Biodiversity Audit Report

“Shrimati Indira Mahadev Beharay College of Arts, Shriman Chandulal Sheth College of Commerce and Shrimati Shobhatai Chandulal Sheth College of Science, Khed, Ratnagiri district, Maharashtra”

January 2017
Submitted by: ECOSPACE GREEN, PUNE
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ACKNOWLEDGEMENTS

We are grateful to the authorities of “Shrimati Indira Mahadev Beharay College of Arts, Shriman Chandulal Sheth College of Commerce and Shrimati Shobhatai Chandulal Sheth College of Science, Khed, President, Shri. Hirbhai Butala; Secretary, Shri. Mangesh Bhai Butala; Chairman, Adv. Anandrao Bhosle for giving us an opportunity to carry out the ‘Biodiversity Audit’ of their ICS college campus, Khed. We express our deep gratitude towards Hon. Principal, Dr. Gopinath Baba Sarang; IQAC coordinator, Dr. Ayub Shaikh; IQAC Secretary Mr. Shrikant Kekane; NSS officer Dr. Sanjay Patole; Prof. S, K, Ghumare; Dr. V. A. Patil; Dr. Anita Awati, HOD Geography; Professional Courses coordinator, Mr. Sachin Bhosle for cooperation and valuable support for this activity. We also express our gratitude towards Mr. Santosh Sakpal, office Superintendent and Mr. Dattaram Shinde, Head Clarke for timely help during the audit work.

Our sincere thanks to teaching and nonteaching staff members, students for their valuable help rendered during assessment of Biodiversity audit work.
SUMMARY

The information in this report is the first stage in the development of a Biodiversity action plan for the campus of ICS College, Khed, MS, India. The premises of ICS College have been visited during the period of June 2016 to December 2017 to carry ‘Biodiversity Audit’ from the period of June 2013 to December 2017. During the visit we carried out detailed survey of the current status of plants, animals (including insects, butterflies, reptiles, birds, etc) from college campus to understand floral and faunal diversity. Efforts were also taken to check area under green cover, various environment friendly activities carried out by the institution, threat to the local biotic components, awareness activities undertaken by the college, etc. The auditing work also undertaken through checking documents, photographs, news coverage, various efforts for biodiversity protection and conservation. On the basis of careful and extensive observations, entire campus area has been assessed and presented in form of report. The report with phase wise data and contribution towards environmental conservation will contribute towards the development of strategies of academic institutions for the conservation and enhancement of Biodiversity through audit of their respective campus.
INTRODUCTION

India is mega-biodiversity hottest hot-spot in the world with tremendous diversity in plants and animals. Such biotic forms are endemic to the different bio-geographic habitats in urban and in forest areas of the country as well. Biodiversity is defined as genetic, species and ecosystem diversity, which offers variability and therefore added values to bio-resources. The most serious and rapidly accelerating of all the global environmental problems is the loss of biodiversity through deforestation and Biodiversity cover depletion. Over the past 300 years, many species of organisms, including mammals, birds, butterflies and plants, have been lost due to many anthropogenic activities. In addition to this, habitats are vanishing very rapidly due to human interference in environment cycle. More than 11,000 species of animals and plants are known to be threatened with extinction. In ‘The Future of Life’ a book by Harvard Biologist Edward O. Wilson writes of his worries that unless we change our ways, half of all species could disappear by the end of this century. In this regards efforts should be given more on protection and conservation of environment, biological diversity, habitat conservation at regional level. There is tremendous pressure on biodiversity of India, due to increasing population and their use of natural resources. The introduction and widespread use of high-external input and modern agriculture have caused many problems.

The environmental components decide what kind of plants and animals are to be sustaining in the specific area. Overall distribution of species principally depends on the climatic conditions and presence of specific ecological parameters along with typical land-form and land-type. In the distribution of flora, the topography, rainfall, soil type etc. play crucial role for their distribution.

ABOUT ICS COLLEGE, KHED

ICSC is a pioneering college with the vision to educate, earner and empower to rural India since June 1990 under the able guidance of prestigious “Shrimati Indira Mahadev Beharay College of Arts, Shriman Chandulal Sheth College of Commerce and Shrimati Shobhatai Chandulal Sheth College of Science, Khed, Ratnagiri district, Maharashtra”. To generate the social mind set amongst students and as social reasonability, the college has established NSS and NCC units for serving duty for society through various social and outreach activities. College has also established Women’s Hostel, Central Library, Gymkhana, In-door Training Centre in
The college is situated at the foot hills of Western Ghats at an altitude of 226 m. from mean sea level and located at latitude 17˚73’18.79” N and longitude 73˚40’15.44” E. The college campus of 5 acres which is surrounded by lush green vegetation towards east side while a hillock towards north side. During biodiversity audit work, efforts were made to understand the current status and ongoing changes in the ecology of the campus as well as surrounding area.

AIM AND OBJECTIVES

The aim of the Biodiversity Audit of the ICS College, Khed were to survey existing vegetation and assess the significance of the features found in order to facilitate the development of Environment Action Plan (EAP) with clear, long-term objectives and a time tabled program for implementation.

Objectives:

1. To analyze current status of floristic composition of ICS COLLEGE campus.
2. To demarcate areas within the institute campus which have potential for restoration of biodiversity.
3. To suggest measures to make the institute campus biodiversity rich.
4. To deal with any other relevant environmental and ecological issues to the surrounding area in general.
5. To make recommendations for the conservation, protection and rejuvenation of the natural vegetation and animal life by involving students and faculty members.
ACTIVITIES UNDERTAKEN:

In this regards ICS College, Khed have initiated ‘Biodiversity Audit’ of their institution campus. In present survey, focus has been given on assessment of present status of diversity in form of plants, insects and birds from college campus and efforts made by the college authorities for nature conservation. The data related to protection and conservation of nature, plantation activities, awareness, eco-friendly development, etc. by the institution since last three years has been assessed. The report provides a baseline review of various activities carried out by institution to inculcate environmental consciousness amongst college students and for general people at large.

The review is the first stage in the development of a biodiversity action plan for the ICS College, Khed will contribute towards the implementation of “The strategy for the conservation and enhancement of biodiversity and Biodiversity initiatives”.

Methodologies were adapted from Comptroller Auditor General (CAG) of India of ‘Biodiversity Audit’ with the scope (from genetics to species to ecosystems), the threats (from habitat loss to pollution to urbanization), and the responses of institution (in conservation of biodiversity). The assessment includes understanding present vegetation composition which includes trees, shrubs, climbers and herbaceous elements in and around campus. The inventory of faunal components including insects and birds has been done by random sampling method and visual observations in the campus. The standard for the work is followed through the identification of plants (by regional floras) and faunal components during the visit period in the campus. The focus is also given on pollution control methodology, best practice for environment conservation, etc.

Primary survey of college campus was undertaken for assessment of floral and faunal diversity. The list of plants which includes trees, shrubs, climbers, herbs have been prepared and documented for its further ecological importance. The field activities in the ICS College, Khed has been carried out during the period June 2016 to December 2017. The assessment period for documentary evidences of environmental issues, various activities by the institution is June 2013 to December 2017. The reconnaissance survey have been undertaken to understand the boundaries of the campus, vegetation pattern, existing floral and faunal
components, various activities carried within the campus, etc. By visual primary observations on insects and birds diversity, a checklist has been prepared.

During the assessment of biodiversity we tried to understand the previous contribution of the institution in Biodiversity conservation through the involvement of students and staff members. Efforts were made to understand changes in vegetation pattern, avifaunal (birds) migration (if any) and other faunal components. The flowering pattern of trees, shrubs and climbers were observed to understand the pollinators and dispersal agents. The observation on faunal components including insects and birds has also been done by random sampling method and visual observations in the campus.

**Figure-1: Location Map of ICS College, Khed**

Source- Google earth
Figure-2: Location Map of ICS College, Khed
**FLORAL DIVERSITY OF ICS COLLEGE, KHED:**

**Table-1: List of Plant Species**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Plant</th>
<th>Family</th>
<th>Common Name</th>
<th>Habit</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Abrus precatorius L.</td>
<td>Fabaceae</td>
<td>Gunj</td>
<td>Cl</td>
<td>Wild</td>
</tr>
<tr>
<td>2</td>
<td>Abutilon indicum (Link) Sweet</td>
<td>Malvaceae</td>
<td>Mudra, Ati-bala</td>
<td>S</td>
<td>Wild</td>
</tr>
<tr>
<td>3</td>
<td>Acacia auriculiformis A.Cunn. Ex Benth.</td>
<td>Mimosaceae</td>
<td>Australian Babhul</td>
<td>T</td>
<td>Exotic Tree</td>
</tr>
<tr>
<td>4</td>
<td>Acacia mangium Willd.</td>
<td>Mimosaceae</td>
<td>Mangium</td>
<td>T</td>
<td>Exotic Tree</td>
</tr>
<tr>
<td>5</td>
<td>Acacia catechu (L.) Wild</td>
<td>Mimosaceae</td>
<td>Khair</td>
<td>T</td>
<td>Wild</td>
</tr>
<tr>
<td>6</td>
<td>Acalypha hispida L.</td>
<td>Euphorbiaceae</td>
<td>Khalipha, Foxtail, Red Hot cat-tail</td>
<td>S</td>
<td>Cultivated</td>
</tr>
<tr>
<td>7</td>
<td>Achyranthes aspera L.</td>
<td>Amaranthaceae</td>
<td>Aghada</td>
<td>S</td>
<td>Indigenous shrub</td>
</tr>
<tr>
<td>8</td>
<td>Adhatoda vasica Nees</td>
<td>Acanthaceae</td>
<td>Adulsa</td>
<td>S</td>
<td>Cultivated</td>
</tr>
<tr>
<td>9</td>
<td>Aegle marmelos L.</td>
<td>Rutaceae</td>
<td>Bel</td>
<td>T</td>
<td>Indigenous</td>
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<tr>
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<td>Agave americana L.</td>
<td>Agavaceae</td>
<td>Ghaypat</td>
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<td>Shrub</td>
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<tr>
<td>11</td>
<td>Albizia procera Benth.</td>
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<td>Shirish</td>
<td>T</td>
<td>Wild</td>
</tr>
<tr>
<td>12</td>
<td>Albizia saman F. Muell.</td>
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<td>Rain Tree</td>
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<td>13</td>
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<td>Pivali Ghanta</td>
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</tr>
<tr>
<td>14</td>
<td>Aloe vera L.</td>
<td>Liliaceae</td>
<td>Korphad</td>
<td>H</td>
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</tr>
<tr>
<td>15</td>
<td>Alstonia scholaris (L.) R.Br.</td>
<td>Apocynaceae</td>
<td>Saptaparni</td>
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<tr>
<td>16</td>
<td>Amaranthus virides L.</td>
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<td>Anacardium occidentale L.</td>
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<td>Kaju</td>
<td>T</td>
<td>Cultivated</td>
</tr>
<tr>
<td>18</td>
<td>Annona reticulata L.</td>
<td>Annonaceae</td>
<td>Ramphal</td>
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<tr>
<td>19</td>
<td>Anthocephalus cadamba (Roxb.) Miq.</td>
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<td>Kadamb</td>
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<tr>
<td>20</td>
<td>Anthurium sp.</td>
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<td>White Vietnamese Anthurium</td>
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<td>22</td>
<td>Artocarpus integrifolius Lam.</td>
<td>Moraceae</td>
<td>Phanas</td>
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<tr>
<td>23</td>
<td>Asparagus racemosus Wild.</td>
<td>Asparagaceae</td>
<td>Garden Shatavari</td>
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<td>Atylosia indica L.</td>
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<td></td>
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<tr>
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<td>Azadirachta indica L.</td>
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<td>Neem</td>
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<td>26</td>
<td>Bauhinia purpurea L.</td>
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<td>Kanchan</td>
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<tr>
<td>27</td>
<td>Bauhinia racemosa</td>
<td>Caesaslpiniaceae</td>
<td>Apata</td>
<td>T</td>
<td>Wild</td>
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<tr>
<td>28</td>
<td>Blumea lacer L.</td>
<td>Asteraceae</td>
<td>Burundi</td>
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<td>29</td>
<td>Bombax ceiba L.</td>
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<td>Katesavar</td>
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<td><em>Bougainvillea spectabilis</em> Willd.</td>
<td>Nyctaginaceae</td>
<td>Boganvel</td>
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<td>31</td>
<td><em>Bridelia retusa</em> (L.) A. Juss</td>
<td>Euphorbiaceae</td>
<td>Katak, Asana</td>
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<td>32</td>
<td><em>Butea monosperma</em> (Lam.) Taub.</td>
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<td>Palas</td>
<td>T</td>
<td>Wild</td>
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<tr>
<td>33</td>
<td><em>Butea superba</em></td>
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<td>Palas Vel</td>
<td>L</td>
<td>Wild</td>
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<td>34</td>
<td><em>Bixa orellana</em> L.</td>
<td>Bixaceae</td>
<td>Shendari, Lipstick plant</td>
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<td><em>Caesalpinia pulcherrima</em> (L.) SW</td>
<td>Caesalpinaceae</td>
<td>Shankasur</td>
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<td>Ornamental</td>
</tr>
<tr>
<td>36</td>
<td><em>Caiba pentandra</em> (L.) Gaertn.</td>
<td>Bombacaceae</td>
<td>Hiravi Savar, Dolkathi</td>
<td>C</td>
<td>Cultivated</td>
</tr>
<tr>
<td>37</td>
<td><em>Cajanus cajan</em> (L.) Millsp.</td>
<td>Fabaceae</td>
<td>Tur</td>
<td>S</td>
<td>Cultivated</td>
</tr>
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<td>38</td>
<td><em>Calatropis prosera</em> (Ait.) R.Br.</td>
<td>Asclepiadaceae</td>
<td>Rui</td>
<td>S</td>
<td>Wild</td>
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<tr>
<td>39</td>
<td><em>Calliandra haematocephala</em> Hassk.</td>
<td>Mimosaceae</td>
<td>Powder Puff</td>
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<td><em>Calophyllum inophyllum</em> L.</td>
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<td>Undi</td>
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<td>Cultivated</td>
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<tr>
<td>41</td>
<td><em>Calycopteris floribunda</em> (Roxb.) Lam.</td>
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<td>Wild</td>
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<td>42</td>
<td><em>Canna indica</em> L.</td>
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<td>Kardal</td>
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<td>Cultivated</td>
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<td>43</td>
<td><em>Canscora diffusa</em> (Vahl) R.Br. ex Roem. &amp; Schult.</td>
<td>Gentianaceae</td>
<td></td>
<td>H</td>
<td>Wild</td>
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<td>44</td>
<td><em>Capparis zeylanica</em> L.</td>
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<td>Wild</td>
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<td>45</td>
<td><em>Caesalpinia bonducella</em> (L.) Fleming</td>
<td>Caesalpinaceae</td>
<td>Sagar Gota</td>
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<td>Wild</td>
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<tr>
<td>46</td>
<td><em>Ceiba pentandra</em> (L.) Garetn.</td>
<td>Bombacaceae</td>
<td>Dolkathi</td>
<td>T</td>
<td>Cultivated</td>
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<td><em>Carica papaya</em> L.</td>
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<td><em>Carissa carandas</em> L.</td>
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<td>49</td>
<td><em>Carya arborea</em></td>
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<td>Kumbha</td>
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<td>Wild</td>
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<td><em>Caryota urens</em> L.</td>
<td>Areceaceae</td>
<td>Bherli Maad</td>
<td>T</td>
<td>Wild</td>
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<td>51</td>
<td><em>Cassia fistula</em> L.</td>
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<td>Bahava, Amaltas</td>
<td>T</td>
<td>Indigenous</td>
</tr>
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<td>52</td>
<td><em>Cassia siamia</em> Lam.</td>
<td>Caesalpinaceae</td>
<td>Kashid</td>
<td>T</td>
<td>Ornamental Tree</td>
</tr>
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<td>53</td>
<td><em>Cassuarina equisetifolia</em> L.</td>
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<td>Suru</td>
<td>T</td>
<td>Cultivated</td>
</tr>
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<td>54</td>
<td><em>Catharanthus rosea</em> (L.) G. Don</td>
<td>Apocynaceae</td>
<td>Sadaphuli</td>
<td>H</td>
<td>Ornamental</td>
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<td>55</td>
<td><em>Cestrum nocturnum</em> L.</td>
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<td>56</td>
<td><em>Cissus quadrangularis</em> L.</td>
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<td>H</td>
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<td><em>Citrus medica</em> L.</td>
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<td>Citrus, Lemon</td>
<td>T</td>
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<td>58</td>
<td><em>Clitoria ternatea</em> L.</td>
<td>Fabaceae</td>
<td>Gokarna</td>
<td>Cl</td>
<td>Wild/cultivated</td>
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<td>59</td>
<td><em>Cleome viscosa</em> L.</td>
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<td>Gokarna</td>
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<td>Wild</td>
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<td><em>Cleoma gynandra</em> L.</td>
<td>Cleomaceae</td>
<td></td>
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<td>Wild</td>
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<td>61</td>
<td><em>Clerodendrum splendens</em> G.Don.</td>
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<td>Flaming Glory</td>
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</tr>
<tr>
<td>No.</td>
<td>Scientific Name</td>
<td>Family</td>
<td>Common Name</td>
<td>Status</td>
<td>Habitat</td>
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<tr>
<td>62</td>
<td>Cocos nucifera L.</td>
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Biodiversity Audit Report of ICS College, Khed

Table-2: Habit-wise Floristic Composition of ICS College, Khed

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<tr>
<td>Scandant Shrubs</td>
<td>8</td>
</tr>
<tr>
<td>Epiphytes</td>
<td>1</td>
</tr>
<tr>
<td>Parasites</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>167</strong></td>
</tr>
</tbody>
</table>

Figure- 3: Habit-wise floristic composition of ICS College, Khed
A total of 166 species of plants have been recorded from college campus and adjoining area. Habit wise distribution shows dominating tree species which is with 87 species of trees, 28 sp. of herbs, 28 sp. of shrubs, 7 sp. of climbers, lianas 5 sp., Scandant shrubs 8 sp., epiphytes, bulbous herbs and parasites are of 1 sp. each. They species cover an area as avenues and in semi-natural vegetation in the campus and in surrounding area. So far medicinal value is concern most of plant species have utilization in various traditional methods of medicine.
Table 5: Recommended Plant list of Indigenous Trees for Plantation Programme

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Plant Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Artocarpus lakoocha</td>
<td>Lakooch</td>
</tr>
<tr>
<td>2.</td>
<td>Careya arborea</td>
<td>Kumbha</td>
</tr>
<tr>
<td>3.</td>
<td>Diospyros malabarica</td>
<td>Temaru</td>
</tr>
<tr>
<td>4.</td>
<td>Erythrina stricta</td>
<td>Pangara</td>
</tr>
<tr>
<td>5.</td>
<td>Garcinia indica</td>
<td>Kokam</td>
</tr>
<tr>
<td>6.</td>
<td>Grewia asiatica</td>
<td>Phalsa</td>
</tr>
<tr>
<td>7.</td>
<td>Heterophragma quadriloculare</td>
<td>Varas</td>
</tr>
<tr>
<td>8.</td>
<td>Lagerstroemia microcarpa</td>
<td>Nana</td>
</tr>
<tr>
<td>9.</td>
<td>Mesua ferrea</td>
<td>Naagchafa</td>
</tr>
<tr>
<td>10.</td>
<td>Michelia champaca</td>
<td>Sonchafa</td>
</tr>
<tr>
<td>11.</td>
<td>Myristica fragrans</td>
<td>Jayphal</td>
</tr>
<tr>
<td>12.</td>
<td>Oroxyllum indicum</td>
<td>Tetu</td>
</tr>
<tr>
<td>13.</td>
<td>Pterospermum acerifolium</td>
<td>Muchkund</td>
</tr>
<tr>
<td>14.</td>
<td>Schleichera oleosa</td>
<td>Kusum</td>
</tr>
<tr>
<td>15.</td>
<td>Spondias pinnata</td>
<td>Ambada</td>
</tr>
<tr>
<td>16.</td>
<td>Sterculia foetida</td>
<td>Jangali Badam</td>
</tr>
<tr>
<td>17.</td>
<td>Sterculia urens</td>
<td>Kahandal</td>
</tr>
<tr>
<td>18.</td>
<td>Terminalia bellirica</td>
<td>Beheda</td>
</tr>
<tr>
<td></td>
<td>Scientific Name</td>
<td>Common Name</td>
</tr>
<tr>
<td>---</td>
<td>----------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>19.</td>
<td><em>Terminalia chebula</em></td>
<td>Hirda</td>
</tr>
<tr>
<td>20.</td>
<td><em>Terminalia elliptica</em></td>
<td>Ain</td>
</tr>
<tr>
<td>21.</td>
<td><em>Thespesia lampas</em></td>
<td>Bhendi</td>
</tr>
<tr>
<td>22.</td>
<td><em>Vitex negundo</em></td>
<td>Nirgudi</td>
</tr>
<tr>
<td>23.</td>
<td><em>Bomba malabarica</em></td>
<td>Katesawar</td>
</tr>
</tbody>
</table>
FAUNAL DIVERSITY OF THE COLLEGE CAMPUS:

Insect fauna on the campus:

The insects are by far the largest group of organisms on earth, which are measured in terms of number of species or number of individuals. Insect live in every conceivable habitat on land and in fresh water and few have even invaded the sea. More than half of all the named animal species are the insects and the actual proportional is undoubtedly much higher, because of millions of additional forms awaiting detection, classification and naming.

Insects as economically important group of organisms, have been associated in mans interest in many ways. Some insects with their pollinating activities make possible the production of many agricultural crops, they provide us with honey, bee wax, silk and other products of commercial value they serve as food for many birds, fish and other beneficial animals, they perform valuable services as scavengers, they act as bio-control agents and keep harmful animals and plants in check, they have been useful in medicine and in scientific research.

Insects also contain vast array of chemical compounds, some of which can be collected, extracted and used by us. Chitin or a component of insect cuticle, can act as anticoagulant or haemostatic agent for tissue repair in humans. Chitin and its derivatives enhance wound and burn healing, reduce serum cholesterol, serve as anti-allergic drug carrier, provide a strong biodegradable plastic, and enhance removal of pollutants from wastewater.

A few insects are harmful and responsible for enormous losses each year in agricultural crops and stored products, and they may transmit diseases that seriously affect the health of humans and other animals. As far as diversity of insects are concerned species of insects are distributed unevenly among the higher taxonomic groups. Five orders stand out for their high species richness, which includes Coleoptera (beetles), Diptera (flies), Hymenoptera (wasps, ants and bees), Lepidoptera (butterflies and moths), and the true bugs i.e. Hemiptera. Among them beetles comprise almost 40% of described insects (more than 3,00,000 species). Although other orders are described as minor this doesn’t mean that it is insignificant.

As insect, being the member of biotic community, interact with other living members of the community as well as with nonliving components of the environment. The out come of these interactions is the population dynamics, the positive or negative growth of the
population. Hence the life system, existence, abundance and diversity of insects can be understood by the study of interaction between the insects and the biotic and abiotic factors as well as population dynamics.

During present auditing report a rapid survey was undertaken to analyze insect diversity on the campus.

**METHODS**

In the present investigation, the insect diversity of the campus was studied by visual observations, where early morning and evening visits were planned during study period as the insects are more active during this period. For some nocturnal insects light traps have been used for observation.

**Identification:**


**Order Orthoptera:** Grasshoppers, Crickets

A great many types of insects sing. The songs of these insects are produced by stridulation, which is by rubbing of one body part against another. The singing orthopteran usually posses auditory organs-oval eardrums or tympana, located on the sides of first abdominal segment (short-horned grass hoppers) or at the base of the front tibiae (long-horned grasshoppers and crickets). The songs of grasshoppers and crickets play an important role in their behavior and differ in different species.

**Table-6: Names of the Orthoptera species recorded from college campus**

<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific name</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gryllotalpidae</td>
<td><em>Neocurtilla sps</em></td>
<td>Mole cricket</td>
</tr>
<tr>
<td>Nimobiinae</td>
<td><em>Acheta sps</em></td>
<td>Ground crickets</td>
</tr>
<tr>
<td>Acrididae</td>
<td><em>Poicelocera picta</em></td>
<td>Printed grasshopper</td>
</tr>
<tr>
<td>Tettigidae</td>
<td><em>Tettigidea sps</em></td>
<td>Pygmy grasshopper</td>
</tr>
</tbody>
</table>
Table-7: Names of the Hemiptera (Bugs) species recorded from college campus

<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific name</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coreidae</td>
<td>Anasa sps</td>
<td>Leaf footed bug</td>
</tr>
<tr>
<td></td>
<td>Alydus sps</td>
<td></td>
</tr>
<tr>
<td>Lygaeidae</td>
<td>Aphanus sps</td>
<td>Seed bugs</td>
</tr>
<tr>
<td></td>
<td>Blissus sps</td>
<td></td>
</tr>
<tr>
<td>Acanthosomatidae</td>
<td>Euchistus sps</td>
<td>Stink bugs</td>
</tr>
<tr>
<td></td>
<td>Euchistus sps</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thynta sps</td>
<td></td>
</tr>
<tr>
<td>Pentatomidae</td>
<td>Coenus sps</td>
<td>Stink bugs</td>
</tr>
<tr>
<td></td>
<td>Coenus oebalus</td>
<td></td>
</tr>
</tbody>
</table>

Order Coleoptera: Beetles

The principle characters of beetles used in identification were those of the head, antennae, thoracic sclerites, legs, elytra, and abdomen. Occasionally, characters such as size, shape, and colour were used. In most cases these characters are depends on the size of the beetle.

Table-8: Names of the Coleoptera species recorded from college campus

<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific name</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scarabaeidae</td>
<td>Geotrupes sps</td>
<td>Scarab beetle</td>
</tr>
<tr>
<td>Subfam:Scarabaeinae</td>
<td>Phanaeus sps</td>
<td>Dung beetles</td>
</tr>
<tr>
<td>Subfam:Centoniinae</td>
<td>Osmoderma sps</td>
<td>Flower beetles</td>
</tr>
<tr>
<td>Subfam:Dynastinae</td>
<td>Dynastes sps</td>
<td>Rhinoceros beetles</td>
</tr>
<tr>
<td>Cicindelidae</td>
<td>Cicindela sps</td>
<td>Tiger beetles</td>
</tr>
<tr>
<td>Carabidae</td>
<td></td>
<td>Ground beetles</td>
</tr>
<tr>
<td>Coccinellidae</td>
<td>Hippodamia sps</td>
<td>Ladybird beetles</td>
</tr>
<tr>
<td>Tenebrionidae</td>
<td>Diaperis sps</td>
<td>Darkling beetles</td>
</tr>
<tr>
<td>Chrysomelidae</td>
<td>Crioceris sps.</td>
<td>Leaf beetles</td>
</tr>
<tr>
<td>Subfam:Cassidinae</td>
<td>Cassida sps.</td>
<td>Tortoise beetles</td>
</tr>
</tbody>
</table>
Order Lepidoptera: Butterflies and Moths:

The butterflies and moths are common insects and well known to everyone. They are most readily recognized by the scales on the wings. Most of the body and legs are also covered with scales. Its members are to be found almost everywhere, often in considerable numbers.

The principal characters used in identifying adult Lepidoptera are those of the wings (venation, method of wing union, wing shape and scaling). Other characters used include the characters of the antennae, mouthparts, ocelli, and legs, and frequently such general features as size and color.

| Table-9: Names of the Lepidoptera species recorded from College campus |
|---|---|---|
| Family | Scientific name | Common name |
| Danaidae | Eulopoea core core | Common crow |
| | Danaus chrysippus chrysippus | Plain tiger |
| | Danaus genutia genutia | Striped tiger |
| | Tirumala limniace exoticus | Blue tiger |
| Nymphalidae | Précis iphita iphita | Chocolate pansy |
| | Précis almana almana | Peacock pansy |
| | Précis lemonias lemonias | Lemon pansy |
| | Ariadne merione merione | Common castor |
| | Précis atlites | Grey pansy |
| Pieridae | Eurema blanda sihetana | Three spot grass yellow |
| | Eurema hecabe simulata | Common grass yellow |
| | Delias eucharis | Common jezebel |
| | Azanus ubaldus Cramer | Bright babul blue |
| | Castalius rosimon rosimon | Common pierrot |
| | Talicada nyseus nyseus | Red parrot |
| | Curetis dentate | Angled sunbeam |
| Papilionidae | Papilio polytes romulus | Common mormon |
| | Pachliopta aristochiae | Common rose |
| | Graphium agamemnon menid | Tailed jay |
| | Papilio machaon | Yellow swallowtail |
Biodiversity Audit Report of ICS College, Khed

### Table-10: Names of the Hymenoptera species recorded from college campus

<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific name</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braconidae</td>
<td><em>Meteorus sps.</em></td>
<td>Braconids</td>
</tr>
<tr>
<td></td>
<td><em>Phanomeris sps.</em></td>
<td></td>
</tr>
<tr>
<td>Ichneumonidae</td>
<td>Unidentified</td>
<td>Ichneumonids</td>
</tr>
<tr>
<td>Superfamily Chalcidoidea</td>
<td><em>Eupteronalus sps.</em></td>
<td>Chalcids</td>
</tr>
<tr>
<td>Apidae</td>
<td></td>
<td>Honey bees</td>
</tr>
<tr>
<td>Subfamily Bombinae</td>
<td><em>Xylocopa sps.</em></td>
<td>Bumble bees</td>
</tr>
<tr>
<td>Subfamily Apinae</td>
<td><em>Apis mellifera</em></td>
<td>Honey bees</td>
</tr>
<tr>
<td></td>
<td><em>Apis indica</em></td>
<td>Honey bees</td>
</tr>
</tbody>
</table>

Order: Hymenoptera - Ants, Wasps and Bees

This is the most beneficial order from the human point of view. It contains great many species that are of value as parasites or predators of insect pests and it contains the most important pollinators of plants, the bees. The Hymenoptera are very interesting group in terms of their biology. They exhibit a great diversity of habitats and complexity of behavior in the social organization of the wasps, bees and ants.

The insect fauna of College Campus is dominated by order Lepidoptera, followed by Coleoptera and others. The Lepidopteran fauna i.e. butterflies and moths population, diversity
is rich during and soon after monsoon and lasts up to the end of October, and then gradually begins to decline. This may be because during and after monsoon, most of the vegetation goes from vegetative state to reproductive state.

During study period due to sufficient rainfall in the month of July and September while moderate to trace in October and November, the campus was covered with greenish carpet, sprinkled with yellow, orange, red, pink and violet colour grass flowers, which made the campus, a wonderful place. Almost all water bodies on the campus were full and supporting aquatic life. Humidity observed in the range of 65-95 % while temperature was in the range of 25 to 30°C, with moderate to high wind speed and moderate to low sunny hours. These fluctuations in the climatic conditions were administrating the diversity and abundance of insect population.

Sudden peak in insect population of certain species followed by disappearance of the same, and dominance of another was observed. While some insect species showed their constant but moderate appearance. Many insect species were observed in variety of life forms, showing activities such as camouflage, mimicry, as well as different defensive strategies and migration.

In the present investigation, a total of 123 insect species belonging to 46 families and 7 orders have been recorded and described. However, these studies have excluded ants and termite species, which seem to dominate the ecosystem. The full picture of insect diversity of the explored area was not possible in a short duration. The Lepidopteran fauna i.e. butterflies and moths population, diversity is rich during and soon after monsoon and lasts up to the end of October, and then gradually begins to decline. This may be because during and after monsoon, most of the vegetation goes from vegetative state to reproductive state. The Lepidopterans were dominated by the species of family Danaidae, Nymphalidae, Pieridae, Lycanidae, Papilionidae, Sphingidae, Saturnidae and Arctiidae. They showed fluctuations in the species diversity and richness.

Odonatans showed their continuous appearance throughout the study period but their population increased soon after rain subsided. They were represented by 6 species from 3 families, and were dominated by species of family Libellulidae. Phasmids were represented by 4 species from 3 families and species of genera Anisomorpha and Diapheromera were dominant. Their population was very less and was subsiding during the rain.
Four families and eight species represented hymenopterans. They were dominated by family Apidae (honey bees) and Brachionidae. They showed continuous appearance but with low species richness. As there was wonderful plant-animal interaction operating in nature by going through results obtained in present investigation and also by keeping in mind the plant diversity of the study area, the insect diversity could be substantial. As there is delicate ratio between plants and insects in the nature where survival is interdependent, it is very important for their existence.

Some recommendations to conserve and preserve the insect diversity of the college campus are given below. These could form the basis of any action plan to prepare a full catalogue of campus biodiversity and undertake scientific conservation measures.

1. The wild vegetation needs to be identified and conserved. Signboards could be put displaying “Conservation area”.
2. The microhabitats of insects need to be identified and protected. These include trees, grass-stands, small ponds, anthills, etc.
3. The fire to grass should be controlled.
4. Plantation of exotic species has to be avoided.
5. Patches of wild-flower habitats have to be fenced and protected from reclamation.
6. No chemical pesticides should be used within the campus.
7. Invasive weeds need to be eliminated /controlled.
8. All the insect species need to be catalogued, seasonally and preserved to create a museum display for environmental education.
9. Economically useful insect species need to be given special protection. e.g. honeybees.
10. Literature on insect fauna of the campus needs to be published.
AVIFAUNAL OR BIRD DIVERSITY:

According to Huxley, the birds are glorified reptiles. They are included in class Aves of subphylum Vertebrata (Craniata) belonging to phylum Chordata. India is providing habitat to 1250 different species of birds (Wikipedia.org, 2008). As many as 14% of the world’s birds species have been recorded in the Indian subcontinent (Islam and Rahmani, 2005).

The most distinctive feature of the bird is their feather (Alexander, 1975). They are uniform in structure though, they differ considerably in ways of life and particularly in feeding habits. Most of the birds can fly well as they are regarded as kings of the sky. Many birds do not have an ability to fly but there are modifications in the legs and beaks. Legs are modified for running.

The birds are the good indicators of environmental conditions. Most of the bird species prefer to live in better environmental conditions. They are indicators of degraded environment. Specifically if there is any kind of imbalance in environmental parameters then birds may change their habits or they may migrate to better environmental condition habitat. For example if there is a scarcity of food in their habitat then, they may alter in reproductive cycles and shifts breeding period for specific time.

In present survey, the avifauna from ICS College, Khed campus was screened meticulously for their presence. The existence of species was confirmed by direct observations. The biodiversity (kind of plants and animals) of any area is totally decided by the environmental components of an area. Overall distribution of species principally depends on the climatic conditions and presence of specific ecological parameters along with typical land-form and land-type. In the distribution of flora the topography, rainfall, soil type etc. play crucial role for their distribution. An animal distribution is depends on the distribution of the flora.
Table- 11: Bird’s observed in and around the ICS College, Khed Campus

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Status</th>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>PHALACROCORACIDAE : Cormorants, Darter</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>RM</td>
<td>Little Cormorant</td>
<td><em>Phalacrocorax niger</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ARDEIDAE : Herons, Egrets, Bitterns</strong></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>R</td>
<td>Pond Heron</td>
<td><em>Ardeola grayii</em></td>
</tr>
<tr>
<td>3.</td>
<td>RM</td>
<td>Cattle Egret</td>
<td><em>Bubulcus ibis</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ACCIPITRIDAE : Carnivorous Birds, Vultures</strong></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>R</td>
<td>Pariah Kite</td>
<td><em>Milvus migrans</em></td>
</tr>
<tr>
<td>5.</td>
<td>R</td>
<td>Black Shouldered Kite</td>
<td><em>Elanus caeruleus</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>FALCONIDAE : Falcons</strong></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>R</td>
<td>Red-headed Falcon</td>
<td><em>Falco chicquera</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PHASIANIDAE: Partridges, Quails, Spur Fowl, Peafowl</strong></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>R</td>
<td>Common Peafowl</td>
<td><em>Pavo cristatus</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CHARADRIIDAE : Plovers, Curlews, Sandpipers, Snipe</strong></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>R</td>
<td>Red Wattled Lapwing</td>
<td><em>Vanellus indicus</em></td>
</tr>
<tr>
<td>9.</td>
<td>RM</td>
<td>Common Sandpiper</td>
<td><em>Actitis hypoleucos</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>COLUMBIDAE :- Pigeons, Doves</strong></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>R</td>
<td>Blue Rock Pigeon</td>
<td><em>Columba livia</em></td>
</tr>
<tr>
<td>11.</td>
<td>R</td>
<td>Spotted Dove</td>
<td><em>Streptopelia chinensis</em></td>
</tr>
<tr>
<td>12.</td>
<td>R</td>
<td>Little Brown Dove</td>
<td><em>Streptopelia senegalensis</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PSITTACIDAE :- Parakeets, Lorikeet</strong></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>R</td>
<td>Rose Ringed Parakeet</td>
<td><em>Psittacula krameri</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>14.</td>
<td>R</td>
<td>Plum Headed Parakeet</td>
<td><em>Psittacula cyanocephala</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CUCULIDAE:</strong> - Cuckoos</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>R</td>
<td>Asian Koel</td>
<td><em>Eudynamys scolopacea</em></td>
</tr>
<tr>
<td>16.</td>
<td>R</td>
<td>Crow-Pheasant or Coucal</td>
<td><em>Centropus sinensis</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>APODIDAE:</strong> - Swifts</td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>RM</td>
<td>House Swift</td>
<td><em>Apus affinis</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ALCEDINIDAE:</strong> - Kingfishers</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>R</td>
<td>White Breasted Kingfisher</td>
<td><em>Halecyon smyrnensis</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>MEROPIDAE:</strong> - Bee-Eaters</td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>R</td>
<td>Small Green Bee-Eater</td>
<td><em>Merops orientalis</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CAPITONIDAE:</strong> - Barbets</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>R</td>
<td>White Cheeked Barbet</td>
<td><em>Megalaima viridis</em></td>
</tr>
<tr>
<td>21.</td>
<td>R</td>
<td>Coppersmith Barbet</td>
<td><em>Megalaima haemacephala</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>HIRUNDINIDAE:</strong> - Martins, Swallows</td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>R</td>
<td>Wire Tailed Swallow</td>
<td><em>Hirundo smithii</em></td>
</tr>
<tr>
<td>23.</td>
<td>RM</td>
<td>Red Rumped Swallow</td>
<td><em>Hirundo daurica</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>LANIIDAE:</strong> - Shrikes</td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>R</td>
<td>Long Tailed Shrike</td>
<td><em>Lanius schach</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ORIOLIDAE:</strong> - Orioles</td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>R</td>
<td>Black Hooded Oriole</td>
<td><em>Oriolus xanthornus</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>DICRURIDAE:</strong> - Drongos, Swallow-Shrike</td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>R</td>
<td>King Crow, Black Drongo</td>
<td><em>Dicrurus macrocercus</em></td>
</tr>
<tr>
<td>27.</td>
<td>R</td>
<td>Whit Bellied Drongo</td>
<td><em>Dicrurus caerulescens</em></td>
</tr>
</tbody>
</table>
### Biodiversity Audit Report of ICS College, Khed

<table>
<thead>
<tr>
<th>Corvidae: Tree Pie, Crows</th>
</tr>
</thead>
<tbody>
<tr>
<td>28. R</td>
</tr>
<tr>
<td>29. R</td>
</tr>
</tbody>
</table>

**Campephagidiae: Cuckoo-Shrikes, Minivets**

| 30. R | Little Minivet | *Pericrocotus cinnamomeus* |

**Irienidiae: Bluebird, Ioras, Green Bulbuls**

| 31. R | Iora | *Aegithina tiphia* |

**Pycnonotidae: Bulbuls**

| 32. R | Red Vented Bulbul | *Pycnonotus cafer* |

**Timiniae: Babblers**

| 33. R | Yellow Eyed Babbler | *Chrysomma sinense* |

**Muscinapinae: Flycatchers**

| 34. R | White Browed Fantail Flycatcher | *Rhipidura aureola* |

**Sylviiniae: Warblers, Leaf Warblers**

| 35. R | Ashy Prinia | *Prinia socialis* |
| 36. R | Common Tailorbird | *Orthotomus sutorius* |

**Turdiniae: Chats, Thrushes**

| 37. R | Oriental Magpie-Robin | *Copsychus saularis* |
| 38. R | Indian Robin | *Saxicoloides fulicata* |
| 39. R | Pied Bush Chat | *Saxicola caprata* |

**Motacillidae: Pipits, Wagtails**

| 40. R | Large Pied Wagtail | *Motacilla maderaspatensis* |

**Nectarinidiae: Sunbirds**
Table 12: Checklist of Reptiles of ICS College Campus.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Order:- Squamata, Family:- Geckonidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>House Gecko</td>
<td><em>Hemidactylus flaviviridis</em> (Rupell)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Family:- Agamidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Common Garden Lizard</td>
<td><em>Calotes versicolor</em> (Daudin)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Family:- Scincidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Common Skink</td>
<td><em>Mobuya carinata</em> (Schneider)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Family:- Colubridae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Indian Rat Snake</td>
<td><em>Ptyas mucosa</em> (Linnaeus)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Family:- Elapidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Spectacled Cobra</td>
<td><em>Naja naja</em> (Linnaeus)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Family:- Viperidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Russel’s Viper</td>
<td><em>Duboia russelii</em> (Shaw &amp; Nodder)</td>
<td></td>
</tr>
</tbody>
</table>
7. Saw-scaled Viper  
*Echis carinatus* (Schneider)

**Table- 13 Checklists of Amphibians of ICS, Khed Campus**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Order:- Anura</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Family:- Bufonidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Common Indian Toad</td>
<td><em>Bufo melanostictus</em> (Schneider)</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td><strong>Family:- Ranidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Skittering Frog</td>
<td><em>Euphlyctis cyanophlictis</em> (Schneider)</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Indian Bull Frog</td>
<td><em>Hoplobatrachus tigerinus</em> (Daudin)</td>
<td>V</td>
</tr>
<tr>
<td>4.</td>
<td>Indian Cricket Frog</td>
<td><em>Limnonectes limnochoris</em> (Gravenhorst)</td>
<td>V</td>
</tr>
</tbody>
</table>

**Table- 14: Checklist of Mammals**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Order- Primates Family- Cercopithecidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Common Langur</td>
<td><em>Semnopithecus entellus</em> (Dufresne)</td>
<td>NT</td>
</tr>
<tr>
<td></td>
<td><strong>Family- Herpestidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Common Mongoose</td>
<td><em>Herpestes edwardsi</em> (Geoffroy)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Order- Chiroptera Family- Pteropidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Flying Fox</td>
<td><em>Pteropus giganteus</em> (Brunnich)</td>
<td></td>
</tr>
</tbody>
</table>
### Order- Rodentia  Family- Sciuridae

<table>
<thead>
<tr>
<th></th>
<th>Order- Rodentia  Family- Sciuridae</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>Three-striped Palm Squirrel</td>
</tr>
<tr>
<td>5.</td>
<td>House mouse</td>
</tr>
</tbody>
</table>

Family- Muridae

<table>
<thead>
<tr>
<th></th>
<th>Family- Muridae</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>House mouse Mus musculus (Waterhouse)</td>
</tr>
</tbody>
</table>

Family- Cervidae

<table>
<thead>
<tr>
<th></th>
<th>Family- Cervidae</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Barking Deer Muntiacus muntjack (Zimmermann)</td>
</tr>
</tbody>
</table>

During the study period, the efforts were made to study the Vertebrate (Tetrapoda) species of College campus and adjoining area for the preparation of checklist from direct observations and from signs and tracks. Extensive surveys were also conducted and the checklist has been prepared to ascertain the status and richness of Tetrapoda diversity of campus area.

The study reveals that, I. C. S. College campus area along with the adjoining area is with well managed vegetation area comprises variety of vertebrate (Tetrapoda) species. From the class amphibian, 04 species belonging to 02 families from 04 genera were observed and sited. The study of reptilian species reveals that there are about 07 species belonging to 06 families distributed over 07 genera. The study of mammal species reveals that 06 species of mammals from 06 families distributed over 06 genera.

Observations on the bird species reveals that, there are about 44 species of birds found in Park area and which are from 29 families distributed over 38 genera.

**Threats to the Avian Biodiversity:**

Birds are currently confronted with many threats, the most important of which are habitat loss and deterioration. Along with this, over population of human being, over exploitation of wetland resources, drainage & siltation of wetlands, pollution of wetlands by sewage & industrial effluents, agricultural fertilizers and pesticides are also affecting the bird population. The reduction in grassland as well as fragmentation and degradation of forest for
large scale expansion of agriculture, overgrazing by domestic livestock etc. are also affecting on bird diversity (Grimmette et al. 2006). Currently poaching and hunting of birds, heavy use of fertilizers and pesticides and unregulated fishing from the water bodies are creating great problems for conservation of birds. (Sivaperuman and Jayson, 2000).

**Recommendations which avoid disturbance for birds diversity:**

1) Avoid the burning of leaf litter in the campus.
2) Prevent the use of chemical fertilizers and pesticides.
3) Restriction or marked use of vehicles in campus area.
4) If possible there should be the arrangement of artificial ponds as a source of potable water specially in summer season
5) Plantation of seed bearing and flowering plants.
6) Periodical observations of animals (through the projects of EVS) in campus area to update the data.
BIODIVERSITY AUDIT WORK AND ANALYSIS

List of Activities and documentary evidences have been assessed (last 5 years) from the data obtained from ICS college, Khed. Documentation on Biodiversity has been assessed w.r.t. protection, conservation, and its management from the institution.

1. **Documentary evidences of various activities (related to environment) conducted by the institution.**

The college has conducted numerous activities for environment protection, conservation and it’s management. Some of the activities are mentioned below:

1. This College has waste collection points and guidance for the disposal of Waste paper, cardboards, glass, plastic, e-waste, hazardous waste, etc.
2. The college takes initiatives to raises the environmental related issues among its staff/students/visitors so as to have hygienic clean and pollution free college campus.
3. This College is in practice to minimize the consumption of water and enhances ground water level by ‘Rainwater harvesting Practices’.
4. The college take initiatives to reducing the consumption of electricity through
   i) Progressive replacement of light bulbs with energy efficient LED bulbs.
   ii) Awareness among the staff and students to turn off the electrical appliances when not in use through proper signages in suitable places.
   iii) Conservation of energy by promoting the use of daylight, conducting frequent preventive and corrective maintenance. The College has planned for solar power systems in the campus.
5. At point of need, the Waste bins are placed to maintain a clean and tidy campus.
6. The organic waste in the college campus is recycled in Vermicomposting units.
7. The green campus is maintained through adequate tree plantation by the college NSS, NCC along with active participation of Botany and Geography departments.

2. **Tree plantation activities within the campus and outside campus area in last five years.**

- Tree plantation campaign in adopted villages and college campus through NSS activity has been carried out.
- Socio-economic survey, water testing and plant survey, bird survey and historical place rejuvenation carried out in the Khed tehsil territory.
- Tree plantation & maintenance has been carried out every year by Botany Department.
- Tree plantation has been carried out by NCC, NSS and even Geography department.

3. **Any eco-friendly/environment friendly practice carried out by the institution within campus or outside campus.**
   1. Installation of Solar units on Library (Reading Room & Ladies Hostel).
   2. Vermi-compost units on college lawn for organic waste recycling into organic fertilizers.

4. **Total area of campus with map.**
   Total area of college campus is 12976.48 Sq. Mtr.
   Location of the campus and area in sq. mts

<table>
<thead>
<tr>
<th>Campus area in sq. mts.</th>
<th>12976</th>
</tr>
</thead>
<tbody>
<tr>
<td>Built up area in sq. mts</td>
<td>992</td>
</tr>
<tr>
<td>Sq.</td>
<td></td>
</tr>
</tbody>
</table>

5. **Soft and hard copy of existing campus area.**- provided

6. **Mode of environmental consciousness generated amongst students, teaching staff, non-teaching staff of the institution, etc.**
   Awareness programmes and interaction with students, teaching staff and non-teaching staff for the attitudinal change for adopting environmentally sustainable lifestyles.

7. **Data regarding number and type (2/4 wheelers) of vehicles used by students, staff members within the campus.**
   Number of two wheelers: 220
   Number of four wheelers: 08

8. **Existing electricity requirement and its mode of supply- e.g. MSEB/wind mill/solar panels/any other mode**
   1938 unit-MSEB

9. **Number of students, teaching staff, non-teaching staff of the institution.**
   Students- 1406, teaching staff- 40, non-teaching staff- 19
10. **Number of visitors/year.**
   170/year

11. **Waste management practice by the institution.**
   i) Vermi-composting unit
   ii) Water harvesting
   iii) Solid waste Ditch

12. **Effluent plant if any.**
   No

13. **Hazardous waste management done by the institution.**
   i) Hazardous chemicals used in exact required quantity and very carefully, list chance of waste formation.
   ii) Autoclaving of the used culture media is done in the Botany and Zoology departments.

14. **Mode of water supply for drinking and for garden.**
   Drinking water is supplied through Institutional Borewell water and for the garden through Rain water harvesting storage tank.

15. **Rain water harvesting if done.**
   Rain water harvesting has been done throughout built up campus. So far college area is concern, rain water is harvested and during rainy season overflow water is added to nearby well and quarry. A trench has been made through the centre of the campus to make the way to natural flow of the water.

16. **Environment Policy of the institution if any.**

   **Environmental Policy:**

   Achieving excellence in teaching and research, the college promotes environmental sustainability, conservation and enhancement of natural resources to prevent pollution or keep it minimal. College always aims to eliminate or reduce all the forms of environmental pollution through 3’R’s policy i.e. reduce, reuse and recycle.
The College will comply fully with environmental legislations and will continue:

- To promote sound environmental management policies and practices;
- To increase awareness of environmental responsibilities amongst staff, students and other stakeholders.
- To minimize consumption of water;
- To minimize use of chemical and other pollutants;
- To encourage modes of transport by staff and students which minimize the environmental impact.

Scrutiny of this policy will be the responsibility of the Environmental Awareness Committee. This Committee will develop a plan for improving environmental performance, with measurable indicators where possible, and will report on its progress annually.

18. Separate financial allocation for environment friendly activities.

College has separate budget for the running of vermin-composting units and garden development and its maintenance.

19. Number of talks, lectures, slide shows, videos related to environment, biodiversity, ecology, nature conservation for the students in last five years.

- Street play on Save Tree by NSS (20/8/2016)
- Swatchha Bharat Abhiyaan (15/07/2016, 22/10/2016, 8/8/2017)
- Organization of 'Road Safety Mission'.by N.C.C.
- Collected E-waste at college to initiate the awareness regarding this upcoming issue. Participation by students and teachers in rally and program on “E-waste and plastic waste management” in collaboration with Khed Nagarparashad on 22.02.2017.
- Socio-economic survey, soil testing, water testing and plant survey, bird survey and historical rejuvenation, safety programmes at Khed Tehsil territory.
• Organized rally and poster competition for "Save Girl Child". During NSS Residential Camp as on 15.08.2015.
• Organized poster and essay competition on "Save Water". During annual gathering 2016 & 2017.
• Organized drawing competition on "Save Earth". During University Youth Festival 12.07.2016.
• Cashless society programme (It reduces use of paper notes) in college on 05.06.2016 & 2017.

• Mapping and tree census of trees in college campus by teachers and students of Botany Department.
• Development of ‘Herbal Garden’ and ‘Spices Garden’ in College campus in collaboration with NGO.
• Solid waste Research Project issued to the students of T.Y. Chemistry.
• Collection of seeds of Rare Endangered and Threatened plants by Dept. of Botany.
• Monitoring biodiversity in industrial premises by students of Zoology.
• Natural Rainwater reservoir conservation in collaboration with NGO.
• Nearby College Campus, forest conservation programme in collaboration with NGO.

College has taken many initiatives for the conservation and protection of nature and environment.

1. Participation in eco-friendly Ganesh Visarjan created awareness about environment friendly practices among the city dwellers and also help to reduce the water pollution of the major rivers of Khed city.
4. Campaigning ‘Say No to Plastic on college campus ‘during every years annual
gathering.
6. Implementation of Environmental Awareness programme for the Commerce second year students at UG level.
7. Contribution of the faculty and students in cleanliness drive.
8. Street plays on Environment Awareness.
9. Awareness on organic farming through raising vermi-compost units.
RECOMMENDATIONS:

Some recommendations to conserve and preserve biodiversity of the ICS College, Khed are given below. These could form the basis of any action plan to prepare a full catalogue of campus biodiversity and undertake scientific conservation measures.

1. Development of college nursery, orchidium, Nakshtra Udyan, etc.
2. Development of Butterfly Park, Bee Park, etc. as college is located in biodiversity rich Western Ghats.
3. Garden needs to plant indigenous flowering plants which flower for whole year and readily available for insects and birds.
4. Signboards could be displayed on plants in the campus area.
5. Plantation of exotic species has to be avoided in the future plantation program.
6. No chemical pesticides should be used within the campus.
7. Workshop on ‘Biodiversity’ could be conducted in coming period of time.
Research Laboratory in ICS College, Khed

Green cover in surrounding area of the ICS college campus

ICS college main building surrounded by fog during winter season
Water Harvesting done in ICS College, Khed

Involvement of students for Environmental awareness through painting on entrance gate of ICS college
Some Important Plants of ICS College Campus

*Terminalia arjuna* - (Arjun) - A valuable indigenous tree. Bark used as cardiac tonic.

*Dalberia sissoo* - (Sheesham/Indian Rosewood) - A valuable timber yielding tree

*Albizia lebbeck* - (Kala Shirish) - A valuable timber yielding tree
Ground cover of wild vegetation in the campus

Ground cover of *Oxalis corniculata*- a sleeping beauty in campus

*Blumea lacera* (Burundo)- a smell like turpentine
Plants ICS College Campus, Khed

*Thuja plicata* (Cupressaceae) a ornamental Gynosperms cultivated in garden

*Allamanda cathartica*  
*Allamanda blancheti*

*Caesalpinia pulcherrima*  
*Catharanthus roseus*  
*Ixora coccinia*
Plants of ICS College Campus, Khed

*Ocimum tenuiflorum*

*Plumbago zeylanica*

*Canscora diffusa* - a common herb in study area

*Lemon Grass* - Important medicinal plant

*Jasminum* - Mogara

*The specia lampas*
Plants of ICS College Campus, Khed

Calotropis gigantia (Rui) - Important medicinal plant

Eranthemum roseum (Aboli)  Mucuna pruriens (Khajkoyali)
Important activities in ICS College Campus, Khed

Place suitable for development of Spice Garden

Place suitable for development of Herbal Park
Noteworthy activities done by ICS College in the Campus

Coconut plantation and trench for rain water discharge naturally. In this way authorities are conserving natural slope for rain water.

Signages for electricity conservation

Water harvesting & water conservation
Insect Diversity of ICS College Campus

Blue Jeay butterfly

Wasp on 'Takala' leaves

Signature Spider

Apes cerena<

Trigona sp. on Hemalia fruits
Spider Diversity of ICS College Campus

Funnel Web Spiders on Thuja plant

Funnel Web Spiders

Giant Spider
Butterfly Diversity of ICS College Campus

- Common Jezebel
- Long Tailed Blue
- Common Wanderer
- Mottled Emigrant
- Tawny Coster
Avifaunal diversity of ICS College Campus

Red Whiskered Bulbul

Spotted Munia

Ashy Prinia

Common Grey Hornbill

Tickell’s Blue Flycatcher

Purple Rumped Sunbird
Avifaunal diversity of ICS College Campus

- Common Myna
- Tailor Bird
- Common Tailor Bird
- Oriental Magpie Robin
- Red vented Bulbul
- Common Crow
Avifaunal diversity of ICS College Campus
Avifaunal diversity of ICS College Campus

Purple Sunbird Female Male

Bay Backed Shrike

Black Drongo

Oriental Magpie Robin