Conservation and management of sacred groves in Kerala
(Project funded by the Biodiversity Cell, Department of Forests and Wildlife,
Government of Kerala)

U.M. Chandrashekara
**Abstract of Project Proposal**

<table>
<thead>
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<th>Project Number</th>
<th>KFRI RP 597/2010</th>
</tr>
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<td>Title</td>
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| Objectives       | a. To conduct an inventory in sacred groves selected by the Biodiversity Cell of Kerala Forest Department for documenting flora and fauna, and 
<p>|                  | B. To prepare Management Plan for sacred groves selected by the Biodiversity Cell of Kerala Forest Department |
| Project period   | April 2010 to April 2011 |
| Funding Agency   | Biodiversity Cell, Department of Forests and Wildlife, Government of Kerala |
| Principal Investigator | Dr. U.M. Chandrashekarar |</p>
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1. EXECUTIVE SUMMARY

The Sacred grove concept is one of the strategies developed by many human societies to conserve biological resources using a traditional approach. Recognising the importance of sacred groves, both in terms of conservation of biodiversity and cultural diversity, and in view of the threats faced by the groves, the Government of India has launched a Scheme ‘Protection and Conservation of Sacred groves’ within its programme ‘Intensification of Forest Management’. As a part of this Central Government sponsored Scheme, the Department of Forests and Wildlife, Government of Kerala (KFD) initiated the ‘Protection and Conservation of Sacred Groves’ project in Kerala. This scheme is coordinated and monitored by the Biodiversity Cell (BDC) of the KFD and implemented through respective Assistant Conservator of Forests (Social Forestry) of each District. The Assistant Conservator of Forests (ACFs of Social Forestry) invited applications from the owners of sacred groves within their Districts after giving wide publicity through media. An expert committee constituted by the BDC scrutinised the applications and selected the sacred groves to be supported. Initially, twenty eight sacred groves belonging to Devaswoms and Trusts were selected for support. The two tasks namely inventory of these sacred groves for documenting flora and fauna and preparation of Management Plan for each sacred grove have been assigned to the Kerala Forest Research Institute (KFRI). By conducting field visits and stakeholder meetings with local community and owners of the grove, KFRI documented the socio-cultural and ecological dimensions of sacred groves.

The study revealed that the total area of sacred groves ranged from 0.04 ha to 24.0 ha and in majority of the groves, area occupied by the vegetation was more than 76 per cent of total area of the grove. While most of the sacred groves were surrounded by the crop lands, some were bordered by highly degraded forest lands and barren lands. Many sacred groves held water resources in the form of ponds, streams or wells. These water bodies, in many sacred gloves played important ecological roles by providing water for organisms living in and around the groves. Mainly four major forest types, namely evergreen, semi-evergreen, moist deciduous and mangrove forests were seen among twenty-eight sacred groves and the forest patches showed different degrees of degradation. A total of 670 angiosperm species, 154 butterfly species and 122 bird species were recorded from these sacred groves. Among them,
133 angiosperm species, 5 butterfly species and 8 bird species were endemic. Though the inventory of angiosperms, birds and butterflies in sacred groves conducted through this study provided rather preliminary results it indicated directions along which we must work further to document and organise comprehensive programme of maintaining biodiversity. In this document, the need of a Sacred Grove Biodiversity Network (SGBN) of Kerala State as a broad programme of biodiversity monitoring is also projected.

The present study also highlighted the role of sacred groves in the religious and socio-cultural life the local people. Majority of the sacred groves are associated with female deities and devotees dedicated offerings, generally agricultural products, for the fulfilment of their wish. Festivals and performing arts related to different sacred groves were documented. Even though some restrictions existed, women participate in the traditional activities, conservation and day-to-day management of many sacred groves.

During the participatory appraisal meetings, the participants highlighted the fact that many sacred groves are now threatened. Among twelve major threats faced by sacred groves, dumpage of solid waste materials, trespassing, illegal collection and removal of small fallen timbers and other forest products were prominent. Altogether 26 management strategies were recognized for the conservation and protection of these sacred groves. Even though the social barrier is more appropriate, the study revealed that in the present day socio-cultural context, physical barriers such as fencing and compound wall are needed to protect sacred groves till the attitude of stakeholders towards sacred groves becomes positive. The participatory approach adopted in this project helped to prepare the budget estimates for grove-specific management activities. The KFRI prepared the Management Plan for each of the twenty eight sacred groves and submitted to the BDC. Among others, each Management Plan provides details of cultural and ecological significance of the grove, the contribution by the owner and the local community in the conservation efforts, institutional mechanism whereby all stakeholders lend their support to the conservation of the sacred grove, budget estimates for management activities and mechanisms for monitoring and evaluating the management activities. After scrutiny by the Expert Committee, the Management Plans have been forwarded by the BDC to the Government of India for financial support.
2. INTRODUCTION

Sacred groves are sanctified patches of forests protected by the strength of religious beliefs as abode of Gods and Goddesses. In India, in spite of increase in human population, sacred groves have survived under a variety of ecological situations (Ramakrishnan et al., 1998). They received greater research attention from anthropological as well as biological conservation points of view (Gadgil and Vartak, 1976; Tiwari et al., 1998; Malhotra et al., 2001). These studies indicated that each sacred grove has its own cultural, biological and ecological dimensions.

Sacred groves form an important unit in the rural landscape of Kerala. Studies conducted in the State have already highlighted the fact that well conserved sacred groves of the State are comparable to the regional natural forests for various ecological attributes (Chand Basha, 1998; Chandrashekara and Sankar, 1998; Induchoodan, 1998). Many sacred groves of the State are also treasures of rare and endemic species (Mohanan and Nair, 1981; Unnikrishnan, 1995; Induchoodan, 1998).

Being a biotype in a rural landscape, the sacred grove performs several ecological functions, which directly or indirectly help in the maintenance of ecosystem health of all interacting landscape units (Pushpangadan et al., 1998). Sacred groves with their complex array of interaction influence the flora and fauna of the region as well as microclimate of the locality. Contributions of sacred groves to a village landscape in managing hydrological balance and availing the carbon credits under the Clean Development Mechanism (CDM) of Kyoto protocol have also been recognized by many workers. Sacred groves could help to compensate for carbon emissions of polluting industries. Thus, conservation and management of sacred groves offers economic benefits to the communities besides other ecosystem benefits. Recognizing the ecosystem services and biodiversity conservation values of sacred groves, the Department of Forest and Wildlife, Government of Kerala (KFD) has initiated several programmes to strengthen the institution of sacred groves. One such effort was to implement a project ‘Protection and Conservation of Sacred Groves’ under the Government of India sponsored scheme ‘Intensification of Forest Management’. As a part of this project the Biodiversity Cell (BDC) of the KFD opted to identify a few sacred groves from each district of the State, prepare the management plans for these sacred groves by adopting a participatory approach and submit them to the
Government of India seeking financial support for the community involvement initiatives and eco-development activities envisaged in the management plans. As part of this Project, the task of inventory, documentation of flora and fauna and preparation of management plans for the sacred groves that are identified by the Biodiversity Cell and Social Forestry Wing of KFD was assigned to the Kerala Forest Research Institute. KFRI prepared the management plans for all sacred groves separately, in the format prescribed by the BDC and submitted them on 21.07.2010 to the Chief Conservator of Forests, BDC. The Management Plans, after scrutiny by the Expert Committee, have been forwarded to Government of India for financial support.

The Management Plan of each sacred grove contained two main sections namely-brief history and status of grove and the proposed management and action plan. Under the section `Brief history and status of grove’ information such the legal status and ownership, details of location and extent, topography, flora, fauna, hydrology, water bodies, adjoining landscape units, cultural, spiritual and ecological significance and threats faced by the grove were provided. Under the Section `Proposed management and action plan`, vision and management activities, action plan, implementation schedule and budget details were provided. The present consolidated report has been prepared based on the information provided in these management plans prepared for all sacred groves.

3. SELECTION OF SACRED GROVES

As stated earlier, the programme `Protection and Conservation of Sacred Groves of Kerala’ is instituted under the Biodiversity Cell (BDC) of the KFD and is to be implemented through the Social Forestry Wing of KFD. In order to initiate this programme, with the request from the Biodiversity Cell, the Assistant Conservators of Forests (Social Forestry) invited applications within their respective districts from the sacred grove owners after giving wide publicity through media. The BDC constituted an Expert Committee to scrutinize the proposals and select the sacred groves to be supported. It was decided to initially support 28 sacred groves belonging to Devaswoms and Trusts. As per the procedure envisaged, the owners of the sacred grove entered into an agreement with the Kerala Forest Department and prepared and submitted the detailed management proposal to the Chief Conservator of Forests of BDC through the respective Assistant Conservators of Forests (Social Forestry).
Copies of the management proposal were made available to the Principal Investigator. After conducting the stakeholder meeting involving local community and owners of the grove, the management plans, in the format as approved by the BDC, were prepared for all 28 groves and submitted to the Chief Conservator of Forests of BDC.

The sacred groves that were selected by the BDC for programme implementation are listed in Table 1 and their locations are marked in Figure 1.

Table 1. Ownership and contact details of sacred groves

<table>
<thead>
<tr>
<th>Sacred grove and acronym*</th>
<th>Ownership</th>
<th>Contact details</th>
</tr>
</thead>
<tbody>
<tr>
<td>KASARAGOD (KS)</td>
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</tr>
<tr>
<td>Edayilekkadu Kavu (KS1)</td>
<td>Edayilekkadu Kavu Samrakshana Samithi</td>
<td>Secretary Edayilekkadu Sree Nagalaya Samrakshana Samithi Valiaparamba P.O.</td>
</tr>
<tr>
<td>Kammadam Kavu (KS2)</td>
<td>Malabar Devaswom Board</td>
<td>Chairman Board of Trustees Kammadam Shree Bhagavati Temple, Kammadam, Mandapam- 571 326</td>
</tr>
<tr>
<td>KANNUR (KN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sree Deviot Kavu (KN1)</td>
<td>Sree Deviot Kavu Trustee Board</td>
<td>Secretary Sree Deviot Kavu Kshethra Committee, Kankal Village Allapadamba Panchayath Thaliparamba Taluk</td>
</tr>
<tr>
<td>Karimanul Chamundikkavu</td>
<td>Malabar Devaswom Board</td>
<td>Secretary Karimanul Chamundikkavu Committee, Vayakkara Village Peringom Panchayat Taliparamba Taluk</td>
</tr>
<tr>
<td>(KN2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Madai Kavu (KN3)</td>
<td>Malabar Devaswom Board</td>
<td>Executive Officer Chirakkal Kovilakam Devaswom Madayi Para P.O.,</td>
</tr>
<tr>
<td>Thekkumbad Thazhe Kavu</td>
<td>Malabar Devaswom Board</td>
<td>Executive Officer Chirakkal Kovilakam Devaswom, Thekkumbad, Mattool Village</td>
</tr>
<tr>
<td>(KN4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sree Varikkarakkadavu Kavu (KN5)</td>
<td>Malabar Devaswom Board</td>
<td>Chairman Hereditary Trustee Board Perlath Sree Bhagavathi Temple Karivelloor, Perlam Panchayat Taliparamba Taluk</td>
</tr>
</tbody>
</table>

*, District abbreviation followed by a number is used as acronym of groves.

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Table 1 (cont’d). Ownership and contact details of sacred groves

<table>
<thead>
<tr>
<th>Sacred grove and acronym*</th>
<th>Ownership</th>
<th>Contact details</th>
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</thead>
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<tr>
<td>WAYANAD (WA)</td>
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<tr>
<td>Mani Kavu (WA1)</td>
<td>Malabar Devaswom Board</td>
<td>Executive Officer Mani Kavu Devaswom Committee, Chaathupara P.O.</td>
</tr>
<tr>
<td>Valliyoor Kavu (WA2)</td>
<td>Malabar Devaswom Board</td>
<td>Executive Officer Sree Valliyoor Devaswom Committee, Payyampilly Village, Mananthavadi Thaluk</td>
</tr>
<tr>
<td>KOZHIKCOKE (KZ)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muchukunnu Kotta Kavu (KZ1)</td>
<td>Muchukunnu Devaswom Trustee Board</td>
<td>Hereditary Trustee Muchukunnu Devaswom Trustee Board, Muchukunnu-673307 Koyilandi Taluk</td>
</tr>
<tr>
<td>Poyil Kavu (KZ2)</td>
<td>Malabar Devaswom Board</td>
<td>Executive Officer Poyil Kavu Devaswom, Poyil, Koyilandi Taluk</td>
</tr>
<tr>
<td>Vallikkattu Kavu (KZ3)</td>
<td>Malabar Devaswom Board</td>
<td>Chairman Vallikkattu Kavu Management Committee, Edakkara</td>
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<tr>
<td>MALAPPURAM (MA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Karakkode Kavu (MA1)</td>
<td>Mannur Sree Ramananda Ashram, Karakkode</td>
<td>President Mannur Sree Ramananda Ashram, Karakkode, Vazhikkadavu P.O.</td>
</tr>
<tr>
<td>PALAKKAD (PL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ayyappan Kavu (PL1)</td>
<td>Naduvilmadom Devaswom</td>
<td>Manager, Naduvilmadom Devaswom Thiruvalthur,</td>
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<tr>
<td>Kavassery Kavu (PL2)</td>
<td>Malabar Devaswom Board</td>
<td>Chairman, Parakkad Shree Bhagavathi Devaswom Board, Kavassery- 678 543</td>
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<tr>
<td>THRISSUR (TS)</td>
<td></td>
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<tr>
<td>Chendangotu Kavu (TS1)</td>
<td>Chendangotu Tharavadu Temple Trust</td>
<td>Secretary, Chendangotu Tharavadu Vaka Paambin Kavu, Chavakkad Block, Ward 11 Orumanayoor Panchayat,</td>
</tr>
<tr>
<td>Chukkath Kavu (TS2)</td>
<td>Nadathara Chukkath Temple Trust</td>
<td>Secretary, Chukkathu Muthappan Kshethra Paripalana Samithi, Ollukkara Block, Nadathara Panchayat</td>
</tr>
<tr>
<td>ERNAKULAM (ER)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aruvikkal Kavu (ER1)</td>
<td>Aruvikkal Sree Durga Devi Temple Trust</td>
<td>Secretary, Thekkkan Maradi P.O., Moovattupuzha</td>
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</tbody>
</table>

*, District abbreviation followed by a number is used as acronym of groves.
Table 1 (cont’d). Ownership and contact details of sacred groves

<table>
<thead>
<tr>
<th>Sacred groove and acronym*</th>
<th>Ownership</th>
<th>Contact details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ERNAKULAM (ER)</strong></td>
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<tr>
<td>Iringole Kavu (ER2)</td>
<td>Travancore Dewaswom Board</td>
<td>Secretary, Iringole Shree Bhagavati Kshethra Upadeshaka Samithi, Iringole P.O., Perumbavoor</td>
</tr>
<tr>
<td><strong>KOTTAYAM (KT)</strong></td>
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<td></td>
</tr>
<tr>
<td>Kalloor Appankavu (KT1)</td>
<td>Kalloorappan Kavu Sree Bhadra Trust</td>
<td>Chairman Kalloorappan Kavu Sree Bhadra Trust, Lakkatooor</td>
</tr>
<tr>
<td>Manimala Kavu (KT2)</td>
<td>Edumpanakuzhiyil Family Trust</td>
<td>Secretary Kerala Kshethra Samarakshana Samithee Reg. No. 799, Manimala</td>
</tr>
<tr>
<td><strong>PATHANAMTHITTA (PT)</strong></td>
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<td></td>
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<tr>
<td>Mannady Pazhayakavu (PT1)</td>
<td>Mannady Pazhayakavu Devi Temple Samarakshana Samithi</td>
<td>Secretary Mannady Pazhayakavu Devi Temple Samarakshana Samithi Kadampanadu, Mannndai P.O. Adoor (via)</td>
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<tr>
<td>Valamchuzhi Kshethrakavu (PT2)</td>
<td>Valamchuzhi Devaswom</td>
<td>Secretary Valamchuzhi Devaswom Mallasserry Village, Pramadom Panchayat</td>
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<td><strong>ALAPPUZHA (AL)</strong></td>
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<tr>
<td>Vetticode Kavu (AL1)</td>
<td>Aadimoolam Vetticode Sree Nagarajaswami Temple Family Trust</td>
<td>Secretary Vetticode Sree Nagaraja Swamy Temple, Vetticode -690 503 Pallickkal</td>
</tr>
<tr>
<td><strong>KOLLAM (KL)</strong></td>
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<td>Valiaveetil Kshethrakavu (KL1)</td>
<td>Valiaveetil Sree Durga Kshethra Committee</td>
<td>Secretary, Valiaveetil Sree Durga Kshethra Committee, Thazhava</td>
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<tr>
<td>Pazhangala Kavu (KL2)</td>
<td>Pazhangala Sree Dharma Sastha Kshethra Commitee</td>
<td>President, Pazhangala Sree Dharma Sastha Kshethra Commitee, Nellila P.O.</td>
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<tr>
<td><strong>THIRUVANANTHAPURAM (TV)</strong></td>
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<tr>
<td>Irinjayam Sarpa Kavu (TV1)</td>
<td>Irinjayam Sarpa Kavu Temple Committee</td>
<td>The Secretary Irinjayam Sarpa Kavu Temple Committee Nedumangad Taluk,</td>
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<tr>
<td>Thrikunnath Kavu (TV2)</td>
<td>Thrikunnathu Kavu Indiyalappan Temple Trust</td>
<td>The Secretary Thrikunnathu Kavu Indiyalappan Temple Trust Parippally, Chavarcode,</td>
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</table>

*, District abbreviation followed by a number is used as acronym of groves.
In the following sections, a comprehensive account of the socio-cultural and ecological dimensions of these sacred groves, threats faced by the groves and management options identified are given. A prospective budget for supporting conservation and management activities of these groves is also provided.
4. SOCIO-CULTURAL DIMENSIONS OF SACRED GROVES

4.1. Size distribution of sacred groves

The total area of the sacred groves ranged from 0.04 ha (Manimala Kavu) to 24.0 ha (Kammadam Kavu) (Table 2). Out of 28 sacred groves, 11 had less than 1 ha area, six had 1.01 to 4.0 ha, eight each had 4.01 to 8.0 ha and 8.01 to 12.0 ha and the rest had more than 12.01 ha. In majority of the groves, area occupied by the vegetation was more than 76 per cent of total area of the grove.

Table 2. Total area and area with vegetation in sacred groves of Kerala.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Sacred grove and acronym</th>
<th>Area (ha)</th>
<th>Total</th>
<th>With vegetation</th>
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<td>1</td>
<td>Edayilekkadu Kavu (KS1)</td>
<td>4.25</td>
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<tr>
<td>2</td>
<td>Kammadam Kavu (KS2)</td>
<td>24.00</td>
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<td>3</td>
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<td>4</td>
<td>Karimanal Chamundikkavu (KN2)</td>
<td>4.44</td>
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<td>5</td>
<td>Madai Kavu (KN3)</td>
<td>4.00</td>
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<tr>
<td>6</td>
<td>Thekkumbad Thazhe Kavu (KN4)</td>
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4.2. Ownership pattern and management of sacred groves

Out of 28 sacred groves discussed here, 11 are under the control of Devaswom Boards which manage them with the assistance of local committees. One sacred grove is the private property of a single family (Vetticode Kavu) managed by a family trust. The
Karakkode Kavu is the property of an Ashram. On the other hand, 15 sacred groves belong to the group of families of one or more communities and area being managed by temple trusts, temple committees or trusty boards. Except for Vetticode Kavu, all other groves have separate committees for conservation and management of the vegetation. Such committees comprise of members belonging to different Hindu communities, occasionally with special privilege to certain of the communities.

4.3. Presiding and associated deities

A random literature search reveals that, by and large, a majority of the sacred groves are associated with female deities (Malhotra et al., 2001). In the present study too, 16 of the groves were found associated with goddesses, while seven were associated with male deities (Shiva, Dharma Sastha, Ayyappa, Muthappa, Kallorappa) and the remaining six with serpent (Naga, Sarpa). Among female deities, Bhagavati was the most prominent (ten sacred groves) followed by Durga (four groves) and Chamundi (two groves).

Association of one sacred groove with several other groves, particularly during festival and other special occasions is reported from many sacred groves. For instance, Thazhekkavu is the associated sacred groove of Kammadam Kavu. Materials such as food grains, pooja items, oil for lamps etc. left after the festival or special functions in the main sacred groove are often distributed to its associated sacred groves for use. Such practices are seen in Kammadam Kavu and Sree Deviot Kavu and their associated sacred groves, Thazhekkavu and Kattu Modanthukkavu respectively.

Generally, there is a belief that some deities of associated sacred groves serve as the guards of the presiding deity of the main sacred groove. Chamundi, Gulikan and Vishnumoorthy are examples for such associated deities.

4.4. Stories related to origin and history of sacred groves

Most of the sacred groves have stories relating to their origin. Almost all sacred groves, according to these stories, originated by certain supernatural powers. Certain stories also reveal the links between sacred groves and historical events and personalities. Generally the name of a sacred grove may have close relation with a person, family, or certain character specific to the locality. For instance, a place where Karimanal Nair family established a deity became Karimanal Chamundikkavu. In
some cases, sacred groves received the name from families owning them (e.g. Chendanghotu Tharavadu Kavu). Names of certain sacred groves are derived from the geographic features (Valamchuzhi Kshethrakavu) or associated vegetation (Vallikkattu Kavu).

4.5. Rituals, festivals and culture

In most of the sacred groves, particularly those in northern Kerala, the ‘Kaliyattam’ - a performing art, is staged every year during May to November in the natural environment of the groves. Kaliyattam is performed generally in the front yard of the temple, and thus surrounding vegetation is not disturbed. Different forms of ‘theyyam’ are involved in Kaliyattam. They include Bhagavathi, Chamundi, Kali, Vanadevatha, Nagarajan, Nagakanya, legendary personalities (e.g. Illathamma in Kammadam Kavu), famous forefathers, ancient heroes, etc. There is a belief among the devotees that the performance of theyyam in the form of Vishnumoorthi and Bhagavathi will protect them from epidemic diseases and natural calamities. The theyyam Kalichan is believed to increase the animal wealth in the village while the performance of Aadivedan is said bring prosperity to the village as a whole. During performance, the theyyam listens to common man’s problems and suggests suitable remedies. Obtaining holy blessings from the theyyam is the most valuable moment for the devotees. Thus, theyyam acts as counselor and advisor of the village.

Certain theyyams (e.g. Kaikkolan theyyam in the Sree Deviot Kavu) are free to collect crops like banana, coconut, arecanut, pepper, etc. during festival period by going around the village from house to house. The collection is done by the helpers who accompany the theyyam during the performance. Farmers consider this as the reward they are giving to the deity for protecting their crops. This collection is referred to as ‘ooradakkam’, because collection is done throughout the village (ooru).

In the sacred groves, apart from Kaliyattam, several festivals are celebrated and rituals followed. During the Sankramana day of each month, the ritual, ‘Kalasamvekkal’ (offering sacred pots) is usual in most of the sacred groves. In Vetticode Kavu, Edayilekkadu Kavu and Irinjayam Sarpa Kavu where serpent is the major deity, ‘Sarpabali’ and ‘Nagamootal’ are important rituals. In the case of Kammadam Kavu, the temple complex is located about 1.5 km away from the sacred forest. Here, on the day previous to the festival, the priest goes to the sacred forest and offers a coconut to
the idol of Bhagavahti located under a tree so as to bring the `goddess’ to the temple and perform the poojas. In the early dawn of the festival day, the theyyam (Vishnumoorthi) goes alone to the forest and brings the coconut offered to the goddess and hands it over to the priest to perform rituals.

In almost all studied groves, pooram festival is celebrated annually during the months Vrischikam and Meenam. Another important festival in most of the sacred groves is ‘Puthariyadintharam’, being celebrated in the month of Thula. In this festival ‘Avil’ (pounded rice) made from the fresh harvest, and banana are distributed to the people as ‘Prasadam’. In connection with the festival ‘Marathukali’, cultural activities and meeting of scholars, are organised to make the festival more attractive and popular. In majority of the sacred groves, special functions are arranged during festivals like ‘Onam’ and ‘Vishu’.

4.6. Offerings

Devotees dedicate offerings for the fulfillment of their wish. Generally agricultural products are the major items of offerings; for instance, avil (pounded rice), malar (puffed rice), unakkalari (raw rice), tender coconut, coconut, banana, betel leaf, arecanut, flowers, gingelly oil, etc. For the blessings of serpents in the serpent groves, ‘nooru’ (a mixture of powders with turmeric and rice) and cow’s milk are offered. In most of the sacred groves (eg., Sree Deviot Kavu), during the ‘Sankramana’ day of the month Kanni, farmers offer betel and arecanut and a bunch of freshly harvested paddy to the deity. This offering is to seek permission from the deity for harvesting the crop. Similarly, Niaraputharai festival is celebrated in these groves during the month of Tulam, the harvest season. Thus it is clear that in rural Kerala, sacred groves and agricultural systems are closely linked with each other.

Villagers pray to the deities of sacred groves for their health and family welfare. Even now young couples visit sacred groves (eg., Sree Deviot kavu and Kammadam Kavu) and pray deities to bless them with a healthy baby. Couples who have infertility problems, vow that they would call their child with god/goddess's name. This practice is common in Kammadam Kavu. Hence in northern Malabar, the name ‘Kammadathi’ is common among children. Thulabharam (offering certain items, mainly agricultural crops, fruits, vegetables etc., equal to body weight of the devotee) is another practice common in most of the sacred groves and is one of the major sources of income for sacred groves.
The practice of oath/vow taking is reported from sacred groves. For instance ‘Penena’ is one such practice in Karimanal Chamundikkavu, where the devotee confesses his guilt in front of the deity. The guilty will be taken to the grove and manjalkuri (a paste of turmeric and other holy plants) is applied on his forehead. After he confesses, he will be allowed to take bath in the pond of the grove (penekundu). He remains unconscious for some time after the bath and when regains his consciousness he is believed to be free from the guilt.

4.7. Sacred grove and women

Women are allowed to the temples in all the sacred groves studied. In general, if the temple (palliyyara) is situated inside the forested area, women are permitted to enter the forested area. On the other hand, if palliyyara is located outside the forest area of the grove, women are allowed only to the palliyyara and not to the forested area. However, in Sree Deviot Kavu, only women of Mavilar community are allowed to go to the bank of the stream flowing from the forest. In Kammadam Kavu, women are allowed except, on Tuesday and Friday, to go inside the forest up to a certain distance.

Even though some restrictions exist, there are examples to highlight women’s participation in the traditional activities, conservation and day-to-day management of sacred groves. For example, in Sree Deviot Kavu, women of the Poduval community have the privilege to receive the Eswaran theyyam before the theyyam is performed. The Thekkumbad Thazhe Kavu is the only place in Kerala where women perform theyyam. There are women organizations like ‘Mathruvedi’, ‘Sthrivedi’ and ‘Mathru committee’ in Karakkode Kavu, Mani Kavu, Valliyoor Kavu etc. These organizations contribute much to the festivals and programmes related to the groves.

The sacred groves and their associated biodiversity are conserved mainly due to the belief of the people besides traditional rules, regulations and restrictions. The belief systems, which regulate or discourage the collection of materials from the sacred groves, contribute to their conservation. In all the 28 sacred groves studied, collection of any materials including medicinal plants is prohibited. Removal of dead and fallen trees, for the use within the grove has been reported in some groves. However, before doing so it should be ascertained from local astrologers (Kanisha) that such biomass removal shall not invite the wrath of the deity. It may be pointed out here that, even though limited biomass harvest is permissible, devotees normally stop harvesting if they see snake or hear some peculiar noise in the sacred grove.
5. ECOLOGICAL DIMENSIONS

5.1. Adjoining landscape
Among the 28 sacred groves, a majority are surrounded by crop lands. Eight groves (Edayilekkadu Kavu, Kavasseri Kavu, Madai Kavu, Mani Kavu, Muchukunnu Kotta Kavu, Valliyoor Kavu, Poyil Kavu, and Vetticode Kavu) are surrounded by coconut plantations and homesteads dominated by coconut. On the other hand, four sacred groves (Ayyappan Kavu, Thrikunnathu Kavu, Sri Varikkarakkadavu Kavu and Vallikkattu Kavu) are surrounded by coconut plantations and paddy fields. However, in the southern side of Ayyappan Kavu, the Shokanasini puzha flows, whereas homegardens and rocky hills also form the adjoining landscape units in Sri Varikkarakkadavu Kavu and Vallikkattu Kavu. While the Karimanal Chamundikkavu is surrounded by rubber and coconut plantations on three sides and rocky area on the other side, the Mannady Pazhayakavu is surrounded by coconut and arecanut gardens, homesteads and shops, and a monument of Velu Thampi Dalava, built near the Mannady temple in the eastern boundary of the kavu. Chendangotu Kavu and Chukkath Kavu are surrounded by homesteads dominated by cassava, rubber, coconut and vegetables. Three sides of Sree Deviot Kavu and Karakkode Kavu are covered by arecanut plantation and paddy fields and on the fourth side rubber plantations. Four groves namely, Irinjayam Sarpa Kavu, Kammadam Kavu, Pazhangala Kavu and Valiaveetil Kavu are surrounded by rubber estates on three sides and paddy fields on the other side. Iringole Kavu, Kalloor Kavu and Manimala Kavu are surrounded by landuses such as residences, paddy fields, homesteads and plantations of rubber and coconut. On the other hand, coffee and rubber plantations and highly degraded secondary forests, infested with exotic weeds, are the adjoining landscape units of Aruvikkal Kavu. Valamchuzhi Kavu is surrounded by Achenkovil River and the special feature of this kavu is that the river flows in a semicircular course around the Temple from west to east (valamchuli). On the other hand, the Thekkumbad Thazhe Kavu is located in an island bordered by Valapattanam River in the south, Pazhayangadi River in the east and backwater of the Arabian Sea in the west.

5.2. Water resource
Many sacred groves hold water sources in the form of ponds, streams or wells. For instance, in ten sacred groves (Vetticode Kavu, Iringole Kavu, Irinjayam Sarpa Kavu, Edayilekkadu Kavu, Muchukunnu Kotta Kavu, Poyil Kavu, Valiaveetil Kshethrakavu,
Madai Kavu, Thekkumbad Thazhe Kavu and Kavassery Kavu) fresh water ponds were seen. In fact, in Vetticode Kavu there are two ponds and both remain full in all seasons. As per the legend, the places from where Lord Parasurama removed soil for constructing the temple transformed as sacred ponds. There is a belief that by taking a dip in these ponds one would become free from all sorts of skin troubles and other diseases. The pond in Muchukunnu Kotta Kavu was constructed around 600 years ago by Shri Chathukuttan Nair of Manguttal Tharavadu of Muchukunnu. Iringole Kavu is associated with two fresh water ponds and people residing adjacent to the grove, believe that these water bodies, to a certain extent, meet the water needs of agricultural fields. In case of Kavassery Kavu, the devotees and people residing adjacent to the grove are using the pond water for their needs. Being covered with good vegetation, Poyil Kavu is helping to recharge ground water and a natural pond located in the kavu is called as ‘Thirikuzhi’. However, this pond, according to local people, has dried recently and is unable now to store water round the year. Similarly, the perennial pond in Madai Kavu considered sacred and known as Vadakunda Parel is also almost dry now. The pond located inside the Thekkumbad Thazhe Kavu was the only source of fresh water near to the temple. However, due to silt accumulation and inflow of brackish water, the pond water cannot be used for temple rituals. The Kavu Committee of Edayilekkadu Kavu has dug a pond for the storage of water. However, due to silt accumulation and seepage the pond is unable to store enough water. The present status of the ponds of Irinjayam Sarpa Kavu and Valiaveetil Kshethrakavu is poor as they are heavily polluted with solid wastes.

Eight sacred groves (Kammadam Kavu, Sree Deviot Kavu, Sree Varikkarakkadavu Kavu, Aruvikkal Kavu, Vallikkattu Kavu, Karimanal Chamundikkavu, Thrikunnath Kavu, Mani Kavu) are associated with streams and among them two sacred groves (Kammadam Kavu, Sree Deviot Kavu) are watersheds of rivulets. These supply water to the down- stream paddy fields. On either side of these streams, profuse growth of species characteristic to a *Myristica* swamp and several rare and endangered ferns can be seen. A perennial stream that originates from the forested area of Vallikkattu Kavu drains into a holy pond (Theerthakkulam) located in front of the temple and then flows to agricultural lands bordering the sacred grove. Similarly, a perennial rivulet, Aruvikkal thodu, that originates from Aruvikkal Kavu is the source of water for downstream agricultural fields. A spring originates from Mani kavu - which falls
throughout the year on an idol of Lord Shiva, installed in the down-stream area and then flows to crop lands.

In three sacred groves (Valliyoor Kavu, Ayyappan Kavu and Chukkath Kavu) wells are present. In Vallillyoor Kavu there are two wells and both are located in the non-forested land of the grove. On the other hand, the open well is the source of water in Ayyappan Kavu and Chukkath Kavu. Thus it is evident that one of the important ecological roles of sacred groves is to provide a more dependable source of water for organisms living in and around the sacred groves. When Manimala Kavu, Karakkode Kavu, Chendangotu Kavu and Ayyappan Kavu are situated on the bank of a river or rivulet, Valamchuzhi kavu is surrounded by Achenkovil River. In these cases, sacred groves may be playing an important role for recharging the rivulets and rivers.

5.3. Vegetation types of sacred groves

Mainly four major forest types, namely evergreen, semi-evergreen, moist deciduous and mangrove forests are seen among twenty eight sacred groves. While the forests of Kammadam Kavu and Sree Deviottu Kavu represent highland evergreen type associated with *Myristica* swamps, those of Poyil Kavu, Vallikkattu Kavu and Iringole Kavu represent lowland evergreen type. In 10 out of 28 sacred groves (Karimanal Chamundikkavu, Aruvikkal Kavu, Irinjayam Sarpa Kavu, Edayilekkadu Kavu, Thekkumbad Thazhe Kavu, Valiaveetil Kshethrakavu, Muchukunnu Kotta Kavu, Mani Kavu and Valliyoor Kavu) the forests are of semi-evergreen type. Except Karimanal Chamundikkavu which is a highland semi-evergreen forest, the remaining nine groves represent lowland semi-evergreen forests. In Thekkumbad Thazhe Kavu, both mangrove and semi-evergreen vegetation can be seen. While the forests of Valiaveetil Kshethrakavu and Pazhangala Kavu are partly degraded, those of Karimanal Chamundikkavu, Muchukunnu Kotta Kavu, Mani Kavu and Valliyoor Kavu are highly degraded.

The vegetation in Vetticode Kavu, Valamchuzhi Kshethrakavu, Thrikunnath Kavu, Madai Kavu, Sree Varikkarakkadavu Kavu, Kalloor Appankavu, Manimala Kavu, Karakkode Kavu, Ayyappan Kavu, Kavassery Kavu, Mannady Pazhayakavu, Chendangotu Kavu and Chukkath Kavu is dominated by tree species characteristic to the moist deciduous forest type. In majority of these sacred groves the understorey
vegetation is dominated by light demanding native or exotic weeds and climbers. Regeneration of tree species is also found to be poor.

5.4. Floristic composition

Floristic inventory was done in all 28 sacred groves. Each grove was visited two to three times during June-December 2010. Plants were identified with the help of floras (Gamble, 1928; Sivarajan and Mathew, 1996; Sisidharan, 2004). The status of rare, endemic, endangered or threatened species was checked with IUCN (1990) and Sasidharan (2004). A total of 670 angiosperm species belonging to 120 families were recorded (Appendix 1). These 670 species included 34 climbers, 157 herbs, 159 shrubs and 320 trees. The family having the maximum number of species (49) was Rubiaceae followed by Euphorbiaceae (38 species), Orchidaceae (24 species), Moraceae (22 species), Acanthaceae (21 species) and Fabaceae (21 species) (Table 3). Forty four families were represented each by single species.

Table 3. Number of species identified from different families in the sacred groves of Kerala.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Family</th>
<th>No. of species</th>
<th>Sl. No.</th>
<th>Family</th>
<th>No. of species</th>
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--- P.T.O. ---
Table 3 (cont’d). Number of species identified from different families in the sacred groves of Kerala.

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<tr>
<td>120</td>
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</tbody>
</table>

About 20% (133 species) of the total number of species recorded from the sacred groves were found to be endemic (Appendix 1). While 76 species were endemic to the southern Western Ghats, 37 were endemic to the Western Ghats and the remaining 21 were endemic to the peninsular India. Among species endemic to the Southern Western Ghats, *Ampelocissus indica* (Vitaceae), *Beilschmiedia wightii* (Lauraceae), *Vepris bilocularis* (Rutaceae) fell under rare category, *Anaphyllum wightii* (Araceae) and *Calamus brandisii* (Arecaceae) under threatened category and *Capparis*
shevaroyensis (Capparaceae), Euonymus angulatus (Celastraceae), Holigarna beddomei (Anacardiaceae) and Pterospermum reticulatum (Sterculiaceae) under vulnerable species category of IUCN. Similarly, among the species endemic to the Western Ghats Holigarna grahamii (Anacardiaceae) is rare while Arenga wightii (Areceae), Belasynapsis vivipara (Commelinaceae) and Myristica malabarica (Myristicaceae) are categorised as vulnerable.

Out of 120 families recorded 45 families have at least one endemic species (Table 4). Available publications (Nayar, 1997; Sasidharan, 2004; Irwin and Narasimhan, 2011) indicated that Rubiaceae, Acanthaceae, Balsaminaceae, Asclepiadaceae, Lamiaceae, Poaceae and Orchidaceae are the families rich in endemism in peninsular India. In the present study, Acanthaceae, Lauraceae, Rubiaceae and Orchidaceae were rich in endemic species (Table 4).

Table 4. Number of endemic species identified from different families

<table>
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</table>

Total number of angiosperm species recorded in a sacred grove was least (21 species) in Chukkath Kavu and highest (185 species) in Iringole Kavu (Table 5). The mean
number of species per sacred grove was 81 with number of species in ten out of 28 sacred groves were more than the average.

Table 5. Number of species recorded from different sacred groves of Kerala

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<tr>
<th>Sacred grove and acronym</th>
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<tr>
<td>Kammadam Kavu (KS2)</td>
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<td>Sree Deviot Kavu (KN1)</td>
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<td>Karimanal Chamundikkavu (KN2)</td>
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<td>Madai Kavu (KN3)</td>
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<td>Thekkumbad Thazhe Kavu (KN4)</td>
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<td>Sree Varikkarakkadavu Kavu (KN5)</td>
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<tr>
<td>Mani Kavu (WA1)</td>
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<td>Valliyoor Kavu (WA2)</td>
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<td>Muchukunu Kotta Kavu (KZ1)</td>
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<td>Poyil Kavu (KZ2)</td>
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<td>Vallikkattu Kavu (KZ3)</td>
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<td>Karakkode Kavu (MA1)</td>
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<td>Mannady Pazhayakavu (PT1)</td>
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<td>Valamchuzhi Kshethrakavu (PT2)</td>
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<tr>
<td>Irinjayam Sarpa Kavu (TV1)</td>
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<tr>
<td>Thrilunath Kavu (TV2)</td>
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Plant species richness increased consistently with area under vegetation in the sacred grove (R= 0.5781; P=0.01). A positive species-area relationship indicated that species richness is a function of area of sacred grove, highlighting the importance of area under vegetation as one of the most important determinant of species richness in fragmented habitats like sacred groves. However, the total number of species occurring in a sacred grove does not reflect the quality of the forested area. For instance, in majority of sacred groves light demanding evergreen species were common (Table 6). However, quantitative studies are required to assess the contribution of primary and successional species to vegetation structure and
composition, regeneration patterns of successional species and in turn the dynamics of sacred grove.

Table 6. Some light demanding plants occurring in 14 or more than 14 sacred groves of Kerala

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<th>Species</th>
<th>Number of Sacred groves of occurrence</th>
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<td>Macaranga peltata</td>
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<td>Alstonia scholaris</td>
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<td>Mallotus philippensis</td>
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<td>Strychnos nux-vomica</td>
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<td>Anamirta cocculus</td>
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<td>Antriars toxicaria</td>
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<td>Cinnamomum malabatrum</td>
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<td>Holigarna arnottiana</td>
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<td>Abrus precatorius</td>
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<td>Aporosa lindleyana</td>
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<tr>
<td>Leea indica</td>
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</tr>
<tr>
<td>Curculigo orchioides</td>
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<tr>
<td>Briedelia scandens</td>
<td>14</td>
</tr>
<tr>
<td>Adenanthera pavonina</td>
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</tr>
<tr>
<td>Grewia tiliifolia</td>
<td>14</td>
</tr>
<tr>
<td>Calycopteris floribunda</td>
<td>14</td>
</tr>
<tr>
<td>Zizyphus rugosa</td>
<td>14</td>
</tr>
</tbody>
</table>

5.5. Butterflies in sacred groves

Butterflies constitute one of the common fauna of all habitat types, and because they are responsive to change, their diversity and abundance can reflect ecological trends in other segments of biodiversity (Furness and Greenwood, 1993). The butterfly diversity was studied by visiting the sacred groves two or three times during June-December 2010. The species were identified on the basis of field characters (Evans, 1932; Wynter-Blyth, 1982; Gaonkar, 1996). The entire area of the sacred grove was sampled by walking at a constant pace for about one to three hours in the morning. Inventory of butterflies in 27 sacred groves recorded a total of 154 species belonging to four families (Appendix 2). The family having the maximum number of species (58 species) was Nymphalidae followed by Papilionidae (36 species), Lycaenidae (35 species) and Hesperiidae (27 species).

Out of 154 species, 54 species were found in 14 or more than 14 sacred groves (Table 7). Among them Euploea core was the most common species, with its occurrence
noticed in 24 groves. Five species, namely *Idea malabarica*, *Pachliopta pandiyana*, *Sarangesa purendra pandra*, *Troides minos* and *Zipoetis satis*, are the endemic to the Western Ghats. Among these *Troides minos* was recorded from a number of groves (22) than any other, followed by *Idea malabarica* (15 groves) (Appendix 2).

Table 7. List of butterflies recorded in 14 or more than 14 sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Common Name</th>
<th>Number of sacred groves of occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Ampittia discorides</em></td>
<td>Bush Hopper</td>
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<tr>
<td>2</td>
<td><em>Lambrictus salsula</em></td>
<td>Chestnut Bob</td>
<td>17</td>
</tr>
<tr>
<td>3</td>
<td><em>Borbo cinnara</em></td>
<td>Rice Swift</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td><em>Celaenorrhinus leucocera</em></td>
<td>Common Spotted Flat</td>
<td>14</td>
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<tr>
<td>5</td>
<td><em>Jamides celeno aelianus</em></td>
<td>Common Caerulean</td>
<td>18</td>
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<tr>
<td>6</td>
<td><em>Castalius rosimon</em></td>
<td>Common Pierrot</td>
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<tr>
<td>7</td>
<td><em>Rathinda amor</em></td>
<td>Monkey Puzzle</td>
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<td>8</td>
<td><em>Caleta caleta desidia</em></td>
<td>Angled Pierrot</td>
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<td>9</td>
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<td>10</td>
<td><em>Euploea core</em></td>
<td>Common Crow</td>
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<td>11</td>
<td><em>Melanitis leda leda</em></td>
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<td><em>Acraea Violae</em></td>
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<td><em>Hypolimnas bolina</em></td>
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<td>14</td>
<td><em>Neptis hylas varmona</em></td>
<td>Common Sailer</td>
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<td><em>Phalanta phalantha</em></td>
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<td>19</td>
<td><em>Junonia lemonias</em></td>
<td>Lemon Pansy</td>
<td>18</td>
</tr>
<tr>
<td>20</td>
<td><em>Mycalesis perseus typhlus</em></td>
<td>Common Bush Brown</td>
<td>17</td>
</tr>
<tr>
<td>21</td>
<td><em>Tanaecia lepidea miyana</em></td>
<td>Grey Count</td>
<td>17</td>
</tr>
<tr>
<td>22</td>
<td><em>Ypthima baldus</em></td>
<td>Common Five Ring</td>
<td>17</td>
</tr>
<tr>
<td>23</td>
<td><em>Ariadne ariadne indica</em></td>
<td>Indian Angled Castor</td>
<td>16</td>
</tr>
<tr>
<td>24</td>
<td><em>Danaus chrysippus</em></td>
<td>Plain Tiger</td>
<td>16</td>
</tr>
<tr>
<td>25</td>
<td><em>Danaus genutia</em></td>
<td>Common tiger</td>
<td>16</td>
</tr>
<tr>
<td>26</td>
<td><em>Junonia almana</em></td>
<td>Peacock Pansy</td>
<td>16</td>
</tr>
<tr>
<td>27</td>
<td><em>Limenitis procris undifragus</em></td>
<td>Commander</td>
<td>16</td>
</tr>
<tr>
<td>28</td>
<td><em>Tirumala limniace exotica</em></td>
<td>Blue Tiger</td>
<td>16</td>
</tr>
<tr>
<td>29</td>
<td><em>Euthalia aconthea meridionalis</em></td>
<td>Baron</td>
<td>15</td>
</tr>
<tr>
<td>30</td>
<td><em>Idea malabarica</em></td>
<td>Malabar Tree Nymph</td>
<td>15</td>
</tr>
<tr>
<td>31</td>
<td><em>Neptis jumbah</em></td>
<td>Chestnut Streaked Sailer</td>
<td>15</td>
</tr>
<tr>
<td>32</td>
<td><em>Tirumala septentrionis</em></td>
<td>Dark Blue Tiger</td>
<td>15</td>
</tr>
<tr>
<td>33</td>
<td><em>Ypthima huhebneri</em></td>
<td>Common Four Ring</td>
<td>15</td>
</tr>
<tr>
<td>34</td>
<td><em>Orsotrioena medus mandata</em></td>
<td>Nigger</td>
<td>14</td>
</tr>
<tr>
<td>35</td>
<td><em>Polyura athamas</em></td>
<td>Common Nawab</td>
<td>14</td>
</tr>
</tbody>
</table>

-----cont’d-----
Table 7 (cont’d). List of Butterflies recorded in 14 or more than 14 sacred groves of Kerala.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Common Name</th>
<th>Number of sacred groves of occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>36.</td>
<td><em>Troides minos</em></td>
<td>Southern Birdwing</td>
<td>22</td>
</tr>
<tr>
<td>37.</td>
<td><em>Delias eucharis</em></td>
<td>Common Jezebel</td>
<td>23</td>
</tr>
<tr>
<td>38.</td>
<td><em>Pachliopta aristolochiae</em></td>
<td>Common Rose</td>
<td>23</td>
</tr>
<tr>
<td>39.</td>
<td><em>Pachliopta hector</em></td>
<td>Crimson Rose</td>
<td>23</td>
</tr>
<tr>
<td>40.</td>
<td><em>Papilio demoleus</em></td>
<td>Lime butterfly</td>
<td>23</td>
</tr>
<tr>
<td>41.</td>
<td><em>Graphium sarpedon teredon</em></td>
<td>Common Blue bottle</td>
<td>22</td>
</tr>
<tr>
<td>42.</td>
<td><em>Papilio polymnestor</em></td>
<td>Blue Mormon</td>
<td>21</td>
</tr>
<tr>
<td>43.</td>
<td><em>Leptosia nina</em></td>
<td>Psyche</td>
<td>20</td>
</tr>
<tr>
<td>44.</td>
<td><em>Papilio polytes</em></td>
<td>Common Mormon</td>
<td>20</td>
</tr>
<tr>
<td>45.</td>
<td><em>Anaphes aurota</em></td>
<td>Caper White</td>
<td>19</td>
</tr>
<tr>
<td>46.</td>
<td><em>Eurema hecabe simulata</em></td>
<td>Common Grass Yellow</td>
<td>19</td>
</tr>
<tr>
<td>47.</td>
<td><em>Papilio liomedon</em></td>
<td>Malabar Banded</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Swallowtail</td>
<td></td>
</tr>
<tr>
<td>48.</td>
<td><em>Catopsilia pomona</em></td>
<td>Lemon Emigrant</td>
<td>17</td>
</tr>
<tr>
<td>49.</td>
<td><em>Graphium agamemnon menides</em></td>
<td>Tailed Jay</td>
<td>17</td>
</tr>
<tr>
<td>50.</td>
<td><em>Hebomoia glaucippe australis</em></td>
<td>Giant Orange Tip</td>
<td>17</td>
</tr>
<tr>
<td>51.</td>
<td><em>Papilio paris tamilana</em></td>
<td>Paris Peacock</td>
<td>16</td>
</tr>
<tr>
<td>52.</td>
<td><em>Graphium doson</em></td>
<td>Common Jay</td>
<td>15</td>
</tr>
<tr>
<td>53.</td>
<td><em>Catopsilia pyranthe</em></td>
<td>Mottled Emigrant</td>
<td>14</td>
</tr>
<tr>
<td>54.</td>
<td><em>Parenonia valeria</em></td>
<td>Common Wanderer</td>
<td>14</td>
</tr>
</tbody>
</table>

Total number of butterfly species recorded in a sacred grove was lowest (34 species) in Chukkath Kavu and highest in Vallikkattu Kavu (Table 8). The mean number of butterfly species per grove was 66 and in 10 out of 27 groves, the number of species was more than the average. In 21 groves one or more than one endemic species were observed.

The sacred groves with no endemic species recorded during the study period include Thekkumbad Thazhe Kavu, Kalloor Appankavu, Ayyappan Kavu, Kavassery Kavu, Chendangotu Kavu, Chukkath Kavu. No significant correlation between the number of butterfly species and area under vegetation in the sacred grove was noticed (R = 0.4354; P>0.05).
Table 8. Number of butterfly species and endemic butterflies recorded from the sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sacred grove and acronym</th>
<th>Total number of butterfly species</th>
<th>Number and species of endemic butterflies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edayilekkadu Kavu (KS1)</td>
<td>109</td>
<td>3 Idea malabarica, Troides minos, Zipoetis satis</td>
</tr>
<tr>
<td>Kammadam Kavu (KS2)</td>
<td>77</td>
<td>3 Idea malabarica, Troides minos Sarangesa purendra pandra</td>
</tr>
<tr>
<td>Sree Deviot Kavu (KN1)</td>
<td>80</td>
<td>4 Idea malabarica, Troides minos Zipoetis satis, Sarangesa purendra pandra</td>
</tr>
<tr>
<td>Karimanal Chamundikkavu (KN2)</td>
<td>63</td>
<td>1 Idea malabarica</td>
</tr>
<tr>
<td>Madai Kavu (KN3)</td>
<td>58</td>
<td>0</td>
</tr>
<tr>
<td>Thekkumbad Thazhe Kavu (KN4)</td>
<td>62</td>
<td>1 Troides minos</td>
</tr>
<tr>
<td>Sree Varikkarakkadavu Kavu (KN5)</td>
<td>39</td>
<td>0</td>
</tr>
<tr>
<td>Mani Kavu (WA1)</td>
<td>63</td>
<td>1 Idea malabarica</td>
</tr>
<tr>
<td>Valliyoor Kavu (WA2)</td>
<td>97</td>
<td>4 Idea malabarica, Pachliopta pandiyana, Zipoetis satis Sarangesa purendra pandra</td>
</tr>
<tr>
<td>Muchukunnu Kotta Kavu (KZ1)</td>
<td>101</td>
<td>4 Pachliopta pandiyana, Troides minos Zipoetis satis Sarangesa purendra pandra</td>
</tr>
<tr>
<td>Poyil Kavu (KZ2)</td>
<td>122</td>
<td>4 Pachliopta pandiyana, Troides minos Zipoetis satis Sarangesa purendra pandra</td>
</tr>
<tr>
<td>Vallikkattu Kavu (KZ3)</td>
<td>47</td>
<td>1 Idea malabarica</td>
</tr>
<tr>
<td>Karakkode Kavu (MA1)</td>
<td>43</td>
<td>0</td>
</tr>
<tr>
<td>Ayyappan Kavu (PL1)</td>
<td>43</td>
<td>0</td>
</tr>
<tr>
<td>Kavassery Kavu (PL2)</td>
<td>50</td>
<td>1 Troides minos</td>
</tr>
<tr>
<td>Chendangotu Kavu (TS1)</td>
<td>34</td>
<td>0</td>
</tr>
<tr>
<td>Chukkath Kavu (TS2)</td>
<td>39</td>
<td>1 Troides minos</td>
</tr>
<tr>
<td>Aruvikkal Kavu (ER1)</td>
<td>78</td>
<td>4 Idea malabarica, Pachliopta pandiyana, Troides minos Sarangesa purendra pandra, Sarangesa purendra pandra</td>
</tr>
<tr>
<td>Iringole Kavu (ER2)</td>
<td>95</td>
<td>3 Sarangesa purendra pandra, Troides minos Zipoetis satis</td>
</tr>
<tr>
<td>Kalloor Appankavu (KT1)</td>
<td>46</td>
<td>1 Troides minos</td>
</tr>
<tr>
<td>Manimala Kavu (KT2)</td>
<td>51</td>
<td>1 Troides minos</td>
</tr>
<tr>
<td>Mannady Pazhayakavu (PT1)</td>
<td>51</td>
<td>3 Idea malabarica, Troides minos Sarangesa purendra pandra</td>
</tr>
<tr>
<td>Valamchuzhi Kshethrakavu (PT2)</td>
<td>39</td>
<td>0</td>
</tr>
<tr>
<td>Valiaveetil Kshethrakavu (KL1)</td>
<td>53</td>
<td>2 Idea malabarica, Zipoetis satis</td>
</tr>
<tr>
<td>Pazhangala Kavu (KL2)</td>
<td>108</td>
<td>3 Idea malabarica, Troides minos Sarangesa purendra pandra</td>
</tr>
<tr>
<td>Irinjayam Sarpa Kavu (TV1)</td>
<td>36</td>
<td>1 Troides minos</td>
</tr>
<tr>
<td>Thrikunnath Kavu (TV2)</td>
<td>108</td>
<td>3 Idea malabarica, Troides minos Sarangesa purendra pandra</td>
</tr>
</tbody>
</table>
5.6. Birds in sacred groves

In terms of indicator organisms for biodiversity studies, birds are also an excellent choice. They are common to all habitats and generally easy to observe. Many species, both common and rare, can be easily and reliably identified in the field. Thus bird diversity was also studied by visiting the sacred groves two or three times during June-December 2010. During each visit, the entire area of the sacred grove was sampled by walking at a constant pace for about one to three hours in the morning. The encountered birds were identified as per Ali and Ripley (1983), while nomenclature was based on Inskipp et al. (1996).

A total of 122 species, with 8 endemic species, were recorded from 27 groves (Appendix 3). Of the 122 species, 34 were found in 14 or more than 14 groves (Table 9), the Common Myna being the most common species, noticed in 25 groves.

Table 9. List of birds recorded in 14 or more than 14 sacred groves of Kerala. (N= 27 sacred groves).

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Scientific name</th>
<th>Common Name</th>
<th>No. of groves of occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><em>Acrocephalus tristis</em></td>
<td>Common Myna</td>
<td>25</td>
</tr>
<tr>
<td>2.</td>
<td><em>Orthotomus sutorius</em></td>
<td>Common Tailorbird</td>
<td>24</td>
</tr>
<tr>
<td>3.</td>
<td><em>Oriolus oriolus</em></td>
<td>Eurasian Golden Oriole</td>
<td>23</td>
</tr>
<tr>
<td>4.</td>
<td><em>Bubulcus ibis</em></td>
<td>Cattle Egret</td>
<td>22</td>
</tr>
<tr>
<td>5.</td>
<td><em>Copsychus saularis</em></td>
<td>Oriental Magpie Robin</td>
<td>22</td>
</tr>
<tr>
<td>6.</td>
<td><em>Dicerurus paradiseus</em></td>
<td>Racket-tailed drongo</td>
<td>22</td>
</tr>
<tr>
<td>7.</td>
<td><em>Haliastur indus</em></td>
<td>Brahmni Kite</td>
<td>22</td>
</tr>
<tr>
<td>8.</td>
<td><em>Phalacrocorax niger</em></td>
<td>Little Cormorant</td>
<td>22</td>
</tr>
<tr>
<td>10.</td>
<td><em>Dendrocopos mahattensis</em></td>
<td>Yellow -Fronted Pied Woodpecker</td>
<td>20</td>
</tr>
<tr>
<td>11.</td>
<td><em>Dinopium benghalense</em></td>
<td>Black-rumped woodpecker</td>
<td>20</td>
</tr>
<tr>
<td>12.</td>
<td><em>Cuculus micropterus</em></td>
<td>Indian Cuckoo</td>
<td>19</td>
</tr>
<tr>
<td>13.</td>
<td><em>Lonchura kelaartii</em></td>
<td>Black-Throated Munia</td>
<td>19</td>
</tr>
<tr>
<td>14.</td>
<td><em>Lonchura mlacca</em></td>
<td>Black-headed Munia</td>
<td>19</td>
</tr>
<tr>
<td>15.</td>
<td><em>Terpsiphone paradisi</em></td>
<td>Asian Paradise Flycatcher</td>
<td>19</td>
</tr>
<tr>
<td>16.</td>
<td><em>Corvus splendens</em></td>
<td>House Crow</td>
<td>18</td>
</tr>
<tr>
<td>17.</td>
<td><em>Dinopium benghalense</em></td>
<td>Lesser Golden-backed Woodpecker</td>
<td>18</td>
</tr>
<tr>
<td>18.</td>
<td><em>Hemicircus canente</em></td>
<td>Heart spotted woodpecker</td>
<td>18</td>
</tr>
<tr>
<td>19.</td>
<td><em>Myiophonus horsfieldii</em></td>
<td>Malabar Whistling Thrush</td>
<td>18</td>
</tr>
<tr>
<td>20.</td>
<td><em>Nectarinia asiatica</em></td>
<td>Purple Sunbird</td>
<td>18</td>
</tr>
<tr>
<td>21.</td>
<td><em>Alcedo athis</em></td>
<td>Small Blue Kingfisher</td>
<td>17</td>
</tr>
<tr>
<td>22.</td>
<td><em>Ardeola grayii</em></td>
<td>Indian Pond Heron</td>
<td>17</td>
</tr>
<tr>
<td>23.</td>
<td><em>Corvus macrorhynchos</em></td>
<td>Jungle Crow</td>
<td>17</td>
</tr>
<tr>
<td>24.</td>
<td><em>Cyornis tickelliae</em></td>
<td>Tickell’s Blue Flycatcher</td>
<td>17</td>
</tr>
<tr>
<td>25.</td>
<td><em>Dendrocitta vagabunda</em></td>
<td>Indian Treepie</td>
<td>16</td>
</tr>
<tr>
<td>26.</td>
<td><em>Dicerurus macrocerus</em></td>
<td>Black Drongo</td>
<td>16</td>
</tr>
<tr>
<td>27.</td>
<td><em>Merops philipinus</em></td>
<td>Blue-tailed Bee-eater</td>
<td>16</td>
</tr>
</tbody>
</table>
Table 9 (cont’d). List of birds recorded in 14 or more than 14 sacred groves of Kerala. (N= 27 sacred groves).

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Scientific name</th>
<th>Common Name</th>
<th>No. of groves of occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.</td>
<td><em>Psittacula cyanocephala</em></td>
<td>Plum-headed Parakeet</td>
<td>16</td>
</tr>
<tr>
<td>29.</td>
<td><em>Acrideres fuscus</em></td>
<td>Jungle Myna</td>
<td>15</td>
</tr>
<tr>
<td>30.</td>
<td><em>Accipiter badius</em></td>
<td>Shikra</td>
<td>14</td>
</tr>
<tr>
<td>31.</td>
<td><em>Dendrocitta vagabunda</em></td>
<td>Rufous treepie</td>
<td>14</td>
</tr>
<tr>
<td>32.</td>
<td><em>Megalaima haemacephala</em></td>
<td>Crimson breasted barbet</td>
<td>14</td>
</tr>
<tr>
<td>33.</td>
<td><em>Merops leschenaultia</em></td>
<td>Chestnut-headed Bee-eater</td>
<td>14</td>
</tr>
<tr>
<td>34.</td>
<td><em>Turdoides striatus</em></td>
<td>Jungle Babbler</td>
<td>14</td>
</tr>
</tbody>
</table>

Among endemic species (Table 10), the Malabar Grey hornbill was seen in 11 groves, while Nilgiri Wood Pigeon was found only in Kammadam Kavu and Valliyoor Kavu.

Table 10. Distribution of endemic birds in the sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Species</th>
<th>Common name</th>
<th>Number and code number of sacred groves* of occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><em>Columba elphinstonii</em></td>
<td>Nilgiri Wood Pigeon</td>
<td>2 KS2, WA2</td>
</tr>
<tr>
<td>2.</td>
<td><em>Eumyias albicaudata</em></td>
<td>Nilgiri Flycatcher</td>
<td>7 ER1, ER2, KS2,KZ3, KN1, KN5, WA1</td>
</tr>
<tr>
<td>3.</td>
<td><em>Ficedula nigrorufa</em></td>
<td>Black-and-Orange Flycatcher</td>
<td>8 ER1, KS2,KZ1,KZ2, KZ3, KN1,KN4, WA1</td>
</tr>
<tr>
<td>4.</td>
<td><em>Garrulx delesserti</em></td>
<td>Wynad Lughingthrush</td>
<td>6 KS2, KZ2, KZ3,KN1, WA1,WA2</td>
</tr>
<tr>
<td>5.</td>
<td><em>Nectarinia minima</em></td>
<td>Small Sunbird</td>
<td>10 ER2,KS1,KS2,KN1,KN2, MA1,PL2,TS1,WA1,WA2</td>
</tr>
<tr>
<td>6.</td>
<td><em>Ocyceros griseus</em></td>
<td>Malabar Grey Hornbill</td>
<td>11 ER1,KS1,KS2,KZ2, KZ3,KN1,KN2,MA1,PL2,WA1,WA2</td>
</tr>
<tr>
<td>7.</td>
<td><em>Psittacula columboide</em></td>
<td>Blue-winged Parakeet</td>
<td>5 ER1,KS2,KZ3, KN1, N4</td>
</tr>
<tr>
<td>8.</td>
<td><em>Pycnonotus prioecephalus</em></td>
<td>Grey-headed Bulbul</td>
<td>8 ER1,ER2, KS1,KS2, KZ3, KN1,KN4,WA1</td>
</tr>
</tbody>
</table>

* Names of sacred groves are as in Table 8.

Total number of bird species recorded in a sacred grove was lowest (17 species) in Chendangotu Kavu and highest in Sree Deviot Kavu (87 species) (Table 11). In 12 groves, the number of species recorded was more than the average number of species recorded (46 species). In 15 groves, one or more than one endemic birds were noticed. Kammadam Kavu and Sree Deviot Kavu were rich in endemic species by harbouring eight and seven endemic species respectively. No significant correlation between the number of bird species and area under vegetation in the sacred grove was noticed ((R= 0.4832; P>0.05).
Table 11. Total number of bird species and endemic birds recorded from the sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sacred Grove and acronym</th>
<th>Number of species</th>
<th>Number and names of endemic birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edayilekkadu Kavu (KS1)</td>
<td>25</td>
<td>3 Nectarinia minima, Ocyceros griseus, Pycnonotus priocephalus</td>
</tr>
<tr>
<td>Kammadam kavu (KS2)</td>
<td>85</td>
<td>8 Columba elphinstonii, Garrulx delesserti, Eumyias albicaudata, Ocyceros griseus, Ficedula nigrorufa, Nectarinia minima, Psittacula columboides, Pycnonotus priocephalus</td>
</tr>
<tr>
<td>Sree Deviot Kavu (KN1)</td>
<td>87</td>
<td>7 Eumyias albicaudata, Ficedula nigrorufa, Garrulx delesserti, Nectarinia minima, Ocyceros griseus, Psittacula columboides, Pycnonotus priocephalus</td>
</tr>
<tr>
<td>Karimanal Chamundikkavu (KN2)</td>
<td>33</td>
<td>2 Nectarinia minima, Ocyceros griseus</td>
</tr>
<tr>
<td>Madai Kavu (KN3)</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Thekkumbad Thazhe Kavu (KN4)</td>
<td>28</td>
<td>3 Ficedula nigrorufa, Psittacula columboides, Pycnonotus priocephalus</td>
</tr>
<tr>
<td>Sree Varikkarakkadavu Kavu (KN5)</td>
<td>41</td>
<td>1 Eumyias albicaudata</td>
</tr>
<tr>
<td>Mani Kavu (WA1)</td>
<td>59</td>
<td>6 Eumyias albicaudata, Ficedula nigrorufa, Garrulx delesserti, Nectarinia minima, Ocyceros griseus, Psittacula columboides, Pycnonotus priocephalus</td>
</tr>
<tr>
<td>Valliyoor Kavu (WA2)</td>
<td>73</td>
<td>4 Columba elphinstonii, Garrulx delesserti, Nectarinia minima, Ocyceros griseus</td>
</tr>
<tr>
<td>Muchukunnu Kotta Kavu (KZ1)</td>
<td>30</td>
<td>1 Ficedula nigrorufa</td>
</tr>
<tr>
<td>Poyil Kavu (KZ2)</td>
<td>33</td>
<td>3 Ficedula nigrorufa, Garrulx delesserti, Ocyceros griseus</td>
</tr>
<tr>
<td>Vallikkattu Kavu (KZ3)</td>
<td>78</td>
<td>6 Eumyias albicaudata, Ficedula nigrorufa, Garrulx delesserti, Ocyceros griseus, Psittacula columboides, Pycnonotus priocephalus</td>
</tr>
<tr>
<td>Karakkode Kavu (MA1)</td>
<td>60</td>
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</tr>
<tr>
<td>Ayyappan Kavu (PL1)</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>Kavassery Kavu (PL2)</td>
<td>63</td>
<td>2 Nectarinia minima, Ocyceros griseus</td>
</tr>
<tr>
<td>Chendangotu Kavu (TS1)</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>Chukkath Kavu (TS2)</td>
<td>48</td>
<td>0</td>
</tr>
<tr>
<td>Aruvikkal Kavu (ER1)</td>
<td>74</td>
<td>5 Eumyias albicaudata, Ficedula nigrorufa, Ocyceros griseus, Psittacula columboides, Pycnonotus priocephalus</td>
</tr>
<tr>
<td>Iringole Kavu (ER2)</td>
<td>55</td>
<td>3 Eumyias albicaudata, Nectarinia minima, Pycnonotus priocephalus</td>
</tr>
<tr>
<td>Kalloor Appankavu (KT1)</td>
<td>26</td>
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</tr>
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<td>Manimala Kavu (KT2)</td>
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</tr>
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<td>Mannady Pazhayakavu (PT1)</td>
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<td>Valamchuzhi Kshethrakavu (PT2)</td>
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</tr>
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<td>Vaiaveetil Kshethrakavu (KL1)</td>
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<td>0</td>
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<td>Pazhangala Kavu (KL2)</td>
<td>40</td>
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</tr>
<tr>
<td>Irinjayam Sarpa Kavu (TV1)</td>
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<td>0</td>
</tr>
<tr>
<td>Thrikkunnath Kavu (TV2)</td>
<td>46</td>
<td>0</td>
</tr>
</tbody>
</table>
6. THREATS TO SACRED GROVES

The present study demonstrated the fact that due to faiths, taboos and beliefs, over years, the local people have developed a strong affinity towards the temple and the forest of sacred groves. The local people in general also believe that their livelihood, security and prosperity are complementary to the blessings of the deity of the kavu. Even then, this ancient and widespread institution is showing signs of weakening in terms of both cultural and biological integrity in many parts of the State. The nature and extent of threats and pressures are in general grove-specific. The nature of threats reported from 28 sacred groves (Table 12) are grouped under three heads namely - those that lead to a) loss of forest land, b) degradation of forest land, and c) abuse of forest land.

Table 12. Nature of threats reported from sacred groves of Kerala

<table>
<thead>
<tr>
<th>Threats</th>
<th>Sacred groves and acronyms*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Loss of forest land</strong></td>
<td></td>
</tr>
<tr>
<td>Encroachment of sacred grove area</td>
<td>3 ER1, KS2, KN1</td>
</tr>
<tr>
<td>Erosion of forest fringe</td>
<td>2 KN4, PL1</td>
</tr>
<tr>
<td><strong>Degradation of forest land</strong></td>
<td></td>
</tr>
<tr>
<td>Damage to established seedlings due to trampling</td>
<td>18 ER1, ER2, KS1, KS2, KZ1, KN1, KN2, KN5, KL1, KL2, KT1, KT2, MA1, PL2, PT2, TV1, TV2, WA1</td>
</tr>
<tr>
<td>Illegal collection and removal of biomass</td>
<td>10 ER2, KS1, KS2, KZ1, KZ2, KZ3, KN4, PL2, WA1, WA2</td>
</tr>
<tr>
<td>Grazing</td>
<td>2 MA1, PT2</td>
</tr>
<tr>
<td>Deposition of solid wastes that are floating in the river</td>
<td>1 KN4</td>
</tr>
<tr>
<td>Premature fall of trees</td>
<td>1 ER2</td>
</tr>
<tr>
<td>Poaching wild animals</td>
<td>1 KS2</td>
</tr>
<tr>
<td><strong>Abuse of forest land</strong></td>
<td></td>
</tr>
<tr>
<td>Dumping solid wastes</td>
<td>16 ER2, KS1, KN2, KN3, KN5, KZ1, KL1, KL2, KT1, KT2, PL1, PL2, PT2, TV1, TV2, WA1</td>
</tr>
<tr>
<td>Illegal activities by anti social elements</td>
<td>3 ER2, KZ2, PL2</td>
</tr>
<tr>
<td>Increase in tourism activities</td>
<td>1 ER2</td>
</tr>
</tbody>
</table>

* Names of sacred groves are as in Table 11.
6.1. Loss of forest land of sacred groves

The loss of forest area of sacred groves can be due to encroachment or due to erosion of the fringe area of the forest. For instance, it is reported that the border area of the groves of Aruvikkal Kavu, Kammadam Kavu and Sree Deviot Kavu has been encroached by some farmers and has been transformed into some other land use systems. Lack of clear-cut boundary demarcation and a strong institutional setup to protect the sacred grove lands have responsible for the destruction of integrity of these sacred groves.

Thekkumbad Thazhe Kavu and Ayyappan Kavu are located on the river banks. Sparse vegetation and instability of the forest edge are leading to river bank erosion and in turn the loss of area under forest.

6.2. Degradation of forest land of sacred groves

Six major factors are identified for the degradation of forest lands of sacred groves (Table 12). Among them, damage by trespassing and trampling of understorey vegetation, particularly to the tree seedling population, followed by illegal biomass harvest are the major factors. In 18 out of 28 groves, wandering of people inside the forested land was found common. The severity of damage both to the seedling and saplings was found to bemore during festival seasons as a large number of people walked inside the forest. The damage to seedlings led to poor regeneration of forest species and invasion of exotic weeds and light tolerant understorey plants.

There is a general belief that biomass should not be harvested from sacred groves. However, it is reported from ten sacred groves that the practice of illegal collection and removal of fire wood and small timbers was in vogue (Table 12). Even though, the quantity and frequency of biomass removal were relatively less, such activities need to be stopped for allowing the disturbed forest to undergo progressive succession. In the case of Thekkumbad Thazhe Kavu, illegal collection of pneumatophores for making bottle stoppers was reported. This sacred grove is located in an island having Valapattanam river on one side and Pazhayangadi River and backwaters of the Arabian sea on the remaining sides. The solid wastes that are floating in these water bodies come and settle in the mangrove area of the Grove and obstruct the establishment and growth of the seedlings of mangrove species.
In the southern part of Iringole Kavu, about 6-8 years back a large number of trees have fallen down leading to opening of the canopy and invasion of light demanding exotic weeds. This was mainly due to the loss of wind break adjacent to the grove. Earlier, lands adjacent to the southern part of the grove were occupied by mixed species farms and coconut farms. However, over the years many of these farms have been transformed into rubber plantations. In this process of landuse change, the windbreak has been lost which led to natural tree fall inside the grove.

6.3. Abuse of forest land
In 16 out of 28 sacred groves (Table 12), one can see a large quantity of solid waste materials such as plastic bottles, carry bags, wrappers of food/ confectionary items, kitchen wastes and old cloths. The source of these solid wastes is primarily the shops and houses located around the grove. The visitors also discard the plastic materials such water bottles, wrappers of food and confectionary items, carry bags etc. in the grove. Dumping of solid wastes, if not controlled, not only affects the serenity of the grove but also the ecological functions of the system.

Local people reported that often activities by antisocial elements can be seen in certain parts of the groves such as Iringole Kavu, Poyil Kavu and Kavassery Kavu. People also feel that they are unable to control or stop such activities because of the fear of confrontation or fight.

A considerable increase in number of visitors to Iringole Kavu was seen in recent years. A large number of visitors, instead of considering their visits as an eco-pilgrimage regarded it as pleasure trips. As a result, they did not give much importance to the sanctity of the grove and integrity of the forest ecosystem.

7. MANAGEMENT OPTIONS
Despite all the threats described above, the local people are maintaining the groves as a part of their culture. During the stakeholder meetings, the stakeholders opined that their sacred grove should remain as a community-conserved conservation area containing the rich biodiversity, ecological, traditional, cultural and social importance. They also viewed that their sacred grove should be a model grove for effective conservation of biological and cultural diversity through participation of all stakeholders to overcome all the existing threats and weaknesses. In this context,
grove-specific management options need to be identified and the objectives of such management activities should be to: a) ensure that all activities which adversely affect the conservation and management of forest vegetation of the sacred grove are effectively curtailed, and b) enhance the biodiversity and the ecological and cultural values of the grove. Considering these aspects, certain management options; both grove-specific or common, have been proposed, as discussed below.

7.1. Awareness creation activities
Regardless of whether the responsibility of management of sacred grove is rested with one or a few families or is fully assigned to a statutory agency for temple and sacred grove management, it is a fact that many stakeholders have an interest and role to play for ensuring effective management of such systems. To ensure the positive attitude of all stakeholder groups for sustainable management and conservation of sacred groves and also to uphold and sustain the cultural, biological and ecological values of sacred groves and transfer it to the coming generations, the awareness creation programmes need to be targeted at all stakeholder groups. Therefore, the main management option, applicable to all sacred groves, is organising awareness creation programme for different sections of people. The aim of each programme should be to disseminate information such as ecological, cultural, biological and social dimensions of groves and also ways and means by which different stakeholder groups can contribute for the conservation and management of groves. Apart from the scheduled awareness creation programmes, necessary support should be provided for the visits and camps by nearby colleges and schools to appreciate the multi-fold importance of sacred groves. During the management plan preparation meetings, the participants suggested the grove managers to constitute a sub-committee comprising teachers, representatives from youth clubs and NGOs to plan, co-ordinate and organize awareness campaigns.

It was also suggested, as part of awareness creation programme, to install display boards in each sacred grove. Cultural and ecological importance of sacred groves of Kerala in general and the given grove in particular, threats to groves, role and responsibilities of each stakeholder group in conserving and managing grove can be displayed in these boards. Similarly, some important plant species in the groves can be labelled to provide information such as local name, botanical name, family and conservation status. The expert committee constituted by the Biodiversity Cell
suggested that information that has to be displayed and dimension and quality of the display board should be decided by the Biodiversity Cell and communicated to the concerned officials of each grove. The grove managers should get display boards prepared and fixed in appropriate places, using the fund allocated for the purpose. It was also suggested that the Biodiversity Cell should take the help of local research and academic institutions to select the species to be labeled.

Another activity suggested was to prepare an information brochure on the kavu (containing information on location, extent, mythological and historical account, important species of plants and animals, ecological and socio-cultural importance, etc.). These brochures may be distributed free of cost to participants of the awareness programmes and sold at a nominal price to other visitors. This activity has been considered as an important activity for 23 groves.

7.2. Protective measures

During the stakeholder meetings organised in the sacred groves, the participants of many groves stressed the need of physical barriers to protect the sacred groves from encroachment, trespassing and forest degradation (Table 12). For instance, the participants of the meetings held at Edayilekkadu Kavu and Karakkode Kavu pointed out that the trespassing and soil erosion can be prevented only by constructing a mud wall or lateritic brick wall (2-3 feet tall) between the kavu and private agricultural lands. In the case of Valliyoor Kavu and Kavassery Kavu, the participants opted for chain-link fence around the groves to prevent trespassing, grazing, illegal collection of biomass and other activities which are affecting the ecological health of groves. On the other hand, for Iringole Kavu, the barbed wire fence was preferred to prevent trespassing, dumping of household and market wastes inside the grove and also illegal removal of biomass from the grove. Here, the barbed wire fence was preferred over other types fence as it does not affect the general view of the grove. However, to prevent encroachment of forest land of Kammadam Kavu, it was suggested that area should be declared as an ecologically fragile land and boundary demarcation structures (posts) should be constructed all around the kavu. In the case of Kammadam Kavu and Iringole Kavu, where the area under vegetation is considerably more, recruitment of watchers is becoming a necessity to prevent trespassing in the forest fringe, encroachment of the forest land, poaching of wild animals and collection of biomass. In Mani Kavu, establishment of a fire line all along the boundary of the
grove to protect forest from anthropogenic fire has been identified as the major management option.

7.3. Forest restoration measures
Due to anthropogenic disturbance and fragmentation, many sacred groves are showing different degrees of degradation. Thus, ecological restoration measures - the intentional activities that initiate or accelerate the recovery of sacred groves with respect to their health, integrity and sustainability are needed. The ecological restoration measures identified for groves are different. For instance, removal of climber and weeds, particularly exotic species, is identified as the major restoration activity in groves such as Kammadam Kavu, Karimanal Chamundikkavu, Edayilekkadu Kavu, Madai Kavu, Mani Kavu, Muchukunnu Kotta Kavu, Karakkode Kavu, Ayyappan Kavu, Kavassery Kavu, Valiyaveettil Kavu, Pazhangala Kavu, Irinjayam Sarpa Kavu and Thrikkunnath Kavu. Re-vegetation of disturbed areas, by reintroduction of species characteristic to the given grove, is another strategy for ecological restoration of Sri Varikkarakkadavu Kavu, Aruvikkal Kavu, Valamchuzhi kavu, Thrikkunnath Kavu and Kammadam Kavu. Enrichment planting around temples is also opted for Valliyoor kavu, Vettikode kavu, Chendangottu kavu and Chukkath Kavu. In Valliyoor Kavu, planting along the river bank was also proposed. Establishment of Nakshathravanam as an effort to re-vegetating the grove and catering to the understanding and beliefs of local people has been identified as the forest restoration activity in the Mani Kavu. During the meetings, the stakeholders also suggested that the Nakshathravanam can be developed in the grove by allowing devotees to plant and nurture trees of their birth star. In many groves, the local management committees are ready to raise seedlings locally with the technical know-how and financial assistance from the concerned departments. However, in some other groves, the committees are ready to plant seedlings that are supplied by the Social Forestry Wing of the Kerala Forest Department. In case of Karakkode Kavu and Vallikkattu Kavu, it was also proposed to construct a trek-path of about 1.5 to 2 m wide and about 400 m long, using laterite blocks to prevent trampling of seedlings growing inside the forest.

7.4. Measures for restoration of water bodies
In at least eight out of 28 sacred groves the existing water bodies need to be effectively managed for making them functional. For instance, in Poyil Kavu,
‘Thirikuzhi’ is a natural pond and regarded as a holy pond. In Thekkumbad Thazhe Kavu, a fresh water pond situated adjacent to the temple was the source of water for temple rituals. However, due to silt deposition and lack of management for several decades the ponds are unable to store water. Removal of silt and deepening are the suggested measures to make the ponds functional. A perennial pond known as Vadakunda Parel in Madai Kavu can be managed by de-silting and minor repair in order to make it as a good source of water, both for religious activities and supporting biological diversity in the Kavu. The ponds of many groves (eg. Vetticode Kavu, Muchukunnu Kotta Kavu and Iringole Kavu) are covered with algal bloom and partially filled with silt and debris. Thus cleaning, de-silting and repairing are suggested for their restoration. Devotees consider the pond situated in front of the Temple of Vallikkattu Kavu as a holy water tank (Theertha Kulam). However, the tank is now damaged and unable to store water. Thus it is proposed to repair the tank.

Construction of a low-cost pond for rainwater harvesting and digging an open well, mainly to obtain water for irrigating the planted area of the groves were suggested for Karakkode Kavu and Sri Varikkarakkadavu Kavu. The open wells of Ayyappan Kavu and Chendangotu Kavu have to be repaired using laterite stones. A perennial rivulet (Aruvikkal Thodu) originates from Aruvikkal Kavu. In order to check run-off and store water in the Kavu, it is proposed to construct a check dam across the rivulet.

8. BUDGET PROPOSAL FOR MANAGEMENT OF SACRED GROVES

Realising the cultural, biological and ecological importance of sacred groves in Kerala and the threats faced by this ancient institution, the Kerala Forest Department (KFD) has initiated a number of activities. The Department also recognised the fact that for effective management of sacred groves, the local committees often need to be supported with financial assistance and incentives; however, such support should be for eco-development activities and community involvement incentives. With this background, the Biodiversity Cell of the Kerala Forest Department designed a scheme where the owners of sacred groves, with the help of local Assistant Conservator of Forests (Social Forestry Wing), can prepare the estimates for undertaking different management activities in their respective groves. The estimate duly approved by the competent officers in the Social Forestry Wing can be submitted to the Chief Conservator of Forests. Subsequently, based on stakeholder meetings with local
committees and owners and also based on the estimate submitted, the draft budget for management activities identified for each sacred grove has been prepared by the KFD, Kerala Forest Research Institute (KFRI) and local committees. An expert committee constituted by the KFD has scrutinised the proposals. The consolidated final budget estimate, approved by the expert committee, for forwarding to the Government of India to support under the scheme ‘Intensification of Forest Management’, is given in Table 13.

During the stakeholder meetings conducted in sacred groves, the participants stressed the need of physical barriers for protecting forest and water resources of many of the groves. However, the Government of India, under its scheme—Protection and Conservation of Sacred Groves, shall not provide any assistance for the structures like check dam, barbed wire fence, boundary demarcation posts, paths, soil retention wall and also for engaging protection watchers. This aspect has been discussed with the concerned sacred grove committees and suggested them to undertake such activities separately by mobilizing money and man-power locally. However, in the budget part of the management plan, provision has been made for bio-fencing.

It was also suggested in the management plans that the Biodiversity Cell of the Kerala Forest Department, which is the project implementing agency, should constitute a sub-committee to monitor the management activities on a regular basis. The committee should also have the mandate to give necessary input to the agency/ies for the successful completion of the activities envisaged in the Management Plan.
Table 13. Detailed total budget (Rs. in lakhs) for conservation and protection of selected sacred groves in Kerala

<table>
<thead>
<tr>
<th>Sacred groves and their code names given in parentheses</th>
<th>Management activities</th>
<th>Monitoring and evaluation</th>
<th>Report preparation</th>
<th>Total (Rs. in lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Awareness creation</td>
<td>Forest protective measures</td>
<td>Forest restoration measures</td>
<td>Water bodies restoration measures</td>
</tr>
<tr>
<td>Vetticode Kavu (AL1)</td>
<td>1.46</td>
<td>0</td>
<td>0.10</td>
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<tr>
<td>Aruvikkal Kavu (ER1)</td>
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<tr>
<td>Iringole Kavu (ER2)</td>
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<tr>
<td>Vallikkattu Kavu (KZ3)</td>
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<td>Pazhangala Kavu (KL2)</td>
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<td>Sree Varikkarakkadavu Kavu (KN5)</td>
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<tr>
<td>Manimala Kavu (KT2)</td>
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<td>Mani Kavu (WA1)</td>
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<td>1.30</td>
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<td>Valliyoor Kavu (WA2)</td>
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<tr>
<td>Grand Total (Rs.)</td>
<td>27.93</td>
<td>3.36</td>
<td>17.63</td>
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</table>
9. CONCLUSIONS

The present overview indicates that sacred groves of Kerala represent community conserved biodiversity area with varied degree of ecological and socio-cultural dimensions. In this context, the efforts of both State and Central Government to launch schemes for conservation and management of sacred groves are commendable. These agencies have also recognised the fact that the sacred groves are facing threats of differing intensity and thus location-specific protection and conservation activities have to be undertaken. To identify location-specific conservation and management strategies for community conserved areas the best option is the preparation of management plan by adopting participatory approach. The participatory approach adopted in this project not only helped in the preparation of management plans for 28 sacred groves but also encouraged the custodians of sacred groves to initiate awareness campaigns. It may also be pointed out here that most sacred grove custodians worry that, the ancestral wisdom behind protection of the groves is no longer respected. Thus, they felt that the funding agencies should support them with physical support (boundary posts, compound wall, chain link or barb wire fence) to protect the groves. Even though the social barrier is more appropriate, the custodians of many groves are of the opinion that in the present day socio-cultural context, physical barriers such as fencing and compound wall are needed to protect sacred groves till the attitude of stakeholders towards sacred groves becomes positive.

It may also be noted that even as the social changes occur, the rejuvenation of cultural heritage - one of the important ecosystem services of sacred groves, can act to support the conservation and restoration of groves. Thus, processes of building institutions to strengthen the cultural heritage need to undertaken. It may also be pointed out here that the cultural heritage and forest vegetation are complementary to each other in determining ecosystem health of community-based biodiversity conservation institutions like sacred groves. Imbalance of these two components can severely affect all other ecosystem services. Therefore, in each sacred grove, a natural resource conservation committee should be constituted to protect and conserve forest and water bodies and also restore or enrich biodiversity.

Inventory of angiosperms, birds and butterflies in sacred groves conducted through this study rather provides preliminary results but they indicate directions along which
we must work further to document and organise comprehensive programme of maintaining biodiversity. However, the future biodiversity documentation programmes should encompass a broad range of representative organisms, including belowground flora and fauna. Furthermore, to promote the value of sacred grove for biodiversity conservation, there would be a need for proper scientific assessment of sacred groves to demonstrate their relevance to habitat and species protection. This should include state-wide inventories and the documentation of biodiversity status of sacred groves. In this context, it is suggested that a sacred grove biodiversity network (SGBN) of Kerala State may be built up as a broad programme of biodiversity monitoring.

10. ACKNOWLEDGEMENTS

This project was sponsored by the Biodiversity Cell (BDC) of the Kerala Forest Department, Government of Kerala. I thank Dr. K.V. Sankaran, Director, KFRI and former Directors Dr. J.K. Sharma and Dr. R. Gnanaharan for their support and encouragement. I thank sincerely Dr. B.S. Corrie and Shri. W.S. Suting, former and present Chief Conservators of Forests (Biodiversity Cell) respectively, for their constant support and guidance in running this project. Thanks are due to all the Assistant Conservators of Forests, Social Forestry Wing of Kerala Forest Department for the help during visits to different sacred groves, conducting stakeholder meetings and discussions and providing me necessary documents to prepare Management Plans. I also thank the members of local committees of all sacred groves for sharing their knowledge on sacred grove management, cultural, social and ecological aspects related to their groves. Valuable suggestions rendered by the members of the Expert Committee on Sacred Groves constituted by the BDC helped me in successful completion of the Project. I thank them all. Thanks are due to Dr. P.A. Jose, KFRI for helping to organize meetings in several sacred groves and offering necessary help to preparing management plans. I thank Dr. C.S. Kumar and his team, Sahyadri Centre for Nature Conservation, Somwarpet for their help to document birds and butterflies in some sacred groves. Useful comments and suggestions by Dr. K.Swarupanandan, Dr. K.V. Bhat and Dr. N. Sasidharan for improving the manuscript are gratefully acknowledged. I am thankful to Mr. E.C. Baiju, Ms. R.S. Neethu and Mr. K.I Arun, Mr. T.P. Rajagopal, Mr. K.M. Poovayya, Mr. S.R. Balakrishna Gowda, Mr. P. Ranjan, Mr. C.S. Greeshma, Mr. P.K. Meghna, Mr. V.K. Vipin, Mr. M.C. Jayan, Mr.
C.R. Nilan, Mr. K. Jayan, Mr. M.C. Achuthan, Mr. V. Shashi for their help in the field works and data processing. Thanks are due to Mr. K. Krishnadas for his able driving during field visits.

11. REFERENCES


Appendix 1. List of angiosperm species recorded in the sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Habit</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
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<tbody>
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<td>1</td>
<td><em>Acanthus ilicifolius</em></td>
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</table>

The names of the sacred groves are as in Table 1. Plant name with superscript, a = endemic to the southern Western Ghats, b=endemic to the Western Ghats, c=endemic to the Peninsular India.

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---cont’d---
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---cont’d---
## Appendix 1 (cont’d). List of angiosperm species recorded in the sacred groves of Kerala

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<tr>
<th>Sl. No.</th>
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---cont’d---
Appendix 1 (cont’d). List of angiosperm species recorded in the sacred groves of Kerala

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<td>Ipomoea muricata</td>
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<td>EUPHOBIAEAE</td>
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<tr>
<td>214.</td>
<td>Cleistanthus collinus</td>
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<td>215.</td>
<td>Agrostistachys borneensis</td>
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</tr>
<tr>
<td>216.</td>
<td>Agrostistachys indica</td>
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<td>4</td>
</tr>
<tr>
<td>217.</td>
<td>Antidesma acidum</td>
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<td>218.</td>
<td>Antidesma alexiteria</td>
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<td>219.</td>
<td>Antidesma montanum</td>
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<td>220.</td>
<td>Aporosa acuminata</td>
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<td>221.</td>
<td>Aporosa bourdilloni$^{b}$</td>
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<td>222.</td>
<td>Aporosa lindleyana</td>
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<td>223.</td>
<td>Baccaurea courtallensis</td>
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<td>224.</td>
<td>Bischofia javanica</td>
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<td>225.</td>
<td>Bremia retusa</td>
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<td>226.</td>
<td>Briedelia retusa</td>
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<td>4</td>
</tr>
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<td>227.</td>
<td>Briedelia scandens</td>
<td>S</td>
<td>14</td>
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<td>228.</td>
<td>Croton caudatus</td>
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<td>229.</td>
<td>Croton malabaricus$^{b}$</td>
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<td>230.</td>
<td>Cyclostephanos confertiflorus</td>
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<td>231.</td>
<td>Dimorphocalyx beddomei$^{b}$</td>
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<td>232.</td>
<td>Drypetes venusta$^{b}$</td>
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<td>233.</td>
<td>Excoecaria agallocha</td>
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<td>234.</td>
<td>Excoecaria indica</td>
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<td>235.</td>
<td>Flueggea virosa</td>
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<td>236.</td>
<td>Glochidion velutinum</td>
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<td>237.</td>
<td>Homonoia riparia</td>
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<tr>
<td>238.</td>
<td>Jatropha curcas</td>
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<tr>
<td>239.</td>
<td>Macaranga peltata</td>
<td>T</td>
<td>20</td>
</tr>
</tbody>
</table>

The names of the sacred groves are as in Table 1. Plant name with superscript, $^{a}$ endemic to the southern Western Ghats, $^{b}$ endemic to the Western Ghats, $^{c}$ endemic to the Peninsular India.

---cont’d---
Appendix 1 (cont’d). List of angiosperm species recorded in the sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Habit</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
</tr>
</thead>
<tbody>
<tr>
<td>240.</td>
<td><em>Mallotus philippensis</em></td>
<td>T</td>
<td>17 ER1, ER2, KS1, KS2, KZ1, KZ3, KL1, KL2, KN1, KN2, KN3, KN5,KT1,KT2,PT1,TV1,WA1</td>
</tr>
<tr>
<td>241.</td>
<td><em>Mallotus tetracoccus</em></td>
<td>T</td>
<td>3 KZ3, PL2, WA1</td>
</tr>
<tr>
<td>242.</td>
<td><em>Micrococa mercurialis</em></td>
<td>H</td>
<td>1 KN3</td>
</tr>
<tr>
<td>243.</td>
<td><em>Phyllanthus airy-shawii</em></td>
<td>H</td>
<td>2 ER2, TV2</td>
</tr>
<tr>
<td>244.</td>
<td><em>Phyllanthus amarus</em></td>
<td>H</td>
<td>1 KN3</td>
</tr>
<tr>
<td>245.</td>
<td><em>Phyllanthus debilis</em></td>
<td>T</td>
<td>1 KN3</td>
</tr>
<tr>
<td>246.</td>
<td><em>Phyllanthus urinaria</em></td>
<td>H</td>
<td>4 ER2, KZ1, KL2, KN3</td>
</tr>
<tr>
<td>247.</td>
<td><em>Putranjiva roxburghii</em></td>
<td>T</td>
<td>2 ER2, PT2</td>
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<tr>
<td>248.</td>
<td><em>Sapium insigne</em></td>
<td>T</td>
<td>2 KZ3, TV1</td>
</tr>
<tr>
<td>249.</td>
<td><em>Saurus androgynus</em></td>
<td>S</td>
<td>1 KN2</td>
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<tr>
<td>250.</td>
<td><em>Tragia involucrata</em></td>
<td>H</td>
<td>2 ER2, KN2</td>
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<tr>
<td>251.</td>
<td><em>Abrus precatorius</em></td>
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<td>15 AL1, ER1, ER2, KS2, KZ2, KZ3, KN1, KN2, KN4, KT2, MA1, PL1, PT1, TV1, WA2</td>
</tr>
<tr>
<td>252.</td>
<td><em>Butea monosperma</em></td>
<td>T</td>
<td>2 KS2, TV1</td>
</tr>
<tr>
<td>253.</td>
<td><em>Cajanus scarabaeoides</em></td>
<td>S</td>
<td>2 KN4, PT2</td>
</tr>
<tr>
<td>254.</td>
<td><em>Clitoria ternatea</em></td>
<td>C</td>
<td>1 KN2</td>
</tr>
<tr>
<td>255.</td>
<td><em>Crotalaria walkeri</em></td>
<td>S</td>
<td>2 KS1, TS2</td>
</tr>
<tr>
<td>256.</td>
<td><em>Dalbergia horrida var. horridae</em></td>
<td>S</td>
<td>7 ER2, KS2, KZ2, KZ3, KN1, KN3, PT2</td>
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<tr>
<td>257.</td>
<td><em>Dalbergia latifolia</em></td>
<td>T</td>
<td>7 KS1, KS2, KL1, KN2, KT2, MA1, WA1</td>
</tr>
<tr>
<td>258.</td>
<td><em>Derris scandens</em></td>
<td>C</td>
<td>3 ER1, KS1, WA2</td>
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<tr>
<td>259.</td>
<td><em>Derris trifoliata</em></td>
<td>S</td>
<td>3 KZ2, KN1, PL1</td>
</tr>
<tr>
<td>260.</td>
<td><em>Desmodium gangeticum</em></td>
<td>S</td>
<td>1 KN2</td>
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<tr>
<td>261.</td>
<td><em>Desmodium heterocarpum</em></td>
<td>S</td>
<td>1 WA2</td>
</tr>
<tr>
<td>262.</td>
<td><em>Desmodium triflorum</em></td>
<td>H</td>
<td>11 ER1, ER2, KN1, KN3, KT1, KT2, MA1, PT1, TS1, TV1, WA2</td>
</tr>
<tr>
<td>263.</td>
<td><em>Erythrina stricta</em></td>
<td>T</td>
<td>2 KZ1, KN3</td>
</tr>
<tr>
<td>264.</td>
<td><em>Gliricidia sepium</em></td>
<td>T</td>
<td>2 KL2, KN3</td>
</tr>
<tr>
<td>265.</td>
<td><em>Mucuna prurienss</em></td>
<td>C</td>
<td>2 KZ2, KZ3</td>
</tr>
<tr>
<td>266.</td>
<td><em>Pithecellobium gracile</em></td>
<td>S</td>
<td>1 KN2</td>
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<tr>
<td>267.</td>
<td><em>Pongamia pinnata</em></td>
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<td>7 ER1, ER2, KZ3, KL2, KN1, KN2, KN5</td>
</tr>
<tr>
<td>268.</td>
<td><em>Pterocarpus marsupium</em></td>
<td>T</td>
<td>4 KN2, PL1, PT2, WA1</td>
</tr>
<tr>
<td>269.</td>
<td><em>Vigna sublobata</em></td>
<td>C</td>
<td>1 KZ3</td>
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<tr>
<td>270.</td>
<td><em>Zornia diphylla</em></td>
<td>H</td>
<td>1 KN3</td>
</tr>
<tr>
<td>271.</td>
<td><em>Zornia gibbosa</em></td>
<td>H</td>
<td>2 KZ3, KN1</td>
</tr>
</tbody>
</table>

The names of the sacred groves are as in Table 1. Plant name with superscript, a = endemic to the southern Western Ghats, b=endemic to the Western Ghats, c=endemic to the Peninsular India.

---cont’d---
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<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Habit</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
</tr>
</thead>
<tbody>
<tr>
<td>277.</td>
<td><em>Hydnocarpus alpina</em></td>
<td>T</td>
<td>7 ER1, KZ2, KZ3, KN5, KT1, PT1, WA2</td>
</tr>
<tr>
<td>278.</td>
<td><em>Hydnocarpus laurifolia</em></td>
<td>T</td>
<td>1 TV1</td>
</tr>
<tr>
<td>279.</td>
<td><em>Hydnocarpus pentandra</em></td>
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<td>9 AL1, ER1, KS1, KS2, KN1, KN2, KT2, TS1, TV1</td>
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</tbody>
</table>

**FLAGELLARIACEAE**

<table>
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<th>Sl. No.</th>
<th>Species</th>
<th>Habit</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
</tr>
</thead>
<tbody>
<tr>
<td>280.</td>
<td><em>Flagellaria indica</em></td>
<td>S</td>
<td>1 KZ2</td>
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</table>

**GESNERIACEAE**

<table>
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<th>Species</th>
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<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
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<tr>
<td>281.</td>
<td><em>Aeschynanthus perrottetii</em></td>
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**HIPPOCRATEACEAE**

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<tbody>
<tr>
<td>282.</td>
<td><em>Salacia reticulata</em></td>
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<td>3 KZ3, KN1, KT1</td>
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**HYPOXIDACEAE**

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<th>Species</th>
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<tbody>
<tr>
<td>283.</td>
<td><em>Hypericum hookerianum</em></td>
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**ICACINACEAE**

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<th>Sl. No.</th>
<th>Species</th>
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<tbody>
<tr>
<td>284.</td>
<td><em>Curculigo orchoides</em></td>
<td>H</td>
<td>14 ER1, KZ2, KZ3, KN2, KN3, KN5, KT1, KT2, MA1, PL1, PT1, TS1, TV1, WA2</td>
</tr>
<tr>
<td>285.</td>
<td><em>Molineria trichocarpa</em></td>
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<td>1 ER2</td>
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**LAMIACEAE**

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<tbody>
<tr>
<td>286.</td>
<td><em>Gomphandra polymorpha</em></td>
<td>T</td>
<td>3 KS1, KZ2, WA2</td>
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<tr>
<td>287.</td>
<td><em>Gomphandra tetrandra</em></td>
<td>T</td>
<td>1 KS2</td>
</tr>
<tr>
<td>288.</td>
<td><em>Sarcostigma kleinii</em></td>
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<td>5 AL1, ER2, KZ3, KN1, PT1</td>
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**Lauraceae**

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<tr>
<td>297.</td>
<td><em>Actinodaphne bourdilloniacea</em></td>
<td>T</td>
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<tr>
<td>298.</td>
<td><em>Actinodaphne malabarica</em></td>
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<tr>
<td>299.</td>
<td><em>Actinodaphne semecarpifolia</em></td>
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<td>300.</td>
<td><em>Alseodaphne semecarpifolia</em></td>
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<tr>
<td>301.</td>
<td><em>Beilschmiedia wightii</em></td>
<td>T</td>
<td>1 WA2</td>
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<tr>
<td>302.</td>
<td><em>Cinnamomum malabatrum</em></td>
<td>T</td>
<td>16 ER1, ER2, KS1, KS2, KZ1, KZ2, KZ3, KL2, KN1, KT1, KT2, PT1, TS1, TV1, WA1, WA2</td>
</tr>
<tr>
<td>303.</td>
<td><em>Cinnamomum verum</em></td>
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<td>7 AL1, KZ2, KZ3, KL1, KN1, PL1, WA2</td>
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<td>304.</td>
<td><em>Cryptocarya wightiana</em></td>
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<td>305.</td>
<td><em>Litsea bourdilloniacea</em></td>
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<td>2 KS2, TV2</td>
</tr>
<tr>
<td>306.</td>
<td><em>Litsea coriacea</em></td>
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<td>1 ER2</td>
</tr>
</tbody>
</table>

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<td>Litsea floribunda$^b$</td>
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<td>308.</td>
<td>Litsea insignis$^b$</td>
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<tr>
<td>309.</td>
<td>Litsea laevigata$^a$</td>
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<tr>
<td>310.</td>
<td>Litsea sp.</td>
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<td>311.</td>
<td>Litsea wightiana$^a$</td>
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<td>312.</td>
<td>Neolitsea scrobiculata</td>
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<td>Persea macranta</td>
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<td>Careya arborea</td>
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<td>Leea sambucina</td>
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<td>Lemma globosa</td>
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<td>Wolfia globosa</td>
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<td>Asparagus racemosus</td>
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<td>Gloriosa superba</td>
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<td>Urginea indica</td>
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<td>Hugonia mystax</td>
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<td>Fagraea ceylanica</td>
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<td>Strychnos cinnamomea</td>
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<td>Strychnos colubrina</td>
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<td>Strychnos involucra</td>
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<td>330.</td>
<td>Strychnos nux-vomica</td>
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<td>331.</td>
<td>Strychnos vanprukii</td>
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<tr>
<td>LORANTHACEAE</td>
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<tr>
<td>332.</td>
<td>Dendrophthoe falcata$^b$</td>
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<tr>
<td>333.</td>
<td>Helixanthiera intermedia</td>
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</table>

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---cont’d---
Appendix 1 (cont’d). List of angiosperm species recorded in the sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Habit</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td>Number</td>
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<tr>
<td><strong>LYTHRACEAE</strong></td>
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<tr>
<td>334.</td>
<td>Lagerstroemia lanceolata(^b)</td>
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<tr>
<td>335.</td>
<td>Lagerstroemia microcarpa(^b)</td>
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<td>336.</td>
<td>Lagerstroemia speciosa</td>
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<td><strong>MAGNOLIACEAE</strong></td>
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<td>337.</td>
<td>Michelia champaca</td>
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<td><strong>MALPIGHIACEAE</strong></td>
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<td>338.</td>
<td>Hyptage madablotta</td>
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<td><strong>MALVACEAE</strong></td>
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<td>339.</td>
<td>Abelmoschus moschatus</td>
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<td>340.</td>
<td>Hibiscus hispidissimus</td>
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<td>341.</td>
<td>Hibiscus rosa-sinensis</td>
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<td>Hibiscus surattensis</td>
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<td>343.</td>
<td>Sida ajinfolia</td>
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<td>Sida cordifolia</td>
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<td>Sida fryxellii</td>
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<td>Sida rhombifolia</td>
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<td>Urena lobata</td>
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<td>348.</td>
<td>Urena lobata ssp. sinuata</td>
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<td>349.</td>
<td>Melastoma malabathricum</td>
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<td></td>
<td>Memecylon depressum(^a)</td>
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<td>350.</td>
<td>Memecylon edule(^c)</td>
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<td>351.</td>
<td>Memecylon malabaricum(^a)</td>
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<td>Memecylon molestum(^c)</td>
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<td>353.</td>
<td>Memecylon randierianum(^c)</td>
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<td>Memecylon umbellatum</td>
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<td>Osbeckia leshenaulitiana</td>
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<td>356.</td>
<td>Sonerila rheedei(^a)</td>
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<td>Aglaia barberi</td>
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<td>Aglaia elaeagnoida</td>
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<td>Aglaia lawii</td>
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<td>Aphanamixis polystachya</td>
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<td>Azadirachta indica</td>
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<td>Chukrasia tabularis</td>
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<td>363.</td>
<td>Dysoxylum ficiiforme</td>
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<td>364.</td>
<td>Dysoxylum malabaricum(^c)</td>
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<td>Naregamia alata(^a)</td>
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<td>Swietenia macrophylla</td>
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<td>Toona ciliata</td>
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<td>368.</td>
<td>Trichilia connaroides</td>
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<td>369.</td>
<td><em>Anamirta cocculus</em></td>
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<td>370.</td>
<td><em>Cyclia peltata</em></td>
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<td>9 KS1, KS2, KL1, KL2, KN1, KN2, KN3, PL2, WA1</td>
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<tr>
<td>371.</td>
<td><em>Diplolisia glaucescens</em></td>
<td>C</td>
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<tr>
<td>372.</td>
<td><em>Tiliacora acuminata</em></td>
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<td>373.</td>
<td><em>Tinospora cordifolia</em></td>
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<td>374.</td>
<td><em>Tinospora malabarica</em></td>
<td>S</td>
<td>4 KZ3, KN1, KN5, TS1</td>
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<td><strong>MIMOSACEAE</strong></td>
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<td>375.</td>
<td><em>Acacia caesia</em></td>
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<td><em>Acacia nilotica</em></td>
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<td><em>Adenanthera pavonina</em></td>
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<td>378.</td>
<td><em>Albizia chinensis</em></td>
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<td>379.</td>
<td><em>Albizia odoratissima</em></td>
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<tr>
<td>380.</td>
<td><em>Albizia procera</em></td>
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<td>1 TV1</td>
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<tr>
<td>381.</td>
<td><em>Mimosa pudica</em></td>
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<td>382.</td>
<td><em>Samanea saman</em></td>
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<td>1 KN3</td>
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<td>383.</td>
<td><em>Xylocarpus malabarica</em></td>
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<td>11 KS1, KZ1, KZ3, KL1, KL2, KN2, KN5, KT2, MA1, PL1, WA1</td>
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<td><strong>MORACEAE</strong></td>
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<td>384.</td>
<td><em>Antiaris toxicaria</em></td>
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<td>16 ER1, ER2, KS1, KS2, KZ1, KZ3, KL2, KN5, KT1, KT2, PL1, PT1, TS1, TV1, TV2, WA2</td>
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<td>385.</td>
<td><em>Artocarpus gomezianus</em></td>
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<td>386.</td>
<td><em>Artocarpus heterophyllus</em></td>
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<td>387.</td>
<td><em>Artocarpus hirsutus</em></td>
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<td>388.</td>
<td><em>Ficus hispida</em></td>
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<tr>
<td>389.</td>
<td><em>Ficus amplissima</em></td>
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<td><em>Ficus asperrima</em></td>
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<td>391.</td>
<td><em>Ficus beddomei</em></td>
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<td>2 KS2</td>
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<td>392.</td>
<td><em>Ficus benghalensis</em></td>
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<td>394.</td>
<td><em>Ficus drupacea var. pubescens</em></td>
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<td>395.</td>
<td><em>Ficus exasperata</em></td>
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<td>396.</td>
<td><em>Ficus hispida</em></td>
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<td>397.</td>
<td><em>Ficus microcarpa</em></td>
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<td>398.</td>
<td><em>Ficus nervosa</em></td>
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<td><em>Ficus racemosa</em></td>
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<td>400.</td>
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<td><em>Ficus isjaula</em></td>
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</tbody>
</table>

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<td>Moringa oleifera</td>
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<td>Knema attenuata&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>Myristica malabarica&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>Rapaneea wightiana</td>
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<td>Syzygium cumini</td>
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<td>Syzygium gardneri</td>
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<td>Syzygium heynaeanum&lt;sup&gt;c&lt;/sup&gt;</td>
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<td>Syzygium travancoricum&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>430.</td>
<td>Syzygium zeylanicum</td>
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<td>Psidium guajava</td>
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<td>435.</td>
<td>Anacolosa densiflora&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>437.</td>
<td>Chionanthus mala-elengi&lt;sup&gt;c&lt;/sup&gt;</td>
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<td>Jasminum angustifolium</td>
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<td>Jasminum multiflorum</td>
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<td>441.</td>
<td>Jasminum rotellifoliuma</td>
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<td>442.</td>
<td>Myxopyrum smilacifolium</td>
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<tr>
<td>443.</td>
<td>Olea dioica</td>
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<td>10</td>
</tr>
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<td>444.</td>
<td>Olea polygamaa</td>
<td>T</td>
<td>5</td>
</tr>
<tr>
<td>445.</td>
<td>Ludwigia octovalvis</td>
<td>S</td>
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</tr>
<tr>
<td>446.</td>
<td>Cansjera rheedei</td>
<td>T</td>
<td>3</td>
</tr>
<tr>
<td>447.</td>
<td>Acampe praemorsa</td>
<td>H</td>
<td>7</td>
</tr>
<tr>
<td>448.</td>
<td>Aerides crispa&lt;sup&gt;b&lt;/sup&gt;</td>
<td>H</td>
<td>9</td>
</tr>
<tr>
<td>449.</td>
<td>Bulbophyllum aureum&lt;sup&gt;c&lt;/sup&gt;</td>
<td>H</td>
<td>6</td>
</tr>
<tr>
<td>450.</td>
<td>Bulbophyllum sterile&lt;sup&gt;c&lt;/sup&gt;</td>
<td>H</td>
<td>4</td>
</tr>
<tr>
<td>451.</td>
<td>Cottonia peduncularis</td>
<td>H</td>
<td>1</td>
</tr>
<tr>
<td>452.</td>
<td>Dendrobium anamalayanum&lt;sup&gt;c&lt;/sup&gt;</td>
<td>H</td>
<td>2</td>
</tr>
<tr>
<td>453.</td>
<td>Dendrobium haemoglossum</td>
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</tr>
<tr>
<td>454.</td>
<td>Dendrobium heyneanumc</td>
<td>H</td>
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<tr>
<td>455.</td>
<td>Dendrobium macrostachyum</td>
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</tr>
<tr>
<td>456.</td>
<td>Dendrobium ovatumc</td>
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</tr>
<tr>
<td>457.</td>
<td>Epidendrum tenuifolium</td>
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<td>2</td>
</tr>
<tr>
<td>458.</td>
<td>Gastrochilus flabelliformis</td>
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<tr>
<td>459.</td>
<td>Geodorum densiflorum</td>
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<td>3</td>
</tr>
<tr>
<td>460.</td>
<td>Malaxis rheedei</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td>461.</td>
<td>Malaxis versicolor</td>
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</tr>
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<td>462.</td>
<td>Nervilia crociformis</td>
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</tr>
<tr>
<td>463.</td>
<td>Nervilia infundibulifolia</td>
<td>H</td>
<td>5</td>
</tr>
<tr>
<td>464.</td>
<td>Nervilia prainiana</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td>465.</td>
<td>Oberonia santapaua</td>
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<td>2</td>
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<tr>
<td>466.</td>
<td>Pholidota pallida</td>
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</tr>
<tr>
<td>467.</td>
<td>Porpax reticulataab</td>
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<td>7</td>
</tr>
<tr>
<td>468.</td>
<td>Schoenorchis nivea</td>
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</tr>
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<td>469.</td>
<td>Seidenfia rheedei</td>
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<td>2</td>
</tr>
<tr>
<td>470.</td>
<td>Zeuxine longilabris</td>
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<td>3</td>
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<tr>
<td>471.</td>
<td>Biophyrum sensitivum var. candelleanum</td>
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<tr>
<td>472.</td>
<td>Biophyrum sensitivum var. sensitivum</td>
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<td>4</td>
</tr>
</tbody>
</table>

The names of the sacred groves are as in Table 1. Plant name with superscript, a = endemic to the southern Western Ghats, b=endemic to the Western Ghats, c=endemic to the Peninsular India.

---cont’d---
### Appendix 1 (cont’d). List of angiosperm species recorded in the sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sl. No.</th>
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<th>Habit</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
</tr>
</thead>
<tbody>
<tr>
<td>473.</td>
<td><em>Pandanus furcatus</em></td>
<td>T</td>
<td>2 WA1, WA2</td>
</tr>
<tr>
<td>474.</td>
<td><em>Pandanus odoratissimus</em></td>
<td>S</td>
<td>5 ER1, KZ3, KN1, KN5, WA2</td>
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</tbody>
</table>

#### PANDANACEAE

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Habit</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
</tr>
</thead>
<tbody>
<tr>
<td>475.</td>
<td><em>Passiflora foetida</em></td>
<td>S</td>
<td>1 KN2</td>
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</tbody>
</table>

#### PASSIFLORACEAE

<table>
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<th>Sl. No.</th>
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<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
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</thead>
<tbody>
<tr>
<td>476.</td>
<td><em>Cryptolepis buchananii</em></td>
<td>S</td>
<td>1 AL1, ER1, KZ3, KN1, KN2, KN5, KT1, KT2, MA1, PL1, PT1, TS1</td>
</tr>
</tbody>
</table>

#### PERIPLOCAEAE

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Habit</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
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</thead>
<tbody>
<tr>
<td>477.</td>
<td><em>Hemidesmus indicus</em></td>
<td>S</td>
<td>12 AL1, ER1, KZ3, KN1, KN2, KN5, KT1, KT2, MA1, PL1, PT1, TS1</td>
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#### PIPERACEAE

<table>
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<tr>
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<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
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<tbody>
<tr>
<td>478.</td>
<td><em>Alloteropsis cimicina</em></td>
<td>H</td>
<td>2 ER2, TS2</td>
</tr>
<tr>
<td>479.</td>
<td><em>Axonopus compressus</em></td>
<td>H</td>
<td>2 ER2, TV1</td>
</tr>
<tr>
<td>480.</td>
<td><em>Brachiaria remotia</em></td>
<td>H</td>
<td>2 ER2, TS2</td>
</tr>
<tr>
<td>481.</td>
<td><em>Centotheca lappacea</em></td>
<td>H</td>
<td>2 ER2, TS2</td>
</tr>
<tr>
<td>482.</td>
<td><em>Chrysopogon aciculatus</em></td>
<td>H</td>
<td>3 ER2, KZ2, KN1</td>
</tr>
<tr>
<td>483.</td>
<td><em>Cynodon dactylon</em></td>
<td>H</td>
<td>1 KN2</td>
</tr>
<tr>
<td>484.</td>
<td><em>Eleusine indica</em></td>
<td>H</td>
<td>2 ER1, ER2</td>
</tr>
<tr>
<td>485.</td>
<td><em>Ochlandra rheedii</em></td>
<td>S</td>
<td>2 KS1, WA2</td>
</tr>
<tr>
<td>486.</td>
<td><em>Ochlandra travancorica</em></td>
<td>S</td>
<td>1 WA2</td>
</tr>
<tr>
<td>487.</td>
<td><em>Oplismenus aemuls</em></td>
<td>H</td>
<td>1 KN3</td>
</tr>
<tr>
<td>488.</td>
<td><em>Oplismenus compositus</em></td>
<td>H</td>
<td>2 ER2, PT2</td>
</tr>
<tr>
<td>489.</td>
<td><em>Oryza sativa</em></td>
<td>H</td>
<td>1 ER2</td>
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</table>

#### POACEAE

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Habit</th>
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</thead>
<tbody>
<tr>
<td>499.</td>
<td><em>Clematis smilacifolia</em></td>
<td>S</td>
<td>6 KS1, KS2, KL1, KN1, PL2, WA1</td>
</tr>
<tr>
<td>500.</td>
<td><em>Naravelia zeylanica</em></td>
<td>S</td>
<td>13 AL1, ER1, ER2, KS2, KZ3, KN1, KN2, KN5, KT1, KT2, MA1, PT1, TV1</td>
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</tbody>
</table>

#### RHAMNACEAE

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Habit</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
</tr>
</thead>
<tbody>
<tr>
<td>501.</td>
<td><em>Colubrina travancorica</em></td>
<td>S</td>
<td>1 ER2</td>
</tr>
<tr>
<td>502.</td>
<td><em>Zizyphus oenoplea</em></td>
<td>C</td>
<td>9 ER2, KZ1, KZ3, KL2, KN1, KN2, KN3, KN5, PL1</td>
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<tr>
<td>503.</td>
<td><em>Zizyphus rugosa</em></td>
<td>S</td>
<td>11 ER1, ER2, KS1, KZ3, KL1, KN2, KN3, KN5, KT2, PL2, WA1</td>
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#### RHIZOPHORACEAE

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<th>Sl. No.</th>
<th>Species</th>
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<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
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</thead>
<tbody>
<tr>
<td>504.</td>
<td><em>Carallia brachiata</em></td>
<td>T</td>
<td>5 KZ2, KZ3, KN1, KN3, WA2</td>
</tr>
</tbody>
</table>

The names of the sacred groves are as in Table 1. Plant name with superscript, a = endemic to the southern Western Ghats, b=endemic to the Western Ghats, c=endemic to the Peninsular India.

---cont’d---
### Appendix 1 (cont’d). List of angiosperm species recorded in the sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Habit</th>
<th>Number of sacred groves of occurrence</th>
<th>Acronym of the sacred groves</th>
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</thead>
<tbody>
<tr>
<td>505.</td>
<td>Prunus ceylanica</td>
<td>T</td>
<td>3</td>
<td>ER1, KS2, KL1</td>
</tr>
<tr>
<td>506.</td>
<td>Rosa damascena</td>
<td>S</td>
<td>1</td>
<td>KN2</td>
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<tr>
<td><strong>RUBIACEAE</strong></td>
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<tr>
<td>507.</td>
<td>Anthocephalus cadamba</td>
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<td>1</td>
<td>KN2</td>
</tr>
<tr>
<td>508.</td>
<td>Benkara malabarica</td>
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<td>2</td>
<td>KZ2, KN3</td>
</tr>
<tr>
<td>509.</td>
<td>Canthium angustifolium</td>
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<td>KZ2, KN1</td>
</tr>
<tr>
<td>510.</td>
<td>Canthium coromandelicum</td>
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<td>ER2, KZ1, KL2, KN1</td>
</tr>
<tr>
<td>511.</td>
<td>Canthium dicoccum</td>
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<tr>
<td>512.</td>
<td>Canthium rheedei&lt;sup&gt;c&lt;/sup&gt;</td>
<td>T</td>
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<td>KS1, KS2, KL1, PL2</td>
</tr>
<tr>
<td>513.</td>
<td>Catunaregam spinosa</td>
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<td>5</td>
<td>ER1, KZ1, KZ3, KL2, PL1</td>
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<td>514.</td>
<td>Chassalia curviflora</td>
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<tr>
<td>515.</td>
<td>Coffea arabica</td>
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<td>3</td>
<td>ER1, ER2, TS2</td>
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<tr>
<td>516.</td>
<td>Geophila reniformis</td>
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<td>KS2</td>
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<tr>
<td>517.</td>
<td>Geophila repens</td>
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<td>518.</td>
<td>Haldina cordifolia</td>
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<td>KN2</td>
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<tr>
<td>519.</td>
<td>Hedyotis auricularia</td>
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<td>6</td>
<td>ER1, KZ2, KZ3, PT2, TS1, TV2</td>
</tr>
<tr>
<td>520.</td>
<td>Hedyotis corymbosa</td>
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<td>2</td>
<td>KN3, TV2</td>
</tr>
<tr>
<td>521.</td>
<td>Ixora brachiata&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>6</td>
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<tr>
<td>522.</td>
<td>Ixora coccinea</td>
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<td>9</td>
<td>AL1, KZ3, KN1, KN2, KN5, KT2, MA1, TV1, WA2</td>
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<tr>
<td>523.</td>
<td>Ixora elongata&lt;sup&gt;b&lt;/sup&gt;</td>
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<tr>
<td>524.</td>
<td>Ixora lanceolalaria</td>
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<tr>
<td>525.</td>
<td>Ixora nigricans</td>
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<td>526.</td>
<td>Ixora parviflora</td>
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<td>KN2</td>
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<td>527.</td>
<td>Lasianthus dichotomous</td>
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<td>KS1, KS2</td>
</tr>
<tr>
<td>528.</td>
<td>Mitragyna parviflora</td>
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<td>1</td>
<td>KN2</td>
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<tr>
<td>529.</td>
<td>Morinda tinctoria</td>
<td>T</td>
<td>3</td>
<td>KZ2, MA1, PL1</td>
</tr>
<tr>
<td>530.</td>
<td>Morinda umbellata</td>
<td>S</td>
<td>4</td>
<td>KZ3, KN1, KN5, PT1</td>
</tr>
<tr>
<td>531.</td>
<td>Mussaenda bellila</td>
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<td>KN2</td>
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<tr>
<td>532.</td>
<td>Mussaenda frondosa</td>
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<td>ER2, KZ3, KN1</td>
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<td>533.</td>
<td>Oldenlandia auricularia</td>
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<td>ER2, KN1, KN2</td>
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<td>534.</td>
<td>Oldenlandia corymbosa</td>
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<td>ER2</td>
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<tr>
<td>535.</td>
<td>Ophiorrhiza brunosia&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>1</td>
<td>ER2</td>
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<tr>
<td>536.</td>
<td>Ophiorrhiza hirsutula</td>
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<td>1</td>
<td>KN2</td>
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<tr>
<td>537.</td>
<td>Pavetta hispidula</td>
<td>T</td>
<td>1</td>
<td>PL2</td>
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<tr>
<td>538.</td>
<td>Pavetta indica</td>
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<td>9</td>
<td>AL1, ER1, ER2, KZ3, KN1, KN2, KN3,TV1, WA2</td>
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<tr>
<td>539.</td>
<td>Pavetta tomentosa</td>
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<td>KN2</td>
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<tr>
<td>540.</td>
<td>Pavetta zeylanica</td>
<td>S</td>
<td>7</td>
<td>KS1, KS2, KZ3, KN1, KN5, PL2, PT2</td>
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<tr>
<td>541.</td>
<td>Psilanthus travancorensis</td>
<td>S</td>
<td>1</td>
<td>ER2</td>
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<tr>
<td>542.</td>
<td>Psychotria anamalayana&lt;sup&gt;a&lt;/sup&gt;</td>
<td>T</td>
<td>2</td>
<td>KS1, KS2</td>
</tr>
<tr>
<td>543.</td>
<td>Psychotria elongata</td>
<td>S</td>
<td>1</td>
<td>PL2</td>
</tr>
<tr>
<td>544.</td>
<td>Psychotria flavida&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>ER2</td>
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<tr>
<td>545.</td>
<td>Psychotria macrocarpa&lt;sup&gt;a&lt;/sup&gt;</td>
<td>S</td>
<td>3</td>
<td>ER1, KZ3, KN1</td>
</tr>
</tbody>
</table>

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</tr>
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<tbody>
<tr>
<td>546</td>
<td><em>Psychotria truncata</em>&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>3 KS1, KS2, KL1</td>
</tr>
<tr>
<td>547</td>
<td><em>Psydrax travancorica</em>&lt;sup&gt;a&lt;/sup&gt;</td>
<td>T</td>
<td>1 ER2</td>
</tr>
<tr>
<td>548</td>
<td><em>Psydrax umbellata</em></td>
<td>T</td>
<td>2 KN3, KN5</td>
</tr>
<tr>
<td>549</td>
<td><em>Randia dumetorum</em></td>
<td>T</td>
<td>1 KS1</td>
</tr>
<tr>
<td>550</td>
<td><em>Randia sp.</em></td>
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<td>1 KZ3</td>
</tr>
<tr>
<td>551</td>
<td><em>Randia spinosa</em></td>
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<td>2 KN1, PT2</td>
</tr>
<tr>
<td>552</td>
<td><em>Randia uliginosa</em></td>
<td>T</td>
<td>4 KS1, KL1, KN1, PL2</td>
</tr>
<tr>
<td>553</td>
<td><em>Saprosma glomerata</em>&lt;sup&gt;b&lt;/sup&gt;</td>
<td>S</td>
<td>4 KS1, KS2, PL2, TV1</td>
</tr>
<tr>
<td>554</td>
<td><em>Spermacoce ocyroides</em></td>
<td>H</td>
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</tr>
<tr>
<td>555</td>
<td><em>Spermacoce pusilla</em></td>
<td>H</td>
<td>2 KN2, KL2</td>
</tr>
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<td>556</td>
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<td><em>Aegle marmelos</em></td>
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<td><em>Toddalia asiatica</em></td>
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</table>

The names of the sacred groves are as in Table 1. Plant name with superscript, a = endemic to the southern Western Ghats, b=endemic to the Western Ghats, c=endemic to the Peninsular India.
---cont’d---
Appendix 1 (cont’d). List of angiosperm species recorded in the sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Habit</th>
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</table>

The names of the sacred groves are as in Table 1. Plant name with superscript, a = endemic to the southern Western Ghats, b=endemic to the Western Ghats, c=endemic to the Peninsular India.

---cont’d---
## Appendix 1 (cont’d). List of angiosperm species recorded in the sacred groves of Kerala

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<tr>
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<th>Habit</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
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<td>ER1, KS1, KZ3, PT2, TS2, TV2</td>
</tr>
<tr>
<td>668.</td>
<td><em>Curcuma sp.</em></td>
<td>H</td>
<td></td>
<td>1</td>
<td>AL1</td>
</tr>
<tr>
<td>669.</td>
<td><em>Elettaria cardamomum</em></td>
<td>H</td>
<td></td>
<td>3</td>
<td>ER1, TV2, WA2</td>
</tr>
<tr>
<td>670.</td>
<td><em>Globba sessiliflora</em></td>
<td>H</td>
<td></td>
<td>2</td>
<td>ER2, TS2</td>
</tr>
</tbody>
</table>

The names of the sacred groves are as in Table 1. Plant name with superscript, a = endemic to the southern Western Ghats, b=endemic to the Western Ghats, c=endemic to the Peninsular India.
Appendix 2. List of butterfly species recorded in the sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Common Name</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Family: Hesperidae</td>
<td>Number</td>
</tr>
<tr>
<td>1.</td>
<td>Ampititia discorides</td>
<td>Bush Hopper</td>
<td>16</td>
</tr>
<tr>
<td>2.</td>
<td>Badamia exclamationis</td>
<td>Brown Awl</td>
<td>8</td>
</tr>
<tr>
<td>3.</td>
<td>Baracus vittatus</td>
<td>Hedge Hopper</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>Bibasis sena sena</td>
<td>Orange Tail Awl</td>
<td>5</td>
</tr>
<tr>
<td>5.</td>
<td>Borbo cinnara</td>
<td>Rice Swift</td>
<td>14</td>
</tr>
<tr>
<td>6.</td>
<td>Caprona procris</td>
<td>Commander</td>
<td>4</td>
</tr>
<tr>
<td>7.</td>
<td>Celaenorrhinus ambareesa</td>
<td>Malabar Spotted Flat</td>
<td>12</td>
</tr>
<tr>
<td>8.</td>
<td>Celaenorrhinus leucocera</td>
<td>Common Spotted Flat</td>
<td>14</td>
</tr>
<tr>
<td>9.</td>
<td>Gangara thyrsis thyrsis</td>
<td>Giant Red Eye</td>
<td>13</td>
</tr>
<tr>
<td>10.</td>
<td>Hasora badra</td>
<td>Common Awl</td>
<td>12</td>
</tr>
<tr>
<td>11.</td>
<td>Hasora chromus</td>
<td>Common Banded Awl</td>
<td>12</td>
</tr>
<tr>
<td>12.</td>
<td>Hasora taminatus</td>
<td>White banded Awl</td>
<td>3</td>
</tr>
<tr>
<td>13.</td>
<td>Hasora taminatus</td>
<td>White Banded Awl</td>
<td>8</td>
</tr>
<tr>
<td>14.</td>
<td>Hasora vitta</td>
<td>Plain Banded Awl</td>
<td>2</td>
</tr>
<tr>
<td>15.</td>
<td>Lambrix salsula</td>
<td>Chestnut Bob</td>
<td>15</td>
</tr>
<tr>
<td>16.</td>
<td>Notocrypta curvifascia</td>
<td>Restricted Demon</td>
<td>8</td>
</tr>
<tr>
<td>17.</td>
<td>Pelopidas Inathias</td>
<td>Small Banded Swift</td>
<td>13</td>
</tr>
<tr>
<td>18.</td>
<td>Psedocoladenia dan</td>
<td>Fulvous Pied Flat</td>
<td>11</td>
</tr>
<tr>
<td>19.</td>
<td>Psolos fuligo subfasciatus</td>
<td>Coon</td>
<td>9</td>
</tr>
<tr>
<td>20.</td>
<td>Sarangesa dasahara</td>
<td>Common Small Flat</td>
<td>7</td>
</tr>
<tr>
<td>21.</td>
<td>Sarangesa purendra pandra *</td>
<td>Spotted Small Flat</td>
<td>10</td>
</tr>
</tbody>
</table>

The names of the sacred groves are as in Table 1.

--cont’d--
Appendix 2 (cont’d). List of butterfly species recorded in the sacred groves of Kerala

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Spiula galba</td>
<td>Indian Grizzled Skipper</td>
<td>KS1,KZ1,KZ2,KZ3,KN1,PL1,PL2,PT1,WA1</td>
</tr>
<tr>
<td>23</td>
<td>Suastus gremius</td>
<td>Indian Palm Bob</td>
<td>ER1,KS1,KZ2,KN2,PL1,PL2</td>
</tr>
<tr>
<td>24</td>
<td>Tagiades gana silvia</td>
<td>Immaculate Snow Flat</td>
<td>ER1,ER2,KS1,KS2,KZ1,KZ3,KN1,KN2,KN4,KN5,PT1,WA1</td>
</tr>
<tr>
<td>25</td>
<td>Tagiades litigiosa</td>
<td>Water Snow Flat</td>
<td>KS1,KS2,KZ2,KZ3,KN1,KN2,KN3,KN5,PT1,WA1,WA2</td>
</tr>
<tr>
<td>26</td>
<td>Taractrocera maevius sagara</td>
<td>Common Grass Dart</td>
<td>ER1,KS1,KZ1,KZ2,KZ3,KN1</td>
</tr>
<tr>
<td>27</td>
<td>Telicota ancilla bambusae</td>
<td>Dark Palm Dart</td>
<td>KS1,KS2,KZ2,KN1,KN2,KT1,MA1,TS1,TS2,WA1</td>
</tr>
</tbody>
</table>

**Family: Hesperiidae**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>Abisara echerius prunosa</td>
<td>Plum Judy</td>
<td>KS2,KZ1,KZ2,KZ3,KN1,KN2,KN3,KN4,KN5,WA1,WA2</td>
</tr>
<tr>
<td>29</td>
<td>Actolepis puspa felderi</td>
<td>Common Hedge Blue</td>
<td>KS1,KS2,KZ2,KZ3,KN1,KN2,KN3,KN4,KN5,PT1,WA1,WA2</td>
</tr>
<tr>
<td>30</td>
<td>Arhopala atrax</td>
<td>Indian Oakblue</td>
<td>ER1,ER2,KZ1,KZ2,KZ3,PT1,PT1,TV1,TV2</td>
</tr>
<tr>
<td>31</td>
<td>Arhopala pseudocentaurus</td>
<td>Western Centaur Oak Blue</td>
<td>ER1,ER2,KZ2</td>
</tr>
<tr>
<td>32</td>
<td>Bindahara phocides</td>
<td>The Plane</td>
<td>ER1,ER2,KZ2,KZ3</td>
</tr>
<tr>
<td>33</td>
<td>Caleta caleta desidia</td>
<td>Angled Pierrot</td>
<td>KS2,KZ1,KZ2,KZ3,KN1,KN2,KN4,KN5,KT2,MA1,PT1,PT1,TV1,WA1</td>
</tr>
<tr>
<td>34</td>
<td>Castalius rosimon</td>
<td>Common Pierrot</td>
<td>KS2,KZ1,KZ2,KZ3,KN1,KN2,KN4,KN5,KT1,KT2,MA1,PL1,PL2,PT1,TS1,TS2,TV1,WA1</td>
</tr>
<tr>
<td>35</td>
<td>Catochrysops Strabo</td>
<td>Forget-Me-Not</td>
<td>ER1,ER2,KZ1,KZ3</td>
</tr>
<tr>
<td>36</td>
<td>Cheritra freja</td>
<td>Common Imperial</td>
<td>ER1,ER2,KS2,KZ2,KZ3,KN1,KN4,MA1,PT1,WA1</td>
</tr>
<tr>
<td>37</td>
<td>Curetis thetis</td>
<td>Indian Sunbeam</td>
<td>ER1,ER2,KS1,KS2,KZ3,KN1,KN2,KN3,KN4,KN5,WA2</td>
</tr>
<tr>
<td>38</td>
<td>Discolampa ethion vavas anus</td>
<td>Banded Blue Pierrot</td>
<td>ER1,ER2,KS1,KS2,KZ2,KZ3,KN1,KN2</td>
</tr>
<tr>
<td>39</td>
<td>Euchrysops cnejus</td>
<td>Gram Blue</td>
<td>KS2,KZ1,KZ3,KN1,KN2,KN3,KN4,KN5,MA1,PL1,PL2,WA1,WA2</td>
</tr>
<tr>
<td>40</td>
<td>Everes lactrunus syntala</td>
<td>Indian Cupid</td>
<td>PL1,PL2</td>
</tr>
<tr>
<td>41</td>
<td>Freyeria trochylus</td>
<td>Grass Jewel</td>
<td>ER1,KZ2,KZ3,PL1,PL2</td>
</tr>
<tr>
<td>42</td>
<td>Iraota timoleon</td>
<td>Silver Streak Blue</td>
<td>KS1,KZ2,KZ3,KN1,KN2,WA1</td>
</tr>
<tr>
<td>43</td>
<td>Jamides alecto</td>
<td>Metallic Cereulian</td>
<td>KZ3,KT1,MA1,TS1,TS2</td>
</tr>
<tr>
<td>44</td>
<td>Jamides bochus</td>
<td>Dark Cereulian</td>
<td>ER1,ER2,KS1,KZ1,KZ2,KN1,KN4,KN5,TV2,WA1</td>
</tr>
<tr>
<td>45</td>
<td>Jamides celeno aelianus</td>
<td>Common Cereulian</td>
<td>ER1,ER2,KS1,KS2,KZ1,KZ2,KZ3,KN1,KN2,KN4,KT1,MA1,PL1,PL2,PT1,TS1,WA1</td>
</tr>
</tbody>
</table>

The names of the sacred groves are as in Table 1. ---cont’d---
## Appendix 2 (cont’d). List of butterfly species recorded in the sacred groves of Kerala

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>46.</td>
<td>Lampides boeticus</td>
<td>Pea Blue</td>
<td>10 ER1, ER2, KS1, KS2, KZ2, KZ3, KN1, KN2, KN4, WA1</td>
</tr>
<tr>
<td>47.</td>
<td>Leptotes plinias</td>
<td>Zebra Blue</td>
<td>10 KS1, KS2, KZ2, KZ3, KN1, KN2, KN4, KN5, PT1, WA1</td>
</tr>
<tr>
<td>48.</td>
<td>Loxura atymnus</td>
<td>Yamfly</td>
<td>9 ER1, ER2, KS1, KZ1, KZ3, KN1, KN3, WA1, WA2</td>
</tr>
<tr>
<td>49.</td>
<td>Neopithecosps zalmora dharma</td>
<td>Quaker</td>
<td>8 KS2, KZ1, KZ3, KN1, KN2, KN3, WA1, WA2</td>
</tr>
<tr>
<td>50.</td>
<td>Prosotas nora</td>
<td>Common Line Blue</td>
<td>6 KS1, KS2, KZ2, KZ3, KN1, WA1</td>
</tr>
<tr>
<td>51.</td>
<td>Pseudozizeeria maha ossa</td>
<td>Pale Grass Blue</td>
<td>10 KS2, KZ1, KZ3, KN1, KN2, PL1, PL2, WA1</td>
</tr>
<tr>
<td>52.</td>
<td>Rapala manea schistacea</td>
<td>Slate Flash</td>
<td>8 KS1, KS2, KZ1, KZ2, KZ3, KN1, KN2, WA1</td>
</tr>
<tr>
<td>53.</td>
<td>Rathinda amor</td>
<td>Monkey Puzzle</td>
<td>17 ER1, KS1, KZ1, KZ2, KZ3, KL1, KL2, KN1, KN2, KN4, KT2, PL1, PL2, PT1, TV1, TV2, WA1</td>
</tr>
<tr>
<td>54.</td>
<td>Spalgis epius epius</td>
<td>Apefly</td>
<td>8 ER1, ER2, KS1, KZ2, KZ3, KL2, KN1, WA1</td>
</tr>
<tr>
<td>55.</td>
<td>Spindasis vulcanus</td>
<td>Common Silver Line</td>
<td>14 KZ1, KZ2, KZ3, KL1, KL2, KN1, KN3, KN4, KT2, PT1, TV1, TV2, WA1</td>
</tr>
<tr>
<td>56.</td>
<td>Spindasis lohita lazularia</td>
<td>Long Banded Silver Line</td>
<td>3 KL2, KN4, WA1</td>
</tr>
<tr>
<td>57.</td>
<td>Surendra quercetorium bipalgiata</td>
<td>Common Acacia Blue</td>
<td>3 KL2, KN4, WA1</td>
</tr>
<tr>
<td>58.</td>
<td>Tajuria cippus</td>
<td>Peacock Royal</td>
<td>8 ER1, ER2, KS1, KS2, KZ3, KN1, PT1, WA1</td>
</tr>
<tr>
<td>59.</td>
<td>Talicada nyseus</td>
<td>Red Pierrot</td>
<td>9 KS1, KS2, KZ1, KZ2, KZ3, KN1, KN2, KN5, WA1</td>
</tr>
<tr>
<td>60.</td>
<td>Thaduka multicaudata</td>
<td>Many Tailed Oak Blue</td>
<td>7 KL2, KN1, KN2, KN3, KT2, WA1, WA2</td>
</tr>
<tr>
<td>61.</td>
<td>Udara akasa</td>
<td>White Hedge Blue</td>
<td>1 MA1</td>
</tr>
<tr>
<td>62.</td>
<td>Zesius chrysomallus</td>
<td>Red Spot</td>
<td>8 KS2, KZ1, KZ3, KN1, KN3, PT1, WA1, WA2</td>
</tr>
</tbody>
</table>

### Family: Lycaenidae

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</tr>
</thead>
<tbody>
<tr>
<td>52.</td>
<td>Acraea Violae</td>
<td>Tawny Coster</td>
<td>22 ER1, ER2, KS1, KS2, KZ2, KZ3, KL1, KN1, KN2, KN4, KN5, KT1, KT2, MA1, PL1, PL2, PT1, TS1, TS2, TV1, TV2, WA1</td>
</tr>
<tr>
<td>63.</td>
<td>Ariadne ariadne indica</td>
<td>Indian Angled Castor</td>
<td>16 KS1, KS2, KZ1, KZ2, KZ3, KL1, KL2, KN1, KN2, KN4, KN5, KT2, PT1, TV1, TV2, WA1</td>
</tr>
<tr>
<td>64.</td>
<td>Ariadne merione</td>
<td>Common Castor</td>
<td>5 ER1, ER2, KS1, KS2, PL1, PL2</td>
</tr>
<tr>
<td>65.</td>
<td>Athyma perius</td>
<td>Common Sergeant</td>
<td>9 KS1, KS2, KZ1, KZ3, KN1, KN2, KN4, KN5, WA1</td>
</tr>
<tr>
<td>66.</td>
<td>Athyma ranga karwara</td>
<td>Blackvein Sergeant</td>
<td>11 ER1, KS1, KS2, KZ1, KZ2, KL1, KL2, KN3, KN5, PT1, WA2</td>
</tr>
<tr>
<td>67.</td>
<td>Byblia ilithyia</td>
<td>Spotted Jocker</td>
<td>5 ER1, ER2, KS1, KZ2, KZ3</td>
</tr>
</tbody>
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Appendix 2 (cont’d). List of butterfly species recorded in the sacred groves of Kerala

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<tr>
<td></td>
<td></td>
<td></td>
<td>Family: Nymphalidae</td>
</tr>
<tr>
<td>68.</td>
<td>Cethosia nietneri</td>
<td>Tamil Lacewing</td>
<td>2 ER1,ER2</td>
</tr>
<tr>
<td>69.</td>
<td>Charaxes bernardus</td>
<td>Tawny Rajah</td>
<td>7 KZ1, KL1, KL2, KT2, PT1, TV1, TV2</td>
</tr>
<tr>
<td>70.</td>
<td>Charaxes dolon</td>
<td>Black Rajah</td>
<td>11 ER1, KS1, KS2, KZ2, KZ3, KL2, KN1, KN3, KT2, WA1, WA2</td>
</tr>
<tr>
<td>71.</td>
<td>Cirrochora thais</td>
<td>Tamil yeoman</td>
<td>21 ER1, KS1, KS2, KZ1, KZ2, KL1, KL2, KN1, KN2, KN3, KN5, KT1, KT2, MA1, PT1, TS1, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>72.</td>
<td>Cupha erymanthis</td>
<td>Rustic</td>
<td>18 ER1, ER2, KS1, KS2, KZ2, KZ3, KL1, KL2, KN1, KN2, KN3, KN4, KT2, MA1, PT1, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>73.</td>
<td>Cynthia cardui</td>
<td>Painted Lady</td>
<td>10 KS2, KZ2, KZ3, KN1, KN2, KN3, KN5, PT1, WA1, WA2</td>
</tr>
<tr>
<td>74.</td>
<td>Danaus chrysippus</td>
<td>Plain Tiger</td>
<td>16 ER1, ER2, KS1, KS2, KZ3, KL1, KN1, KN4, KT1, MA1, PL1, PL2, PT1, TS1, TV1, WA1</td>
</tr>
<tr>
<td>75.</td>
<td>Danaus genutia</td>
<td>Common tiger</td>
<td>16 KS2, KZ2, KZ3, KL1, KL2, KN1, KN2, KN4, KT2, MA1, PL1, PL2, PT1, TV1, TV2, WA1</td>
</tr>
<tr>
<td>76.</td>
<td>Dophla evelina laudabilis</td>
<td>Redspot Duke</td>
<td>13 KS1, KS2, KZ1, KZ2, KL1, KL2, KN1, KN2, KN3, KN4, KT2, WA1, WA2</td>
</tr>
<tr>
<td>77.</td>
<td>Elymnias hypermnestra caudata</td>
<td>Common Palmfly</td>
<td>13 ER1, ER2, KS1, KS2, KZ3, KN1, KN2, KN4, KT1, MA1, TS1, TS2, WA1</td>
</tr>
<tr>
<td>78.</td>
<td>Euploea core</td>
<td>Common Crow</td>
<td>24 ER1, ER2, KS1, KS2, KZ2, KZ3, KL1, KL2, KN1, KN2, KN3, KN5, KT1, KT2, MA1, PL1, PL2, PT1, TS1, TS2, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>79.</td>
<td>Euploea klugii</td>
<td>Brown King Crow</td>
<td>7 KS2, KZ2, KN1, KN2, KN3, WA1, WA2</td>
</tr>
<tr>
<td>80.</td>
<td>Euploea sylvester coreta</td>
<td>Double Branded Crow</td>
<td>3 ER1, KS1, KZ2</td>
</tr>
<tr>
<td>81.</td>
<td>Euthalia aconthea meridionalis</td>
<td>Baron</td>
<td>15 ER1, KS1, KZ1, KZ2, KL1, KL2, KN2, KN3, KT2, PL1, PL2, PT1, TV1, TV2, WA2</td>
</tr>
<tr>
<td>82.</td>
<td>Euthalia lubentina</td>
<td>Gaudy Baron</td>
<td>5 ER1, ER2, KZ1, KZ2, KZ3</td>
</tr>
<tr>
<td>83.</td>
<td>Euthalia lubentina arasada</td>
<td>Gaudy Baron</td>
<td>9 KS1, KS2, KZ1, KZ3, KN1, KN3, KN5, WA1, WA2</td>
</tr>
<tr>
<td>84.</td>
<td>Hypolimnas bolina</td>
<td>Great Eggfly</td>
<td>22 ER1, ER2, KS1, KS2, KZ1, KZ2, KZ3, KL1, KL2, KN1, KN2, KN4, KN5, KT1, KT2, MA1, PT1, TS1, TS2, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>85.</td>
<td>Hypolimnas misippus</td>
<td>Danaid Eggfly</td>
<td>9 KS1, KS2, KZ2, KZ3, KN2, KN3, KN5, MA1, WA2</td>
</tr>
<tr>
<td>86.</td>
<td>Junonia atlites</td>
<td>Gray Pansy</td>
<td>19 ER1, KS1, KZ1, KZ2, KZ3, KL2, KN2, KN3, KN5, KT1, KT2, MA1, PL1, PL2, PT1, TS1, TS2, TV2, WA2</td>
</tr>
</tbody>
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The names of the sacred groves are as in Table 1. --cont’d--
Appendix 2 (cont’d). List of butterfly species recorded in the sacred groves of Kerala

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<tr>
<td>87.</td>
<td><em>Hypolimnas septentrionis</em></td>
<td>Dark Blue Tiger</td>
<td>4 ER1,ER2,KZ1,KZ3</td>
</tr>
<tr>
<td>88.</td>
<td><em>Idea malabarica</em></td>
<td>Malabar Tree Nymph</td>
<td>13 ER1,ER2,KS2,KZ1,KL1,KL2, KN1,KN2,KN3,PT1,TV1, WA1,WA2</td>
</tr>
<tr>
<td>89.</td>
<td><em>Junonia almana</em></td>
<td>Peacock Pansy</td>
<td>16 ER1,ER2,KS2,KZ1,KZ3,KL1, KN1,KN2,KN3,KN4,MA1, PL1,PL2,PT1,WA1,WA2</td>
</tr>
<tr>
<td>90.</td>
<td><em>Junonia hierta</em></td>
<td>Yellow Pansy</td>
<td>9 ER1,KS1,KS2,KZ2, KZ3, KN2, KN4,KN5,PT1</td>
</tr>
<tr>
<td>91.</td>
<td><em>Junonia iphita pluvia</em></td>
<td>Chocolate Pansy</td>
<td>12 ER1,ER2,KS1,KS2,KZ3,KL2, KN1,KN3, PL1, PL2, WA1, WA2</td>
</tr>
<tr>
<td>92.</td>
<td><em>Junonia lemonias</em></td>
<td>Lemon Pansy</td>
<td>18 ER1,ER2,KS1,KS2,KZ1,KZ2, KZ3,KL1,KN1, KN2,KN5, KT1,MA1,PL1,PL2,TS1, TS2,WA1</td>
</tr>
<tr>
<td>93.</td>
<td><em>Junonia orithya</em></td>
<td>Blue Pansy</td>
<td>9 KS1,KS2,KZ2,KZ3,KN1, KN3,KN5,WA1,WA2</td>
</tr>
<tr>
<td>94.</td>
<td><em>Kaniska canace</em></td>
<td>Blue Admiral</td>
<td>11 ER1,ER2,KZ1,KZ2, KZ3, KL1, KL2,PT1,TV1,TV2</td>
</tr>
<tr>
<td>95.</td>
<td><em>Lethe drypetes</em></td>
<td>Tamil Tree Brown</td>
<td>2 ER1,MA1</td>
</tr>
<tr>
<td>96.</td>
<td><em>Lethe europaea ragalva</em></td>
<td>Bamboo Tree Brown</td>
<td>12 ER1,ER2,KS1,KS2,KZ1,KT1,MA1,TS1, TS2,WA1,WA2</td>
</tr>
<tr>
<td>97.</td>
<td><em>Libythea lepita leptoides</em></td>
<td>Common Beak</td>
<td>8 KS1,KZ1,KZ2,KZ3, KN1,KN3,WA1,WA2</td>
</tr>
<tr>
<td>98.</td>
<td><em>Limenitis procris undifragus</em></td>
<td>Commander</td>
<td>16 ER1,ER2,KS1,KS2,KZ1,KZ2, KZ3, KL1, KN1,KN2,KN3, KN4,KN5,PT1,WA1,WA2</td>
</tr>
<tr>
<td>99.</td>
<td><em>Melanitits leda leda</em></td>
<td>Common Evening Brown</td>
<td>23 KS1,KZ1,KZ2,KZ3,KL1,KL2 KN1,KN2,KN3, KN4,KN5, KT1,KT2,MA1,PL1,PL2,PT1, TS1,TS2,TV1,TV2,WA1,WA2</td>
</tr>
<tr>
<td>100.</td>
<td><em>Moduza procris</em></td>
<td>Commander</td>
<td>1 MA1</td>
</tr>
<tr>
<td>101.</td>
<td><em>Mycalesis mineus polydecta</em></td>
<td>Dark-Brand Bush Brown</td>
<td>11 ER1,ER2,KS2,KZ1,KZ2,KZ3, KN1,KN5,PL1,PL2,WA1</td>
</tr>
<tr>
<td>102.</td>
<td><em>Mycalesis patnia junonia</em></td>
<td>Glad Eye Bush Brown</td>
<td>13 KS1,KS2,KZ1,KZ2,KZ3,KN1 KN2,KT1,MA1,PT1,TS1,TS2,WA1</td>
</tr>
<tr>
<td>103.</td>
<td><em>Mycalesis perseus typhlus</em></td>
<td>Common Bush Brown</td>
<td>17 ER1,ER2,KS1,KS2,KZ2,KZ3, KL1,KL2,KN3,KN4,KN5, KT2,PL1,PL2,PT1,TV1,WA2</td>
</tr>
<tr>
<td>104.</td>
<td><em>Neptis hylas varmona</em></td>
<td>Common Sailer</td>
<td>22 ER1,ER2,KS1,KS2,KZ1,KZ2, KZ3,KL1,KL2,KN1,KN2, KN4,KN5,KT1,KT2,MA1, PT1,TS1,TS2,TV1,TV2,WA1</td>
</tr>
<tr>
<td>105.</td>
<td><em>Neptis jumbah</em></td>
<td>Chestnut Streaked Sailer</td>
<td>15 ER1,ER2,KS1,KS2,KZ1,KZ3, KN1,KN2,KN3,KT1,MA1, TS1,TS2,WA1,WA2</td>
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</tbody>
</table>

The names of the sacred groves are as in Table 1.

---cont’d---
Appendix 2 (cont’d). List of butterfly species recorded in the sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Common Name</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Family: Nymphalidae</strong></td>
<td></td>
<td></td>
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<tr>
<td>106.</td>
<td><em>Orsotrioena medus</em> mandata</td>
<td>Nigger</td>
<td>14 KS2,KZ1,KZ2,KZ3,KL2, KN1,KN2,KN3,KN4,KT2, PL1,PL2,WA1,WA2</td>
</tr>
<tr>
<td>107.</td>
<td><em>Pantoporia hardonia</em></td>
<td>Common Lascar</td>
<td>11 KS1,KS2,KZ2,KZ3,KN1,KN2 KN3,KN4,KN5,WA1,WA2</td>
</tr>
<tr>
<td>108.</td>
<td><em>Parantica aglea aglea</em></td>
<td>Glassy Blue Tiger</td>
<td>12 ER1,ER2,KS1,KS2,KZ1,KZ3, KN1,KN2,KN3,KN4,WA1, WA2</td>
</tr>
<tr>
<td>109.</td>
<td><em>Parthenos sylvia</em></td>
<td>Clipper</td>
<td>11 ER1,ER2,KS1,KS2,KZ2,KZ3, KN1,KN3,PT1,WA1,WA2</td>
</tr>
<tr>
<td>110.</td>
<td><em>Phalanta phalantha</em></td>
<td>Leopard Butterfly</td>
<td>19 ER1,ER2,KS1,KS2,KZ1,KZ2, KL1,KL2,KZ1,KN1,KN2, KP5,KT2,PL1,PL2,PT1,TV1, TV2,WA1</td>
</tr>
<tr>
<td>111.</td>
<td><em>Polyura athamas</em></td>
<td>Common Nawab</td>
<td>14 ER1,ER2,KS1,KS2,KZ1,KZ3, KL1,KL2,KN1,KN2,KT2,PT1 TV1,WA1</td>
</tr>
<tr>
<td>112.</td>
<td><em>Tanaecia lepidea miyana</em></td>
<td>Grey Count</td>
<td>17 ER1,ER2,KS1,KS2,KZ3,KL1, KL2,KN1,KT1,KT2,MA1, PT1,TS1,TS2,TV1,TV2,WA1</td>
</tr>
<tr>
<td>113.</td>
<td><em>Tirumala limniace exoticus</em></td>
<td>Blue Tiger</td>
<td>16 ER1,ER2,KS1,KS2,KZ1,KZ2, KL3,KN1,KN5,KT1,MA1, PL1,PL2,TS1,TS2,WA1</td>
</tr>
<tr>
<td>114.</td>
<td><em>Tirumala septentrionis</em></td>
<td>Dark Blue Tiger</td>
<td>15 ER1,ER2,KS1,KS2,KN1,KN2 KN3,KN5,KT1,MA1,PT1,TS1,TS2,WA1</td>
</tr>
<tr>
<td>115.</td>
<td><em>Vindula erota</em></td>
<td>Cruiser</td>
<td>8  ER1,ER2,KS1,KS2,KZ3,KN3, KN5,WA2</td>
</tr>
<tr>
<td>116.</td>
<td><em>Ypthima baldus</em></td>
<td>Common Five Ring</td>
<td>17 ER1,ER2,KS1,KS2,KZ2,KZ3, KL1,KL2, KN1,KN2,KN3, KT2,PT1,TV1,TV2,WA1</td>
</tr>
<tr>
<td>117.</td>
<td><em>Ypthima ceylonica</em></td>
<td>Ceylon Four Ring</td>
<td>9  ER1,ER2,KS1,KS2,KN2,KN3 KN4,KN5,WA2</td>
</tr>
<tr>
<td>118.</td>
<td><em>Ypthima huhebneri</em></td>
<td>Common Four Ring</td>
<td>15 ER1,ER2,KS1,KS2,KZ2,KZ3, KL1,KN1,KN2,KN5,PT1, PT1,TV1,TV2,WA1</td>
</tr>
<tr>
<td>119.</td>
<td><em>Zipoetes satis</em></td>
<td>Tamil Catseye</td>
<td>7* ER1,KS1,KS2,KZ2,KZ3,KL2, KN2</td>
</tr>
<tr>
<td></td>
<td><strong>Family: Papilionidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>120.</td>
<td><em>Anapheis aurota</em></td>
<td>Caper White</td>
<td>19 ER1,ER2,KS1,KS2,KZ1,KZ3, KL2, KN1,KN2,KN3,KN4,KN5, KT1,MA1,PT1,TS1,TV1, TV2,WA1,WA2</td>
</tr>
<tr>
<td>121.</td>
<td><em>Appias albina</em></td>
<td>Chocolate Albatross</td>
<td>1 MA1</td>
</tr>
<tr>
<td>122.</td>
<td><em>Appias indra</em></td>
<td>Plain Puffin</td>
<td>5  ER1,ER2,KZ1,KZ2,KZ3</td>
</tr>
<tr>
<td>123.</td>
<td><em>Appias lyncida latifasciata</em></td>
<td>Common Albatross</td>
<td>13 ER1,ER2,KS1,KS2,KZ1,KZ2, KL1,KN1,KN2,KN3,PT1, WA1,WA2</td>
</tr>
</tbody>
</table>

The names of the sacred groves are as in Table 1.
Appendix 2 (cont’d). List of butterfly species recorded in the sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Common Name</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
</tr>
</thead>
<tbody>
<tr>
<td>124.</td>
<td><em>Catopsilia pomona</em></td>
<td>Lemon Emigrant</td>
<td>17 KS1,KS2,KZ2,KZ3,KN1,KN2,KN3,KN5,KT1,MA1,PL1,PL2,TS1,TS2,TV2,WA1,WA2</td>
</tr>
<tr>
<td>125.</td>
<td><em>Catopsilia pyranthe</em></td>
<td>Mottled Emigrant</td>
<td>14 ER1,ER2,KS1,KZ3,KL2,KN1,KN3,KN5,MA1,PL1,PL2,PT1,WA1,WA2</td>
</tr>
<tr>
<td>126.</td>
<td><em>Cepora nerissa phryne</em></td>
<td>Common Gull</td>
<td>13 ER1,KS2,KZ1,KZ3,KN1,KN2,KN5,KT1,MA1,PT1,TS1,TS2,WA1</td>
</tr>
<tr>
<td>127.</td>
<td><em>Delias eucharis</em></td>
<td>Common Jezebel</td>
<td>23 ER1,KS1,KS2,KZ1,KZ3,KL1,KL2,KN1,KN2,KN3,KN5,KT1,KT2,MA1,PL1,PL2,PT1,TS1,TS2,TV1,TV2,WA1</td>
</tr>
<tr>
<td>128.</td>
<td><em>Eurema hecabe simulata</em></td>
<td>Common Grass Yellow</td>
<td>19 ER1,ER2,KS1,KZ2,KZ3,KL2,KN1,KN2,KN4,KT1,KT2,MA1,PL1,PL2,PT1,TS1,TS2,TV1,WA1</td>
</tr>
<tr>
<td>129.</td>
<td><em>Eurema blanda silhetana</em></td>
<td>Three Spot Grass Yellow</td>
<td>12 ER1,ER2,KS1,KS2,KZ2,KZ3,KN1,KN4,PL1,PL2,TV2,WA1</td>
</tr>
<tr>
<td>130.</td>
<td><em>Eurema brigitta rubella</em></td>
<td>Small Yellow</td>
<td>7 KS2,KZ3,KL1,KN1,KN4,PT1,WA1</td>
</tr>
<tr>
<td>131.</td>
<td><em>Eurema hecabe</em></td>
<td>Common Grass Yellow</td>
<td>6 ER1,ER2,KZ2,KT1,MA1,TS1</td>
</tr>
<tr>
<td>132.</td>
<td><em>Eurema laeta</em></td>
<td>Spotless Grass Yellow</td>
<td>1 KZ3</td>
</tr>
<tr>
<td>133.</td>
<td><em>Graphium agamemnon menides</em></td>
<td>Tailed Jay</td>
<td>17 KS1,KS2,KZ2,KZ3,KL1,KL2,KN1,KN2,KN4,KN5,KT2,PL1,PL2,PT1,TS1,TS2,TV1,TV2,WA1</td>
</tr>
<tr>
<td>134.</td>
<td><em>Graphium antiphates</em></td>
<td>Five bar swordtail</td>
<td>4 ER1,ER2,KZ1,KZ2</td>
</tr>
<tr>
<td>135.</td>
<td><em>Graphium doson</em></td>
<td>Common Jay</td>
<td>15 ER1,ER2,KS1,KS2,KZ2,KN1,KN2,KN3,KN4,KN5,KT1,TS1,TS2,WA1,WA2</td>
</tr>
<tr>
<td>136.</td>
<td><em>Graphium sarpedon teredon</em></td>
<td>Common Blue bottle</td>
<td>22 ER1,ER2,KS1,KS2,KZ3,KL1,KL2,KN1,KN2,KN4,KN5,KT1,KT2,MA1,PL1,PL2,PT1,TS1,TS2,TV1,TV2,WA1</td>
</tr>
<tr>
<td></td>
<td><em>Hebomoia glaucippe australis</em></td>
<td>Giant Orange Tip</td>
<td>17 ER1,KS1,KS2,KZ1,KZ2,KZ3,KL1,KL2,KN1,KN2,KN3,KT2,PT1,TV1,TV2,WA1,WA2</td>
</tr>
<tr>
<td>137.</td>
<td><em>Ixias pyrene</em></td>
<td>Yellow Orange Tip</td>
<td>2 ER1,ER2</td>
</tr>
<tr>
<td>138.</td>
<td><em>Leptosia nina</em></td>
<td>Psyche</td>
<td>20 ER1,ER2,KS1,KS2,KZ3,KL1,KL2,KN1,KN2,KN5,KT1,KT2,MA1,PL1,PL2,PT1,TS1,TS2,TV1,WA1,WA2</td>
</tr>
</tbody>
</table>

The names of the sacred groves are as in Table 1.
Appendix 2 (cont’d). List of butterfly species recorded in the sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Common Name</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
</tr>
</thead>
<tbody>
<tr>
<td>139.</td>
<td>Pachliopta aristolochiae</td>
<td>Common Rose</td>
<td>23 ER1,ER2,KS1,KS2,KZ1,KZ2,KZ3,KL1,KL2,KN1,KN4,KN5,KT1,KT2,MA1,PL1,PL2,PT1,TS1,TS2,TV1,TV2,WA1</td>
</tr>
<tr>
<td>140.</td>
<td>Pachliopta hector</td>
<td>Crimson Rose</td>
<td>23 ER1,ER2,KS1,KS2,KZ1,KZ2,KZ3,KL1,KL2,KN1,KN2,KN4,KN5,KT1,KT2,MA1,PL1,PL2,PT1,TS1,TV1,TV2,WA1</td>
</tr>
<tr>
<td>141.</td>
<td>Pachliopta pandiyana</td>
<td>Malabar Rose</td>
<td>5 ER1,ER2,KZ1,KZ2,KZ3</td>
</tr>
<tr>
<td>142.</td>
<td>Papilio buddha</td>
<td>Buddha Peacock</td>
<td>8 KS1,KS2,KZ1,KZ3,KN1,KN4,KN5,WA1</td>
</tr>
<tr>
<td>143.</td>
<td>Papilio clytia</td>
<td>Common Mime</td>
<td>4 KT1,MA1,TS1,TS2</td>
</tr>
<tr>
<td>144.</td>
<td>Papilio clytia</td>
<td>Common Mime</td>
<td>11 ER1,ER2,KS1,KS2,KZ1,KZ3,KN1,KN3,KN4,WA1,WA2</td>
</tr>
<tr>
<td>145.</td>
<td>Papilio demoleus</td>
<td>Lime butterfly</td>
<td>23 KS1,KS2,KZ1,KZ2,KZ3,KL1,KL2,KN1,KN3,KN4,KN5,KT1,KT2,MA1,PL1,PL2,PT1,TS1,TS2,TV1,TV2,WA1,WA2</td>
</tr>
<tr>
<td>146.</td>
<td>Papilio dravidarum</td>
<td>Malabar raven</td>
<td>8 ER1,ER2,KS2,KZ1,KZ2,KZ3,KN1,WA1</td>
</tr>
<tr>
<td>147.</td>
<td>Papilio helenus</td>
<td>Red Helen</td>
<td>9 ER1,ER2,KS1,KS2,KZ2,KN1,KN4,KN5,WA1</td>
</tr>
<tr>
<td>148.</td>
<td>Papilio liomedon</td>
<td>Malabar Banded Swallowtail</td>
<td>18 KS1,KS2,KZ1,KZ2,KZ3,KL2,KN1,KN3,KN4,KN5,KT1,KT2,MA1,PL1,PL2,PT1,TV1,TV2,WA1,WA2</td>
</tr>
<tr>
<td>149.</td>
<td>Papilio paris tamilana</td>
<td>Paris Peacock</td>
<td>16 KS1,KS2,KZ1,KZ2,KZ3,KN1,KN2,KN3,KN4,KN5,KT1,MA1,TS1,TS2,WA1,WA2</td>
</tr>
<tr>
<td>150.</td>
<td>Papilio polymnestor</td>
<td>Blue Mormon</td>
<td>21 ER1,ER2,KS1,KS2,KZ2,KL1,KL2,KN1,KN2,KN3,KN4,KN5,KT2,MA1,PL1,PL2,PT1,TV1,TV2,WA1,WA2</td>
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<tr>
<td>151.</td>
<td>Papilio polytes</td>
<td>Common Mormon</td>
<td>20 ER1,ER2,KS1,KS2,KZ1,KZ2,KZ3,KL1,KN1,KN2,KN3,KN4,KN5,PL1,PL2,PT1,TV1,TV2,WA1,WA2</td>
</tr>
<tr>
<td>152.</td>
<td>Parenonia valeria</td>
<td>Common Wanderer</td>
<td>14 ER1,ER2,KS1,KS2,KZ1,KZ2,KZ3,KL1,KN1,KN5,KT2,PL1,PL2,PL2,PT1,TV1,TV2,WA1,WA2</td>
</tr>
<tr>
<td>153.</td>
<td>Prioneris sita</td>
<td>Painted Sawtooth</td>
<td>11 KS1,KS2,KZ1,KZ2,KZ3,KN1,KN2,KN3,WA1,WA2</td>
</tr>
<tr>
<td>154.</td>
<td>Troides minos*</td>
<td>Southern Birdwing</td>
<td>22 ER1,ER2,KS1,KS2,KZ2,KZ3,KL1,KL2,KN1,KN2,KN5,KT1,KT2,MA1,PL1,PL2,PT1,TS1,TS2,TV1,TV2,WA1</td>
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</table>
Appendix 3. List of birds recorded from sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Scientific Name</th>
<th>Common name</th>
<th>Number of sacred groves of occurrence and acronym of the sacred groves</th>
<th>Acronym of the sacred groves</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Accipiter badius</td>
<td>Shikra</td>
<td>14 ER1,ER2,KZ1,KZ3,KN1,KN3,KN4,KN5,MA1,PL2,TV1,WA1,WA2</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Acridotheres fuscus</td>
<td>Jungle Myna</td>
<td>15 ER1,ER2,KZ1,KZ3,KN1,KZ2,KN5,MA1,PL2,PT1,TS1,TV2,WA1,WA2</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Acridotheres tristis</td>
<td>Common Myna</td>
<td>25 ER1,ER2,KZ1,KZ2,KZ3,KL1,KL2,KN1,KN2,KN3,KN4,KN5,KT1,KT2,MA1,PL1,PL2,PT1,PT2,TS2,TV1,TV2,WA1,WA2</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Aegithina tiphia</td>
<td>Common Iora</td>
<td>2 KS1,KN1</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Alcedo athis</td>
<td>Small Blue Kingfisher</td>
<td>17 ER1,ER2,KS2,KZ1,KZ3,KL1,KL2,KN1,KT1,KT2,MA1,PL2,T1,PT2,TV1,TV2,WA2</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Anthus rufulus</td>
<td>Paddyfield Pipit</td>
<td>11 ER1,ER2,KZ2,KZ3,KN1,KN2,KN3,KN5,PL1,WA1,WA2</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Ardeola grayii</td>
<td>Indian Pond Heron</td>
<td>17 ER1,KS2,KZ1,KZ2,KZ3,KL1,KL2,KN1,KN3,KN4,KN5,KT1,KT2,PT1,PT2,TS2,TV1,TV2,WA1,WA2</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Batrachostomus montiger</td>
<td>Ceylon Frogmouth</td>
<td>1 KN1</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Brachypteryx major</td>
<td>White -Bellied Shortwing</td>
<td>2 PT2,TV1</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Bubulcus ibis</td>
<td>Cattle Egret</td>
<td>22 ER1,ER2,KS1,KS2,KZ1,KZ3,KL1,KL2,KN1,KN2,KN4,KN5,KT1,KT2,MA1,PL2,PT1,PT2,TS1,WA1,WA2</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Batorodes striatus</td>
<td>Little Green Heron</td>
<td>10 KS2,KN1,KN3,KN4,KN5,MA1,PL2,TS1,WA1,WA2</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Cacomantis sonneratii</td>
<td>Banded Bay Cuckoo</td>
<td>3 KS2,KN1,KN2</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Caprimulgus Asiaticus latham</td>
<td>Common Indian Nightjar</td>
<td>6 KS2,KZ3,MA1,PL2,WA1,WA2</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Caprimulgus indicus</td>
<td>Indian Jungle Nightjar</td>
<td>6 ER1,KS2,KZ3,PL1,TS2,WA2</td>
<td></td>
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<tr>
<td>15.</td>
<td>Casmerodius Albus</td>
<td>Large Egret</td>
<td>5 ER1, KZ3, KN1, KN4, WA1</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Chloropsis cochinchenis</td>
<td>Bluewinged leafbird</td>
<td>13 ER1,ER2,KL1,KL2,KT2,MA1,PL2,PT1,PT2,TV1,TV2,WA1,WA2</td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Columba elphinstonii (E)</td>
<td>Nilgiri Wood Pigeon</td>
<td>2 KS2,WA2</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Copsychus saularis</td>
<td>Oriental Magpie Robin</td>
<td>22 ER1,ER2,KS1,KS2,KZ1,KZ2,KL1,KL2,KN1,KN5,KT1,KT2,MA1,PL2,PT1,PT2,TS1,TV1,TV2,WA1,WA2</td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Copsychus Malabaricus</td>
<td>White-Rumped Shama</td>
<td>9 KS2,KN1,MA1,PL2,PT1,PT2,TV1,TV2,WA2</td>
<td></td>
</tr>
</tbody>
</table>

The names of the sacred groves are as in Table 1.  

---cont’d---
Appendix 3 (cont’d). List of birds recorded from sacred groves of Kerala

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<tr>
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</thead>
<tbody>
<tr>
<td>21.</td>
<td><em>Coracias benghalensis</em></td>
<td>Indian Roller</td>
<td>8 ER1,ER2,KL1,KL2,KN1,KN5,KT1,KT2</td>
</tr>
<tr>
<td>22.</td>
<td><em>Coracina melanoptera</em></td>
<td>Black-headed Cuckoo-Shrike</td>
<td>6 ER1,KS2,KZ3,KN1,KN5,WA2</td>
</tr>
<tr>
<td>23.</td>
<td><em>Corvus macrorhynchos</em></td>
<td>Jungle Crow</td>
<td>17 ER1,ER2,KS1,KS2,KZ1,KZ3,KL2,KN1,KN2,KN4,MA1,PL2,PT2,TV1,WA1,WA2</td>
</tr>
<tr>
<td>24.</td>
<td><em>Corvus splendens</em></td>
<td>House Crow</td>
<td>18 KS1,KZ1,KZ2,KZ3,KL2,KN3,KN4,KT2,MA1,PL1,PL2,PT2,TS1,TS2,TV1,TV2,WA1,WA2</td>
</tr>
<tr>
<td>25.</td>
<td><em>Cuculus micropterus</em></td>
<td>Indian cuckoo</td>
<td>19 ER1,ER2,KS1,KS2,KZ3,KL1,KL2,KN1,KT1,KT2,MA1,PL2,PT1,PT2,TS1,TV1,TV2,WA1,WA2</td>
</tr>
<tr>
<td>26.</td>
<td><em>Calicicapa ceylonensis</em></td>
<td>Grey-headed Flycatcher</td>
<td>10 ER1,ER2,KS2,KZ2,KZ3,KL2,KN1,PT2,TV1,WA1</td>
</tr>
<tr>
<td>27.</td>
<td><em>Cyornis rubeculoides</em></td>
<td>Blue-throated Flycatcher</td>
<td>6 KS2,KZ1,KZ3,KN1,KN2,WA1</td>
</tr>
<tr>
<td>28.</td>
<td><em>Cyornis tickelliae</em></td>
<td>Tickell’s Blue Flycatcher</td>
<td>17 ER1,ER2,KS2,KZ1,KZ3,KN1,KN2,KN3,KN5,MA1,PL1,PL2,PT1,TS2,TV2,WA1,WA2</td>
</tr>
<tr>
<td>29.</td>
<td><em>Cyptisus balasiensis</em></td>
<td>Asian Palm Swift</td>
<td>1 KL1</td>
</tr>
<tr>
<td>30.</td>
<td><em>Dendroanthus indicus</em></td>
<td>Forest Wagtail</td>
<td>10 ER1,ER2,KS2,KZ1,KZ2,KZ3,KN1,KN2,WA1</td>
</tr>
<tr>
<td>31.</td>
<td><em>Dendrocitta vagabunda</em></td>
<td>Indian Treepie</td>
<td>16 ER1,ER2,KS2,KZ1,KZ2,KZ3,KL2,KN1,KN2,KN3,MA1,PL2,PT2,TV1,WA1,WA2</td>
</tr>
<tr>
<td>32.</td>
<td><em>Dendrocitta vagabunda</em></td>
<td>Rufous treepie</td>
<td>14 KZ3,KL1,KL2,KN2,KN5,KT1,KT2,MA1,PL2,PT1,PT2,TV1,TV2,WA2</td>
</tr>
<tr>
<td>33.</td>
<td><em>Dendrocopus mahrattensis</em></td>
<td>Yellow-fronted Pied Woodpecker</td>
<td>20 ER1,ER2,KS1,KS2,KZ2,KZ3,KL2,KN1,KN3,KN4,MA1,PL1,PL2,PT2,TS2,TV1,TV2,WA1,WA2</td>
</tr>
<tr>
<td>34.</td>
<td><em>Dendrocopus nanus</em></td>
<td>Brown-capped Pygmy Woodpecker</td>
<td>5 ER1,ER2,KS2,KZ3,KN3</td>
</tr>
<tr>
<td>35.</td>
<td><em>Dicaeum agile</em></td>
<td>Thick-billed Flowerpecker</td>
<td>5 KS2,MA1,PL2,TV1,WA2</td>
</tr>
<tr>
<td>36.</td>
<td><em>Dicaeum concolor</em></td>
<td>Plain Flowerpecker</td>
<td>8 KS2,KZ1,KZ3,KN1,KN2,MA1,PL2,WA2</td>
</tr>
<tr>
<td>37.</td>
<td><em>Dicaeum erythrorhynchos</em></td>
<td>Tickell’s Flowerpecker</td>
<td>5 KS2,KZ3,KN1,KN4,TS1</td>
</tr>
<tr>
<td>38.</td>
<td><em>Dicrurus caerulescens</em></td>
<td>White bellied drongo</td>
<td>7 ER1,KZ2,KN1,MA1,PL2,TS1,WA2</td>
</tr>
<tr>
<td>39.</td>
<td><em>Dicrurus leucophaeus</em></td>
<td>Ashy Drongo</td>
<td>4 KS2,KZ3,WA1,WA2</td>
</tr>
<tr>
<td>40.</td>
<td><em>Dicrurus macrocerus</em></td>
<td>Black Drongo</td>
<td>16 ER1,ER2,KL1,KL2,KN1,KT1,KT2,MA1,PL1,PL2,PT1,PT2,TS1,TV1,TV2,WA2</td>
</tr>
<tr>
<td>41.</td>
<td><em>Dicrurus paradiseus</em></td>
<td>Greater Racket-tailed Drongo</td>
<td>8 KS2,KZ1,KZ3,KL2,KT2,PT2,TV1,WA1</td>
</tr>
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<tr>
<td>42.</td>
<td><em>Dicrurus paradiseus</em></td>
<td>Racket-tailed drongo</td>
<td>22 ER1, ER2, KS2, KZ1, KZ2, KZ3, KL1, KL2, KN1, KN2, KN5, KT1, KT2, MA1, PL2, PT1, PT2, TS1, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>43.</td>
<td><em>Dinopium benghalense</em></td>
<td>Black-rumped woodpecker</td>
<td>20 ER1, ER2, KS1, KS2, KZ1, KZ2, KZ3, KL1, KN1, KN3, KN4, KN5, MA1, PL2, PT1, TS1, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>44.</td>
<td><em>Dinopium benghalense</em></td>
<td>Lesser Golden-backed Woodpecker</td>
<td>18 ER1, ER2, KS2, KZ3, KL1, KL2, KN1, KN4, KN5, KT1, KT2, PL1, PT1, PT2, TS2, TV1, TV2, WA1</td>
</tr>
<tr>
<td>45.</td>
<td><em>Dinopium javense</em></td>
<td>Common Golden-backed Woodpecker</td>
<td>13 ER1, ER2, KS2, KZ2, KZ3, KL1, KN1, KN2, KN3, KN4, KN5, PT1, TV2</td>
</tr>
<tr>
<td>46.</td>
<td><em>Ducula aenea</em></td>
<td>Green Imperial-Pigeon</td>
<td>1 KZ3</td>
</tr>
<tr>
<td>47.</td>
<td><em>Egretta garzetta</em></td>
<td>Little Egret</td>
<td>10 KS1, KS2, KN1, KN3, KN4, KN5, MA1, PL2, WA1, WA2</td>
</tr>
<tr>
<td>48.</td>
<td><em>Eudynamys scolopacea</em></td>
<td>Asian Koel</td>
<td>5 ER1, KS2, KZ3, KN1, KN4</td>
</tr>
<tr>
<td>49.</td>
<td><em>Eumyias albicaudata (E)</em></td>
<td>Nilgiri Flycatcher</td>
<td>7 ER1, ER2, KS2, KZ3, KN1, KN5, WA1</td>
</tr>
<tr>
<td>50.</td>
<td><em>Ficedula nigroarea (E)</em></td>
<td>Black-and-Orange Flycatcher</td>
<td>8 ER1, KS2, KZ1, KZ2, KZ3, KN1, KN4, WA1</td>
</tr>
<tr>
<td>51.</td>
<td><em>Gallopardix spadicea</em></td>
<td>Malabar spurfowl</td>
<td>3 MA1, PL2, WA2</td>
</tr>
<tr>
<td>52.</td>
<td><em>Gallus sonnerattii</em></td>
<td>Grey Junglefowl</td>
<td>12 ER1, KS1, KS2, KZ2, KZ3, KN1, KN2, KN3, KN4, PL2, WA2</td>
</tr>
<tr>
<td>53.</td>
<td><em>Garrulx delesserti (E)</em></td>
<td>Wynad Lughingthrust</td>
<td>6 KS2, KZ2, KZ3, KN1, WA1, WA2</td>
</tr>
<tr>
<td>54.</td>
<td><em>Gracula indica</em></td>
<td>Southern Hill-Myna</td>
<td>6 ER1, KS2, KZ3, KN1, KN2, WA1</td>
</tr>
<tr>
<td>55.</td>
<td><em>Halcyn smyrnensis</em></td>
<td>White-breasted Kingfisher</td>
<td>4 ER1, KS2, KZ3, KN1</td>
</tr>
<tr>
<td>56.</td>
<td><em>Haliastur indus</em></td>
<td>Brahmini Kite</td>
<td>22 ER1, ER2, KS1, KS2, KZ2, KZ3, KL1, KL2, KN1, KN2, KN3, KN4, KT1, KT2, MA1, PL2, PT1, PT2, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>57.</td>
<td><em>Hemicircus canente</em></td>
<td>Heart spotted woodpecker</td>
<td>18 ER1, ER2, KS2, KZ3, KL1, KL2, KN1, KN2, KN3, KN5, MA1, PL2, PT1, PT2, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>58.</td>
<td><em>Hieroccycyx varius</em></td>
<td>Common hawk cuckoo</td>
<td>5 KN1, MA1, PL2, WA1, WA2</td>
</tr>
<tr>
<td>59.</td>
<td><em>Hirundo rustica linnaeus</em></td>
<td>Common Swallow</td>
<td>6 ER1, ER2, KZ3, KL1, PT1, TV2</td>
</tr>
<tr>
<td>60.</td>
<td><em>Hypothymis azurea</em></td>
<td>Black-naped Monarch-Flycatcher</td>
<td>7 ER1, ER2, KZ1, KZ2, KZ3, KN1, WA2</td>
</tr>
<tr>
<td>61.</td>
<td><em>Hypsipetes leucocephalus</em></td>
<td>Black Bulbul</td>
<td>2 KZ3, WA1</td>
</tr>
<tr>
<td>62.</td>
<td><em>Iole indica</em></td>
<td>Yellow-browed Bulbul</td>
<td>7 ER1, KN1, KN4, PL1, TS2, WA1, WA2</td>
</tr>
</tbody>
</table>

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<tr>
<td>63.</td>
<td>Lanius cristatus</td>
<td>Brown Shrike</td>
<td>3 PL1, TS2, TV2</td>
</tr>
<tr>
<td>64.</td>
<td>Lonchura kelaarti</td>
<td>Black-Throated Munia</td>
<td>19 ER1, ER2, KS1, KS2, KZ2, KZ3, KN1, KN2, KN5, MA1, PL1, PL2, PT1, PT2, TS1, TS2, TV1, TV2, WA2</td>
</tr>
<tr>
<td>65.</td>
<td>Lonchura mlacca</td>
<td>Black-headed Munia</td>
<td>19 ER1, ER2, KS1, KS2, KZ2, KZ3, KL1, KL2, KN1, KN3, KN5, KT1, KT2, PT1, PT2, TS1, TV1, TV2, WA2</td>
</tr>
<tr>
<td>66.</td>
<td>Lonchura striata</td>
<td>White-rumped Munia</td>
<td>8 KZ3, KN1, MA1, PL1, PL2, TS2, WA1, WA2</td>
</tr>
<tr>
<td>67.</td>
<td>Lascinia bunnea</td>
<td>Indian Blue Robin</td>
<td>13 KS2, KN1, KN2, KN3, KN5, MA1, PL1, PL2, PT1, TS2, TV2, WA1, WA2</td>
</tr>
<tr>
<td>68.</td>
<td>Megalaima haemacephala</td>
<td>Crimson breasted barbet</td>
<td>14 KS2, KZ3, KL1, KL2, KN1, KT1, KT2, MA1, PL2, PT1, PT2, TV1, TV2, WA2</td>
</tr>
<tr>
<td>69.</td>
<td>Megalaima viridis</td>
<td>White-cheeked Barbet</td>
<td>13 ER1, KL1, KL2, KT1, KT2, MA1, PL2, PT1, PT2, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>70.</td>
<td>Megalaima viridis</td>
<td>White-cheeked Barbet</td>
<td>5 KS2, KZ3, KN1, TS1, WA2</td>
</tr>
<tr>
<td>71.</td>
<td>Megalaima zeylanica</td>
<td>Brown-headed Barbet</td>
<td>3 ER1, KZ1, KZ3</td>
</tr>
<tr>
<td>72.</td>
<td>Merops leschenaultia</td>
<td>Chestnut-headed Bee-eater</td>
<td>14 ER1, ER2, KS2, KZ2, KZ3, KL2, KN1, KN2, KT2, MA1, PL2, PT2, TV1, WA2</td>
</tr>
<tr>
<td>73.</td>
<td>Merops orientalis</td>
<td>Small Bee-eater</td>
<td>13 KS2, KL1, KL2, KN2, KN5, KT1, KT2, PL1, PT1, PT2, TS2, TV2, TV1, WA2</td>
</tr>
<tr>
<td>74.</td>
<td>Merops philippinus</td>
<td>Blue-tailed Bee-eater</td>
<td>16 ER1, ER2, KS1, KS2, KZ3, KL2, KN1, KN3, KN5, KT2, PL2, PT2, TS1, TV1, TV2, WA2</td>
</tr>
<tr>
<td>75.</td>
<td>Monticola Solitarius</td>
<td>Blue Rock Thrush</td>
<td>1 KS2</td>
</tr>
<tr>
<td>76.</td>
<td>Motacilla cinerea</td>
<td>Grey Wagtail</td>
<td>5 ER1, KS2, KZ3, KN1, KN3</td>
</tr>
<tr>
<td>77.</td>
<td>Motacilla maderaspatensis</td>
<td>Large Pied Wagtail</td>
<td>8 KL1, KL2, KT1, KT2, PT1, PT2, TV1, TV2</td>
</tr>
<tr>
<td>78.</td>
<td>Muscicapa latirostris</td>
<td>Asian Brown Flycatcher</td>
<td>8 ER1, ER2, KZ2, KZ3, KN1, MA1, PL2, WA2</td>
</tr>
<tr>
<td>79.</td>
<td>Muscicapa muttui</td>
<td>Brown-breasted Flycatcher</td>
<td>10 ER1, ER2, KZ2, KL2, KN1, KN5, PL2, PT2, TV1, WA1</td>
</tr>
<tr>
<td>80.</td>
<td>Muscicapa ruficuda</td>
<td>Rusty-tailed Flycatcher</td>
<td>2 KN1, WA1</td>
</tr>
<tr>
<td>81.</td>
<td>Myiophonus horsfieldii</td>
<td>Malabar Whistling Thrush</td>
<td>18 ER1, ER2, KS2, KZ1, KZ2, KZ3, KN1, KN2, KN4, KN5, MA1, PL2, PT1, PT2, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>82.</td>
<td>Nectarinia asiatica</td>
<td>Purple Sunbird</td>
<td>18 ER1, ER2, KS2, KZ1, KZ2, KL1, KL2, KN5, KT1, KT2, MA1, PL2, PT1, PT2, TS1, TV1, TV2, WA2</td>
</tr>
<tr>
<td>83.</td>
<td>Nectarinia lotenia</td>
<td>Loten’s Sunbird</td>
<td>10 KZ3, KN1, KN3, MA1, PL2, PT1, PT2, TV1, TV2, WA2</td>
</tr>
<tr>
<td>84.</td>
<td>Nectarinia minima (E)</td>
<td>Small Sunbird</td>
<td>10 ER2, KS1, KS2, KN1, KN2, MA1, PL2, TS1, WA1, WA2</td>
</tr>
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<td>85.</td>
<td><em>Nectarinia zeylonica</em></td>
<td>Purple-rumped Sunbird</td>
<td>3 KS2, KZ3, WA1</td>
</tr>
<tr>
<td>86.</td>
<td><em>Nycticorax nycticorax</em></td>
<td>Black-crowned Night Heron</td>
<td>4 KS1, KS2, KN1, KN4</td>
</tr>
<tr>
<td>87.</td>
<td><em>Nyctyornis athertoni</em></td>
<td>Blue-bearded Bee-eater</td>
<td>6 ER1, KS2, KZ1, KZ3, KN1, KN3</td>
</tr>
<tr>
<td>88.</td>
<td><em>Ocyeros griseus</em> (E)</td>
<td>Malabar Grey Hornbill</td>
<td>11 ER1, KS1, KS2, KZ2, KZ3, KN1, KN2, MA1, PL2, WA1, WA2</td>
</tr>
<tr>
<td>89.</td>
<td><em>Oriolus chinensis</em></td>
<td>Black-naped Oriole</td>
<td>1 KS1</td>
</tr>
<tr>
<td>90.</td>
<td><em>Oriolus oriolus</em></td>
<td>Eurasian Golden Oriole</td>
<td>23 ER1, ER2, KS1, KS2, KZ1, KZ2, KZ3, KL1, KL2, KN1, KN2, KN3, KN5, MA1, PL1, PL2, PT1, PT2, TS2, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>91.</td>
<td>Oriolus xanthornus</td>
<td>Black-haired Oriole</td>
<td>11 KL1, KL2, KT1, KT2, MA1, PL2, PT1, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>92.</td>
<td><em>Orthotomus sutorius</em></td>
<td>Common Tailorbird</td>
<td>24 ER1, KS1, KS2, KZ1, KZ2, KZ3, KL1, KL2, KN1, KN2, KN3, KN4, KN5, KT1, KT2, MA1, PL2, PT1, PT2, TS1, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>93.</td>
<td><em>Pericrocotus cinnamomeus</em></td>
<td>Small Minivet</td>
<td>10 ER1, KS2, KZ3, KN1, KN3, MA1, PL2, TS1, WA1, WA2</td>
</tr>
<tr>
<td>94.</td>
<td><em>Pericrocotus flammeus</em></td>
<td>Scarlet Minivet</td>
<td>9 ER1, ER2, KS2, KZ3, KN1, KN4, KN5, TV2, WA1</td>
</tr>
<tr>
<td>95.</td>
<td><em>Phaenicophaeus viridirostris</em></td>
<td>Blue-faced Malkoha</td>
<td>10 ER1, ER2, KS2, KN1, KN2, KN3, KN4, MA1, PL2, WA2</td>
</tr>
<tr>
<td>96.</td>
<td><em>Phaenicophaeus viridirostris</em></td>
<td>Small Green-</td>
<td>7 KS2, KN1, KN5, MA1, PL2, WA1, WA2</td>
</tr>
<tr>
<td>97.</td>
<td><em>Phalacrocorax carbo</em></td>
<td>Great Cormorant</td>
<td>7 ER1, ER2, KS2, KZ2, KZ3, KN1, TS1</td>
</tr>
<tr>
<td>98.</td>
<td><em>Phalacrocorax niger</em></td>
<td>Little Cormorant</td>
<td>22 ER1, ER2, KS1, KS2, KZ1, KZ2, KZ3, KL1, KL2, KN1, KN3, KN4, KN5, KT1, KT2, PT1, PT2, TS1, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>99.</td>
<td><em>Phylloscopus affinis</em></td>
<td>Tickell’s Leaf Warbler</td>
<td>5 ER1, ER2, KS2, KN1, KN2</td>
</tr>
<tr>
<td>100.</td>
<td><em>Picus chlorolophus</em></td>
<td>Small Yellow-naped Woodpecker</td>
<td>10 ER1, ER2, KS2, KZ3, KN1, MA1, PL1, PL2, WA1, WA2</td>
</tr>
<tr>
<td>101.</td>
<td><em>Pitta brachyura</em></td>
<td>Indian Pitta</td>
<td>11 ER1, ER2, KS2, KZ3, MA1, PL1, PL2, TS2, TV2, WA1, WA2</td>
</tr>
<tr>
<td>102.</td>
<td><em>Psittacula columboides</em> (E)</td>
<td>Blue-winged Parakeet</td>
<td>5 ER1, KS2, KZ3, KN1, KN4</td>
</tr>
<tr>
<td>103.</td>
<td><em>Psittacula cyanocephala</em></td>
<td>Plum-headed Parakeet</td>
<td>16 ER1, ER2, KS2, KZ3, KL1, KL2, KN1, KT1, KT2, MA1, PL2, PT1, PT2, TV1, TV2, WA2</td>
</tr>
<tr>
<td>104.</td>
<td><em>Pycnonotus cafer</em></td>
<td>Red-vented Bulbul</td>
<td>22 ER1, ER2, KS2, KZ3, KL1, KL2, KN1, KN3, KN5, KT1, KT2, MA1, PL1, PL2, PT1, PT2, TS1, TS2, TV1, TV2, WA1, WA2</td>
</tr>
<tr>
<td>105.</td>
<td><em>Pycnonotus jocosus</em></td>
<td>Red-whiskered Bulbul</td>
<td>7 ER1, ER2, KS2, KZ1, KN1, KN5, PL1, TS2</td>
</tr>
</tbody>
</table>

The names of the sacred groves are as in Table 1.  

---cont’d---
Appendix 3 (cont’d). List of birds recorded from sacred groves of Kerala

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Scientific Name</th>
<th>Common name</th>
<th>Number of sacred groves of occurrence and Acronym of the sacred groves</th>
</tr>
</thead>
<tbody>
<tr>
<td>106.</td>
<td><em>Pycnonotus melanicterus gularis</em></td>
<td>Black-crested Bulbul</td>
<td>7  ER1,ER2,KS1,KN1,KN2,KN3, KN5</td>
</tr>
<tr>
<td>107.</td>
<td><em>Pycnonotus priocephalus</em> (E)</td>
<td>Grey-headed Bulbul</td>
<td>8  ER1,ER2,KS1,KS2,KZ3,KN1, KN4,WA1</td>
</tr>
<tr>
<td>108.</td>
<td><em>Rhopocicla aticeps</em></td>
<td>Dark-fronted warbler</td>
<td>6  KL1,MA1,PL2,PT1,TV2,WA2</td>
</tr>
<tr>
<td>109.</td>
<td><em>Rhopocicla atriceps</em></td>
<td>Black-headed Babbler</td>
<td>3  KS2,KN1,TV1</td>
</tr>
<tr>
<td>110.</td>
<td><em>Spilornis cheela</em></td>
<td>Crested Serpent Eagle</td>
<td>13 ER1,ER2,KS1,KS2, KZ1, KZ2, KZ3,KN1,KN5,MA1,PL2,WA1, WA2</td>
</tr>
<tr>
<td>111.</td>
<td><em>Streptopelia chinensis</em></td>
<td>Spotted Dove</td>
<td>9  ER1,ER2,KS2,KZ3,KN2,MA1, PL2,TV2,WA2</td>
</tr>
<tr>
<td>112.</td>
<td><em>Surniculus lugubris</em></td>
<td>Drongo Cuckoo</td>
<td>1  KS2</td>
</tr>
<tr>
<td>113.</td>
<td><em>Tephrodornis Pondicerianus</em></td>
<td>Common Woodshrike</td>
<td>12 ER1,KL1,KL2,KT1,KT2,MA1, PL2,PT1,PT2,TV1,TV2,WA2</td>
</tr>
<tr>
<td>114.</td>
<td><em>Terpsiphone paradisi</em></td>
<td>Asian Paradise Flycatcher</td>
<td>19 ER1,ER2,KS2,KZ1,KZ3,KL1, KL2,KN4,KN5,KT1,KT2,MA1, PL2,MT1,PT2,TV1,TV2,WA1,WA2</td>
</tr>
<tr>
<td>115.</td>
<td><em>Treron pompadora</em></td>
<td>Pompadour green pigeon</td>
<td>3  MA1,PL2,WA2</td>
</tr>
<tr>
<td>116.</td>
<td><em>Turdoides affinis</em></td>
<td>White-headed Babbler</td>
<td>11 ER1,ER2,KS2,KL1,CL2,KT1, KT2,PT2,TV1,TV2</td>
</tr>
<tr>
<td>117.</td>
<td><em>Turdoides affinis</em></td>
<td>Yellow-billed babbler</td>
<td>5  KN1,MA1,PL2,WA1,WA2</td>
</tr>
<tr>
<td>118.</td>
<td><em>Turdoides striatus</em></td>
<td>Jungle Babbler</td>
<td>14 ER1,ER2,KS2,KZ1,KZ3, KL2, KN1, KN5,MA1,PL2,PT2,TV1, WA1,WA2</td>
</tr>
<tr>
<td>119.</td>
<td><em>Turdoides Subrufus</em></td>
<td>Indian Rufous Babbler</td>
<td>8  KS2,KZ3,KN1,MA1,PL2,TV1, TV2,WA2</td>
</tr>
<tr>
<td>120.</td>
<td><em>Zoonavena sylvatica</em></td>
<td>White-rumped Needletail-Swift</td>
<td>1  KZ3</td>
</tr>
<tr>
<td>121.</td>
<td><em>Zoothera citrina citrina</em></td>
<td>Orange-headed Thrush</td>
<td>7  ER1,ER2,KS2,KN1,MA1,PL2, WA2</td>
</tr>
<tr>
<td>122.</td>
<td><em>Zoothera citrina cyanotus</em></td>
<td>White-throated Ground Thrush</td>
<td>4  KS2,KN1,KN2,WA1</td>
</tr>
</tbody>
</table>

The names of the sacred groves are as in Table 1.