ASSESSMENT OF STATUS OF YELLAMALLAPPASHETTARA LAKE AND VENGAIAHANA LAKE THROUGH DISTRIBUTION AND DIVERSITY OF ANGIOSPERMS

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OBJECTIVE

• Assessment of lakes ecosystems through distribution and diversity of aquatic hydrophytes in Yellamallappashettara lake and Vengaiahana lake.
• **Aquatic plants:**
  – Adapted to living in aquatic environments
  – Grow in shallow to deep water zones.
  – Can only grow in water or in soil that is permanently saturated with water.

• **Importance of aquatic plants in Lake ecosystems:**
  – Primary producers
  – Maintain the micro-climate of the region
  – Trap/sequester nutrients and CO$_2$

• **Diversity in aquatic plants:**
  – Bio-diversity is an essential characteristics of the aquatic ecosystem
  – Reflects the physico-chemical condition of water.
  – Higher diversity is proportional to good water quality
  – Higher nutrient enrichment (cultural eutrophication) leads to poorer diversity implies poor water quality.
Study area:
YELLAMALLAPPASHETTARA LAKE: located at 13°01'27.64"N and 77° 43’ 55.08"E

VENGAIAHANA LAKE: located at 13°01'28.96"N and 77° 42’ 33.69"E
MATERIALS AND METHODS

AREA

• Bengaluru - capital of Karnataka State is located at an altitude of 920 metres which has expanded as Greater Bengaluru (77°37’19.54” E and 12°59’09.76” N) is a major administrative, cultural, commercial, industrial, and knowledge hub of the state of Karnataka.

• The 'City of thousand lakes' has presently ended up as a city of handful decade lakes.

• **Yellamallappashettara lake** : Near Virgonagar on the road leading from KR Puram to Hoskote.

• **Vengaiahana lake** : Near main road after KR Puram bus station and enroute towards Garden City College.
METHOD OF COLLECTION:

- The Yellamallappashettara lake and Vengaiahana lake were surveyed during the random periodic visits in the month of June and July 2014.

- Referred flora to identify the plant sample

- The plants were also collected from these lakes for the preparation of herbarium specimens.
VENGALAHANA
LAKE
1. *Alternanthera paronycioides* (smooth chaff flower):

**Identification**

- Perennial herb with white papery flowers
- Stems are densely hairy.
- Stalkless flower-heads are ovoid to spherical, often hairy at base.
- Tepals are white.
- Stamens are 5, with yellow anthers.

**Uses**

- Used as ornamental plants.
2. Alternanthera philoxiroides (alligator weed)

**Identification**
- Perrenial herb
- Stems are long, branched, and hollow.
- Leaves are simple, elliptic, and have smooth margins.
- Have whitish, papery ball-shaped flowers that grow on stalks.

**Disadvantages**
- Invades waterways.
- Can reduce water flow and quality by preventing light penetration and oxygenation of the water.

**Uses**
- It is used as a cultivated vegetable by some ethnic communities.
3. *Polygonum lanigerum* (pink knotweed)

**Identification**
- Non-woody perennial.
- Aquatic, growing as floating plants in ponds.
- The smooth-edged leaves.
- The stems are often reddish or red-speckled.
- The small flowers are pink, white, or greenish.

**Uses**
- Used as food by the larvae of some Lepidoptera species.
4. *Eichhornia crassipus* (water hyacinth)

**Identification**

- Free-floating perennial aquatic plant
- Broad, thick, glossy, ovate leaves.
- Freely hanging roots are purple-black.
- Attractive flowers, mostly lavender to pink in colour with six petals.

**Disadvantages**

- Known as **TERROR OF BENGAL**
- Blocks sunlight from reaching native aquatic plants.
- Starves the water of oxygen, often killing fish.

**Uses**

- Excellent source of biomass.
Yellamallappashettara Lake
1. *Amaranthus spinosus* (spiny amaranth)

**Identification**

- Annual herb with sometimes red tinged erect stems.
- Leaves ovate to rhombic-ovate, elliptic.
- Flowers green, in axillary clusters.

**Uses**

- The leaves of this plant have been used in the diet.

**Disadvantages**

- Has spines that can cause injury to the mouths of grazing animals and few cases of poisoning in cattle.
2. *Nelumba nucefera*  
(Indian lotus)

**Identification**

- The leaves float on top of the water surface.
- The leaves may be as large as 60 cm in diameter.
- The flowers are usually found on thick stems.

**Uses**

- Decorative purposes and for dried flower arranging.
3. *Nymphaea pubescens* Willd (Hairy water lily)

**Identification**
- Having erect perennial rhizomes.
- Its leave blades are round above the water and heart-shaped below.
- The flowers are quite large, about 15 cm in diameter when fully open.

**Uses**
- Antioxidant effect.
4. *Nymphaea nouchali* (blue star water lily)

**Identification**

- Day-blooming nonviviparous plant with submerged roots and stems.
- Usually violet blue in color with reddish edges.
- Flower look star-shaped from above.
- The leaves are round and green on top.

**Uses**

- Medicinal plant in Indian *Ayurvedic* medicine.
- An ornamental plant.
5. *Nymphaea rubra*  
(red water lily)

*Identification*

- Beautiful floating plant.
- Flowers are intensely red or rose-coloured.
- Leaves are around, sharply toothed.
- The lobes of the leaves diverge away from each other.

*Uses*

- Extracts of the rhizomes and flowers, have anti-diabetic and anti-inflammatory effects.
LITERATURE AND SEASONAL SURVEY

• Literature survey of Flora of Bangalore District (Ramaswamy and Razi-1973), Flora of Karnataka (Saldanha) and Flora of Karnataka (Sharma et al-1984, BSI) has no citation of Yellamallappashettara and Vengaiahana Lake in the floras.

• The seasonal survey of Yellamallappashettara lake during 2014 shows 20 families, 30 genera and 34 species (Table II & Table III) when compared to 24 families, 42 genera and 47 species found from 2005-2010.

• Vengaiahana Lake survey during 2014 shows 22 families, 38 genera and 43 species (Table I & Table III) when compared to 23 families, 35 genera and 40 species found from 2005-2010.

• Since 2005, there is a progressive decline in the number of species due to the increased human activities due to rapid urbanisation at the outskirts of Bengaluru.
• At present Yellamallappashettara and Vengaiahana Lake has Hygrophila auriculata (Schum.) Heine, Alternanthera paronychioides A. St.-Hil, Alternanthera philoxeroides (Mart.) Griseb., Alternanthera sessilis (L.) DC., Amaranthus spinosus L., Persicaria glabrum L. Colocasia esculenta (L.) Schott, Eichhornia crassipes (Mart.) Solms, Typha domingensis Pers. and Ludwigia perennis L.

• The changing profile in the lake is depicted by the absence of many sensitive aquatic angiosperms and the sustenance of only the rigid invasive species of angiosperms.
## Results

### IMP Wetland Plants: Bio indicators

<table>
<thead>
<tr>
<th></th>
<th>Lake 1 V</th>
<th>Lake 2 Y</th>
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<tbody>
<tr>
<td>1</td>
<td>Alternanthera philoxiroides</td>
<td>++</td>
</tr>
<tr>
<td>2</td>
<td>Alternanthera paronicoides</td>
<td>++</td>
</tr>
<tr>
<td>3</td>
<td>Alternanthera sessilis</td>
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<tr>
<td>4</td>
<td>Eichhornia crassipus</td>
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<tr>
<td>5</td>
<td>Cyperus alopecuroides</td>
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<tr>
<td>6</td>
<td>Typha angustfolia</td>
<td>++</td>
</tr>
<tr>
<td>7</td>
<td>Pistia striata</td>
<td>-</td>
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### INDEX

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Medium</th>
<th>Maximum</th>
<th>Absent</th>
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<td>Minimum</td>
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<td>Medium</td>
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<td>Maximum</td>
<td>+++</td>
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### Table- III : Angiosperm distribution in the two lakes during 2014

<table>
<thead>
<tr>
<th>Lakes</th>
<th>Monocotyledons</th>
<th>Dicotyledons</th>
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<tbody>
<tr>
<td></td>
<td>Family</td>
<td>Genera</td>
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<tr>
<td>Vengaiahana lake(V)</td>
<td>6</td>
<td>7</td>
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<tr>
<td>Yellamallappashettara lake(Y)</td>
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<td>12</td>
</tr>
</tbody>
</table>
**INFERENCES**

- Higher abundance of aquatic plants in Yellamallappashettara lake (Y) \( \Rightarrow \) higher nutrient enrichment that poses **threat to lake ecosystem**

- **Proliferative growth of aquatic plants** \( \Rightarrow \)
  - lead to lower Dissolved Oxygen levels and consequent fish kills
  - Blocks sunlight – create anoxic environments
  - Blocks the air-water interface – do not allow algal growth – disruption of lake productivity
  - Higher decomposition of aquatic plant parts – higher bacterial oxygen demand – inhabitable lake ecosystem for different tropic levels
REFERENCE


Thank you