the Thondamanaru lagoon an even more valuable resource than it is now.

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July 14, 2015*

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We would like to thank all of our Research assistants especially Mr.K.Asokan and field assistants especially Mr.T.Jeyaraj, Technical assistants Miss. J. Thangarajah and Mr. K. Harichandra for their sincere support in all data collections and photographing. Further we would like to thank staff of Department of Zoology, University of Jaffna and the students of Zoological Students Association specially Mr.R.W.M.H.Bandara Kapukotuwa, Miss. R.P.G.Wathsala Ratnaweera, Miss. K.B.A. Dona Sachini, Miss R.M.C. Thilini Ratnayaka, for their assistance in the data collections and translation of this document in to Sinhala.

We are thank full to The Director of the Botanical Gardens and the National Herbarium of Sri Lanka, Dr. D.S.A.Wijesundara , who helped us on some floral identification. We are very much grateful for the financial support of Mangrove For Future project through International Union for Conservation of Nature (Ref: IUCN/MFF/138) for the research studies and the printing of this ecological guide. Above all we would like to thank the reader's especially undergraduate students, researchers, tourists, ecologists and school students who gain knowledge out of it. Last and not least we beg forgiveness of all those who have been with us over the research studies and whose names we have failed to mention.

INTRODUCTION

1.1. Characterization of a Thondamanaru Lagoon

The northern coast of Sri Lanka is the longest coastline about 403 km, harbors 17 lagoons including Thondamanaru (Vadamradchi) lagoon (TL) which is the largest inland water body in Jaffna Peninsula. It is a shallow, coastal body of water, separated from the ocean naturally by a sand bar of only 11m. According to Kjerfve, 1994, coastal lagoons can be divided into three geomorphic types as Choked, Restricted, and Leaky, based on the water exchange with the coastal ocean. Thondamanaru lagoon can be categorized as Choked lagoon which consists of elliptical cell, connected by a single long narrow entrance channel (Plate: 1.1)

1.2 Location

Thondamanaru lagoon is located in Northern and Northeastern part of the peninsula covers four Divisional Secretariats – Point Petro, Karaveddy Maruthankerny and Kopay of Jaffna District. The Lagoon covers an area of about 30 sq km during dry season and will be as 50 sq km when filled with water in rainy season. It is The lagoon extends to about 57 km commencing at the Thondamanaru – outlet into the sea ($9^{\circ}49'15.1''N$ $80^{\circ}08'01.4''E$).It is running in southward direction to about 4 km , then turning eastward and again after another 8km then runs south – southeastward direction to end blindly at a distance of about 57 km from the mouth ($9^{\circ}33'27.9''N$ $80^{\circ}29'05.8''E$) at Mullian.

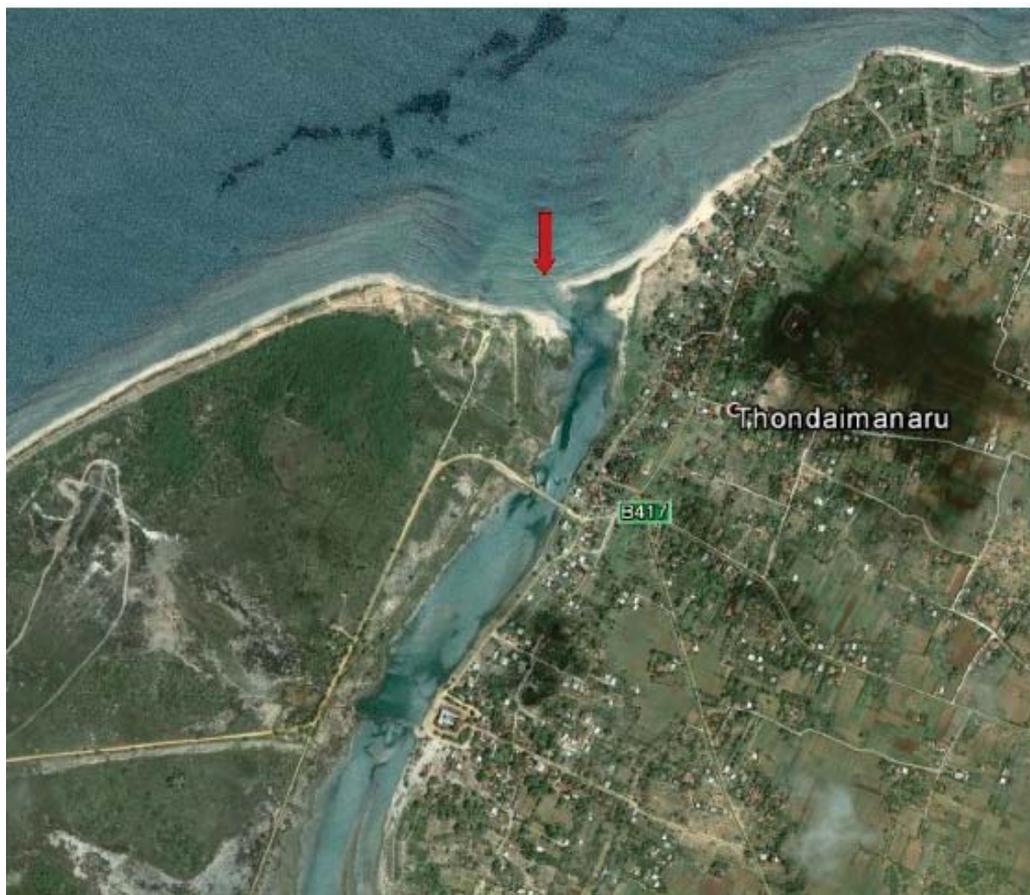


Plate : 1.1 It shows the anterior part of the Thondamanaru lagoon where the arrow indicates the position of the lagoon mouth ($9^{\circ}49'15.1''\text{N}$ $80^{\circ}08'01.4''\text{E}$). (Source: Google map)

This lagoon is basically a seawater body – and it functions as an outlet for surplus rain water. During the rainy season it becomes connected to Upparu, an inland arm of Jaffna lagoon. The total catchment area of these lagoons is about 50% of the area of the peninsula. Attempts have been made to prevent seawater entry to Thondamanaru and Upparu lagoons by constructing barrages across the lagoons with a view to convert them to freshwater bodies (Plate: 1.2 and 1.3).

This field guide is not a complete listing of all flora and fauna species that inhabit this Lagoon . However, it will provide the fundamental knowledge as the guide in identification of the most frequently encountered species and references to assist the undergraduate, postgraduate students, School children and ecologists for those who wish to know more about this lagoon ecosystem.



Plate : 1.2. The view of Upparu barrage at Ariyalai



Plate : 1.3. The view of Thondamanaru barrage near to Selva sannathy Kovil

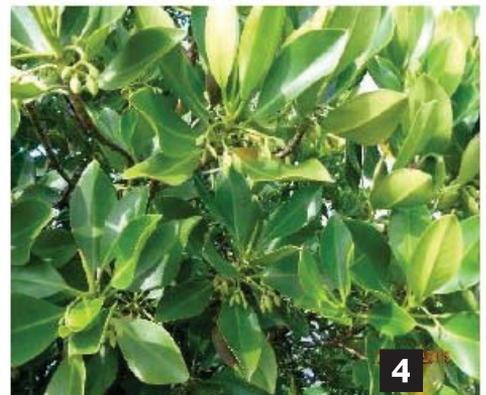


CHAPTER - 1

VEGETATION OF THONDAMANARU LAGOON



Dr. (Mrs.) R. Ganeswaran



Flowers of

1. *Derris trifoliata*
2. *Clerodentrum inerme*
3. *Excoecaria agallocha*
4. *Rhizophora macronata*

Photo by : Dr.(Mrs) Ganeswaran (Author)



1. Salt Marsh habitat (Mandan)

2. Disturbed Mangrove Habitat (Nagarkovil)

1. Vegetation of Thondamanaru Lagoon

Coastal zone of Sri Lanka includes a 2 km band of shallow sea and a 300m strip inland. The total coastal belt of Sri Lanka is about 1585km long. Two types of habitats are recognized in the coastal zone of Sri Lanka such as Marine habitat - the belt of shallow sea and maritime habitat - boundary of land exposed to tidal differences. This includes Mangroves, salt marshes, sand dunes, parts of lagoons and estuaries, sea shore plants on the beaches and inland water bodies situated at the boundary of the shore. Since these habitats (especially the mangroves and salt-marshes) are salty, the plants that live in such habitats are salt tolerant and known as halophytes (Kugathanan 2009, Ranawala, 2012).

Maritime vegetation in Thondamanaru Lagoon ecosystem:

Thondamanaru Lagoon (TL), as stated earlier, a choked type of lagoon, located within the Dry Zone, extended up to 57 km from its narrow sea mouth, in which three major habitats may be distinguished as Sea Shore, Salt Marshes and Mangrove.

2.1. Sea Shore habitat

Lagoon opens to the sea through a nearly 11 m wide mouth during the rainy season. In the dry periods the mouth is closed by a naturally formed sand bar which is about one meter high from the lagoon water level. The adjacent sea coast is normally flat about two meter high from the sea level with sand dunes and sparse dry evergreen scrub. Since the public residence is near the sea – within 100 meters, this vegetation is heavily disturbed and has lost its nature by human and his domestic animals (Plate : 2.1)



Plate : 2.1 Sea shore Habitat at the Lagoon mouth (9°49'15.1"N 0°08'01.4"E)

The following types of plants were found at the sea shore near the lagoon mouth
 E.g.: *Cocos nucifera*, *Borassus flabellifer*, *Ipomoea pes-caprae*, and *Calotropis gigantea*
Azadirachta indica, *Cdynodon dactylon* and *Argemone mexicana*. (Kugathanan, 2004; Vlas
 and Vlas, 2008; 2014)

2.1.1 *Ipomea pes-caprae* (Family: Convolvulaceae)

T= Adamban Kody; S= Muhudu binthamburu (Plate 2.2)

Ipomea pes-caprae is one of the most widely distributed beach plants – mangrove
 associate throughout tropical and subtropical areas in the world. Perennial herb, glabrous,
 with a thick tap root. Stems 5-30 m, prostrate, sometimes twining, rooting at nodes brown in
 color. Leaves are thick with emarginated or deeply 2-lobed apex, flowers pink or purple.
 Good cover crop for holding sand. It is also used for the treatment of swelling in different
 parts of the body caused by wind abrasions, skin diseases, and inflammation caused by
 jellyfish allergy. Seed is used for the treatment of fatigue (Ravindran. et.al,2005).



Plate : 2.2. Habitat and habitus of *Ipomea pes-caprae* near Thondamanaru lagoon mouth

a. during April 2014 b. during October 2014 c. flower and leaves

2.1.2 *Calotropis gigantea* (Family: Asclepiadaceae) T = Erukkalai; S= wara Plate : 2.3

Calotropis gigantea is a common tree/shrub of disturbed vegetations in dry and arid zones of low
 country. It is an indigenous plant of Sri Lanka and has clusters of flowers in white or light purple in
 clour. Flowering all the year round. Milky juice extracted from this tree is used as a remedy for
 Leprosy.



Plate : 2.3. a. Habitus of *Calotropis gigantea*;



b. Flowers and leaves

2.1.3 *Argemone Mexicana* (Family: Papaveraceae)

T=Piramathanclu; S= Rankiri Gokadu Plate 2.4.

The common name is Mexican prickly poppy- an exotic perennial herb growing to 0.6m. It is a prickly, glabrous, branching herb with yellow juice and showy yellow flowers. Leaves glaucous, oblong oblanceolate, pinnately lobed, 1/2-3/4 to midrib, both surfaces sparsely covered with prickles along veins, margins somewhat sinuate-dentate, the teeth tipped with a prickle, sessile, upper ones usually somewhat clasping the stem. It has good medicinal value, it is purgative, diuretic and can annihilate worms. It is also useful in the treatment of skin-diseases, leprosy, inflammations, bilious fevers, ophthalmia and opacity of cornea according to Ayurveda. Drugs prepared from this plant are used in the treatment of tape-wonn caused health problems in Homoeopathic medicine system.



Plate . 2.4. a. Habitus of *Argemone mexicana* b. Flower and leaves

2.2 Mangrove habitat in the Northern Part of the Lagoon

On the way through the Lagoon from the Mouth , the first mangrove habitat is found just passed the Barrage , in the middle of the Lagoon with few *Avicennia marina* (Plate: 2.5).



Plate: 2.5 *Avicennia marina* - near the bridge ($9^{\circ}48'33.5''\text{N } 80^{\circ}07'45.8''\text{E}$)

2.2.1 *Avicennia Marina* - Family *Avicenniaceae*

T= Vennkandal, S= Manda (Plate: 2.6)

Trees or shrubs with abundant pencil -like thin erect pneumatophores ; leaves opposite; small flowers yellow or orange . Widely distributed mangrove swamps of Sri Lanka. Mud flats, brackish swamps are the suitable habitats for *Avicennia*. In Thondamanaru lagoon trees of *A. marina* found near the barrage and near Atchuveli and then densely observed in Amban- Kudaththanai area ($9^{\circ}42'26.3''\text{N } 80^{\circ}17'18.8''\text{E}$) in association with *Rhizophora macronata*.



Plate : 2.6 : *Avicennia marina* a Pnematophores b. flowers c. fruits

It is used as firewood and for making tooth picks and boats. Branches are used for bush -pile fishing - all parts have medicinal value- Studies proved that *A. marina* contains active flavonoid compounds with significant potential against HSV (KOS) virions replication inhibition after penetrating the target cells.

Next to the Barrage area, a dense mangrove patch can be observed at Atchuvely (9°47'06.9"N 80°07'23.4"E), nearly 2 km from the lagoon mouth, with fore mangrove, true mangroves and mangrove associates.

Acanthus ilicifolius, *Avicennia marina*, *Lumnitzera racemosa* and *Excoecaria agallocha* are the true mangrove species noted in this area:

2.2.2 *Acanthus ilicifolius* - Family Acanthaceae T= kaluthai mulli, S=Katu ikiri (Plate. 2.7)

Classified as true mangrove (Liangmu *et.al.* 2010). Shrub with spiny leaves grows up to 1.5 m high. The plant produce a cluster of flowers which appear in neatly organized spikes at branch tips. Flowers have single large violet colour petal. Their sap is salty and the excess salt is secreted through the leaves to be removed by rain or wind. It grows in open areas in mangroves so considered as the indicator of the disturbance of the mangrove community. The whole plant can be used in local medicine as and expectorant, stimulant and a nerve tonic, leaves contain a bitter alkaloids and an organic acid.



Plate: 2.7 a. *Acanthus ilicifolius* near Atchuveli (9°47'06.9"N 80°07'23.4"E) b. flower

2.2.3 *Lumnitzera racemosa* Willd Family Combretaceae T = Thipparaththai,S=Suthu beriya



Plate. 2.8: *Lumnitzera racemosa* Willd a. habitus b. leaves and flower

Small to fairly large tree can grow up to 37m tall. It produces pneumatophores , some times stilt roots. Leaves are fleshy, obovate, more or less sessile, spirally arranged. Flowers are white .

It has good timber value which is used in salt water piling, fencing and for house posts, railway sleepers, boat building , furniture and flooring. The bark is used for tanning. Very commonly distributed throughout the mangrove swamps in Sri Lanka. In Thondamanru Lagoon , it is distributed in Atchvely (9°47'06.9"N 80°07'23.4"E), Anthannanthidal (9°46'03.5"N 80°12'18.3"E) in association with *Excoecaria agallocha* but In Amban and Nagar kovil (9°, 42.7"N 80°17'40.9"E) closely associated with *Rhizophora macronata* .

2.2.4. *Excoecaria agallocha* L.- Family: Euphorbiaceae Plate: 2.9

T= Thillai S= Thelakeeriya

Small dioecious tree can grow up to 15m , male inflorescences are in 5-10 cm long while female has short 2-4 cm long, fruits are three lobed (Plate: 2.9), green in color when young then turn black. It is adapted to tolerate high salinity levels. It can exclude 80-90% of the salt while up taking brackish water , the balance salt is accumulated in older leaves which are shed periodically. The white latex is poisonous and can cause blisters and /or blindness. It harbours mangrove Longhorn Beetle (*Aeolesthes holosericeus*) larvae.



Plate: 2.9 Habitus *Excoecaria agallocha* L. Male and Female



Plate : 2.10 *E.agallocha* a. Female inflorescence b. Fruit c. Male inflorescence

Eagallocha is distributed throughout the lagoon but their abundance is varied. Male and female plants (Plate : 2.10) were observed in the eastern side of the Jaffna -Point Pedro road ($9^{\circ}47'05.5''N$ $80^{\circ}08'14.4''E$) which runs south- North direction through the lagoon. The next dense patch of this tree can be observed after Anthananthidal up to Amban in association with *Lumnitzera racemosa*.

In addition to these time mangroves several Fore-Mangrove species (Plate. 2.11) such as *b. Fimbristylis ferruginea*, *Cynodon dactylon*, *Cyperus* sp. and *Lippia nodiflora* were observed in this location



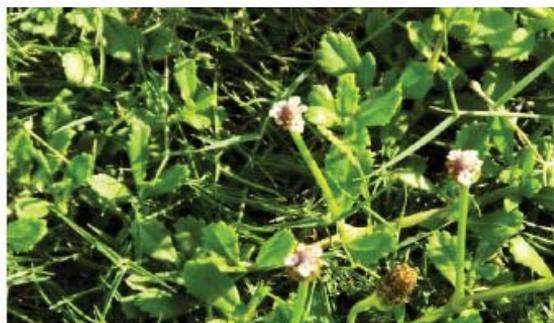
a. *Cyperus* sp. 1



b. *Cynodon dactylon*



c. *Fimbristylis ferruginea*



d. *Lippia nodiflora*

Plate: 2.11 Fore-Mangrove species

In addition to the above , *Clerodendrum inerme*, *Premna obtusifolia*, *Stachytarpheta cayennensis*, *Prosopis juliflora* and *Lantana camara* (Plate : 2.12) are found as the intruders (back mangrove species) in the degraded mangrove habitat of this location .

2.2.5 Clerodendrum inerme Family: Verbenaceae T= Sengankuppi, Pinchi S= Wal gurenda, Boerende (Plate 2.12-13)

This hardy shrub is often scrambling, white colour flowers with long corolla tube and purple tipped stamens and style . fragrant in early morning that attracts many varieties of insects, birds and

butterflies. This is an intruder in mangrove ecosystem, tolerates saline conditions and sea spray. It can be found from coastal fore dunes to mangrove edges. It is very common in all lagoon edges in Jaffna, specially on the sides of the roads which crosses the lagoon .

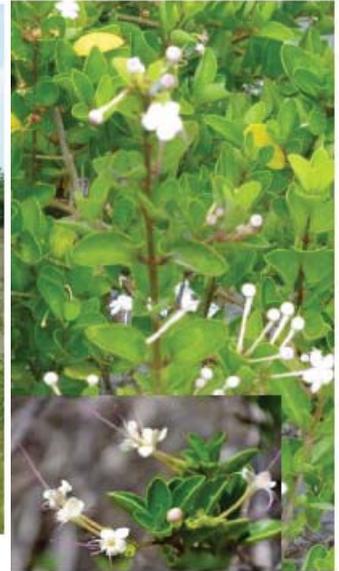


Plate : 2.12 - *Clerodendrum inerme* a. Habitus b. Flowers



Plate : 2.13 - *Clerodendrum inerme* during dry season

2.2.6 : *Premna obtusifolia* Family: Lamiaceae

T=Erumai mullai S= Wal midi Plate : 2.14

Very widely distributed. Woody shrub grow up to 8 m tall, with ovate leaves and small white flowers, fruits are green and black. Intruder - often first plant in a disturbed land It has rich medicinal value. It is found in Atchuvely and Mandan area



Plate : 2.14 - *Premna obtusifolia* and flowers

2.2.7. *Pandanus tectorius* Family Pandanaceae Plate: 2.15

T= Thalai S= Muthu Keyiya

Tree or shrub with erect cylindrical branched stem - bark is brown in colour. Long deep feeding roots from the base of the stem . in addition stilt roots arise from the stem , they grow at an angle. It is considered as an intruded and observed as the boarder crop in the places where the mangroves are degraded , silting occurred in the lagoon



Plate : 2.15: *Pandanus tectorius* a. fruit of *Pandanus tectorius*

Uses: fruit can be eaten raw or cooked ; leaves used as flavoring for sweet dishes or curries and are also said to have medicinal properties, leaves can be used to make string, baskets, mats, thatched roofs and grass skills. It has great ecological value - protection from soil erosion. Strong wind , encourage pollinators. Habitat for birds and other animals.

2.2.8 : Invasive intruders in Thondamanaru Lagoon Ecosystem



Plate: 2.16 *Stachytarpheta Cayennensis* (Rich.) Vahl F:Verbanaceae

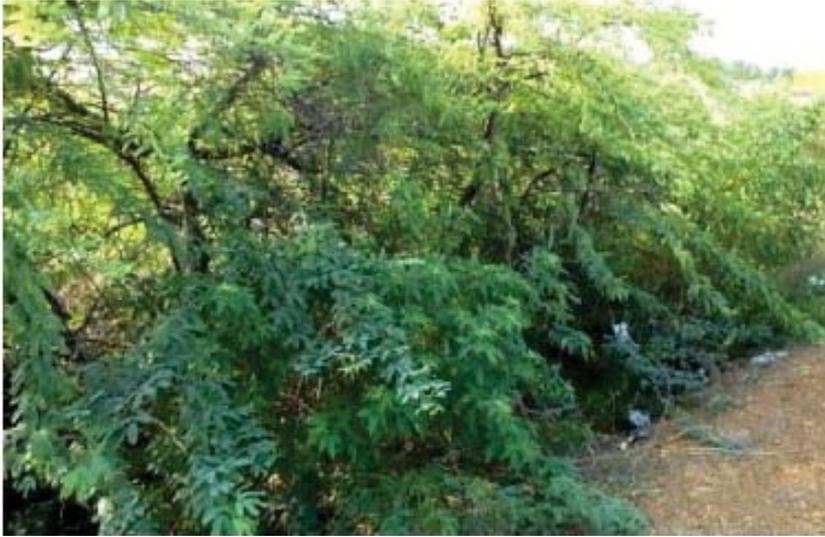


Plate: 2.17 *Prosopis juliflora* (Sw.) DC. F: Fabaceae



Plate : 2.18 *Lantana camara*
L. F. Verbenaceae



Plate : 2.19 *Parthenium hysterophorus*
E. Asteraceae

2.2. Back -mangrove habitat at Vallai along the Jaffha-Point Petro Road (9°47'08.1"N 80°08'16.4"E)

On the either side s of the Jaffna-Point Pedro, Varieties of dry zone land trees and shrubs grow at the back of the mangroves (Plate: 2.20). Common species are *Clerodendrum inerme*, *Premna obtusifolia*, *Calotropis gigantea*, *Croton bonplandianum*, *Vitex negundo*, *Lawsonia inermis*, *Aristolochia bracteolata*, *Phoenix pusilla*, *Ocimum sanctum*, *Ocimum gratissimum*, *Coccinia cordifolia*, *Solanum trilobatum*, *Solanum xanthocarpum* *Tridax procumbens*, *Muntingia calabura*, *Sesuvium portulacastrum*, *Borassus flabellifer* etc (Vlas and Vlas 2008, 2014).



Plate : 2.20 General pattern of distribution of flora in the Lagoon at Vallai - inner eastwards from Jaffna-Point Petro road.



Plate : 2.21 General pattern of distribution of flora in the Lagoon at Vallai - inner west wards from Jaffna- Point Petro road.



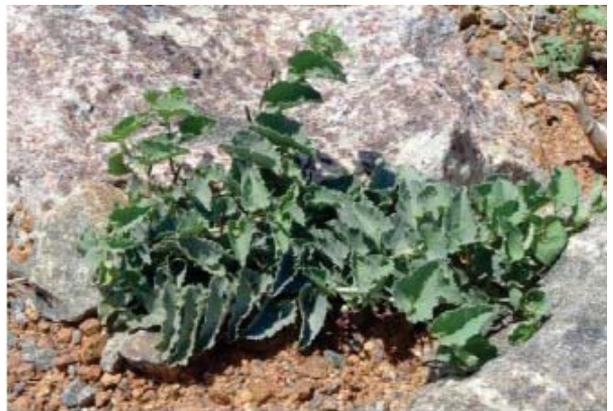
a. *Croton bonplandianum*



b. *Vitex negundo*



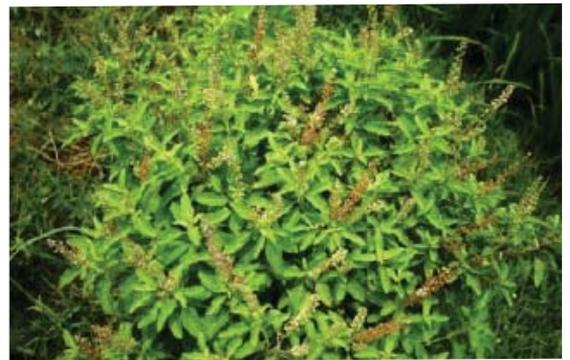
c. *Lawsonia inermis*



d. *Aristolochia bracteolata*



e. *Phoenix pusilla*



f. *Ocimum gratissimum*,

Plate : 2.22 Intruders in the lagoon ecosystem (with medicinal Value)



a. *Coccinea cordifoha*



b. *Solanum trilobatum*



c. *Solanum xanthocarpum*



d. *Citrullus colocynthus*



e. *Muntingia calabura*



f. *Sesuvium portulacastrum*

Plate : 2.23 Intruders in the lagoon ecosystem (with medicinal Value)



a. *Salicornia brachiata* Fam. Amaranthaceae



c. *Suaeda maitima*. Fain. Amaranthaceae



b. *Halosarcia indica* (syn. '*Arthi*' *ocnemum indicum*) Fam: Chenopodiaceae



d *Suaeda maitima*. Fam. Amaranthaceae



e. *Salicornia brachiata* and *Halosarcia indica*

Plate: 2.25 Salt marsh vegetation in Thondamanaru Lagoon

2.2. Mangrove habitat in Southern part of the Lagoon

The Mangrove vegetation after Mandaan ($9^{\circ}46'11.7''\text{N } 80^{\circ}10'55.1''\text{E}$) is represented by isolated *Excoecaria agallocha* (Plate: 2.26) with the associate *Clerodendrum inerme* .

The characteristic mangrove vegetation starts after Mulli ($9^{\circ}46'00.9''\text{N } 80^{\circ}14'04.6''\text{E}$), where the major vegetation is *Lumnitzera racemosa* in association with *Excoecania agallocha* . *Clerodendrum inerme* is present along the road. *Tamarix gallica* (Plate 2.27) a mangrove associate is found among these two mangroves species .

Further down , near Amban ($9^{\circ}43'19.0''\text{N } 80^{\circ}16'18.4''\text{E}$) the vegetation pattern is somewhat fulfilled with all four main species of mangroves, with the above two, *Rhizophora macronata* dominates in the deeper part of the lagoon with the *Avicennia marina* which found scattered towards the edge of the lagoon. (Plate : 2.28)

But in Nagar kovil ($9^{\circ}4r32.0''\text{N } 80^{\circ}17'56.7''\text{E}$) the main vegetation is *Rhizophora macronata* which is very thick in some places and the associates are *L. racemosa* and *E. agallocha* . (Plate : 2.29)

As a result of the cross road from Nagarkovil - to reach A9, the flow of water disturbed and large number of back -mangroves established along the road (Plate: 2.30) as well as the gaps in the lagoon (Plate: 2.31)

The common back -mangrove species *Deiris trifohata* (Fam. Fabaceae) (Plate: 2.31) found with *L. racemosa* along the cross road at Nagar Kovil. But Still , the Nagar kovil mangroves are the potential place to initiate ecotourism through community participation. (Plate. 2.31)



Plate: 2.26 : A single tree of *E. agallocha* at the lagoon (9°46'11.7"N 80°10'55.1"E)



Plate: 2.27 : *Tamarix gallica* at the southern part of the lagoon (9°44'48.5"N 80°14'56.3"E)



Plate: 2.28 : *Avicennia marina* in Ambarv (9°42'47.9"N 80°16'58.6"E)



Plate: 2.29 : *R. macronata* and *L. racemosa* in Nagar Kovil



Plate: 2.30 : Back -mangroves (Intruders) along the cross road (9°41 '16.6"N 80°17'41.9"E)



Plate: 2.31 Intruders in gaps among the mangroves at (9°41 21.4"N 80°17'41.8"E)



Plate: 2.32 : *Derris trifoliata* (Fam. Fabaceae) - a mangrove associate in Nagar Kovil

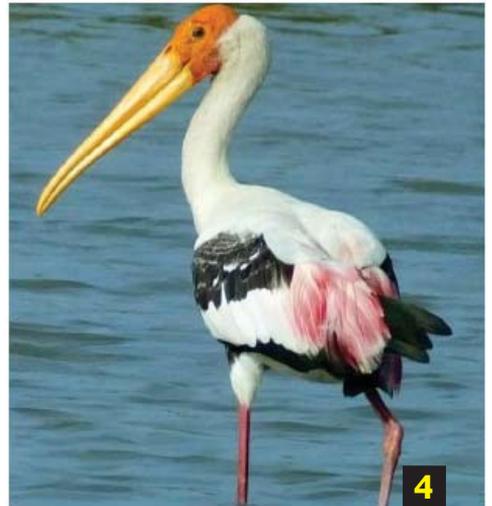
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CHAPTER - 2

BIRDS OF THONDAMANARU LAGOON



Dr.T.Eswaramohan



Mr.K.Asokan



3. Birds of Thondamanaru Lagoon

3.1 Introduction and background

This section of this book is one of the outcomes of one year research project in Thondamanaru lagoon under a small grant project of the Mangrove for Future through International Union of Conservation of Nature (Ref: IUCN/MFF/138) carried out by Department of Zoology of University of Jaffna.

All the photos are taken by the research team during the field visit. Due to the short duration and limited number of equipment's and man power the numbers of birds are limited here. These birds are only a fragment of the birds occupying in Thondamanaru.

As Thondamanaru is situated in the entry point of two of the migratory bird fly way to Sri Lanka, the lagoon is very rich in bird diversity (Figure 1).

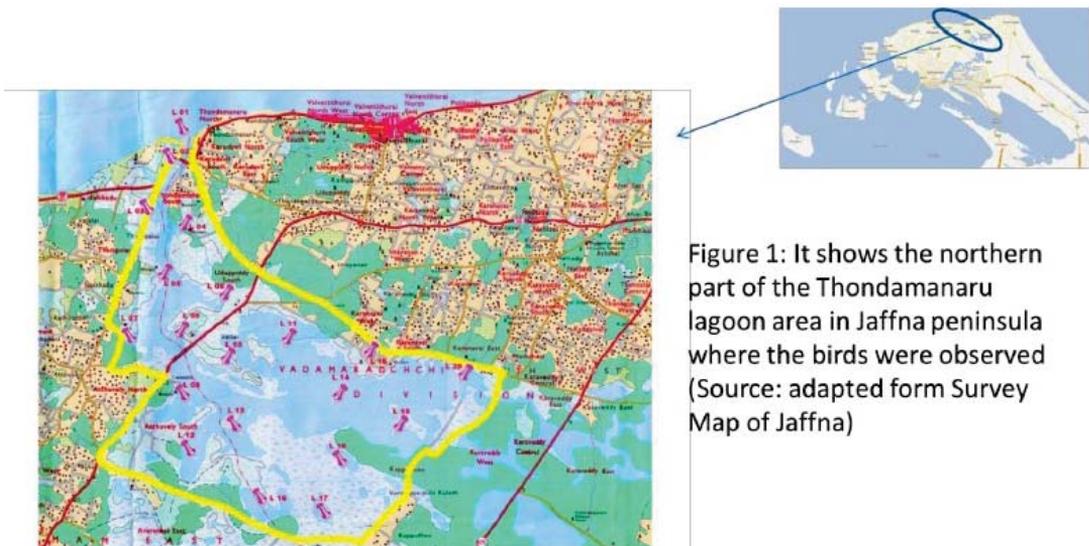


Figure 1: It shows the northern part of the Thondamanaru lagoon area in Jaffna peninsula where the birds were observed (Source: adapted form Survey Map of Jaffna)

Even this attempt is not covering the total birds of the Thondamanaru lagoon, we hope this will motivate other researchers and bird watchers to turn their eyes towards Thondamanaru lagoon which lead to more research and conservation activities.

During the field visit more than 50 birds were recorded in the field note book. But only 21 birds were successfully photographed. Those birds are given with the short description of identifying features and other relevant information in readable simple language. The English names of all the birds are given with the scientific name.

We hope this guide book will open a new era of bird watching, Bird research and Conservation culture in Thondamanaru lagoon for the local people, Sri Lankan people and even the interested bird watchers and researchers from other part of the world.

Basically the birds photographed in Thondamanaru lagoon can be classified as Residential bird (Non migratory birds) and migratory bird.

First we will see some migratory birds of Thondamanaru lagoon. They are,

1. Greater Flamingo (*Phoenicopterus roseus*),
2. Eurasian curlew (*Numenius arquata*),
3. Whimbrel (*Numenius phaeopus*),
4. Blue tail Bee eater (*Merops philippinus*),
5. Eurasian wigeon (*Anas penelope*),
6. Northern Pin tail (*Anas acuta*) and
7. Lesser sand Plover (*Charadrius mongolus*).

The following birds are very common Residential birds found in Thondamanaru lagoon. They

1. Asian Open bill (*Anastomus oscitans*),
2. Brahminy Kite (*Milvus migrans*),
3. Black headed Ibis (*Threskiornis melanocephalus*),
4. Black winged stilt (*Himantopus himantopus*),
5. Painted stork (*Mycteria leucocephala*),
6. Great Egret (*Casmerodius albus*),
7. Intermediate Egret (*Mesophoyx intermedia*),
8. Little Egret (*Egretta garzetta*),
9. Indian Cormorant (*Phalacrocorax fuscicollis*),
10. Pied Kingfisher (*Ceryle alcyon*),
11. Striated Heron (*Butorides striata*),
12. Spot-Billed Pelican (*Pelecanus philippensis*),
13. Red wattle Lap wing (*Vanellus indicus*) and
14. Grey Heron (*Ardea cinerea*).

Greater Flamingo (*Phoenicopterus roseus*)



Plate 3.1 - The flock of Greater Flamingo was observed near to Vallai Bridge

It is one of the Bird tourism important birds in Thondamanaru lagoon. According to the literature it is migrants. But it has been recorded in Thondamanaru lagoon even in the non-migratory season as well.

It is roughly 127 cm height. It is found in Flocks of big numbers. They also show av shape flying patterns even in the local moment.

White plumage suffused with pink and scarlet. Black primaries and outer secondary. Upper and underwing converts rose pink to bright scarlet. Long pinkish red legs. Bill bent down wards from approximately mid-point.

Eurasian curlew -(*Numenius arquata*)



Plate 3.2 : The Euresian curlew was observed near to Kapputliu village
Eurasian curlew -(*Numenius arquata*)

Euresian curlew -(*Numenius arquata*) is a Migratory bird. Adult Size is 59 cm. A migrant seen in Thondaimanaru Lagoon every migrant season. Probably the second largest migrant bird (Next to Flamingo) come to Th on dam am an aru lagoon. Have a long down curved bill, 12 to 14 cm long. Dark sandy brown plumage. Straked upper plumage. White rump extending in a triangle up lower back. Belly region is whitish with lower thort, neck and breast heavily streaked. In flight long curved bill held forward. The common habtats of this bird are lagoon, marshes, sea cost and mud flats.

Whibrel (*Numenius phaeopus*)



Plate 3.3: The Whibrel (*Numenius phaeopus*) was observed near to Kapputliu village

Whibrel (*Numenius phaeopus*) is a Migratory bird. The size of the adult bird is 43 cm. The bill is long and down curved (10- 12 cm long). Crown broadly striped with blackish and white brown body plumage. In flight pale rump. Underwing whitish with dusky barring. In addition to the lagoon this bird will find in marshes, coast, mudflats, and lagoons.

Blue tail Bee eater (*Merops philippinus*)



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Plate 3.4 The Blue tail Bee eater (*Merops philippinus*) was observed near to Mandan village Blue tail Bee eater (*Merops philippinus*) Blue tail Bee eater (*Merops philippinus*) is a migratory bird One of the non water migratory bird found in Thondamanaru lagoon vicinity. Only found in the migratory seasons (From Septemebr to April/May).

The birds size is 30 cm. The head and nape is dull green in colour, lower back, rump and tail is Bluish in colour. There is a black line through eye to bill. Yellow chin. Throt is reddish brown, under parts are light green. Birds will stay in rest (examble; in a bracli or electrcit wire) and insects are purseued and caught in flight.

Eusian wigeon (*Anas penelope*)



Plate : 3.5 The Eusian wigeon (*Anas penelope*) was observed near to Madam Village

Eusian wigeon (*Anas penelope*) is a migratory bird. Even this has been cited as rare migrant according to the past literature in the other part of the country this Eusian wigeon is recored in Thondamanaru lagoon in the recent past during the research activitie. The birds are found in smal group. The sise of the adult bird is 48 cm. Male and female are diffent morphological appearence. Male is having Greyish plumage. Have dark slender neck and upper breast. White belly. Reddish brown head with buff crown. Short blue grey feet. Female is pale in colour. Greyish upper wingcoverts, dark flightfeathers. In addition to lagoons it also found in Marshes and tanks

Northern Pin tail (*Anas acuttia*)

Northern Pin tail (*Anas acuttia*)



Plate : 3.6 The Northern Pin tail (*Anas acutiui*) was observed near to Vallai Bridge

Northern Pin tail (*Anas acuttia*) is a Migratory bird. The size of the adult varies from 53 cm to 75

This migrant bird is starting visible in the lagoon by November then during December and January the number is gradually increased. Matured breeding male size is about 75 cm. The head, face and throat are chocolate brown in color. White under parts. Side of neck has a white streak extending up from upper breast towards eye. Greyish body. Tail is long and called pin tail. Non breeding male is similar to female but has greyish upper parts and black bill with blue grey on sides. Females are 53 cm in size Mottled brown whitish belly. Head and neck more sand brown without eye strip. Bill grey, Soit pointed tail. In flight green speculum with buff bars appeal* in front. It feeds at night. Feed by up ending. In addition to the lagoon, these birds are found in marshes, tank, the population of these birds is veiy high. Sometime more than half of the water body is covered by the flock of these birds.

Lesser sand Plover. (Also called as Mongolian plover) (*Charadrins mongolus*)



Plate : 3.7 The Lesser sand Plover (*Charadrins mongolus*) was observed near to Kapputliu village

Lesser sand Plover (also called as Mongolian plover) (*Charadius mongolus*) is a migratory bird

One of the high populated migrants sand plover come to Thondamanaru lagoon . The size of the adult is 20 cm . Fore head and supercullum white. Broad brown band from lores to ear coverts. Rest of upper parts ashy brown. Under parts white with pale brown band across breast generally broken in the middle. It has small black bill. Legs are short. In flight narrow white wing bar. white boarder to tail. Faintish straks on secondaries. In addition to lagoon these birds are found in Marshes, mud flats and sand banks.

Asian Open bill - *Anastomus oscitans*



Very common Residential birds found in Thondamanaru lagoon
Asian Open bill - *Anastomus oscitans* Plate : 3.8 The Asian Open bill (*Anastomus oscitans*) was observed near to Iddaikadu village

The Asian Open bill (*Anastomus oscitans*) is a Residential bird (Non migratory birds). This is a big bird. 81 cm height. Non Breeding is pale Smokey grey and black plumage. Juvenile are small. Plumage are darker. During the breeding plumage the plumage is white. Bill is with prominent gap at midpoint between mandibles. It is found in the Thondamanaru lagoon itself and nearest paddy field during the rainy seasons but found in alone or in small group. If it is in a reasonable near area it can be identified by naked eye. Main food are bivalve mollusks. Themollusks are brought out of water and the valve will allowed to the hot son. Then soft parts will be eaten generally found in grass land near the lagoon.

Braliminy Kite (*MUvus migranus*)



Plate : 3.9 The Braliminy Kite (*MUvus migranus*) was observed near to Vallalai village

The Braliminy Kite (*Milvus migranus*) is a Residential bird (Non migratory birds). These birds are found not in the water part of the lagoon. But in the non-water land. They are also flying over the lagoon. The size is 45 cm long. Bright reddish brown plumage with white head neck and breast. Juveniles are dull brown in color with buff spots and streaks. During the flights adults have reddish brown wing lining. Black wing tips wing lining. Black wing tips white breast and head. Juveniles are having large pale patch at base of primaries.

Black headed Ibis (*Threskionus melanocephahis*)



Plate : 3.10 The Black headed Ibis (*Threskiomismelanocephahis*) was observed near to Kapputliu village

The Black headed Ibis (*Threskiomis melanocephahis*) is a Residential bird (Non migratory birds). One of the veiy common big birds found in the Thondamanaru lagoon. But the population is varied. Sometimes it is veiy high in number, sometimes only a veiy few and sometimes not seen in the lagoon (The study area). The height of the bird is 76 down curved bill. White body plumage. Beak head and upper region naked and black. Look like classical paddy harvesting knife. Breeding forms are Bare red. Also showed group formation in flight. Bare red skin visible under wing In the Non breeding breast plumes are absent.

Black winged stilt (*Himantopus himantopus*)



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Plate : 3. 11: The Black winged stilt (*Himantopus himantopus*) was observed near to Karaveddy village

The Black winged stilt (*Himantopus himantopus*) is a Residential bird (Non migratory birds). One of the common water bird found in the Thondamanaru lagoon. It is being seen more or less all the months of the year). The height is nearly 38 cm. It has black back and wing, thin bill. Rest of the body is white. Long red legs. Heads often sullied with grey. Some juveniles' males have crown and back of neck greyish or blackish. All neck feathers including hind neck feathers are approximately equal length. In flight black upper parts with clear white rump and upper tail coverts Long red legs trail beyond tip of the tail. The juvenile are brownish back with pale edges to feathers.

Painted stork (*Mycteria leucocephalia*)



Plate : 3.12: The Painted stork (*Mycteria leucocephalia*) was observed near to Karanavai village

The Painted stork (*Mycteria leucocephalia*) is a Residential bird (Non migratory birds). One of the beautiful bird found in the most part of the year. In some month they are isolated or small in number. But in some months they are high in number and found as flocks. Resting in the small islets in the lagoon. If the birds are near by, their feeding behaviour is very interesting to see and enjoy. Local people are believing that this is a migratory as they are not seen or very few in some months and as they increase in large number in the rainy seasons. The size is 102 cm. White plumage. Black primaries and tail. Black stripe across breast. Naked head yellowish. Bill long curved at tip and yellow. Pinkish tinge on greater wing coverts. Non Breeding birds are having paler plumage. Juvenile have blackish grey or brown plumage. During the feeding the beak is dipped into the water while moving steadily forward. Legs some times used to chum up mud. It can be seen even by naked if the birds are close by. The court ship behavior is also notable .

Great Egret (*Casmeroditis albus*)



Plate : 3.13 The Great Egret (*Casmeroditis albus*) was observed near to Avaran gal village

The Great Egret (*Casmeroditis albus*) is a residential bird (Non migratory birds). The size of the adult is 94 cm. Completely white bird. Heavy bill. Neck with “S” shaped kink. Gape extends beyond eye. Non breeding birds have dark brown to black legs. Yellow bill and pale green yellow lore. Breeding birds have black bill. Emerald green lories. Upper part of tibia becomes pinkish grey. Breeding feathered plumes from lower back. These birds are deep, open water feeders, hi addition to the lagoon these birds are found in Marshes, paddy fields mangroves, tanks river, lagoons.

Intermediate Egret (*Mesophoyx intermedia*)



Plate : 3.14 : The Intermediate Egret (*Mesophoyx intermedia*) was observed near to Udupidy south

The Intermediate Egret (*Mesophoyx intermedia*) is residential bird (Non migratory birds). The size of the adult bird is 71 cm and completely white. Gape does not extend beyond eye. Non breeding birds are having dark green to black legs. Bill black with yellow base. Pale yellow lore. Breeding birds have black legs. Yellow bills some time with dark tips and green lore. Feathers plumes on lower back and upper breast. In addition to the lagoon, these birds are found in shallow, open water feeders. Also find in Marshes, paddy field , lakes mangroves

Little Egret (*Egretta garzetta*)



Plate : 3.15 The Little Egret (*Egretta garzetta*) was observed near to Karavedy south

The Little Egret (*Egretta garzetta*) is a residential bird (Non migratory birds). The size of the adult bird is 61 cm. It has completely white plumage. Black bill and legs. Yellow-green feet. Breeding birds have breeding plumes on nape, lower breast and back. This bird is an active feeder. Chasing after insects and fishes. Feeds on the edge of water bodies. In addition to lagoon, this birds are found in Marshes, paddy field, tank edges, mangroves and major rivers.

Indian Cormorant (*Phalacrocorax fiiscicollis*)



Plate : 3.16 The Indian Cormorant (*Phalacrocoraxfiiscicollis*) was observed near to Kapootliu west

The Indian Cormorant (*.Phalacrocorax fiiscicollis*) is a residential bird (Non migratory birds). The size of the adult is 65 cm. Bill is slender. Body plumage is black with tinge of brown. Scaly appearance on wing. White border to gular patch. Breeding birds have white feather tuft behind eye. White speckles on head and neck . In flight show “V” formation. The birds are forming small group, hi addition to the lagoon the birds are seen in tanks, rivers, with stagnant pools.

Pied Kingfisher (*Crylke nutis*)



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Plate : 3.17 The Pied Kingfisher (*Crylke nirtis*) was observed near to Vallai

The Pied Kingfisher (*Crylke mdis*) is a residential bird (Non migratory birds). The size of the adult bird is 30 cm. This bird has black and white plumage. That's why called as “pied”. White breast with horizontal black bars. Bill and feet are black. Male bird has two complete breast bands. Female bird has only one band. This band is frequently broken in the center. This bird show a hovers frequently over the water. In addition to Lagoon this birds are found in Marshes, rivers , mangroves tanks and other wetlands.

Striated Heron (Also called as Little Heron) (*Butorides striata*)



Plate : 3.18 The Striated Heron (*Butorides striata*) was observed near to Avarangal east

The Striated Heron (Also called as Little Heron) (*Butorides striata*) is a residential bird (Non migratory birds). The size of the bird is 52 cm. The color is uniform green above and lighter below. Black crown. Yellowish green leg. Juvenile are browner and heavily streaked. Commonly found skulking among the roots and bases of mangroves and the stills of the fish trap.

Spot-Billed Pelican (*Pelecanus philippenis*)



Plate : 3.19 The Spot-Billed Pelican (*Pefecanusphilippenis*) was observed near to Mouth of the LagoonSpot-Billed Pelican (*Pelecanus philippenis*)

The Spot-Billed Pelican (*Pelecanus philippenis*) is a residential bird (Non migratory birds). Another big bird observed in Thondamanaru lagoon is Pelican. The size of the bird is 140 cm. It has dirty white plumages. Long bill with a large gular pouch extending in to the lower mandible. In flight slow beat with raked neck. Often glides and soars. Wing span is longer than body. When swimming three quarter of the body is above the water level. It feeds by jabbing bill into the water to catch the prey. This bird is important for Bird tourism activity as well. They are recorded in flocks in near to the lagoon mouth and not in the interior part of Thondamanaru lagoon. It shows very interesting population fluctuation in the lagoon. Even they are not migratory species, most of the months the pelicans are not seen in the lagoon. But suddenly they assemblage in big number. Their main assembling area is the new prawn culture area near to Akkarai village. So if the area is damaged for the prawn culture development the pelican may face danger. This should be considered seriously. The pelican found in Thondamanaru lagoon is subject to research where are they coming from and where are they going during their missing time.

Red wattled Lap wing (*Vanellus indicus*)



Plate : 3.20 The Red wattled Lap wing (*Vanellus ulicns*) was observed near to Sannatlii kovil

The Red wattled Lap wing (*Vanellus indicus*) is a residential bird (Non migratory birds). Birds size is 33 cm. Upper parts of the body is sandy brown. Under parts, the belly is white. Black head, neck and upper breast. White patch running from eye down to side of neck. Bill red tipped black. Prominent red wattles. Long Yellow legs. In flight black sub terminal tail band and primaries. Have a distinctive call “did- he- do- it”.

Grey Heron (*Ardea cinerea*)



Plate : 3.21 The Grey Heron (*Ardea cinerea*) was observed near to Field Work Centre

The Grey Heron (*Ardea cinerea*) is a residential bird (Non migratory birds). Adult bird is 94 cm in size. Head and neck are white. Mantle grey underparts are white. Black line running to nape across eyes and occiput region. Interrupted black line down side of neck. Shoulder and outer margin of folded wing blackish. This birds is maintaining individual feeding territories. This will found in addition to lagoon, marshes, paddy field and mangrove.



CHAPTER - 3

FIN FISHES AND SHELL FISHES OF THONDAMANARU LAGOON



Mrs. P. Sivakumar



3. Fish and shell fish in Thondamanaru lagoon

There are some 40 lagoons around the Sri Lanka. There are most common along the southern, southeastern and eastern coasts, where littoral drift causes accumulations of sand as barriers and split at river mouths through which freshwater discharge is low. But in Jaffna peninsula, there are no streams and rivers due to the flatness of the land and the topography that doesn't permit the construction of reservoirs [8].

Thondamanaru lagoon was selected for this study (Fig 1). Similar to most other lagoons and estuaries in Sri Lanka, Thondamanaru lagoon also supports profitable shellfish and finfish fisheries.

Thondamanaru lagoon is one of the lagoons in Jaffna, northern Sri Lanka and it separates the Vadamarachchy area from Valikamam and Thenmarachchy area. The lagoon's water is [brackish](#) to [saline](#).



Fig 1: Location of the Thondamanaru lagoon

There are three existing structures such as barrage with sluice gate, sand bar and bridges. The barrage with sluice gates was erected at a point about quarter mile from the mouth of

the lagoon in 1953 by the Irrigation department to prevent sea water entering the lagoon and retain the rain water and creating a freshwater lake [2]. (Fig 2).



Fig 2: Existing structures of the Thondamanaru lagoon

It was rich in fishery resources and an ecosystem with high biodiversity upto installation of barrage with sluice gate. Principal vegetation of this lagoon is sea grass beds, mangrove, coconut, palmyrah, grass, rice paddy, scrub forest and open forest. The lagoon attracts a wide variety of [water birds](#) [1].

Thondamanaru lagoon once considered to be a sanctuary for shrimps, crabs and most of the popular species of fish like Mullet, Rabbit fish, Milk fish and Cat fish. Before installation of barrage with sluice gate, Thondamanaru was one of the best places for shrimps especially white shrimps naturally and the lagoon harboured all species. The introduction of the barrage with sluice gate had disturbed the ecological equilibrium to such an extent that fish fauna had been reduced from 47 species during 1963-1968 to an about

15 species in 1978. Also construction of roads and two bridges across the lagoon often destroys the natural habitats of fish and shellfish biodiversity.

Also lagoon provided employment and a livelihood for about 300 fishermen and their families, who netted approximately 150 tons of fish per year. The introduction of the barrage with sluice gate has thrown nearly 2/3 of the fishermen out of their traditional employment and bringing down the production of fish about 35 tons per year [2].

Due to the periodical narrowing of the mouth during the dry season and sometimes complete closure of the lagoon mouth, salinity of the lagoon water increased and interfering with ichthyfaunal composition [1].

The Thondamanaru lagoon is significant due to its natural productivity as well as rich and diverse resources. Because of these economic value of the Thondamanaru lagoon and still there is no recent confirmation about its faunal and floral diversity as well. Due to the prevailed war situation and security, field survey was not feasible there about 30 years.

Therefore, current study was conducted for one year from June 2014 to May 2015, with an objective of identification of fish and shellfish diversity in the Thondamanaru lagoon ecosystem to fill the gap of knowledge in this discipline. Collected fish and shellfish were initially identified using standard keys according to the morphological features.

In this present study, 11 species were identified from Thondamanaru lagoon, Jaffna, Sri Lanka. They are 4 fishes, *Chanos chanos*, *Hemirhamphus* sp, *Nematalosa* sp and *Mugil cephalus* and 7 shell fishes, *Penaeus indicus*, *Penaeus monodon*, *Penaeus latisulcatus*, *Penaeus semisulcatus*, *Metapenaeus monoceros*, *Portunus pelagicus* and *Scylla serrata*.

Mugil cephalus, *Penaeus indicus* and *Metapenaeus monoceros* were recorded most abundant in the lagoon with rainy seasons. However, lagoon is being subjected to adverse environmental conditions that threaten to its biodiversity due to lack of salt water availability and changes in rainfall pattern.

3.1 *Chanos chanos* (Forsskal, 1775)



Plate 3.1: *Chanos chanos*

Common name : Milkfish

Colour: Body colour silvery on belly and sides grading to olive-green or blue on back. Dorsal, anal and caudal margins dusky.

Descriptive remarks: Body fusiform, elongated, moderately compressed, smooth and streamlined. Single dorsal fin. D 14-16. Short anal fin. A 10-11. Dorsal fin is opposite to ventrals.

Anal fin is very close to caudal fin. Deeply forked large caudal fin present with large scale flaps at base in adults. Pectoral fins and pelvic fins with axillary scales. Scales cycloid. Mouth small with toothless.

Size: Maximum about 180cm.

Habitat: Coastal waters including lagoons [6].

3.2 Hemirhamphus sp



Plate 3.2: *Hemirhamphus sp*

Common name : Murrall

Colour: Bluish dorsally, silvery on sides

Descriptive remarks: Dorsal Fin. D12-15. Anal fin present. A10-12. Anal fin originates opposite to dorsal fin. No scales on dorsal and anal fin.

Greatly prolonged, beak-like lower jaw, End of the beak coral red, upper jaw short and triangular without scales, preorbital ridge absent. Total number of gill rakers on first gill arch 25-36; pectoral fins is short and not reaching past nasal pit when folded forward. Caudal fin forked. Lower lobe of caudal fin is longer than upper lobe. Dorsal and anal fins located posteriorly. Brilliant lateral band.

Size: Maximum about 44cm.

Habitat: Coastal waters [6].

3.3 *Nematalosa* sp



Plate 3.3: *Nematalosa* sp.

Common name : Koi

Colour: Silvery body with yellow fins

Descriptive remarks: Dorsal fin present. D15-19. Anal fin. A 17 - 26. Belly with 17 to 20 + 9 to 13, total 28 to 32 (usually 30) scutes (Ventral scutes). Black shoulder spot present. Occasionally a diffuse pink lateral band. Snout projecting.

Size: Maximum about 22cm.

Habitat: Bays and lagoons [5], [6].

3.4 *Mugil cephalus* (Linnaeus, 1758)



Plate 3.4: *Mugil cephalus*

Common name : Flathead grey mullet

Colour: Black blue/green, flanks and belly pale or silvery

Descriptive remarks: Body cylindrical, robust. Head broad and flat, its width more than width of mouth cleft, adipose eyelid well developed, covering most of pupil; upper lip thin. Two dorsal fins. DIV; 6-8. First dorsal fin is very closer to snout tip than to caudal fin. Anal fin present. AIII; 8-9. Scales present on back and flanks and it forms streaked longitudinal stripes. pectoral axillary blotch is dark.

Size: Maximum about 90cm.

Habitat: Estuarine, bays and lagoons [6].

SHELL FISHES

3.5 *Penaeus monodon* (Fabricus,1798)



Plate 3.5: *Penaeus monodon*

Common name: Giant tiger prawn (E), Karawandu issa(S)

Colour: Greenish grey body with dark brown bars present and yellow spot on pleopods. Antenna is uniform pink –brown.

Descriptive remarks: The rostrum is well developed and toothed dorsally (7-8) and ventrally (3-4). The most distinct features for identification of this species are fifth pereiopods without exopod, carapace without longitudinal sutures and unarmed telson.

Size: Maximum about 27 cm in males, females about 35cm.

Habitat: Post larvae and juveniles in estuaries, adults in the sea. Abundant in low salinity lagoons [5].

3.6 *Penaeus indicus* (H.Milne-Edwards, 1837)



Plate 3.6: *Penaeus indicus*

Common name : White Shrimp (E), Kiri issa(S)

Colour : White body covered with numerous minute dark brown dots.

Descriptive remarks: The rostrum is well developed and toothed dorsally (7-9) and ventrally (4-6). Carapace is without longitudinal sutures. There are no fixed subapical spines on telson. There are fifth pereopods with exopod.

Size: Maximum about 18cm in males, females about 25cm.

Habitat: Very abundant on sand and mud. Showing preference for soft sand at depth of 30cm. Abundant in both low and high salinity lagoons [5].

3.7 *Penaeus latisulcatus* (Kishinouye,1896)



Plate 3.7: *Penaeus latisulcatus*

Common name : Western King Prawn.

Colour : Pale brown body. Short brown stripes present in abdomen with yellow pleopods.

Descriptive remarks: The rostrum is well developed and toothed dorsally (9-12) and ventrally (1). Carapace is without longitudinal sutures. Exopod present on fifth pereopods. Telson armed with 3 pairs of small movable spines.

Size: Maximum about 16cm in males, females about 20cm.

Habitat: Juveniles common in high salinity lagoons and at mouth of low salinity lagoons; rare in the sea [5].

3.8 *Penaeus semisulcatus* (De Haan, 1884)



Plate 3.8: *Penaeus semisulcatus*

Common name : Green tiger prawn or flower prawn(E), Kurutu issa(S)

Colour: Antenna banded white and brown. Reddish brown to pale brown body with brownish grey dorsal transverse bands present.

Descriptive remarks: The rostrum is well developed and toothed dorsally (5-8) and ventrally (2-4). Antenna banded white and brown. Carapace is without longitudinal sutures. Telson unarmed. Exopod present on fifth pereopods.

Size: Maximum about 18 cm in males, females about 23cm.

Habitat: Post larvae and juveniles in high salinity lagoons and near mouths of low salinity lagoons. Abundant in the sea on very soft green mud/burries in mud at daytime [5].

3.9 *Metapenaeus monoceros* (Fabricus, 1798)



Plate 3.9: *Metapenaeus monoceros*

Common name: Speckled shrimp.

Colour: Greenish grey body

Descriptive remarks: The rostrum is well developed and toothed dorsally (9-12) and no ventral teeth. Carapace is without longitudinal or transverse sutures. Telson armed only with spicules. Fifth pereopods have no exopod. Branchio cardiac ridge reaches the posterior extension of hepatic spine.

Size: Maximum about 15 cm in males, females about 20cm.

Habitat: Post larvae and juveniles in estuaries, adults in marine on mud bank[5].

3.10 *Portunus pelagicus* (Linnaeus, 1758)



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Plate 3.10: *Portunus pelagicus*

Common name : Blue swimming crab

Colour : Blue in colour with white spots

Descriptive remarks: Teeth on each anterolateral border of the carapace cut into nine teeth. The last pair of lateral tooth enlarged in the form of long spine. A single spine present at the distal end of posterior boarder of merus of the cheliped.

Males are blue with extensive white spots. The tips of the chelae and the distal segments of the legs are purple. Females are duller greenish/brownish colour with irregular patches and have rounded carapace. Carapace rough to granulose with regions discernible. Laterally flattened legs present and last 2 segments of last pair paddle-like.

Size: Carapace length about 18cm for males, females about 16.5cm.

Habitat: Very wide spread generally marine. It is a marine crustacean that occurs in large shoals in shallow coastal water overlying sandy or muddy substrates. Commonly rise to the surface at night [5].

3.11 *Scylla serrata* (Forsskal, 1755)



Plate 3.11: *Scylla serrata*

Common name : Indo-Pacific swamp crab

Colour: Greenish body

Descriptive remarks: Carapace smooth, with strong transversal ridges. Orange colour tipped strong chelipeds and well developed spines on the outer surface. Polygonal markings on all limbs and the two sharp spines on the outer margin of the carpus of the cheliped. Teeth of the antero-lateral border of the carapace cut into nine and equal in size. Legs are marbled.

Size: Carapace length to about 22cm.

Habitat: Neritic , benthic on mud and sand and also on high silty substrata. In Sri Lanka most abundant in estuaries [5].

At Thondamanaru, *Penaeus indicus*, *Penaeus monodon* were present along with 33 species of fish. Out of the 33 species 18 species were purely marine forms during 1963 -1969 [1].

Prior to 1953, lagoon harboured all species. But after the introduction of the barrage with sluice gate, fish fauna had been reduced from 47 species during 1967/68 to 15 species in 1978[2].

Fluctuation of fish and shellfish were observed during the study period. During the rainy season, species diversity was observed high compared with other months. *Mugil cephalus*, *Penaeus indicus* and *Metapenaeus monoceros* were most abundant in this lagoon during rainy season from November to January.

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CHAPTER - 5

IMPROVE YOUR WILDLIFE PHOTOGRAPHY (FOR BEGINNERS)



Mr.K.Harichandran



4. Improve Your Wildlife Photography (for Beginners)

It is pleasure that to share the experiences in the wildlife photography that I have learnt during MFF/138 project.

Making vs. Taking Pictures

Photography is a delicate balance between science and art. You need to master both to succeed. Most people already have lights of artistic sensibility — it's why they're drawn to photography in the first place. This is my quick essay on the technical basics. Learn these basics, and then you'll have a nice balance of art and science at your fingertips. Someone who shoots and hopes is taking a picture; someone who purposefully mixes art and science is making a picture. **Be a maker, not a taker!**

First you need to know something about new versions of cameras like SLR and DSLR Cameras (Digital Single-Lenses Reflex)

Elements of Exposure

Exposure is how much light hits your sensor. If it hits for too long, your picture is overexposed and blown out; if it's too short, your picture is underexposed and too dark. It would appear, then, that one should simply let the camera determine the optimal exposure, and Cameras can make pretty good guesses most of the time— that's what 'automatic' modes on cameras do. It is not advisable keeping guesses without self-control.

The problem is that there are three variables that control the exposure, which means there are near-infinite numbers of ways to get "correct" exposure, and the end-results all look different.

The three variables are:

1. ISO
2. Aperture (Focal length)
3. Shutter speed

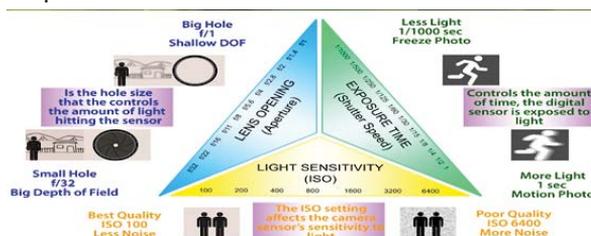


Plate 4.1: Exposure triangle

1. ISO (International Standards Organization in Camera Sensor)

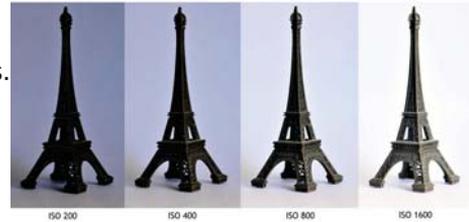
In very basic terms, ISO is the level of sensitivity of your camera to available light. The lower the ISO number, the less sensitive it is to the light, while a higher ISO number increases the sensitivity of your camera. The component within your camera that can change sensitivity is called "image sensor". It is the most important (and most expensive) part of a camera and it is responsible for gathering light and transforming it into an image. The danger of increasing ISO is that the picture gets grainier as it's turned up. ISO ranges from 100 up into the thousands.

On a practical level:

100-400 is best for sunny outdoors.

400-1200 is best for indoors.

1600 and up (6400) is for very low-light situations.



ISO 200 ISO 400 ISO 800 ISO 1600

Plate: 4.2 ISO Range

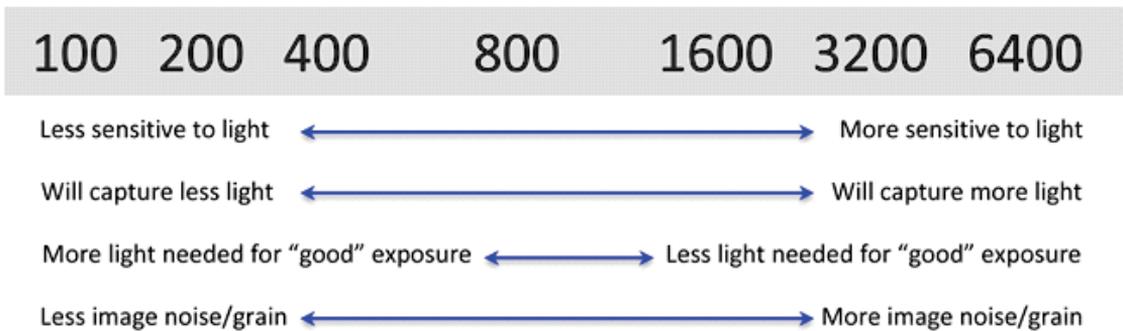


Plate 4.3: ISO Explanation Diagram

2. Aperture

Aperture is the size of the lens' hole. The bigger the hole, the more light gets in. Aperture is measured in units called "F stops" (or just "stops of light"), and written as "f/8". The smaller the f-stop number, the wider the hole (which seems weird at first.) Each lens has its own intrinsic aperture range.

F/1 - 2: super big hole

F/3.5 - 5.6: pretty big hole

F/5.6 - 8: the 'sweet spot' for most lenses, where things usually look best.

F/8 - 11: somewhat small hole

F/11 - 22: approaching pinhole sized

Big Aperture (f/4.0)
Background nicely blurred



Big Aperture (f/22)
Background is distracting



Plate 4.4: Aperture Differences - Vallai Bridge – with the Fujifilm Camera HS50 (18-50mm Lens)

Camera Aperture Values

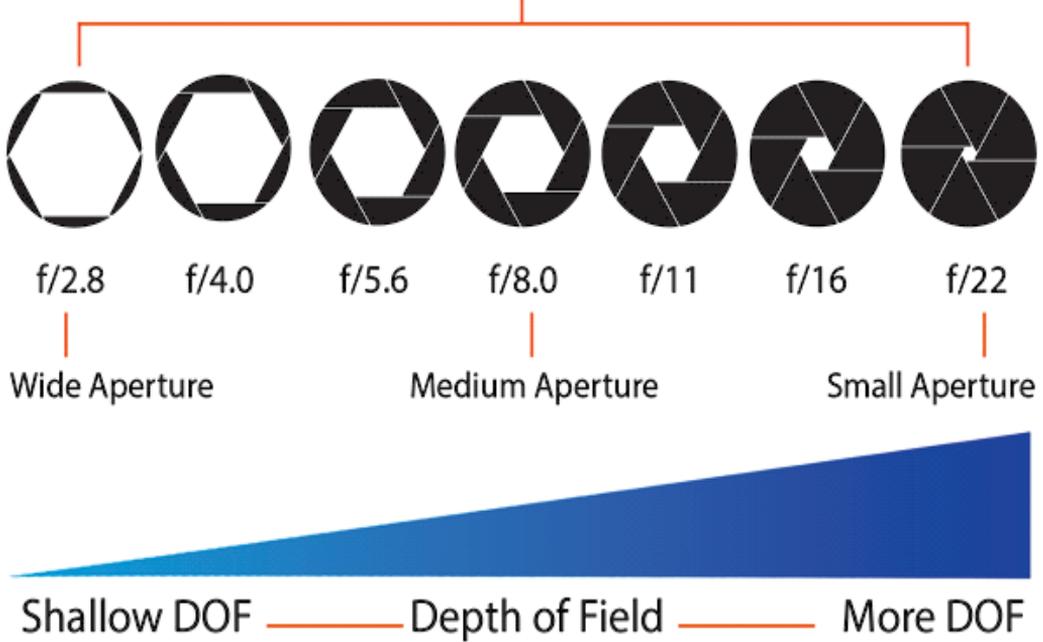


Plate 4.5: Aperture Explanation Diagram

Why does aperture matter? Because the bigger the hole, the shorter the depth-of-field. Depth-of-field is how much of the picture is in focus. If absolutely everything is in sharp focus (foreground subject, background), then it's a "high depth of field". If only a tiny bit of the subject is sharp and everything else is blurry, then it's a "shallow depth of field".

For a blurry background, you'd choose f/2.
For a sharp background, you'd choose f/11.

If you go beyond f/11, you may start to lose image sharpness due to a phenomenon called diffraction. Lenses with big apertures cost a lots of money, because they allow you to work in lower light, and give you bigger choice in depth-of-field.

Focal Length

Focal length also one of the important variable to learn behind this aperture It has to do with the "zoom factor" of a lens. When you look at a scene, how much of it gets framed by the camera?

The classic camera lens uses a focal length of 50mm... Because it's closest to the amount of scene that a human eye sees. It's considered the most natural — that is, the sizes of objects angles are closest to what our eyes see every day. Focal lengths that are bigger (100mm, 200mm...) are "zoomy", in that far-away things fill up the whole frame, and smaller focal lengths (28mm, 18mm,...) are considered "wide angle".



Plate 4.6: Focal length differences – Thondamanaru Barrage – with the Fujifilm Camera HS50 (18-50mm Lens)

3. Shutter Speed

The shutter speed is how fast the hole opens and closes to expose the light sensor. Assuming the ISO is held constant, shutter speed and aperture "trade off" with each other. That is: if the aperture is huge, then the shutter speed needs to be really quick to avoid overexposing. If the aperture is tiny, the shutter needs to be open for a while to avoid underexposing.



Plate 4.7: Shutter speed differences - Kapputhoo – with the Fujifilm Camera HS50 (18-50mm Lens)

Shutter speed is measured in fractions of a second. The main effect shutter speed has is on blur. For a handheld shot, humans generally need the shutter speed to be 1/60th of a second (or faster) to avoid the whole picture being blurry from shaky-hands. If you use a tripod, this restriction is removed.

Putting It All Together

1. Set the ISO based on your environment, understanding the balance between 'being able to work in the dark' and 'picture quality'.
2. Put the camera into 'aperture priority' mode (usually the letter "A" on the dial).
3. Before making a photo, set the aperture and depth-of-field.
4. *Sanity check:* Make sure the impending shutter-speed is reasonable, and won't create a blurry/shaky photo. If so, need to increase the ISO sensitivity and start over.

In a given situation, set the camera to "Shutter priority mode" (usually letter "S" or "T" on the dial) and repeat the set of rules — this time you get to set the shutter speed, and decide if the proposed aperture is acceptable. Put the camera in full "Manual mode" ("M" on the dial) is advisable, where you get to choose all 3 variables. The camera will warn you if you're over- or under-exposing, but it's your own creative choice to make.

Here Some Wildlife Photography (Birds) Tips

Wildlife Photography means Shooting Wildlife (With a Camera). This part comprised of a number of tips will briefly touch on light, weather and lens selection.

I will keep each section brief, presenting some points for you to consider and some comparison samples in various light, settings and conditions. I learnt most of this the hard way and hope you don't have to go through it the same way. Let's get on with it!

a. The Golden Hour / Light

There are many reasons why the golden hour is a great time to shoot photos, but the three reasons are most important

1. The tone of the light 2. The soft diffused light produced 3. The height of the sun relative to the subject.



Plate 4.8: a sample photo taken during morning - golden light time (Light produced some Magical properties) – Navally Barrage – at 08.00am, with the Fujifilm Camera HS50 (18-50mm Lens)

In short...

1. Morning light is the right time for shoot Birds
2. Watch the shutter speed, allow for the light level
3. Watch your white balance – Auto might not be best choice to catch the colors

b. Weather

The weather will be, rule your decision to go out and shoot. The weather for the most part doesn't matter or more accurately, the weather can be your friend. Photographing large animals is most of the time better done on a cloudy day. However, Cloudy time is not advisable to shooting **birds** with sky.



Plate 4.9: a sample photo taken in good weather – near to Thondamanaru Bridge – at 11.00am, with the Fujifilm Camera HS50 (18-50mm Lens)

c. Lens Selection

A telephoto (prime or zoom) lens is required for wildlife photography. The only question here is how close your subject. There is, however, Nikon and canon lenses are fantastic wildlife lenses (200-400mm f/4)

In Short....

1. Long focal lengths can get closer
2. Zoom lenses give you flexibility when framing subjects
3. Protect your expensive lenses against bumps and scratches with covers like Lens Coat
4. Get wet weather gear for your lens and camera
5. Experiment with your lens selection, learn to use various lenses for different effects.

Timing, Blinds, Locations, Animal Behavior and so many things are need know to become a best wildlife photographer. And remember Photography is **not a skill, is a passion** that becomes in naturally but the **practice can beat the skill**.

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