

## Floristic Diversity of "Thol Lake Wildlife Sanctuary, North Gujarat"



### Science

**KEYWORDS :** Floristic diversity, Thol Lake Wildlife Sanctuary, North Gujarat

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### ABSTRACT

*Region of North Gujarat is dotted with a large number of wetlands small and big. "Thol Lake Wildlife Sanctuary" is the only one amongst them which has got the legal protection as a wildlife sanctuary mainly to protect its rich migrant and resident waterfowl. Floristic study of Thol Lake Wildlife Sanctuary popularly known as "Thol Bird Sanctuary (TBS)", was of concern for the reason that unlike two other sanctuaries of North Gujarat this one has remained untouched. TBS is unique due to the fact that owing to its smaller size, it offers much diversity in plant community. An attempt has been made in the present study to carry out research regarding flora of TBS. Falling in the semi-arid region TBS holds scrub vegetation mixed with aquatic and invasive flora. The importance of flora of TBS is also indicated by presence of a few threatened and many medicinal plants.*

### Introduction

As TBS is a bird sanctuary, obviously a lot of efforts have already been made for research on bird community and fauna. Even though the area is rich in biodiversity (especially in birds and plants), and announced as a protected wetland, no detailed floristic and ecological studies have been carried out except a surface level study by GEER Foundation, Gandhinagar in 2002. Hence a deep floristic research of TBS was selected to study under present research, which is going to be a basic informatics database in respect of framing its sustainable conservation and development. As it was mentioned above the study area has been categorized as a protected one, the diversity of plant species found here would be noticed by a variety of group of people from laymen to the experts. An attempt is made here to study floristic diversity in of TBS detail.

### Study area

Gujarat is unique in considering its wealth of natural and man-made water bodies/wetlands. Four such inland wetlands in the state have been established and designated as sanctuaries primarily for waterfowl. These are Nal sarovar, Khijadia, Porbandar and Thol (Singh, 1998). Though, the selected study area Thol is encompassing irrigation tank, is legally named "Thol lake Wildlife Sanctuary" as per the notification. It is in fact one of the sanctuaries of the state considering that waterfowl constitute dominant form of the wildlife to be protected. The sanctuary is popularly known as "Thol Bird Sanctuary" (TBS).

The study area falls under Mehsana district of North Gujarat region, which is a semi-arid zone and mostly composes dry deciduous vegetation. In physiognomic manner forests of the district are of scrub type where vegetation is open i.e. trees and shrubs are widely spaced. The vegetation on the whole consists of co-dominant by thorny shrubs and trees capable of resisting drought. Such vegetation falls under Bio-geographic zone - IV. The area under present study also falls under the same conditions and categories naturally. In addition to that it is a protected area which is considered as wetland. The vegetation found here mainly was of scrub type with mixed flora of aquatic and marshy plants. TBS comprise a total area of 699 ha. with 5.62 km. long periphery. The area experiences three distinct seasons, winter, summer and monsoon. Temperature ranges here from as low as 8°C in winter to as high as 43°C in summer. Average annual rainfall is 600 mm, ranging from 100 mm to 800 mm. The study area is also facing anthropogenic pressures viz. agriculture, grazing, industrialization, oil drilling and tourism.

### Methodology

Present investigation was based on the survey of more than three years of extensive and intensive, regular excursions of the study area which is enriched with floral components. Because

the study area holds a water body with variation in water covered area during different seasons of the year, the survey was started from the peripheral region. Meanwhile when and where (mostly in summer) the water lodged areas dried up, were also surveyed. Thus, entire sanctuary was covered to document its floral diversity. For this purpose standard quantitative assessment technique like belt transects method (Muller-Dombois and Ellenberg, 1974; Kershaw, 1973) was used. Flora of the Presidency of Bombay by Cook (1958) and Flora of Gujarat by Shah (1978) are the best reference to identify plant species. However, standard floras and recent publications were referred for detailed nomenclature and conformation of all revised scientific names of the plant species.

Extensive field visits helped in the inventory of aquatic plants of TBS. During all the seasons the area was observed to locate and identify aquatic flora. Entire edge of the pond and all the water lodged areas were explored for the purpose. Identification and distribution of threaten plants and medicinally important plants were also based on the inventory of the flora. After observing the phytosociological analysis, minimum and maximum numbers of plants available in the studied sample plots were considered. Locally and globally threaten plants were identified and analyzed using collected data. Identification of medicinally important plants was mainly based on references published in the past, recent researches and interviews of local informants. Based on the inventory of the flora, medicinally important plants of the study area were enumerated.

### Results and conclusion

Total 278 species of angiosperm (including 11 varieties) belonging to 190 genera of 70 families have been recorded at TBS. Out of which total 231 dicotyledonae species belonging to 156 genera of 60 families and 47 monocotyledonae species belonging to 34 genera of 10 families (table 1) were found in their existence.

**Table 1: Distribution and ratio of plant species at class level**

	Classes		
	Number of species	Ratio	
	Dicotyledonae	Monocotyledonae	Dicotyledonae : Monocotyledonae
<b>Families</b>	60	10	6 : 1
<b>Genera</b>	156	34	4.58 : 1
<b>Species</b>	231	47	4.91 : 1

The ratio of species of dicotyledonae to monocotyledonae was 4.91 : 1, the same in regards of genera was 4.58 : 1 while the ratio of family between the two was 6 : 1 (table 1). Thus, naturally class dicotyledonae was found to be dominant than monocotyledonae comprising 83.10% species of the total, 82.10% genera of

the total and 85.71% families of the total. While Monocotyledonae was comprising 16.90% species of the total, 17.90% genera of the total and 14.29% families of the total (table 2) in the present study in concern of their diversity in family, genera and species.

**Table 2: Distribution of plant species at distinguished levels of classification**

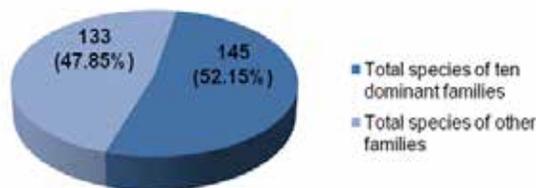
Class	Sub-class	Series	Numbers			
			Families	Genera	Species	
Dicotyledonae	Poly-petalae	Thalamiflorae	11	19	34	
		Disciflorae	10	13	14	
		Calyciflorae	9	43	64	
		Subtotal	30	75	112	
	Gemo-petalae	Inferae	2	14	18	
		Heteromereae	3	5	5	
		Bicarpel-latae	17	41	64	
		Subtotal	22	60	87	
	Mono-chlamydae	Curvembr-yeae	4	12	14	
		Unisexuales	3	8	17	
		Anolamous families	1	1	1	
		Subtotal	8	21	32	
	<b>Total with percentage</b>			<b>60 (85.71%)</b>	<b>156 (82.10%)</b>	<b>231 (83.10%)</b>
	Monocotyle-donae	Microsper-mae	1	2	2	
Coronarieae		3	4	5		
Nudiflorae		2	2	2		
Apocarpae		2	2	2		
Glumaceae		2	24	36		
<b>Total with percentage</b>			<b>10 (14.29%)</b>	<b>34 (17.90%)</b>	<b>47 (16.90%)</b>	
<b>Grand total with percentage</b>			<b>70 (100%)</b>	<b>190 (100%)</b>	<b>278 (100%)</b>	

Most dominant families of the study area were represented by total 145 species, comprising 52.15% of all the species in total. They were belonging to 94 genera, comprising 49.48 % of the total. Poaceae, the most dominant family comprised 12.98 % of the total species found at TBS. It was followed by Fabaceae comprising 10.40% of the total species, Asteraceae comprising 7.35% of the total species and so on as per table 3. Figure 1 elaborates the overall view of dominant families as together in the study area.

**Table 3: Dominant families of TBS**

Sr. No.	Family	Genera		Species	
		#	%	#	%
1	Poaceae	21	11.05	30	12.98
2	Fabaceae	17	8.95	24	10.40
3	Asteraceae	13	6.84	17	7.35
4	Convolvulaceae	6	3.16	13	5.63
5	Caesalpiniaceae	6	3.16	12	5.19
6	Euphorbiaceae	6	3.16	12	5.19
7	Acanthaceae	6	3.16	10	4.33
8	Amaranthaceae	8	4.21	9	3.90
9	Cucurbitaceae	6	3.16	9	3.90
10	Mimosaceae	5	2.63	9	3.90
<b>Total of dominant families</b>		<b>94</b>	<b>49.48</b>	<b>145</b>	<b>52.15</b>
<b>Total of all families</b>		<b>190</b>	<b>100</b>	<b>278</b>	<b>100</b>

**Figure 1: Dominant families of TBS as together**

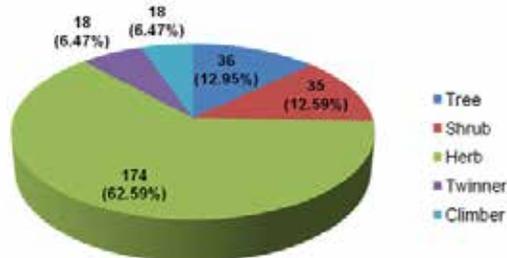


Amongst 190 genera of the study area *Cassia*, *Euphorbia* and *Ipomoea* were found to be the most dominant, carrying 7 species by each. They were followed by Indigofera having 5 species and *Acacia*, *Blumea*, *Corchorus*, *Cyperus*, *Ficus* and *Justicia* carrying 4 species by each. Thus total species of 10 dominant genera of the area was 50, which was 17.98% of the total genera and remaining 228 species of other genera comprised 82.02% of the total (table 4).

**Table 4: Dominant genera of TBS**

Sr. No.	Genus	No. of species
1	Cassia	7
2	Euphorbia	7
3	Ipomoea	7
4	Indigofera	5
5	Acacia	4
6	Blumea	4
7	Corchorus	4
8	Cyperus	4
9	Ficus	4
10	Justicia	4
<b>Total with %</b>		<b>50 (17.98%)</b>

Higher plant species recorded at TBS were distributed in various habits viz. tree, shrub, herb, twiner and climber based on their adaptation and life forms. Out of total 278 species 36 tree species belonging to 26 genera of 16 families, 35 shrub species belonging to 25 genera of 17 families, 174 herb species belonging to 121 genera of 48 families, 18 twiner species belonging to 13 genera of 4 families and 15 climber species belonging to 12 genera of 7 families were reported. Thus, tree species represented 12.95 %, shrub species represented 12.59%, herb species represented 62.59%, twiner species represented 6.47% and climber species represented 5.40% of the total species diversity recorded at TBS (figure 2).



**Figure 2: Plant species distribution at TBS based on habit**

Out of total 278 species of higher plants found in the study area 15 species were categorized as aquatic plants. They were found in the pond and water logged areas of TBS. Based on their stratification in water and life forms they were categorized amongst 4 groups like viz. Submerged rooted vegetation, Rooted floating vegetation, Submerged free vegetation and Free floating vegetation.

In the present study plant species status has been worked out

on criteria, based on rare and/or endangered species. The 2008 IUCN red list shows that the number of threatened plant species is increasing gradually. A total numbers of 9 species listed out as 'Vulnerable & Data Deficient' or 'Locally Rare' from the area. Out of which *Heliotropium bacciferum* Forsk. var. *baccirerum*, *Dalechampia scandens* L. var. *cordofana* (Hochst. ex A. Rich) and *Gloriosa superba* L. were listed out as Data Deficient & Vulnerable worldwide as per the IUCN categories of the red list.

The area under present study is located near urban areas of the state and is developing fast along with medicinal facilities. As a result very poor traditional knowledge of ethnomedicinal plants was seen left amongst the locals. On the basis of personal observations and interviews with experienced and old age personals only 44 (15.83%) plant species of the total were found to be used more or less for the purpose of medicine in the study area. It is considered necessary to mention that knowledge of the people here regarding ethnomedicinal plants was not found as high-quality as of the tribes of other forest regions of North Gujarat. It was very much limited to gum, fodder, timber collection and uses of twigs of *Acacia* as toothbrush.

## REFERENCE

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