FORESTS ALIVE !

Environmental Handbook for Teachers in
Biligiri Rangaswamy Temple Wildlife Sanctuary, Karnataka

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VIVEKANANDA GIRIJANA KALYANA KENDRA
Integrated Tribal Development Project

KALPAVRIKSH
कल्पवृक्ष
Environmental Action Group

Credits

Coordination:	Sujatha Padmanabhan, Sunita Rao (Kalpavriksh)
Research & Text:	Sujatha Padmanabhan, Sunita Rao, Yashodara Kundaji (Kalpavriksh)
Illustrations:	Madhuvanti Anantharajan
Design:	Manisha Sheth Gutman and Madhuvanti Anantharajan
Editing:	Madhuca Krishnan
Maps:	ATREE
Photographs:	R.Siddappa Setty, Vivek Gour-Broome, Sunita Rao, Sujatha Padmanabhan, Ashish Kothari, Joseph Vattakaven
Media Design	Aletha Tavares

Collaborating Agencies:

- **Vivekananda Girijana Kalyana Kendra (VGKK)** is a registered organization that works with the Soliga tribal community in BR Hills since 1980 with the objective of making tribal people realise the dream of a self-reliant, united and progressive tribal society. VGKK runs a school in B.R. Hills for tribal and non-tribal children.
    - *Address:* B.R. Hills, Yelandur Taluk, Chamrajnagar District, Karnataka 571 441.
      Website : **www.vgkk.org**
- **Ashoka Trust for Research in Ecology and Environment (ATREE)** is a not-for-profit organization that promotes scientific research and education, policy development, and community outreach in ecology and management, genetics, livelihoods, policy and education and outreach conservation planning. One of the field sites of ATREE is BRT Wildlife Sanctuary.
- Financial support to ATREE from NORAD and Sir Dorabji Tata Trust enabled the preparation of this handbook.
    - *Address:* 659, 5th A Main Road, Hebbal, Bangalore 560 024. Website: **www.atree.org**
- **Kalpavriksh** is a national environment action group that has been working on environment education, research, campaigns, advocacy and policy issues since 1979. It has offices based in Pune and New Delhi.
    - *Address:* Apt. 5 Shree Dutta Krupa, 908 Deccan Gymkhana, Pune 411 004.
      Website: **www.kalpavriksh.org**

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Learning for Life: Nature as our Teacher

An Introduction

The head, heart, and hands approach to learning

There is a story that illustrates beautifully the value of relevant, need-based education. An illiterate boatman is taking a famous professor of physics across the river. The professor asks the boatman if he has studied physics, and the answer is a simple, "no". The esteemed professor shakes his head, and declares that the boatman has then wasted half his life. They sail along in silence. Soon the boat develops several leaks and they start sinking. The boatman asks the professor if he knows how to swim, to which the reply is, "Of course not!" The boatman quietly tells the professor, "Sir, then you have wasted your whole life."

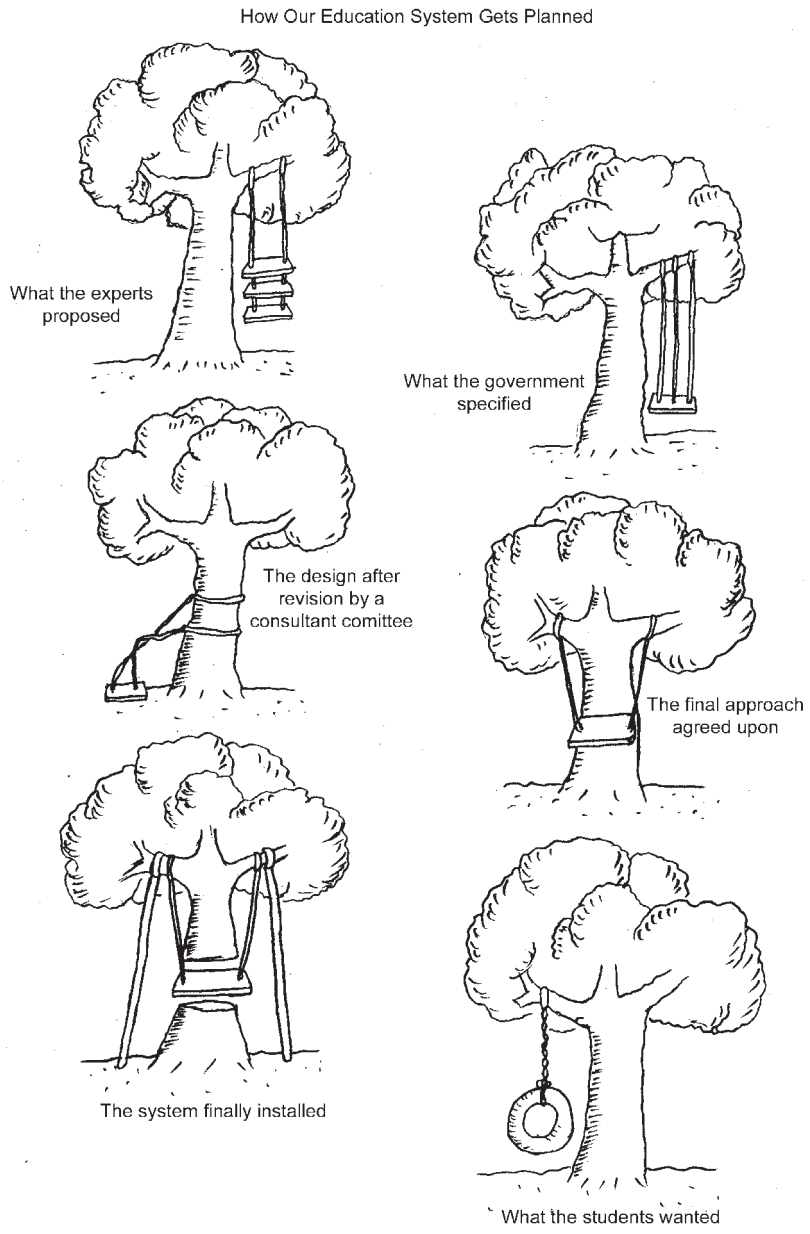
The philosophy behind this simple story has prompted several persons to re-evaluate the concept of learning, and the real-life value of the present education system. It has also resulted in several 'alternative' approaches to learning where the focus is on using the head (thinking), heart (feeling), and hands (doing), leading to a holistic **learning for life**.

Schooling is often cut off from the child's **practical and everyday reality**. Children, especially at the primary stage, first need to learn about their own environment and about things that they see and experience, before being able to learn about places and experiences far removed from themselves. For example, for children of many forest dwelling communities, learning to live in the community, imbibing traditional knowledge related to plants (specially medicinal plants) and animals from their elders, becoming familiar with agriculture, and listening to the rhythm of the forest are important life experiences. "Learning for life" means learning basic concepts through **localised** situations and examples, as well as relating to and understanding one's immediate surroundings. The illustration on page 2 shows the importance of planning education according to what is really needed and relevant.

The "Learning for Life: Nature as our Teacher" programme

The "Learning for Life: Nature as our Teacher" programme was begun in January 2004 in the Vivekananda Girijana Kalyana Kendra (VGKK) School. The programme was a collaborative effort between Ashoka Trust for Ecology and the Environment (ATREE), VGKK, and Kalpavriksh. Earlier the Centre for Environment Education (CEE) worked towards creating general environment education (EE) manuals for the School. The VGKK School is uniquely situated in a small revenue pocket within the Biligiri Rangaswamy Temple (BRT) Wildlife Sanctuary. The Biligiri Rangan (BR) Hills lie at a juncture that links the ecologically fragile Western and Eastern Ghats. A small population of the Soliga tribe lives within the sanctuary in hamlets, having had to give up their shifting cultivation practices for settled life after the area was declared a sanctuary in 1974. Many of the children who attend the VGKK residential school come from these settlements.

The need for developing an EE programme was felt by the teachers and administrators of the school. Some of the reasons given were: erosion of traditional knowledge amongst the Soliga children over the years; need to foster a scientific outlook amongst the students; and the necessity to make them aware of the rapid changes taking place in the outside world. Almost all the teachers are non-Soliga, and they expressed a desire to be sensitised to the tribal way of life and to the issues of the sanctuary.



This handbook for teachers was developed as part of the EE programme for the Lower Primary, Upper Primary, and High School levels. The handbook explores a range of issues that are relevant to the lives of the Soligas within the BRT wildlife sanctuary. It also has a number of activities that the teachers can use to help children become more aware, sensitive, and proud of their culture and natural heritage. The contents of the handbook were discussed at a workshop with the teachers of the school and decisions were taken as to what topics would be dealt with at each level.

During the course of the programme teachers, students, the local Soliga community, staff and researchers from VGKK and ATREE, and others provided information and guidance regularly. Research papers and literature on the BR Hills and the Soliga community were referred to. Draft chapters were shared with all concerned and comments incorporated. Workshops were held with the teachers to field test some activities.

While the handbook is set in the context of the BR Hills and BRT Wildlife Sanctuary, its contents and activities can be adapted and used elsewhere within the country and outside.

Use of the Handbook and Guidelines for Teachers

The handbook will help teachers implement an EE programme in schools. The handbook is based on the premise that all knowledge should lead to a fusion of thinking (head), feeling (heart) and doing (hands). Knowledge should translate into sensitisation followed by appropriate action. Such a curriculum would facilitate "learning for life".

The handbook has been designed keeping in mind the formal school run by VGKK, the boundaries and limits posed by a time-table and a classroom of approximately 30 – 40 children largely guided by one teacher. The abundant natural resources provided by the mountains and forests of the region have been drawn on and there has been a conscious effort to refrain from the use of expensive equipment and material.

The structure of the handbook

There are nine **chapters** on topics relevant to the lives of the people in the sanctuary. These are: Soligas and their *Podus*; Religion and Nature Conservation; The VGKK campus; Forests and Wildlife of the Biligiri Rangan Hills; Non-Timber Forest Products; Agriculture; Health and Nutrition and Environment and Development. Each chapter contains a wealth of information culled from a variety of sources - primary and secondary. This handbook is illustrated with photographs, drawings, colour foldouts and maps to facilitate easy understanding and absorption of ideas.

Each chapter has a wide range of **activities**, which seek to translate the topics and issues within the chapters into realistic, feasible modules that are easy to implement in the classroom. The activity sections are separate except for the chapter "Maps and Map Reading" where the activities are interspersed within the text.

A complete, chapter-wise listing of the 178 activities is provided in a matrix format in Annexure A1, along with suggested **levels of usage** (i.e. whether it is appropriate for Lower Primary, Upper Primary or High School or a combination of these levels).

A **dictionary of terms** commonly used in environment and ecology, and a list of **references** (annexure A4) used while producing the handbook are included. A list of **resource material** such as books, films, checklists, games, puzzles etc. given to the VGKK School is also provided in Annexure A3.

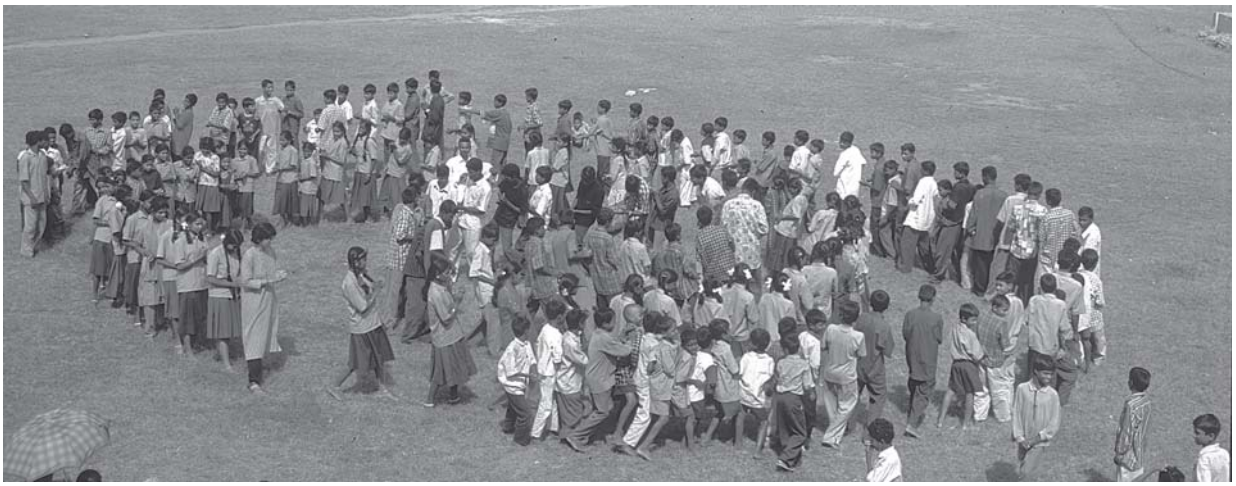
The handbook is accompanied by a **package of educational material**, including posters, a variety of maps, outline sheets to colour, picture flashcards and game cards (Annexure A2). Since visual material specific to a particular region is hard to obtain, (especially for overworked teachers!) this package has been specially developed for the BR Hills and put together for use in the classroom.

How to use the handbook (notes for the teacher)

Plan the EE curriculum

First, speed read/skim through the chapters to get an overall idea of the range of contents. Plan an annual environment education curriculum for **your** class. Select specific topics or chapters, on which you would like to focus in the current academic year. Read through each selected chapter thoroughly and select a schedule of activities against the calendar. This schedule could be a combination of discussions, writing exercises and hands-on activities. A simple written record can be maintained which includes criteria such as: the topic discussed, activity taken up, date, class duration, response of the children, observations and comments.

Implementing an activity



A wide variety of both **indoor** and **outdoor** activities are provided. The ideal **group size** is suggested for each activity: either the entire class; small groups of 5 – 6 children; pairs; or individual children. However, the decision of how to fine-tune and implement the activity is left to the teacher's discretion.

All activities are **graded** and sequenced from Lower Primary to Upper Primary to High School. Some activities are applicable to two, or sometimes all three levels. It is suggested that the teachers read the activities given for all levels before selecting ideas suitable for the levels and capabilities of students in the class. Not all ideas in the text have been translated into activities, so there is tremendous scope for the teacher to create, adapt or devise new activities.

Activities have been designed to address and develop a range of **skills** and **abilities**. They encourage observation, communication (both verbal and written), categorising, analytical thinking, problem solving, group work, practical hands-on exercises using available or recycled material and creative expression through role-play, art, craft, song, poetry and dance.

The activities in the handbook are interdisciplinary and span nearly all **subjects** in the formal education curriculum. This makes the use of the book flexible and innovative; not only can it be used in an environment education programme, but also lends itself to use in other areas of learning.

The **material needed** to conduct specific activities has been clearly mentioned. Material that would be difficult for the teacher to obtain or make has been provided in the package accompanying the handbook, i.e. maps, posters, picture flashcards, etc. Emphasis has been placed on managing with as little material as possible, and using or recycling whatever is available in the VGKK school context.

All activities have been planned for 40-minute sessions or multiples thereof. Wherever more **time** is required it has been specifically mentioned. Preparation time, spent by the teacher wherever necessary, is not included in the time taken for each activity.

Along with the scientific names, wherever possible the names of animals and plants have been given in Soliganudi (the Kannada dialect of the Soligas), in Kannada and in English.

The authors hope that this handbook will be the first step in the evolution of a meaningful environment education programme for the BR Hills region.

Adapting the handbook text and activities for other areas

The information given in the handbook is largely about the BR Hills. With a little imagination and effort, the handbook can be adapted for use in other areas. Some ways of doing it are:

Chapters:
Soligas and their *Podus*: Collect information on the tribal or indigenous people of your area. You could use the framework of the chapter to guide your data collection.

The VGKK Campus: Talk about your own school, campus or surroundings.

Maps and Map Reading: Information given here can be used after substituting names of places with local ones from your area.

Non-Timber Forest Products: Forest products are used everywhere. If you live in a city, you could be buying honey *(jenu),* gooseberry (*nelli*) or soapnut (*sige*) marketed by a cooperative or NGO like VGKK. You could use the example of the Soligas to illustrate the issue of non-timber forest products (NTFP). Alternately, substitute the NTFP named here with local ones if you live and work in a different forest setting.

Agriculture: List crops specific to your area and collect information about them. Use the general information provided in the handbook to discuss soil erosion, diversity of crops, the dangers of pesticides, etc.

Environment and development: List out the environment and development issues of your area and use the information in the handbook chapter as a guide to shape your discussions.

Activities:

Most activities can be implemented directly without any change for your area or situation. For example the art and craft and hands-on activities like "Make an Illustrated Wall-Diary" (Chapter 1), "Leaf Zoo or Talking Fox" (Chapter 3), "Make your own Compass" (Chapter 5), "Water Runs Fast" (Chapter 7), and "Make your own Compost" (Chapter 9). Similarly, other activities like "Loudspeakers are a Nuisance" (Chapter 2) "Bat and Moth Game" (Chapter 4), "Guess-timation" (Chapter 6) or "Discovering Home Remedies" (Chapter 8) can be used directly with no modification.

However, some activities need adaptation. A few examples are given below:

Chapter	**Activity name**	**Modification needed**
Soligas and their *Podus*	*Podu* word scramble	Jumble up the names of towns, villages and settlements in your area
Religion and Nature Conservation	Our *Doddasampige*	Replace with any religious site with environmental links, like a sacred grove, temple tank, sacred tree in the vicinity
The VGKK Campus	BR Hills *antakshari*	Use names applicable to your area (forest, village or city)
Forests and Wildlife of the Biligiri Rangan Hills	Web of life	List flora and fauna in your area and make name cards (illustration optional)
Non-Timber Forest Produce	Recognise your own	Use any local fruit or vegetable (similar sized potatoes or onions do perfectly!)
Agriculture	Agriculture alphabet chart	Names of agricultural produce or wild food consumed in your area can be used for this activity
Health and Nutrition	Anaemia campaign	Identify predominant health issues in your area and plan a campaign
Environment and Development	Minister's choice	Use development and environment issues that affect your area to conduct this activity

Common Terms in Ecology and Environment

Ecology: The study of how plants and animals interact with, and are dependent on one another, and their physical surroundings is known as ecology.

Ecosystem: An ecological unit within which living organisms and non-living elements interact with each other. Forests, lakes, deserts, mountains, islands and estuaries are examples of ecosystems.

Environment: Environment refers to the complete surroundings of an organism or group of animals and plants.

Natural resource: Any part of nature that can be used by humans is called a natural resource. For example, water, wood, granite, fish, etc.

Biodiversity (or biological diversity): The variety of life forms, including ecosystems, species of animals, plants, and micro-organisms, and genetic diversity within these species. The Western Ghats are one of the world's 18 most important biodiversity areas.

Habitat: The living space in which conditions suitable for the survival of an organism are found is known as its habitat. It has three main components – food, shelter, and water. For example, the habitat of the tiger is the forest.

Species: A group of living things that can interbreed with one another. All humans belong to one species. Tropical ecosystems have many species of plants and animals, and thus have high species diversity.

Population: The number of individuals of a species in a habitat is known as population. Population numbers depend on the birth rate, death rate, and migration of the organism.

Endemic: An endemic plant or animal is one that has evolved and exists only in a certain area. The isolation of an area from other areas can lead to the evolution of many endemic forms. 40% of all species found in Western Ghats are endemic! The Nilgiri langur is a good example.

Exotic: Any animal or plant that is foreign to a certain place or habitat is called exotic. It is usually introduced to the region by humans. For example, lantana is an exotic weed that was introduced to India by the British.

Carrying capacity: The number of plants and animals of various species that a habitat can support at a given time is known as its carrying capacity. It depends on the amount and type of food, shelter, and water available. If the carrying capacity of a habitat is exceeded, it may result in irreparable damage.

Predator: Animals that live by hunting and eating other animals are called predators. For example, owl, leopard, etc.

Prey: Animals killed and eaten by predators are called prey. For example, deer, mouse etc.

Producer: Green plants that use sunlight, water, carbon dioxide, and soil nutrients to make food are called producers. Without producers, there would be no food on earth.

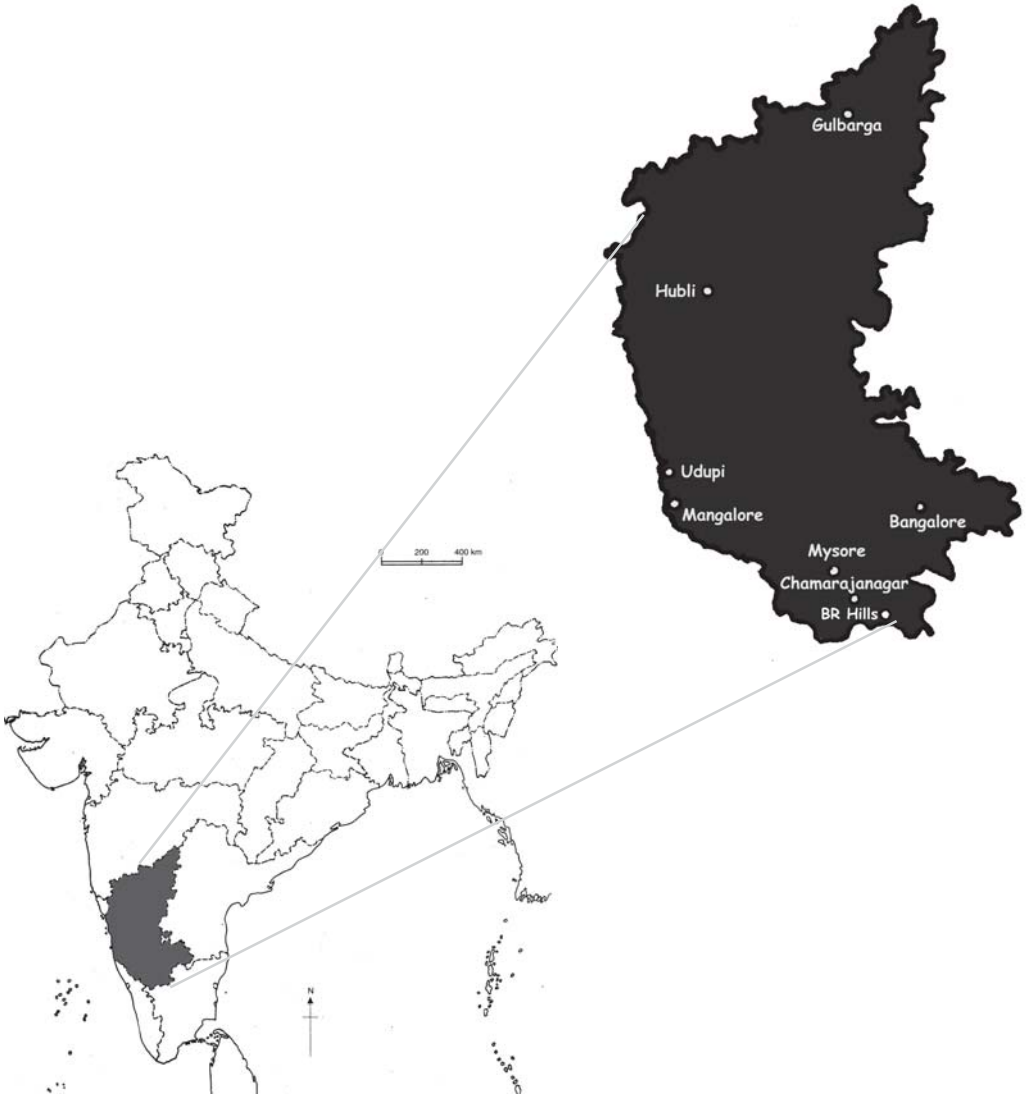
Consumer: There are different levels of consumers. Animals that eat producers are called primary consumers or herbivores. Animals that eat primary consumers are called secondary consumers or carnivores. For example, the chital is a herbivore or a primary consumer and the wild dog is a carnivore or a secondary consumer.

Decomposer: Decomposers are organisms that break down complex, organic waste matter (like dead leaves and dung) into simple nutrients. Bacteria, fungi, earthworms and some crabs are examples of decomposers.

Food chain/ food web: The link that is formed by producers and consumers is called a food chain. Many food chains form a complex food web.

BILIGIRI RANGASWAMY TEMPLE WILDLIFE SANCTUARY

An Overview



The Biligiri Rangaswamy Temple (BRT) Wildlife Sanctuary is situated in the Biligiri Rangan Hills (BR Hills) in the southern part of Karnataka State in India. The sanctuary is located in Chamrajnagar district and lies close to the border with Tamil Nadu.

The area is uniquely located at a juncture that connects the Western Ghats and the Eastern Ghats, and harbours a rich diversity of life. The area was declared a sanctuary in the year 1974.

The sanctuary has been home to the Soliga tribe for many centuries. They live in small hamlets within the sanctuary and on the outskirts.

1 Soligas and their *Podus*

The BR Hills in the pre-historic period

For millennia human beings have lived in forested landscapes in and around the Biligiri Rangan Hills. Recently, a cluster of megalithic burial sites (see box below) was discovered within the BRT Wildlife Sanctuary, clearly proving the existence of early human communities in the region. The plains surrounding the BR Hills are among the three areas in Karnataka that have a high density of ancient human settlements. Most of these settlements, located in T. Narsipura, Chamrajnagar, Yelandur, and Kollegal *talukas,* were discovered by archaeologists between 1867 and 1917.

The perennial rivers, fertile soil, and rich vegetation of the area in and around the BR Hills provided favourable conditions for early human settlements. These pastoral communities mainly depended on hunting animals and gathering produce from the forest for their food and other needs. One theory holds that as agriculture spread in the plains, more and more forests were cleared so hunter-gatherer communities had to move to the hills, where there were thick forests and they could continue their lifestyle. This phenomenon of hunter-gatherer communities moving deeper and deeper into the hills and forests from the deforested plains is common to the history of most hill tribes in India.

Megalithic Burial Sites

Let us go back about 3,500 years. In peninsular India, this period is divided into two phases: the Neolithic (New Stone Age) and Megalithic (Large Stone Age) cultural phases. During the Neolithic Age, people used ground and polished stone tools like multi-purpose axes and adzes, and crude pottery. Iron tools and implements and a very fine pottery type known as Black-and-Red Ware are associated with the Megalithic period. In this phase people used large stones to demarcate burial sites.

Regions around Karnataka and Andhra Pradesh have mainly two megalithic burial types: the simple cist-circles, where the burial site is demarcated by a circle of large stone boulders, and the cist-tomb burial, where a rectangular burial chamber made of large flat slabs of schist (a stone which was freely available in the region) is erected. The Neolithic – Megalithic phase in the region can be dated from about 1500 BC to the early centuries of the Christian era. That means that human beings have inhabited the area for at least 3,500 years!

It would be interesting to learn where the megalithic sites were discovered in the BRT Wildlife Sanctuary and explore early human settlements in the area with students.

Who is a tribal?

Many of us are unclear about who can be classified a tribal or as belonging to a tribal community. About 68 million people (8 % of the population of India) have been designated as 'Scheduled Tribes' (STs) under Article 342 of The Constitution of India. They are generally referred to as *adivasis*. Some of the criteria considered for listing a tribe as a ST are: geographical isolation; distinctive culture; and economic backwardness. Although scheduling is intended to be a legal process, political will and chance often determine the recognition or non-recognition of *adivasis* as STs. For example, some sections of a particular group have been scheduled in one state while being omitted in another. Some non-tribal people have also been included in the category.

The Soligas

It would be unrealistic to give a comprehensive account of the Soligas in a handbook such as this. What is attempted here is to provide just a window into the world of the Soligas – a few nuggets of information that shed light on the rich heritage of the community. The students can use this information as a platform to get into deeper issues, plan activities, and maybe carry these ideas with them when they finish school and move on to do other things.

Where do Soligas live?

Soliga settlements or *podus* are spread over the hilly terrain of the BRT Wildlife Sanctuary and Mahadeshwara *betta*. They are also found in the foothills of these ranges and a few communities stay in the forests of Hunsur, Bandipur, and Kushal Nagar. There are about 12,500 Soligas in and around BR Hills in 54 *podus*.

Some of the other local tribal groups in and around the area include the Betta Kuruba, and Jenu Kuruba.

What's in a name?

There are two theories on how the Soligas got their name. One theory is that Soliga ancestors came from bamboo, as the word Soliga means "one who has come from within a bamboo". The second theory is that the word Soliga may have come from the Tamil word "*solai*", which means a dense thicket or jungle. Nevertheless, both these versions clearly show that the Soligas are closely associated with forests.

Soligas and their *podus*

Podu is the name given to a Soliga hamlet. It usually has a shrine and a small shop. Small houses are interspersed with agricultural fields and, in recent times, coffee bushes. Usually there is a deep trench surrounding the *podu.* This helps to reduce crop depredation by wild animals. Today, there are 54 *podus* in and around BRT Wildlife Sanctuary.

Prior to the area being declared a sanctuary in 1974, the Soligas practiced shifting cultivation. They used to change their *podus* every three years or so. After about three years, their agricultural land became infertile and a shift was necessary. *Podus* were always near a water source, but never too near as that would mean being close to wild animals!

Did you know?

- Yerakanagadde and Bangalepodu are the oldest *podus* in the BR Hills area.
- Errankatte is the smallest *podu* with only 5 families.
- Purani is the largest *podu* with 106 families.
- Gombegallu and Keredimba are closest, in many ways, to what *podus* were in the old days.

The Soliga home

The traditional Soliga home was a one-room hut. The walls of the hut were made of thin wooden strips plastered with mud. The roof was thatched with grass called *banne ullu* along with teak leaves. White mud was used to whitewash the walls. Nowadays, this kind of traditional building can be seen only in Monakai, Gombegallu and Keredimba. In all the other *podus*, houses are now made with stone or brick walls and tile roofs. Some new *podus* are called colonies today.

Next to most Soliga homes are shelters for the animals they keep.

Earlier, the sources of water for a *podu* were wells or streams. Today, only Monakai, Gombegallu, Keredimba, Nellikadaru and Kalyani *podus* use water from wells and streams. All the other *podus* use hand pumps or bore wells. Water from a bore well is pumped up to a water tank in the *podu*.

All *podus,* except Purani, have streetlights. Some houses in Hosapodu, Bangalipodu, Yerakanagadde, Seegebetta and K Devarahalli have electricity.

School of life

The Soligas led a semi-nomadic life in the forests, and practiced shifting cultivation. Crops included *ragi* (finger millet), maize, tubers, pulses, beans, pumpkins, and amaranth. These crops, along with the animals they hunted, honey, fruits, and other forest produce provided plenty of food. Children grew up in a close knit community and learned a great deal from the 'school of life' around them. Soliganudi was and is the language spoken by the community. All aspects of life revolved around what nature provided and their relationship with nature. Festivals like *Roti habba* and *Hosa ragi habba* were joyous times when the gods were thanked for the harvest, and the entire community celebrated with song, dance, and food. Even their medicines were made from the abundance of plants they had around them.

There was a marked change in the way the Soligas lived after the Forest Department declared the area a wildlife sanctuary. The nomadic lifestyle of the Soliga came to an end.

Although a great deal of deep indigenous knowledge is still alive, things have now changed with outside influence and exposure. Today, as the Soligas try to reconcile the two worlds they live in – the modern and the traditional – their sense of identity is questioned and changing. One way to retain their sense of pride in their heritage is to emphasise the value of their forest-based lifestyle. For this it is important to preserve the forests, wildlife and rivers.

The wheel of time

Soligas, like other communities that depend closely on nature, live according to its seasonal cycles. Their sense of time has been largely cyclical. Each year and each season brings with it a special set of tasks to perform, festivals to celebrate and things to get ready. The rains and the seasonal festivals hold sway over how time has passed and is measured. With exposure to the outside world, many Soligas now use the Gregorian calendar and English months. A traditional system co-exists as well, timed with the rains and other features, that many of the older people are familiar with.

Activities through the year

Today, there are some *podus* that are new and closer to the temple settlement, and others further away still living the traditional rhythm of life. There are a whole host of activities that people are involved in through the year. The range includes agricultural work during the rains; collecting of forest products like *jenu*, *nelli*, *arale*, *antwalkai*, *sige*, *pashi*, *genasu*, *mavu*, etc.; firewood collection; housework; house construction and work around the *podu*; working as labourers in coffee plantations; work for the Forest Department, VGKK, and BR Village; and of course activities related to the various festivals, without which life is incomplete! *Sankranti jathray* (January 14th), *Shivarathri*, *Dodda jathray* (May 3rd), *Theputsava* (May 26th), and *Shravana* are some of the big temple festivals that the community members are all involved in.

A medley of songs!

A rich repertoire of song, dance, and folklore exists amongst the Soliga people. The songs especially reflect the community's intimate knowledge and interaction with the forests, animals, hills, and streams. Some of the different kinds of songs are:

- *Goru goruko gorukana*
- *Hadukay* (which women sing all night during festive dancing)
- *Olaga* (songs of prayer)
- *Kagga*

Soligas and their *Podus*: Activities

1.1 Calendar time

Indoor

Group size: Entire class

Level: Lower Primary

Material needed: Any calendar with large numerals, blackboard, chalk, notebooks, pencils

Objective: Understanding concepts of time, recognising numbers and learning ordinal numbers

Method: Hang the calendar at a convenient height. Help children read the day and date, for example, 15th August 2005, Monday. Introduce the concept of ordinal numbers (first, second, third, etc.). Ask the following kinds of questions:
What date will it be tomorrow? What date was it yesterday? Which months have 31 days? How many months are there before June? Which month were you born in? Why are some dates printed in red? When is the festival or special day this month?
Some written work can be given to consolidate the discussions.

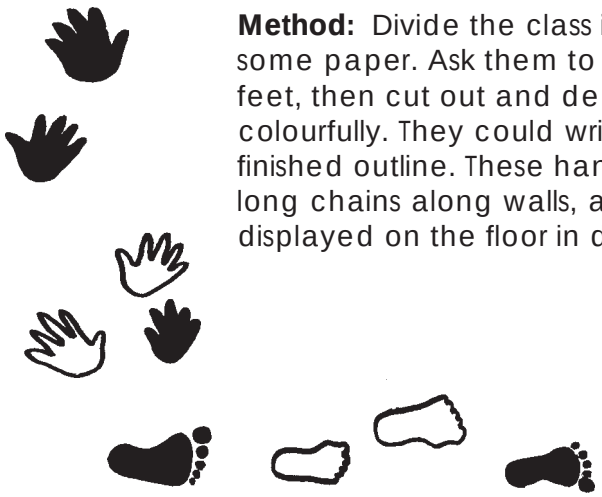
1.2 Art with hands and feet

Indoor

Group size: Pairs

Level: Lower Primary

Material needed: Newspaper or chart paper, scissors, crayons or paints



Method: Divide the class into pairs. Give each pair some paper. Ask them to outline their hands and feet, then cut out and decorate each outline colourfully. They could write their names on each finished outline. These hands / feet could be hung in long chains along walls, across the classroom, or displayed on the floor in decorative patterns.

1.3 Draw a Soliga house

Indoor

Group size: Entire class

Level: Lower and Upper Primary

Material needed: Drawing books or paper, pencils

Method: Divide the page or paper into two parts. On one half ask the children to draw their house as it looks from the outside. Each part must be labelled. What materials are used to make different parts of the house should be written alongside; for example, roof (tile/thatch), walls (brick), floor (mud and cow dung) etc.
On the other half of the paper, ask the children to draw their house as it looks from inside, the different areas/rooms within the house. The children should label what each corner is used for; also draw and label important possessions.

1.4 Building our houses: Discussion

Indoor or Outdoor

Group size: Entire class

Level: Lower and Upper Primary

Material needed: Notebooks, pencils

Method: Have a discussion with the children and make a list of all materials that are used to make houses in their *podus*. Where does each item come from? Is it purchased or collected?
Help children to record this information in a tabular format.
Younger children can draw different kinds of houses, using different materials, in their notebooks.

In addition ask the following questions:

- What material is your house made of? Where does it come from?
- Who built the house? Who helped while building?
- How long did it take to build?
- Are there house-building experts in your *podu*?
- Is there a particular time of year that is preferred for building?

1.5 Building our houses: making models

Time: 40 mins x 2 sessions

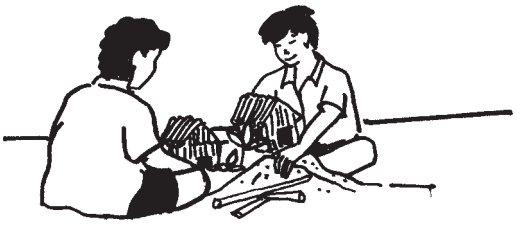
Indoor or Outdoor

Group size: Pairs or groups of 4-5 children

Level: Lower and Upper Primary

Material needed: Mud, stones, twigs, grass, leaves, cardboard, crayons, paint

Subject link: Social Studies



Method: The discussion from the previous activity "Building Our Houses" can be followed up with a hands-on activity where children in pairs or in groups, make models of different kinds of houses using a variety of materials. Some space in the verandah or a corner of the classroom can be allotted to each group to assemble their models in a realistic manner using earth, small plants, cut out figures of humans and animals to depict scenes commonly seen in a *podu.*

1.6 *Podu* word scramble

Indoor

Group size: Entire class

Level: Lower and Upper Primary

Material needed: Blackboard, chalk, notebooks, pencils

Background preparation by teacher: Recall about 10 - 12 *podu* names and mix / jumble the alphabets

Method: Write out the scrambled *podu* names on the blackboard. Ask the children to unscramble them and write the correct names in their notebooks. A few examples are:

- du sa ho po = Ho sa po du
- re dim ba ke = Ke re dim ba
- u ga gom ll be = Gom be ga ll u
- ne ka n ri = Ka n ne ri
- bbe co bi si na = Si bi na co bbe

1.7 Make an illustrated wall diary

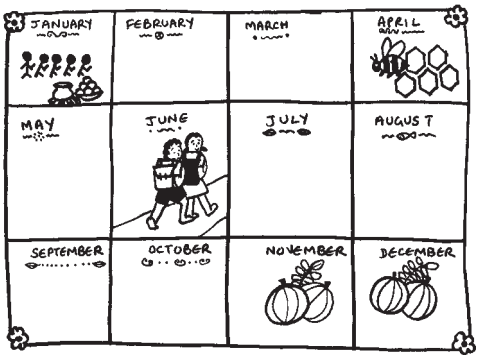
Time: 40 mins 1st session, 10 min per week thereafter

Indoor

Group size: Entire class

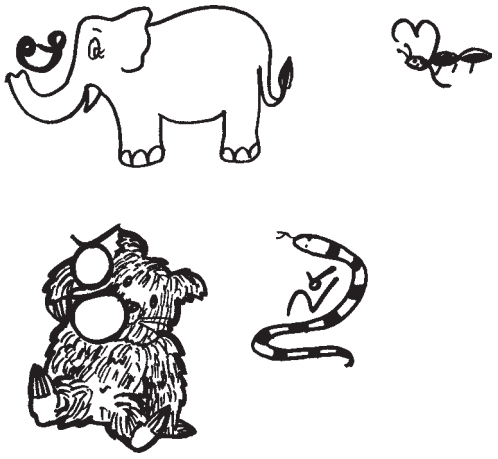
Level: Lower Primary and Upper Primary

Material needed: Chart paper, crayons or sketch pens



Method: Divide the chart paper into 30 or 31 large squares, keeping sufficient place on top to write the month and the days of the week. Write the date on the right hand corner of each square; the rest of the square is meant for illustrations, drawings of important class events, celebrations, special days, exams, cultural programmes and holidays. Divide the class into four groups, each group taking turns to illustrate one week on the chart.

1.8 Soliganudi *akshara mala*



Indoor

Group size: Entire class

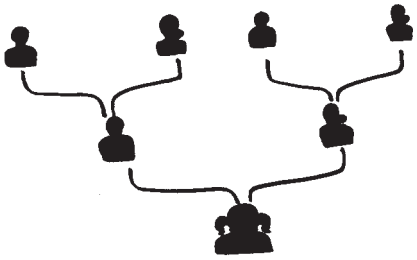
Level: Lower and Upper Primary

Material needed: Blackboard, chalk, notebooks, pencils, chart paper for final presentation

Objective: To build an alphabet chart that is localised. (Alphabets are learnt better if the words are from a familiar context)

Method: Write the Kannada alphabet on the blackboard, a few letters at a time. Children have to recall words in Kannada or Soliganudi related to their life and surroundings, wildlife, the forests. For example: *antwalkai, anubay, aanai, aamay, eli, eruvay, eechalu, uppittu, edda, othikatta, karadi, kumkuma, garuda, ghatay, mannu, malligai, sarpa, sampige, hasu, hasiru* and so on. Older children can write out the final list on chart paper and illustrate each alphabet entry.

1.9 Make your family tree



Indoor

Group size: Entire class

Level: Lower and Upper Primary

Material needed: Blackboard, chalk, notebooks, pencils

Objective: Understanding, recalling and recording information as a diagram

Method: Discuss the notion of family members and the links between generations of ancestors and successors. Show how this information can be recorded by drawing a sample of a family tree (see illustration)on the blackboard. Ask each child to draw a family tree starting from her/his generation, extending up to the great grandparents or as far back as memory goes. Older children can write an interesting fact about each member, relating to appearance, personality trait or his/her skill and ability.

1.10 Songs of the Soligas

Indoor or Outdoor

Group size: Entire class

Level: Lower Primary, Upper Primary and High School

Background preparation by teacher: Arrange for Sri Basavaraju or a Soliga elder to come to class for a song session

Method: Ask Sri Basavaraju or an older Soliga to sing a traditional Soliga song. Ask him to explain the meaning and the specific occasion or context in which the song is sung. Children could learn the tune and copy down the words and present the song in the school assembly.
Older songs of the Soligas have different tunes which are almost forgotten, known perhaps only by a few elders. Calling a Soliga elder may bring a fresh tune or nuance into a well-known song.

Variation: Children could also learn the dance steps that go along with the songs.

1.11 Know your directions

Indoor

Group size: Entire class

Level: Upper Primary

Material needed: Map "An Imaginary *Podu* in BRT Sanctuary" (provided)

Method: Show the map to the children in groups.
Now ask children to answer the following:
• The *sampige* tree is to the —— of the *podu*.
• The pond is to the —— of the *podu*.
• The water tank is to the —— —— of the *podu*.
• What do you see in the northern part of the *podu*?
• What two features run along the western boundary of the *podu*?

An Imaginary Podu in BRT Sanctuary

1.12 Know our *podus*

Time: 40 mins x 2 sessions

Indoor

Group size: Entire class

Level: Upper Primary

Material needed: Blackboard, chalk

Method: Make a list of all *podu* names with the children. Ask if children know the origins of these words and their meanings.

Extension: Children could consult their parents and elders, find out and come back with information in the next class.

1.13 Megalithic site visit

Outdoor

Group size: Entire class

Level: Upper Primary and High School

Material needed: Drawing paper or notebook, pencils, erasers

Objective: Learning about pre-history and early human life

Background reading by teacher: Read chapter "Soligas and their *Podus"*; see box on Megalithic burial sites on page 9.

Method: Talk about pre-historic settlements. Visit the campus megalithic site, talk about early humans and their ways of life. Discuss the burial practices of different communities. Ask children if any of them or members of their families have come across other sites near their *podus* or in the sanctuary. Children could sit and draw/sketch the megalithic burial site in their notebooks and write 8-10 lines about the site based on the discussion.

Extension: The site visit could be followed by a visit to the library to refer to books on pre-history and early human settlements.

1.14 Write a letter about the megalithic site

Indoor

Group size: Entire class

Level: Upper Primary and High School

Material needed: Blackboard, chalk, notebooks, pencils

Objective: Developing writing skills

Method: Write a letter to the Archaeological Survey of India asking about megalithic burial sites. Address your letter to The Director, Archaeological Survey of India, Mysore Circle, Mysore 570 001. Use the pointers given below:

- Explain that there is a burial site on campus. Ask for more information about this site.
- Ask for more information on other such sites nearby and in Mysore District.
- Request the Director for permission to visit the ASI office and the museum.

1.15 Plot your personal time line

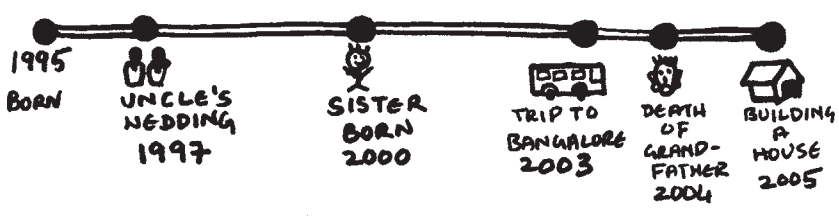
Indoor

Group size: Entire class

Level: Upper Primary and High School

Material needed: Blackboard, chalk, notebooks, pencils

Method: Discuss the time line giving an example on the blackboard. Draw a horizontal line across the middle of the blackboard. The starting point represents the date of birth. All subsequent events (such as birth of siblings, house building, death of family members, weddings, travels undertaken, drought year and so on) are marked with a notch or a symbol on the line and the event or happening written alongside. The time line ends at the present moment, the current date and day. See illustration below.
Tell the children to make their own personal time lines in their notebooks.



1.16 Measuring things around us

Indoor

Group size: Groups of 5 – 6 children

Level: Upper Primary and High School

Material needed: Blackboard, chalk, rulers, metre tape (provided), graph paper, pencils

Method: Divide the class into groups. Using the metre tape each group should measure dimensions of the classroom, the door, windows, the blackboard, the teacher's table.
These measurements should be recorded in their notebooks. On the blackboard, the teacher could show how these measurements are scaled down and replicated as small diagrams keeping the exact proportions intact. For example, a 4 foot x 7 foot door can be drawn as a 4 inch x 7 inch rectangle using a scale of 1 foot : 1 inch, or as an 8 inch x 14 inch rectangle using a scale of 1 foot : 2 inch scale. Each child should then be given a graph paper and asked to draw the measured objects in the form of scale drawings.

Variation: Measuring ourselves
Younger children can measure each other against a wall and this data can be displayed attractively on a chart listing children's names and their respective heights.

1.17 Typical features of our *podus*

Indoor

Group size: Entire class

Level: Upper Primary and High School

Material needed: Blackboard, chalk, map: "An Imaginary *Podu* in BRT Sanctuary" (provided)

Method: Ask children to name the *podus* that they belong to. List these on the blackboard.
Look at the map provided. Ask the children of each *podu* to check if all the features shown on the map are present in their *podu*. What additional features are present which are not shown in the map? List these differences alongside the *podu* names on the blackboard.

An Imaginary Podu in BRT Sanctuary

1.18 Mapping *podus*

Indoor

Group size: Small groups

Level: Upper Primary and High School

Material needed: Chart paper, pencils, sketch pens

Method: Group the children according to the *podus* that they come from. Ask them to make a map of their *podu*. They should first make a list of what their *podu* has and what symbol they plan to use for each feature.

Each group should present their *podu* map to the entire class and answer questions that the class may ask.

1.19 The *podu* versus the colony

Indoor

Group size: Entire class

Level: High School

Material needed: Blackboard, chalk

Method: Ask how many children live in a traditional *podu* and how many in a colony. Discuss the typical features of a traditional *podu* and a colony with the children.

What are the things that they like and do not like about each? They could write a short essay based on this discussion.

1.20 Magic squares

Indoor

Group size: Entire class

Level: High School

Material needed: Blackboard, chalk, notebooks, rulers, pencils

Background preparation by teacher: Read the procedure given below and make a few sample magic squares for practice.

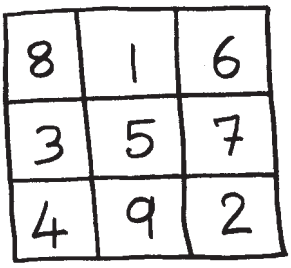


Figure 1

Method: Properties of a magic square: The sum of the digits in each row, column or diagonal is the same. The middle number of every magic square (see second column, second row) is the average of the three numbers.
On the blackboard, draw a sample magic square and show how it works.
Now ask the children to follow these instructions and make magic squares in their notebooks.
Draw a grid 3 columns x 3 rows. There will be 9 cells in the grid.
Choose any nine consecutive numbers (1 to 9 as in Fig 1).

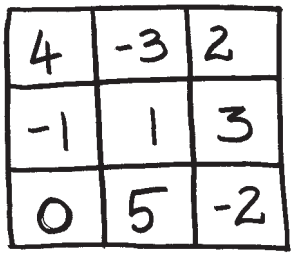


Figure 2

You can choose any series including zero or negative numbers (minus 3 to 5 as in Fig 2).

Start from the lowest number and write the numbers in the cells in the order given below (See Figure 1). Try it and see if it works:

1) 2nd column 1st row
2) 3rd column 3rd row
3) 1st column 2nd row
4) 1st column 3rd row
5) 2nd column 2nd row
6) 3rd column 1st row
7) 3rd column 2nd row
8) 1st column 1st row
9) 2nd column 3rd row.

1.21 Soliga settlements in Karnataka

Indoor

Group size: Entire class

Level: High School

Material needed: Outline map of Karnataka or Karnataka wall map or atlas, pencils, notebooks, colour pencils

Objective: Discussion, map work

Background reading by teacher: Read up section "Who is a Tribal?" on page 10. Also refer to the note on Soligas on page 10.

Method: With the children discuss who is a tribal and why are they called *adivasis*. What is the origin of the word Soliga?
Ask the children to write down the names of some of the tribal groups they know. What are the special skills of each tribal group?

Based on the information provided in the handbook, ask each child to copy the map of Karnataka from the outline map/atlas/wall map. Ask them to shade the areas where the Soligas live.

1.22 Other ways of seeing

Indoor

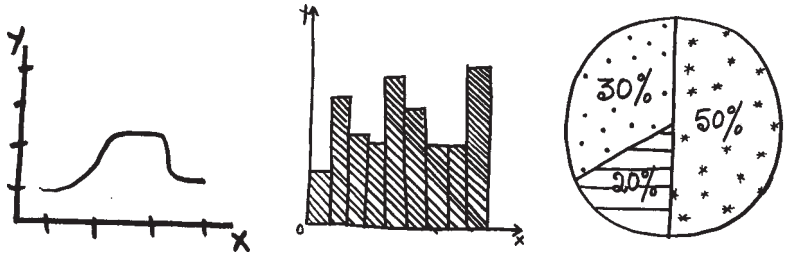
Group size: Entire class

Level: High School

Material needed: Blackboard, chalk, notebooks, pencils

Objective: Learning to represent quantities in different ways

Method: Do a small survey in class. Count the number of boys and girls. This information can be represented as numbers in a table, as a graph, as a bar chart or a pie chart. Introduce these 3 ways of representing information by drawing diagrams on the blackboard. See illustration below.
Take another survey. How many children come from each *podu*? Write this information down as a table, as a bar chart and as a pie chart. As a practice exercise children could conduct similar surveys



in other classes in small groups.

Extension: Think of other survey topics that can be taken up within the class or in the school. These can be displayed as charts on the school notice board.
Children could use any easily available data such as: figures of previous year's 10th standard results; population statistics; male/ female ratios; age profile; occupational status and represent these figures in the 3 ways illustrated.

2 Religion and Nature Conservation

Soligas and nature worship

Like other tribals, the religion and forms of worship of the Soligas is centred around nature. Although there has been a gradual shift towards Hindu gods, there is still a strong focus on forests, streams, and the earth. The song of the *Doddasampige* reflects the love and reverence the Soligas have for their environment.

Nature worship has rules about how people should use their environment and not carelessly misuse it. The Soligas have great respect for trees and believe it to be a sin to cut them. If they have to cut a tree for their use, they do a small *puje* to the tree, prostrate and place a small stone in front of it to mark that it was once a vital life force. Many trees are considered sacred and are of special significance to the Soligas.

Sacred trees

The *Doddasampige* or the 'Great Champak' is sacred to the Soligas. The tree stands tall today and is believed to be over 2, 300 years old! A small stream known as the Bhargavi flows nearby.

It is believed that the Soliga are the descendants of Karayya, a son of Madeswara Swamy (a Soliga god). There is a belief that Madeswara Swamy placed a Champak plant at the present spot and went on a visit to a nearby place. When he returned, the plant had taken root. Thus, the *Doddasampige* tree is very special for the Soligas.

Lingas are placed at the foot of the tree. They represent the main deities worshipped by the Soligas: Madeswara Swamy, Siddappa, Nanjappa, Jadeswamy, and Basappa. Mondays and Fridays are the special days for worship at the *Doddasampige*. Soligas from as far away as Tirupur in Tamil Nadu come here on special occasions.

A smaller champak tree, the *Chikkasampige,* is also considered sacred. They believe that a deity sleeps on these two champak trees at the time of flowering.

Terminalia bellerica (*Tare*), whose fruits are collected for medicinal use, is also sacred to the Soligas. When the fruit is harvested from these trees, the branches are never cut. *Lingas* are placed at the base of some trees, or photos of deities are nailed to their trunks. The fruit of these trees are not collected. Such beliefs play a significant role in helping a species regenerate.

Loudspeakers that deafen!

Religious celebrations of the Soligas have undergone many changes due to modern development or 'progress'. Today, many Soligas have given up traditional ways of celebrating festivals like *Roti habba* and *Ragi habba.* Earlier the community would get together to sing, dance and feast. Instead loud speakers blare music into the sanctuary shattering the silence. In forested areas like the BR Hills, loud sounds have a negative impact on the wildlife.

Using loud speakers during festivals or bursting crackers have become common practices throughout the country. Loud noises have many negative effects on people like deafness, poor concentration, irritation, nervousness and anxiety, to mention only a few. Recently, the Supreme Court passed a ruling banning the use of loudspeakers or the bursting of crackers from 10 pm to 6 am.

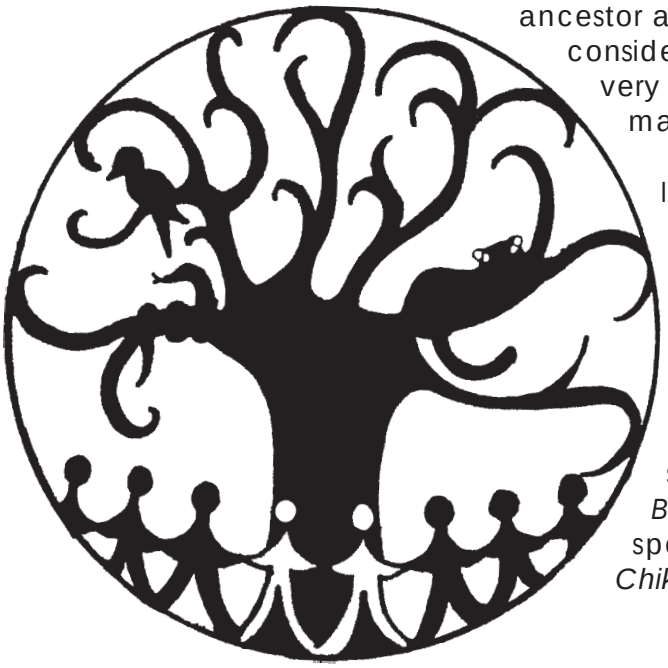
Biligiri Rangaswamy temple

The temple atop the hill is perhaps over 1,000 years old. The area has traditionally been called *Champakaranya* (forest of champak trees). The temple God is *Srinivasa Devaru* also called Ranganatha.

There is a story that Ranganatha came from the plains, married a Soliga woman and settled in the BR Hills. Hence the Soligas refer to him as brother-in-law.

Communities that conserve

Many communities across our country have traditionally followed certain conservation practices as part of their religious or spiritual beliefs. These practices are diverse but the overall impact has helped environmental conservation. Some communities have followed totemism, where a particular animal or plant species is considered a spiritual ancestor and hence is protected. When a species is considered sacred, the community usually has very clear rules protecting it. For example, they may partially or totally ban its hunting.



In many parts of our country, communities have traditionally considered a part of the landscape as sacred and protected it over the years. Forest patches, mountains, rivers, streams, ponds, grasslands, etc. have been held as sacred. While the entire BRT Wildlife Sanctuary forest is considered sacred, there is a particular stream (*Devara Halla*), a hill (*Devara Betta*), a rock (*Rangappa*), and certain specific trees (*Doddasampige* and *Chikkasampige)* that are worshipped.

When areas are declared sacred, there are rules about using the natural resources within the area. In many areas of the Western Ghats, local communities dedicated patches of forest called sacred groves to certain deities. In Karnataka, the larger sacred groves are called *devarakadu* and the smaller ones *nagbana* or *devarabana*. In Shimoga district alone, there are hundreds of *kaans* or sacred groves.

Such efforts by communities at conserving nature must be recognised and encouraged. They have provided protection to many species that otherwise would have become endangered or extinct and to ecosystems that would have been destroyed.

In the state of Karnataka, some river stretches near temples have fish species that are protected by local communities. For example, parts of Cauvery near Ranganathittu and Ramamnathapura temples, parts of river Kumaradhara near Shishila, parts of river Tunga near Sringeri, Jammatigi, and Chippalagudda, are protected.

The story of the Bishnois

The Bishnois are a community living in the desert region of Rajasthan. They believe that all living things have a right to survive and share everything that nature has provided.

In the 14th century, Guru Maharaji Jamboji, who started the Bishnoi sect, realised the importance of preserving nature if one had to survive in the arid Thar Desert. He laid down 29 rules. The sect draws its name 'Bishnoi' from the number of rules: *bees (20)* + *nau (9).* One of these rules was that no living being would be harmed.
The Bishnois carefully remove insects from dry wood before using it to make fire. They are strict vegetarians and non-smokers and do not use certain dyes that are extracted from plants. Farmers by vocation, they plough their fields in such a way that it causes least possible damage to the fragile desert ecosystem. They do not rear sheep and goat because these animals eat up the desert vegetation.

In 1737, King Abhay Singh of Jodhpur ordered firewood to be collected. When his men set about chopping down the *khejri* (*Prosopis cineraria*) trees in the region, the Bishnois hugged the trees and refused to let go. The soldiers killed 363 Bishnois before the king came to hear of it and ordered a stop! The principled stand of the Bishnois impressed him so much that he gave their religion state recognition.

The Bishnois have now spread into different parts of Rajasthan, Haryana and Punjab. Their villages are green with vegetation and stand out like oases in the dry landscape.

Religion and Nature Conservation: Activities

2.1 Our *Doddasampige*

Indoor

Group size: Individual

Level: Lower and Upper Primary

Material needed: Notebooks or chart paper, pencils, crayons or sketch pens

Method: Give each child a piece of chart paper or they can do this activity in their notebooks. Ask the children why they think the *Doddasampige* tree is sacred to their community or personally to her/him. Then make each child trace the outline of one hand and write their views in short sentences or keywords within the outline. Tell the children to suitably colour and decorate the handprint. Make sure the child writes his/ her name under the picture.

2.2 Conservation story time

Indoor

Group size: Entire class

Level: Lower and Upper Primary

Background reading by teacher: Read "The story of the Bishnois" on page 25.

Method: Tell the story of the Bishnois to the children. Engage them in a discussion along the following lines:

- What is their impression after hearing the story?
- Have they come across any such stories of community action?
- Have they heard stories of individuals who have risked much to save nature?
- What would they do in a similar situation?

2.3 *Doddasampige* collage

Indoor

Group size: Groups of 5-6 children

Level: Lower and Upper Primary

Material needed: Chart paper, pencils, sketch pens, old magazines or coloured newspaper supplements, glue

Method: Give each group a quarter piece of chart paper. Ask the children to draw a faint outline of the *Doddasampige* tree as they remember it. The tree should be as large as the piece of paper given to them. Then, ask them to carefully tear up the coloured magazine or newspaper pages into small bits. Next, arrange the coloured pieces on the outline in an interesting way and paste them.

Variation: The group could compose a small poem or slogan about the tree and write it on their collage.

2.4 Creation stories and legends

Indoor

Group size: Individual

Level: High School

Material needed: Notebooks, pencils

Method: Children can discuss, recall, narrate or write down stories from Soliga mythology and folklore. Some suggestions for themes and topics to talk about and write are:

- How the earth or our universe was formed.
- How humans got fire.
- How the Soligas got their name.
- Heroes and Gods of the Soligas.
- Animal lore: how the tiger got its stripes, how the peacock got its tail, why the parrot is green, etc.

In case no stories are recalled, encourage the children to create their own stories, to explain things they see around them.

2.5 Loudspeakers are a nuisance!

Indoor

Group size: Small groups of 5 - 6 children

Level: High School

Background reading by teacher: Read up text on "Loudspeakers that deafen" on page 24.

Method: Discuss the loudspeaker problem with the children. Divide the class into groups. Then ask each group to enact a simple role-play: become different animals who are woken up by the *podu* loudspeakers. What would their arguments and discussion be like? Animals taking part in the play could be an old elephant, mother and baby gaur, sick cheetal, hare, koel etc. Do this activity in the class and the best role-play can be put up for the school assembly.

2.6 Forest clean up

Time: 4 – 5 hours

Outdoor

Group size: Entire class or smaller groups

Level: High School

Material needed: Large plastic or jute sacks to collect garbage, sharp pointed sticks

Background preparation by teacher: Arrange a class trip to the *Doddasampige* tree. Try to time the visit after a festival.

Method: Survey the site with the children. Form groups, distribute sacks, sticks, etc. and allot different areas around the tree to each group. Decide a time for everyone to meet after collecting garbage.
Sit in a circle. Have a discussion on the kinds of garbage collected. What would be the impact of this garbage over many years on the surrounding flora and fauna? Why are pilgrims so careless? How can pilgrims be told not to leave garbage?
The visit could end with children singing Soliga songs, or a poetry writing session (See next activity "Poetry Writing").

2.7 Poetry writing

Indoor

Group size: Individual

Level: High School

Material needed: Notebooks, pencils

Method: Ask the children to sing any songs/ poems about the *Doddasampige* tree. Analyse the words of the song/poem. Ask the children why the *Doddasampige* tree is sacred to their community or personally to her/him. Read out any poem which will set the mood for a poetry writing session.

Oh Lord of the Doddasampige
Do protect us!
The creeper that hangs over the tree
Swings gently as a cradle for thee!

Ask the children to spread out, sit in different corners of the classroom and write out short poems on this theme. They could use any style: rhyme, free verse, alliteration, etc.

Variation: Arrange a class visit to the *Doddasampige*. This session could be conducted outdoors, near the tree.

3 The VGKK Campus

How it all started

A large lantana and forest patch, elephants roaming around freely, Beedaykalu *podu* in one corner... any guesses on the area being described? Believe it or not, this is exactly what the VGKK campus was like not so long ago! Someshwara k*ere* used to be full of water and people have observed 30-40 elephants there at one time. In fact, the whole area from Circle to the temple was a regular elephant route. Today, however, the only creatures using this route are on two feet or in vehicles!

How Dr H Sudarshan came to the BR Hills as a young doctor in 1979-80 and decided to settle down amongst the Soligas is a familiar story. But it is a story that cannot be forgotten either, for it is the reason for the existence of the VGKK campus. All the health, tribal, development and education work that extends over the BR Hills, Yelandur taluka, Chamrajnagar, Kollegal (including the MM Hills), and Nanjangud Taluka would not have taken place but for him. The work covers an area of 60 km, and serves a population of about 20,000 people.

VGKK campus

The VGKK campus in the BR Hills was established in 1980, and covers an area of about 10 acres. Dr. Sudarshan's little hut on the rock is still there. The hospital, training sheds, school and other infrastructure came up over time. What started with health has moved on to education, income generating activities and now centers on community work.

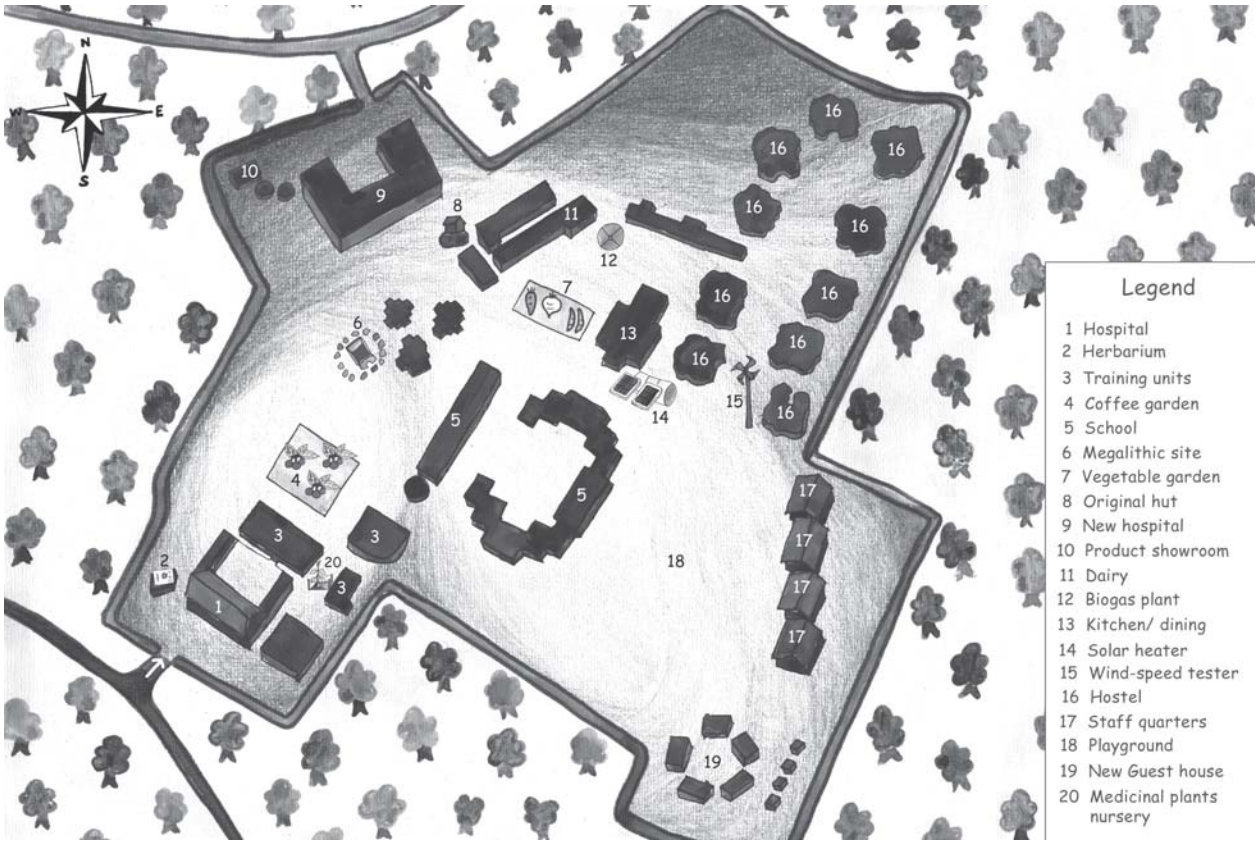
If you hike to the top of Gangadeshwara *betta*, you will get a wonderful view of the campus, the surrounding *podus*, water bodies (*keres*), the temple, the forests, and the hills with *sholas* and grasslands in the distance. You can see how the campus is nestled right in the heart of the BRT Wildlife Sanctuary. It is also possible to get a bird's eye view of the layout of the campus.

Exploring the campus

To look at the campus from an environmental perspective would be fascinating. It would be an enriching learning experience for children of all ages.

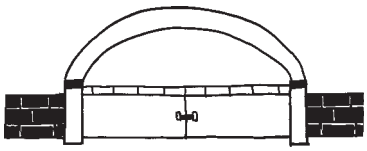
Tour of the campus

The map displays the layout of the campus highlighting the environmental features.



Entrance

At the entrance of the campus there are many trees - champak (s*ampige*), Temple tree(*kadu sampige)*, eucalyptus *(nilgiri mara)*, Silver oak, gulmohur, acacia, and others. Some of the trees are local or indigenous, others are exotic.



Swami Vivekananda

Swami Vivekananda's statue appears next. He was among India's famous spiritual leaders and even today many people follow his teachings. Swami Vivekananda also revered the environment. The Kendra is named after him.

Hospital

The old hospital is one of the earliest buildings of the campus, and has served the health needs of thousands of people. Glass, metal, used needles and syringes, plastic, paper, bio-medical waste, (soiled bandages, blood and tissue, etc.) and toxic waste (certain medicines and chemicals) are part of the waste here. The hospital staff has a simple system to dispose of this waste efficiently.

In 2003, the Government of Karnataka laid out detailed guidelines on how to manage **hospital waste** in an environmentally safe way. There are plans to follow these guidelines in the new hospital. The issue of hospital waste will be interesting for high school students.

Herbarium (*vanyaoushada vidyalaya*)

The herbarium is to one side of the old hospital. It is a small building containing herbarium sheets of several plants of the BR Hills. Herbarium sheets help identify plants and trees correctly. Samples of the leaf, stem and flowers are pressed, dried and mounted on paper. These are labelled and preserved as a record of forest plant wealth.

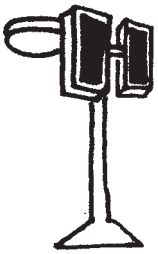
Water sources

Water is one of the lifelines of the campus. Imagine what it would be like to have no water for drinking, cooking, bathing, washing, and for plants! Since the campus is located at an elevation of about 1200 msl and water is found deep below the ground, there are 4 bore wells. There are two overhead tanks to store this water, and supply it to the school, hospital, homes, kitchen, and hostel.

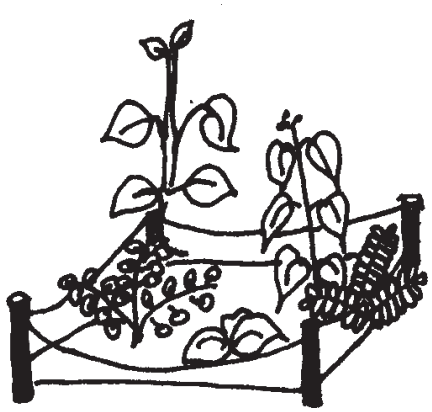
Water should be respected and used with care. Rainwater can be allowed to seep into the ground and recharge groundwater or the bore wells. Rainwater can also be harvested from the roofs of buildings. There are plans to do this on the campus and it would be well worth it for many of the students to get involved. In many major cities, due to acute water shortage, municipal corporations have made rainwater-harvesting systems compulsory for all public and private buildings.

Solar lights

The sun is an important source of renewable energy. There are 5 solar streetlights on campus. The can be recognised by their distinct solar panels, which capture solar energy and convert it into electricity.



Medicinal plants nursery

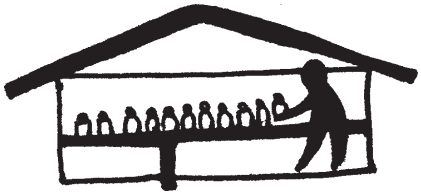


This is one of the most important spots on campus. Some useful medicinal plants grow here. Most pharmaceutical companies (herbal and allopathic) use compounds extracted from plants found in forests such as those of the BR Hills to make the drugs. The ancient science of *ayurveda* tells us how to use these plants to make medicines. Soligas also have their own traditional system of medicine for which plants are crucial. Many medicinal plants have been over harvested and are in danger of dying out (becoming extinct). It is very useful to have some knowledge of medicinal plants. It is also important to use them carefully.

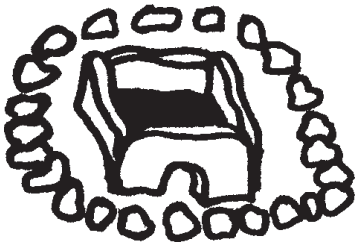
Some of the medicinal plants found in the nursery are *tulsi (Ocimum sanctum), lolesara (Aloe vera), adsoge (Adhatoda vasica), arale (Terminalia chebula), shatavari (Asparagus racemosus), nugge (Moringa oleifera), tare (Terminalia bellerica), sogade (Hemidesmus indicus), vayuvilanga (Embelia ribes), bevu (Azadirachta indica), sarpagandha (Rauwolfia serpentina), nagadale (Ruta graveolens), nelli (Phyllanthus emblica)* and *tagache (Cassia tora).* The use of medicinal plants is explored in detail in the chapter "Health and Nutrition".

Training units

The training units are hives of activity. It would be good to expose the students to the range and scope of work here. The list is impressive!



Honey processing, food processing with *nelli* (gooseberry; *Phyllanthus emblica*), *thore mavu* (wild mango; *Mangifera indica*), *sogade* (Indian sarsaparilla; *Hemidesmus indicus*), *nerale* (*jamun*; *Syzigium cumini*), *antwalkai* (soapberry; *Sapindus laurifolia*), *magali beru* (an edible root, *Decalepis hamiltonii*), *arishina* (turmeric; *Curcuma longa*), *sige* (soapnut; *Acacia sinuata*), bamboo and lantana craft making, bread making, paper recycling and weaving. All these activities depend on nature to provide the raw material.

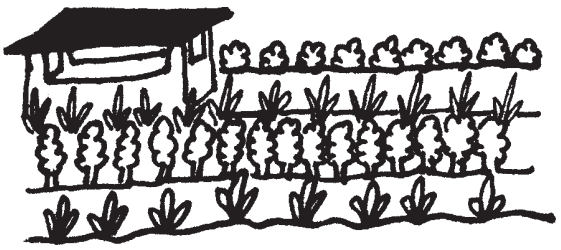


Megalithic site

The remains of a megalithic site have been reassembled on the campus in the area near the library and craft room. It tells us about the early inhabitants of the area and is a good place to talk to the students about the history of the area. (For more details, see Chapter 1 "Soligas and their *Podus".*)

Vegetable garden with compost pit

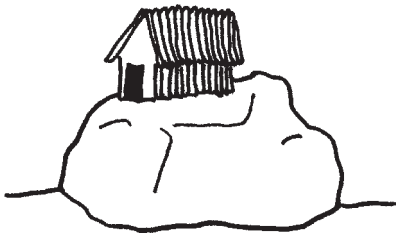
Agriculture is a vital activity on campus, as it is in the *podus*. The vegetable garden is a patch where students learn the art of growing their own food. A garden provides immense learning-for-life opportunities for students. There is a popular saying: "Grow a garden, nurture children, evolve a curriculum".



The compost pit helps convert organic waste into valuable fertilizer. A vermi-compost unit is being planned for the campus, where earthworms will be used to efficiently convert bio-waste into rich manure. VGKK hopes to then collect waste from the staff quarters and other sources to also feed the compost pit.

Coffee plants have been planted in Dr. Sudarshan's garden. In the early days, campus children would take on the task of tending to the coffee plants.

Hut

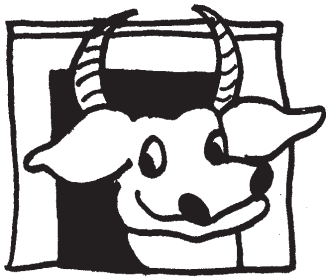


Dr Sudarshan's hut is where the campus began, and if it could talk, would have many stories to tell of the early days on campus. Let the students look at it, see what materials were used to make it and compare the hut with the later buildings. The first school shed was built under the *sampige mara* (champak tree) near the hut. It is not there anymore, as it burned down in a fire.

Product showroom

The produce from the forests are processed into food or made into crafts. These need to be marketed. The showroom is a vital part of the campus because it is the place where people can come and buy things that the VGKK community makes.

Dairy



The dairy has 4 jersey cows. They yield about 15 litres of milk in the morning and 10 litres in the evening. All the milk is used in the campus kitchen.

The cows are fed with green grass, hay, wheat husk, groundnut shells, maize, cotton seed and oil cake. Waste water from the dairy and kitchen is led into a drain and used to grow grass for the cows.

In the earlier years, there was a big dairy and milk was sent in cans to Chamrajanagar for sale. Ramachari remembers how when the bus failed to arrive, there would be 80 litres of milk waiting to be used. Sometimes it would be set into curd and churned to make butter. He recalls how most of the butter would get spattered on the walls since no one knew how to churn butter!

Biogas plant

Cows and buffaloes are dung machines! You feed in grass and other plant matter from one end, and from the other you get dung that can yield methane gas for cooking, lighting and other purposes. The slurry residue, is a nitrogen-rich manure. Dung is also most often composted with plant matter to make farm-yard manure. Scientists in Japan have spent crores of rupees trying to create an artificial dung machine, but have failed!

There is a biogas unit on campus just beyond the cow shed. It is the KVIC Deenabandhu type, with a 4 cubic metre capacity and was built in 1997. Dung is fed into it, and the methane gas generated is used as fuel in the kitchen for cooking.

Septic tanks for human waste

While cow dung is used for biogas, human waste from toilets goes into septic tanks where it decomposes. The compost is removed every two years and can be put to good use as a tree fertilizer.
In many areas (especially in Belgaum) people are connecting toilets to biogas plants, to be able to use human waste as a valuable resource to make biogas. In some places, people feel it is an unclean practice, but other users say they are happy and there is no problem at all handling the slurry.

Energy for the kitchen

We need energy to cook food. The campus kitchen uses the following sources of energy: steam boiler (firewood generated), firewood, LPG (for emergencies only), electricity and solar heaters (using panels to heat water).

Firewood is collected by students and staff from the sanctuary. Only dead wood is collected. There is no data on the amount of firewood used and it would be a useful activity to maintain a data sheet of this.

Keeping the campus clean

In nature, there is no waste... everything has a use! Human beings have created waste, and thus we have the problem of having to 'manage' it. Plastics, glass, metals and paper are some of the items that come to mind when we think of waste.

It is never too early to train children into the practice of thinking about the waste they generate and how to handle it. It is also good to tell them how much waste can be 'recycled' (used again). For example, paper, glass, and metal can all be recycled or be used again. The issue of waste management is explored in detail in the chapter "Environment and Development".

Wind speed testing unit

The wind speed metre near the staff quarters was set up to see if wind energy could be harnessed on campus. The results showed that the winds are seasonal and don't have a high enough speed to be able to set up a windmill.

Rosewood tree

The large, beautiful rosewood tree by the staff quarters marks the spot where Beedaykal *podu* once stood. Rosewood is an important timber tree and the campus is lucky to have such a fine specimen.

Other trees on campus

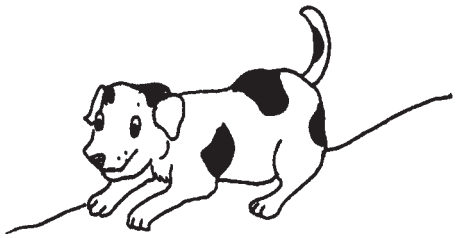
The campus has many trees. Apart from the ones at the entrance, the other commonly seen ones are: *thengu* (coconut), *nelli* (amla), *beratu* (Indian cork tree), *peralay* (guava), *halasu* (jackfruit), *bevu* (neem), *dalimbe* (pomegranate), *nerale* (*jamun*), *gaali mara* (casuarina), *mulu muthuga* (Spiny coral tree), *chakota* (pummelo) and *beete* (rosewood). There is bamboo as well. Some are forest species, and some are cultivated varieties.

In 2003, ATREE gave VGKK 2000 saplings of indigenous species to plant on campus and to distribute. There are plans to have a nursery on campus which would enable a lot of tree planting. Having a tree nursery will also be a good experience for the students to learn how to raise trees. We need to plant several trees for every one that we cut and use.

Trees also mean we have a diversity of birds and other wildlife on campus.

Dogs and more dogs!

There are many dogs on campus. Most of them are friendly and it is nice to have them around. But each year there are puppies to deal with. The campus is inside a sanctuary, where dogs can be dangerous to wildlife. Dogs can hunt and kill other animals, like deer. Dogs also carry rabies and other diseases.
The following should be done for the dogs:



Vaccines*:* All dogs must be inoculated against rabies, distemper, and other diseases.
Animal birth control*:* Dogs also need to be sterilised so that they don't reproduce in large numbers. A qualified veterinary doctor can do this. Communities in the *podus* can also be encouraged to vaccinate, spay and neuter dogs with the help of VGKK.

Environment friendly buildings

As far as possible, campus buildings have been constructed in a way that does not harm the environment, or use too much material like cement and stone. Buildings have as much natural light and ventilation (air) as possible to save on electricity. Green spaces or gardens have also been built into structures (e.g. kitchen gardens in each hostel unit, gardens for the staff quarters).

The set of buildings by the new guesthouse display various kinds of building material possibilities. It is planned to include a typical *podu* house to this display, to show how a house of 100% natural material can be made and lived in.

Thus, the campus is a world unto itself and a place where students and adults have plenty to enjoy and learn from.

The VGKK Campus: Activities

3.1 Re-using waste

Outdoor

Group size: Entire class

Level: Lower Primary

Material needed: Plastic or cloth bags to bring back reusable waste for craft activity

Method: Plan a short walk through the campus keeping in mind areas where waste is usually collected or thrown. Ask the children to observe the different kinds of waste thrown. Which items do they think will be absorbed and used by nature? Which items will remain more or less intact? Ask if humans could recycle any of these. Ask each child to pick up colourful plastic wrappers, some cartons, which can be cut up, thermocol pieces, and tablet/capsule wrappers. Waste collections can be labelled and kept in the classroom for the next activity session.

3.2 Collage with waste

Indoor

Group size: Groups of 5 – 6 children

Level: Lower Primary

Material needed: Quarter sheets of chart paper, scissors, glue or fevicol, sketch pens or crayons for each group, waste collections from previous activity.

Method: Distribute the material. Ask each group to assemble a colourful poster using all the waste that was collected individually during the "Re-using Waste" activity.

Variation: Children could think of simple slogans telling people to use, re-use and recycle their waste. These slogans could become titles for collage-posters and be displayed on the school notice board.

3.3 Cowshed puzzle

Indoor

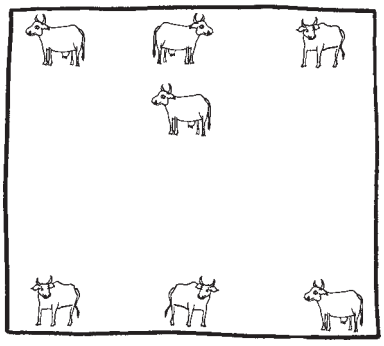
Group size: Individual

Level: Lower and Upper Primary

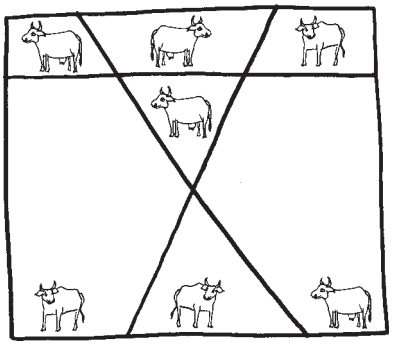
Material needed: Blackboard, chalk, notebooks, pencils, erasers.

Method: Draw the puzzle shown alongside on the blackboard. Give the following instructions to the children: There are 7 cows in the picture. Using only three straight lines enclose each cow in an enclosure. The lines can be horizontal, vertical or diagonal, but cannot curve or encircle the cows.

Puzzle



Solution



3.4 Campus pairs

Indoor/Outdoor

Group size: Pairs

Level: Upper Primary

Material needed: Slips of paper with the names of pairs written.

Background preparation by teacher: List pairs of words that go together. Some suggestions are given below. Cut slips of paper, one slip for each child in class, and write one name on each slip (For a class of 28 children you will need 14 pairs of words and 28 slips). Fold the slips and put them into an open box for easy distribution.

List of pairs

- Lantana - weed
- Megalithic site - old burial site
- Biogas - cow dung
- Compost - earthworms
- Training unit - book-binding
- Medicinal garden - tulsi
- Hospital - injection
- Solar water heater - sun
- Chalk - blackboard
- Books - library

Method: The objective of the game is to find the correct partner, for example, the whale and sea are partners or cricket and Sachin Tendulkar go together. Explain the objective of the game to the students. Each child has to pick up one slip of paper, which is one half of a pair. Children move around and look for their partners by asking who has which slip. As pairs are united or formed, they come to the teacher and sit down. When all the pairs are made, everyone sits in a circle and discusses why these things are associated with each other.

3.5 Recyclable litter collection

Outdoor

Group size: Entire class divided into 3 – 4 groups

Level: Upper Primary

Material needed: Plastic bags to bring back reusable waste for craft activity

Method: Plan a short walk through the campus keeping in mind areas where waste is usually collected or thrown. Ask the children to observe the different kinds of waste thrown. Discuss what items will be absorbed by nature (bio-degradable) and those which cannot be used by nature (non bio-degradable), but can be recycled by humans. Point these out.

Divide the children into 3 groups and send each group in a different direction. Ask them to pick up different things. Group 1 could collect re-usable cardboard cartons (e.g. matchboxes, toothpaste, tea, medicine, etc); Group 2 could collect paper used on one side from the VGKK office/ hospital; Group 3 could collect waste from the book-binding unit. At the end of the class these collections could be labelled and stored in the class for the next activity.

3.6 Craft with waste

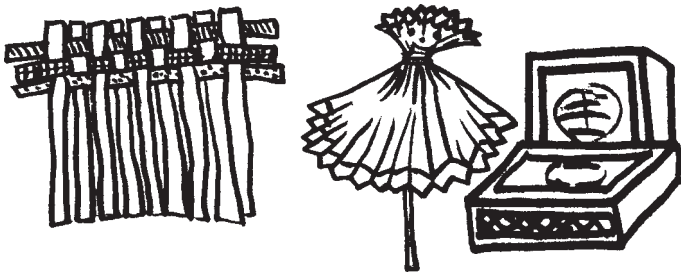
Indoor

Group size: Entire class divided into 3 groups

Level: Upper Primary

Material needed: Waste collections from previous activity, scissors, glue or fevicol, sketch pens or crayons for each group, chart paper if needed.

Method: Distribute the material. Ask each group to try and make useful items from their waste, for example, Group 1 could cut, stick and assemble cartons into containers, make boxes for pins, rubber bands, odds and ends, or make matchbox furniture. Group 2 could use notebook unit waste strips to braid table mats, coasters, wall hangings, greeting cards. Group 3 could cut the available paper used on one side and stitch or staple them to make slip pads, notepads, envelopes etc.



3.7 Tree biodata

Time: 40 mins
to be repeated every 3 to 4 months

Outdoor

Group size: groups of 3 - 4 children

Level: Upper Primary

Material needed: Notebooks, pencils, colour pencils

Method: Choose common trees on the campus such as *jamun*, jackfruit, *kadamba*, mango, and *champak.* Allot three to four children to each tree. Ask them to observe the tree and fill in the tree bio-data form (sample given below). Tell the children to observe the tree every month and make notes on when the tree flowers, bears fruits and seeds. After a few months the tree bio-data can be consolidated and the children could be asked to make drawings of the tree in bloom, the flowers, the fruit, and the seeds.

Each group's charts with drawings can be displayed in the classroom. The teacher could collect and preserve these sheets for use during the next two sessions.

Name of the tree:		Month:
	Description in words	Illustration
Height of the tree		
Leaf: Shape and colour		
Bark: Texture and colour		
Flower: Colour and shape		
Fruit: Description		
Seed: Description		
Insects seen on/around		
Birds/nests seen on/around		
Any other observations		
Names of children observing the tree:		

3.8 Make a weather calendar

Time: 40 mins 1st session; then 5 mins daily

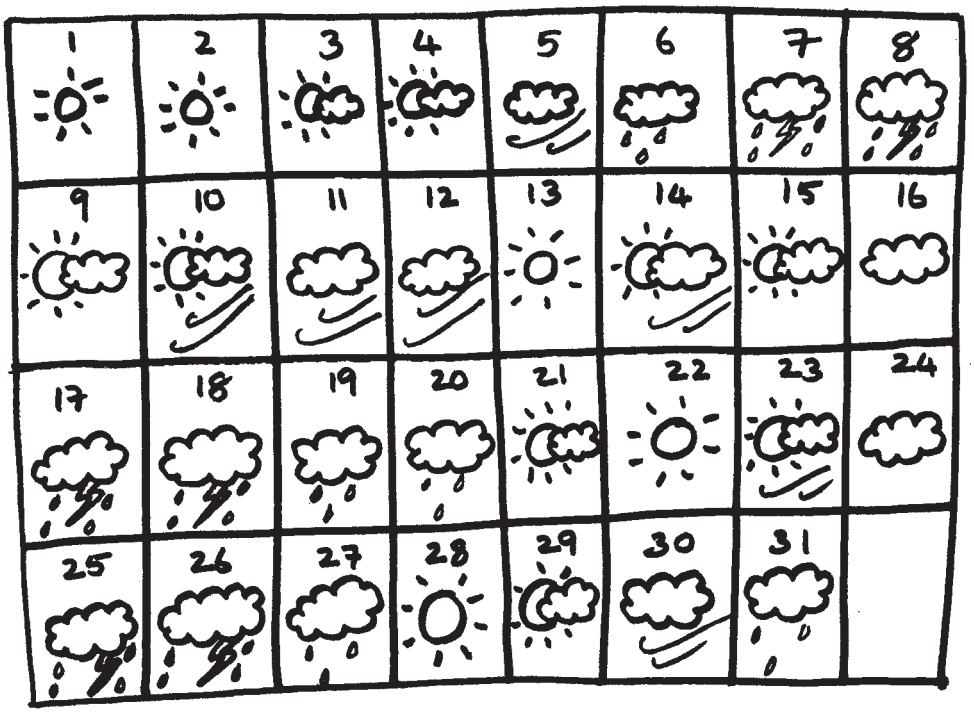
Indoor

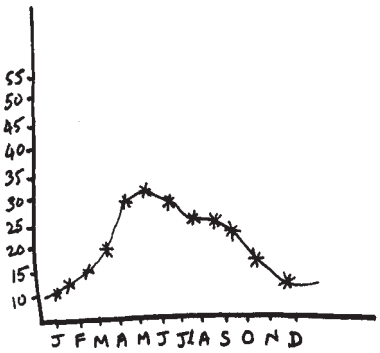
Group size: Entire class divided into four groups

Level: Lower Primary, Upper Primary and High School

Material needed: Chart paper, blackboard, chalk, crayons, colour pencils

Method: Divide the chart paper into 4 pieces; use one quarter for each month. Divide the quarter into 31 squares**,** keeping sufficient place on top of the sheet to write the month and the days of the week. Write the dates on the right hand corner of each square; the rest of the square is meant for drawing.
Discuss and make a list of possible weather conditions with the children and decide a symbol to represent each kind of weather. The list of symbols could be drawn out on a separate strip of paper and pasted near the weather calendar for quick reference.
Divide the class into four groups, each group can take turns to record and illustrate the day's weather on the chart. Groups can change every week. Based on the information displayed on the calendar, a fortnightly or monthly discussion can take place about the seasons and variation in climate.





Variation: Older children could look at the newspaper in the staff room and note down maximum, minimum temperatures of each day, humidity and rainfall and copy these data onto the class weather calendar. Based on this information a six-monthly graph can be plotted in the maths class. Similarly the phases of the moon could also be observed and drawn on the weather calendar.

3.9 Tug of war

Outdoor

Group size: Entire class

Level: Lower Primary, Upper Primary and High School

Material needed: Thick coir rope (8 m long)

Method: Divide the class into two teams. Draw a line on the ground, and make the two teams face each other, on either side of the line. Children line up one behind the other. Hand the two teams the rope. When the whistle blows, the teams begin to pull the rope in opposite directions. The objective is to see which team pulls harder and is able to drag the opponents over the line. Several rounds of tug of war can be played. Explain that this game is good for building team spirit. It also shows how strong twisted coir is.

3.10 BR Hills *antakshari*

Indoor/Outdoor

Group size: Entire class

Level: Lower Primary, Upper Primary and High School

Method: Divide the class into two teams. Team 1 starts with one word related to the BR Hills environment. Team 2 thinks of a word using the last syllable of Team 1's word. For example if the first word is *aa**ne***, the 2nd team can say ***ne**lli* and then the first team responds with *lim**be** hannu*, and the second team says ***be**vu.*
A few rules should be mentioned. Repetitions are strictly forbidden. If the word ends with a generic word like tree, as in *mavina mara* (mango tree) then the last syllable of the first word (qualifying) is picked up; in this case *na*, and not *ra* of the word *mara*.
Dh and dha sounds can be used synonymously
Similarly, l and lla sounds and n and na sounds can be used synonymously.
The word chain goes on until one of the two teams is unable to come up with a new word and acknowledges the other team as the winner.

3.11 Rope in a tree

Outdoor

Group size: 10 - 15 children

Level: Upper Primary and High School

Material needed: Coir rope (5 m long) with knots tied every half a metre.

Method: Tie and suspend the rope from a tall tree. Ask how many children can climb trees like monkeys. Children can take turns to try their hand at climbing up this rope high up into the tree. They will probably be good at this. Tell them how important tree climbing skills are in the forest. You could also mention how useful this ability is while harvesting honey, gooseberry and other NTFP. Ask the children if the class had to conduct a tree-climbing contest, would everyone pass?

3.12 Know the campus

Time: 40 mins x 2 sessions

Outdoor

Group size: Entire class

Level: Upper Primary and High School

Background reading by teacher: Read "Exploring the campus" on page 29 and plan a visit to all places mentioned.

Method: Take the class on an environmental tour of the campus, talking about the features mentioned in the handbook. Do the students have anything to say or any new information to share?

3.13 Campus blindfold game

Outdoor

Group size: Pairs

Level: Upper Primary and High School

Material needed: Scarves or blindfolds

Objective: To highlight the importance of all the senses; to observe how in the absence of one sense, the others compensate.

Method: The students form pairs. One child of each pair is blindfolded and led by the other on a short walk around the campus. Then they switch roles and repeat the walk.
When the pair returns after their blindfold walk, the following points can be discussed:
What does it feel like without sight? Did they know where they were going on campus? Did their sense of hearing, smell and touch become stronger? Did they trust their partners?

3.14 Litter walk

Time: 1 to 2 hrs

Outdoor

Group size: Entire class

Level: High School

Material needed: Notebooks, pencils

Method: Explain to the class that the objective of this exercise is to understand the amount and kind of litter and garbage that is generated by the people living on campus. Lead the children on a walk through the campus; especially the commonly used paths and preferred short cuts. Observe and note down the kinds of litter thrown around. Are there dustbins? Are more needed? In which locations? Which ones are not used at all and why? Will it help to reposition these less-used dustbins?
The group that visits the area near the hospital could check how the hospital disposes its waste. They could ask the hospital staff about the different categories of waste they have, and how these are disposed.

Extension: Another session could be held in the classroom the following week to exchange notes. Write down important points on the blackboard. During the sharing try to arrive at an action plan to let the residents know about the problem and suggest methods to control and recycle garbage. This could be written up as a letter to the VGKK management.

3.15 Every drop counts

Indoor/Outdoor

Group size: 8 - 10 students

Level: High School

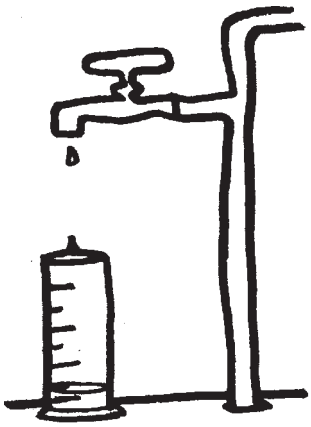
Material needed: Measuring cylinder or empty soft drink bottle of known volume, stopwatch or wristwatch, a tap, bucket.

Objective: To explain the importance of preventing water wastage and conserving water

Method: Gather the students around a water tap. Place a bucket under the tap and adjust the tap so that the water drips, drop by drop. Let one student take charge of the wristwatch and be the timekeeper. Ask another student to hold a measuring cylinder under the dripping tap. As soon as the timekeeper signals the end of one minute, remove the cylinder from under the tap. Measure the water collected in the cylinder. This number multiplied by 60 will indicate the amount of water wasted in one hour. The amount wasted in one hour multiplied by 24 is the water wasted in a day from the dripping tap.

You could start a discussion on the most common causes of water wastage in our homes, schools, work places, etc. and on practical methods of preventing water wastage.

Extension: Collect information on how much water is used everyday for brushing, bathing, cleaning, washing clothes, etc. Compare this with the amount of water wasted from a dripping tap.

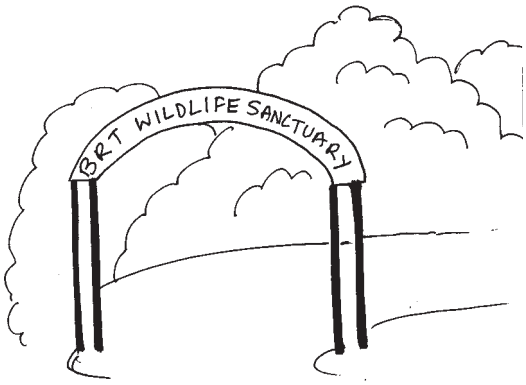


4 Forests and Wildlife of the Biligiri Rangan Hills

4.1 The Biligiri Rangaswamy Temple (BRT) Wildlife Sanctuary

Introduction

Forests are our lifeline. Without them it would be impossible for animals and humans to live. This chapter explores the Biligiri Rangaswamy Temple (BRT) Wildlife Sanctuary, the types of forests and plants found here and the myriad animals that inhabit the sanctuary.

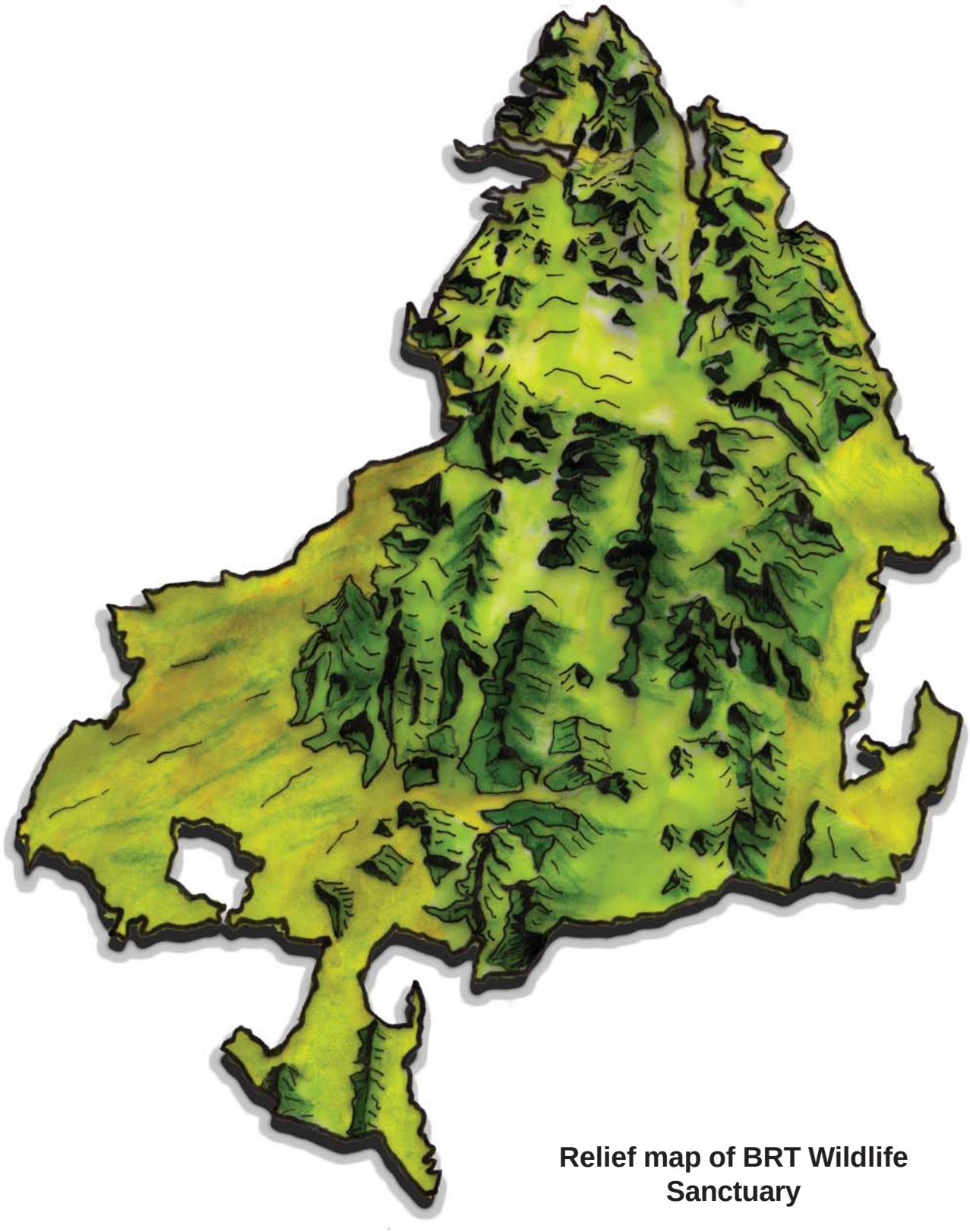


The Biligiri Rangan Hills (BR Hills) are largely occupied by the Bilgiri Rangaswamy Temple (BRT) Wildlife Sanctuary. The sanctuary runs along the southeastern border of Karnataka State and consists of two ridges running north-south rising to nearly 2,000 metres, surrounded by a chain of lower hills. The sanctuary gets its name from the famous temple of Lord Rangaswamy, located on a steep vertical cliff, which appears white in colour (Biligiri means 'white hill') when seen from the plains below, compared to the greenery of the surrounding forests.

The sanctuary is in Chamarajanagar district, bordered by Yelandur *taluk* to the northwest, Kollegal *taluk* to the north and east, and Satyamangalam *taluk* of Coimbatore district, Tamil Nadu to the south.

BRT Wildlife Sanctuary: Fact File

Declared a sanctuary	1974
Geographical location	11° 40' – 12° 09' N 77° 05' – 77° 15' E
Altitude	600 m to 1800 m
Area	540 sq km
Temperature	9 -16° C (minimum) 20-42° C (maximum)
Rainfall	1500 mm per annum
Major rivers	Suvarnavathi and Gundalhalla
Human population in sanctuary (including non- Soligas)	Unknown
Livestock population	5,000 (with 65,000 just outside)



Relief map of BRT Wildlife Sanctuary

Map not to scale

There are about 5000 Soligas in 15 *podus* within the sanctuary and about 12,500 Soligas in 57 settlements in and around the sanctuary. The BR Hills village (including the VGKK campus) is a pocket of revenue land inside the sanctuary, where people of different communities including the Soligas, live.

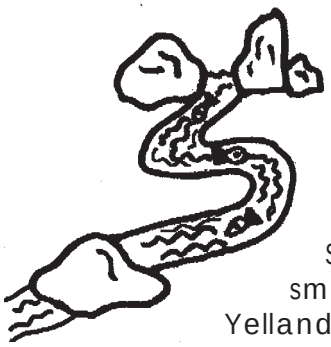
The sanctuary is situated on undulating terrain, with average elevations ranging between 750 msl and 1,816 msl. The ranges run north-south, with a series of hills and interspersed valleys appearing like a wavy carpet of greenery. The western range has uneven terrain, a network of valleys, slow west-flowing streams, and is at an elevation of about 1,300m. The eastern range is longer, higher (about 1650m) and much more complex, with a number of spurs. The watershed drains mainly to the southwest and partly to the north. The highest point is Katari *betta* at an elevation of 1,816m. Honnemetti *betta* is at 1,767m.

Climate

The elevation of the land has influenced climate to a great extent. The average minimum and maximum temperatures are 10°C and 39°C respectively. The average rainfall is 100-150 cm, with rains due to both southwest and northeast monsoons. Honnemetti gets a high rainfall of 250 cm per year. The rainfall is spread over all the months from April to December. The dry season is from January to March and the hot season is from April to June. The wettest months are July to October. The relative humidity is also very high during the rainy season.

The rocks are mainly granitic (of granite), and the soil is lateritic (laterite origin) with alluvial soils in the valleys. The main rock formations are 2,600 million years old.

Streams and other water sources



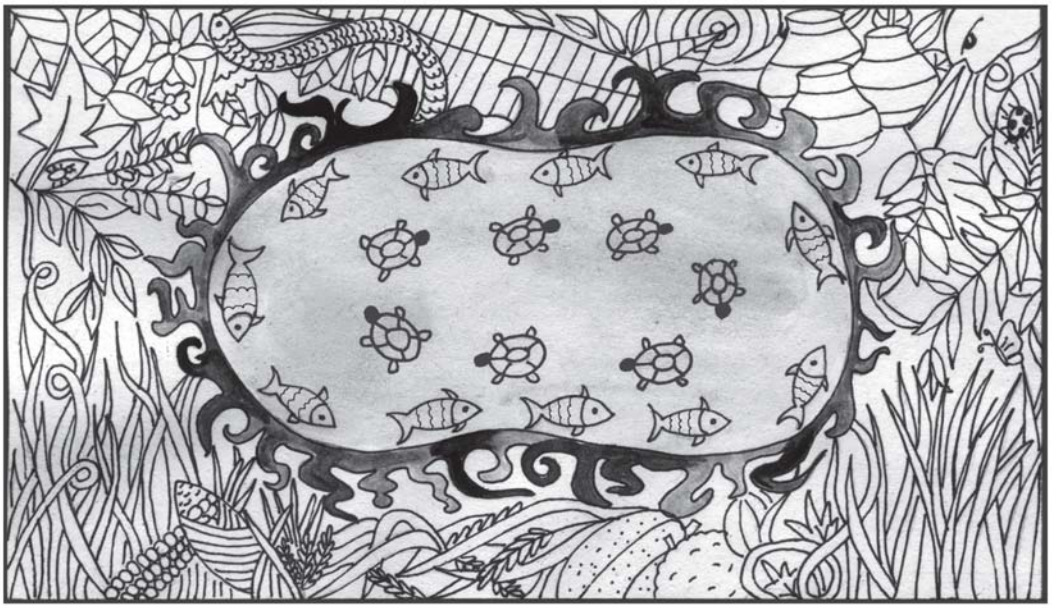
The heavy rainfall ensures abundance of water. The major rivulet is Suvarnavati. There are more than 25 major and minor perennial streams, and many seasonal brooks. Apart from these, there are several springs, and nearly 30 medium and small tanks in the sanctuary area.

Bordering the wildlife sanctuary are two big reservoirs – Gundal and Suvarnavathi. The Bellatha and Krishnaiahna *katte* reservoirs are smaller. These supply water to Chamarajanagar, Kollegal, and Yellandur.

Water - a giver of life!

Water occupies 75% of the earth's surface. It is present as ice (solid), water (liquid), or as vapour (gas). Life first began in water. Without water, life on planet earth would perish. The forests and slopes of the BR Hills are an important watershed area. A watershed (or catchment) is a natural land formation (for example a valley with its surrounding hills) that collects rainwater, which then recharges underground water supplies or flows as streams that eventually feed rivers. Forests act like a giant sponge and soak up the rainwater. They also allow small streams to flow through which would otherwise have dried up. The slopes of the BR Hills are steep. If there were no forest cover, the rain would just fall on the ground with

great force, flow rapidly washing away the soil and fail to recharge ground water. In Himachal Pradesh, there is a wildlife sanctuary called "Shimla Water Catchment Sanctuary"! The town of Shimla gets its water from here because the forests are protected. Thus, forests perform the invaluable ecological service of protecting water.



BRT - vital link between Western Ghats and Eastern Ghats

BRT Wildlife Sanctuary is uniquely located. Here, the Western Ghats project out to the northeast and meet the Eastern Ghats. This extension of the Western Ghats forms a bridge with the Eastern Ghats and the sanctuary is in the middle of this bridge. There is a good mix of the plants and animals of both regions – while the flora and fauna are mostly those found in the Western Ghats, there are elements of the Eastern Ghats too.

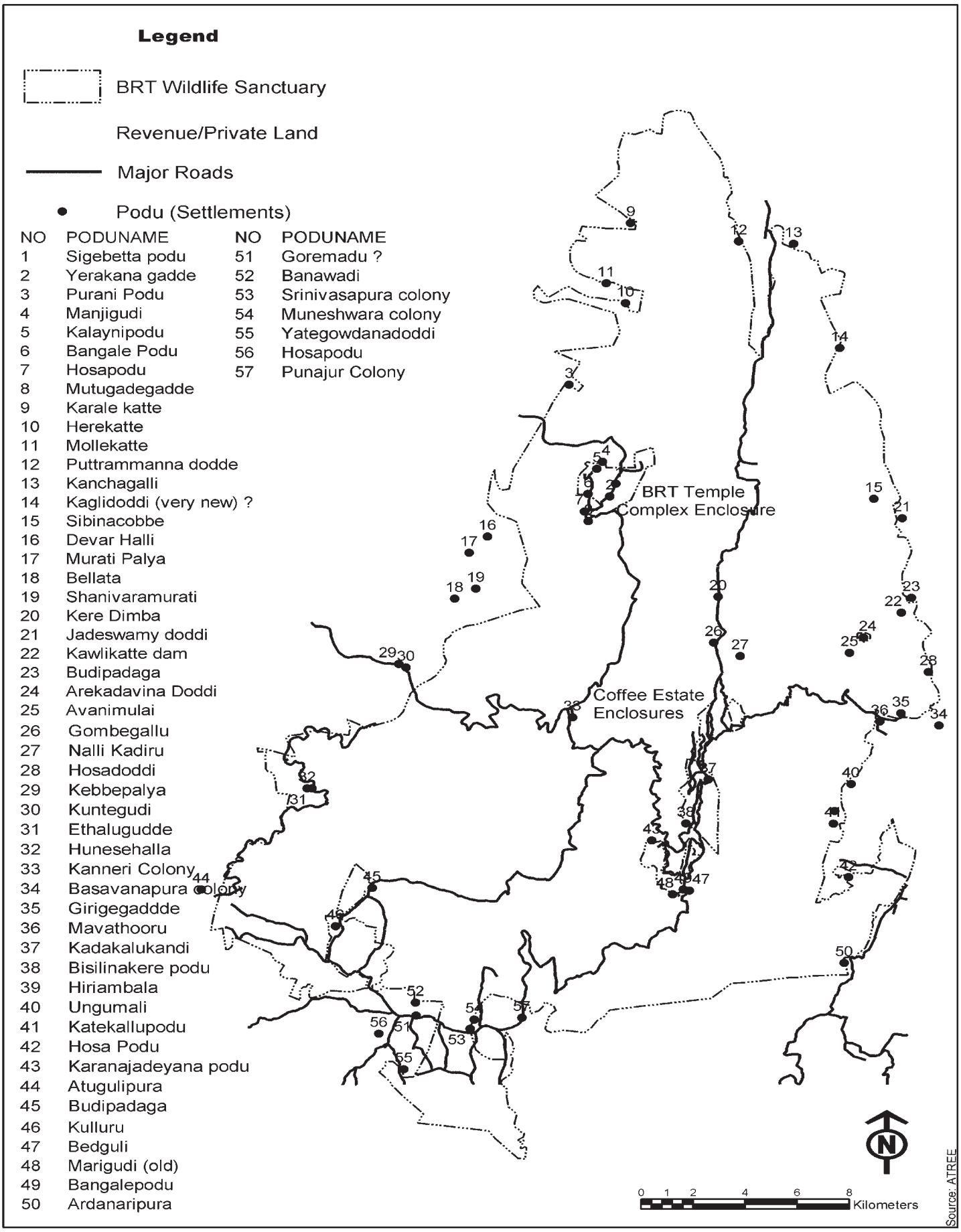
Flora

There are over 1,000 plant species in BRT Wildlife Sanctuary. Trees, shrubs, herbs, orchids, and climbers (lianas) are found here. There are several types of forests and different kinds of vegetation. The diversity of vegetation types is the result of the range of altitudes, soil types, and climatic factors. Fire and human presence have also influenced vegetation. The section on "Flora of the Biligiri Rangan Hills" on page 52 contains a detailed description of each vegetation or forest type.

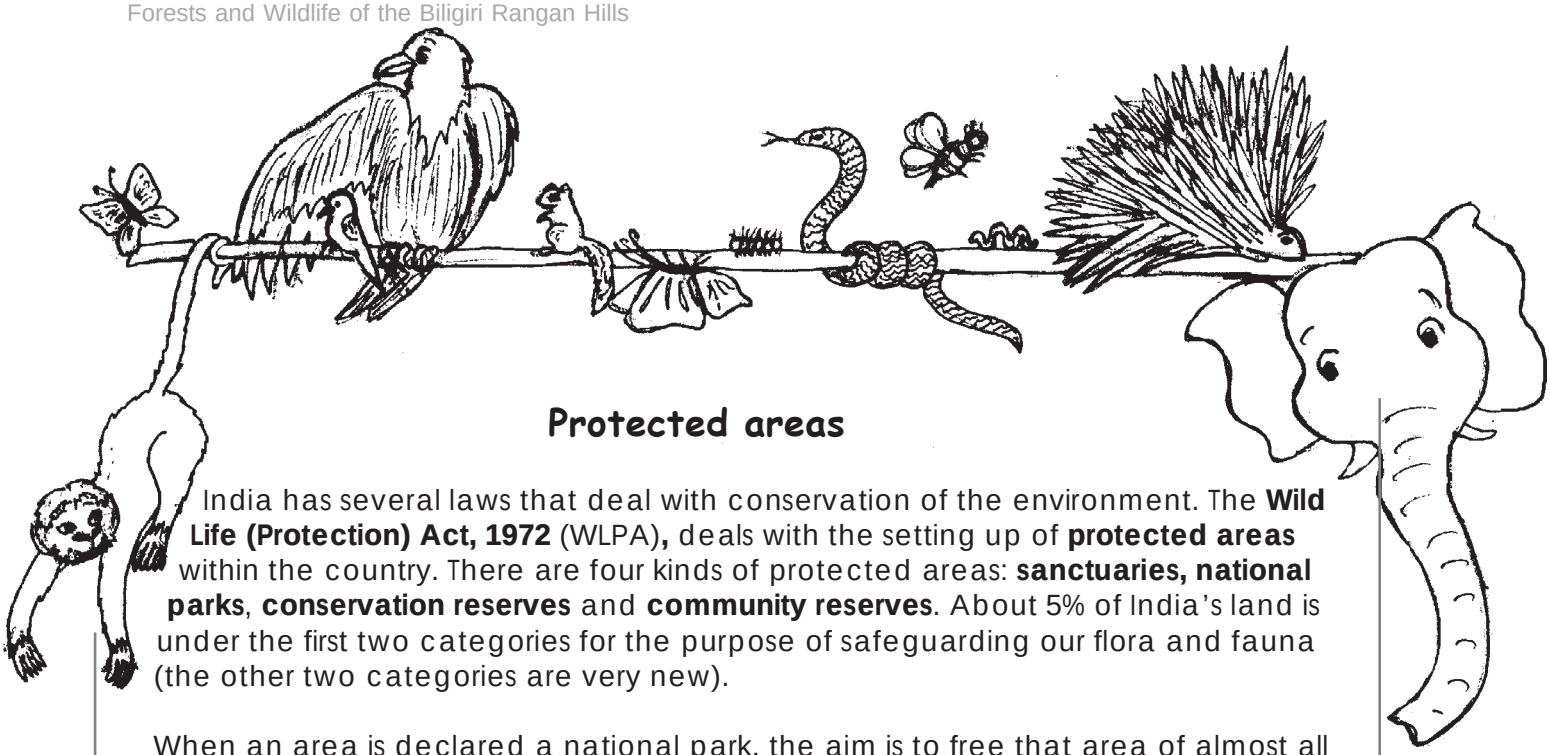
Fauna

The forests of BRT Wildlife Sanctuary were a hunter's haven. The Maharaja of Mysore had a hunting lodge at Kyatadevanagudi. *Khedda* operations were carried out extensively to catch elephants. GP Sanderson describes his hunting experiences in the 19th century, in this area, in his book "Wild Beasts of India". The accounts by RC Morris and Charles McCann also give a good insight into the wildlife of the BR Hills.
There are over 500 recorded animal species here (including mammals, birds, reptiles, amphibians, and butterflies). Documenting the fauna of the sanctuary and making detailed checklists remains unfinished.

BILIGIRI RANGASWAMY TEMPLE (BRT) WILDLIFE SANCTUARY, KARNATAKA, INDIA



NO	PODUNAME	NO	PODUNAME
1	Sigebetta podu	51	Goremadu ?
2	Yerakana gadde	52	Banawadi
3	Purani Podu	53	Srinivasapura colony
4	Manjigudi	54	Muneshwara colony
5	Kalaynipodu	55	Yategowdanadoddi
6	Bangale Podu	56	Hosapodu
7	Hosapodu	57	Punajur Colony
8	Mutugadegadde		
9	Karale katte		
10	Herekatte		
11	Mollekatte		
12	Puttrammanna dodde		
13	Kanchagalli		
14	Kaglidoddi (very new) ?		
15	Sibinacobbe		
16	Devar Halli		
17	Murati Palya		
18	Bellata		
19	Shanivaramurati		
20	Kere Dimba		
21	Jadeswamy doddi		
22	Kawlikatte dam		
23	Budipadaga		
24	Arekadavina Doddi		
25	Avanimulai		
26	Gombegallu		
27	Nalli Kadiru		
28	Hosadoddi		
29	Kebbepalya		
30	Kuntegudi		
31	Ethalugudde		
32	Hunesehalla		
33	Kanneri Colony		
34	Basavanapura colony		
35	Girigegaddde		
36	Mavathooru		
37	Kadakalukandi		
38	Bisilinakere podu		
39	Hiriambala		
40	Ungumali		
41	Katekallupodu		
42	Hosa Podu		
43	Karanajadeyana podu		
44	Atugulipura		
45	Budipadaga		
46	Kulluru		
47	Bedguli		
48	Marigudi (old)		
49	Bangalepodu		
50	Ardanaripura		



Protected areas

India has several laws that deal with conservation of the environment. The **Wild Life (Protection) Act, 1972** (WLPA)**,** deals with the setting up of **protected areas** within the country. There are four kinds of protected areas: **sanctuaries, national parks**, **conservation reserves** and **community reserves**. About 5% of India's land is under the first two categories for the purpose of safeguarding our flora and fauna (the other two categories are very new).

When an area is declared a national park, the aim is to free that area of almost all human activity, so that wildlife is given the maximum protection. If there are villages inside a national park, the government makes plans to relocate them to other sites. Usually such relocations have not been handled well and the villagers have suffered, for example in the Nagarhole National Park.

However, in an area declared as a sanctuary, certain human activities can be continued. For example, livestock are allowed to graze. The District Collector (in consultation with the Wildlife Warden) is supposed to record the rights of people to use the forests inside the sanctuary or pay compensation for those rights that are discontinued.

When the BR Hills area was declared a sanctuary, shifting cultivation practiced by the Soligas was banned. Hunting of wild animals also became an offence. Soligas were given some land to cultivate and were settled in small hamlets called *podus*.

Management of the wildlife sanctuary

Any protected area needs managing. In India, the Forest Department is responsible for this. In BRT Wildlife Sanctuary, the Divisional Forest Officer (DFO) based in Chamarajanagar is in charge, and he is assisted by Range Forest Officers (RFOs), Forest Guards and watchers. The highest officers in charge at the state level are the Chief Wildlife Warden (CWLW) and the Principal Chief Conservator of Forests (PCCF), both of whom are based in Bangalore and look after the wildlife and forests of Karnataka State.

In recent years, there has been a lot of debate on involving local communities in the management of protected areas. This is because having just one government authority (like the Forest Department) to look after such a large, complex area may not be the perfect model. When an area is declared 'a protected area', locals are often left out, and their rights and knowledge of the area are overlooked. This has a negative impact on them and their sense of identity with the protected area. By involving local communities our national parks, wildlife sanctuaries and tiger reserves can be managed more efficiently, to benefit both people and wildlife.

Forest issues

Some of the issues concerning the health of the forests are explored here.

Invasive species

What is an 'invasive species'? As the name suggests, it is an animal or plant that enters an area, and takes over so completely that there is little room for local vegetation or animals. In the sanctuary there are several examples of invasive species or weeds as they are commonly called. They are lantana, eupatorium, and parthenium.

The story of lantana

It is believed that *Lantana camara* (*Roja gida*) was introduced to India from outside in the 19th century. It became popular because of its lovely scented flowers that attracted a lot of butterflies, and its fruit that lured many birds. Now in the 21st century, the plant has taken over a lot of our country's forest area, and become an unmanagable weed. Because it is thick, it does not allow other plants to receive sunlight beneath it. It also has no natural competitor in India, so there is no way to control its growth. Lantana is a huge problem that has reached unmanageable levels in BRT Wildlife Sanctuary, and the Forest Department struggles to control its spread. Being thorny and dense, it is almost impossible to remove. It also produces a lot of seeds that get scattered by birds eating the fruit. It suppresses the growth of native, indigenous plants and has spread all over. Communities in the Male Madeshwara Hills (MM Hills) are now harvesting and making furniture with lantana stalks, with the help of ATREE. Often the harmless introduction of a 'foreign' or exotic plant can result in unpredictable and massive changes to the landscape and vegetation.

Indian lantana

There is a native lantana species found in the BR Hills and other areas, which is indigenous to the region, and not invasive. The Soligas call this plant *joojakki* and its scientific name is *Lantana indica*. Many people plant *Lantana camara* in their gardens, which is only encouraging the spread of this weed. Using local plants like *joojakki*, can help reduce the spread of invasive species.

Forest fires

Fires in forests may be natural or caused by humans. Using fire to manage vegetation is an ancient practice. In the BR Hills too, Soligas have traditionally used fire to manage their forests. These were low intensity, ground fires. They resulted in a lush growth of new grass, and controlled the parasite *uppilu* (*Taxillus tomentosus)* that grows on *nelli* (*Phyllanthus emblicus*) and kills 40 –50% of the infected plants. Fires also keep ticks under control. However, with the spread of lantana, forest fires have become high intensity fires and can reach the canopy of the forest. The harmful effects of such high intensity fires may outweigh their beneficial effects. Scientists say that such high intensity fires affect forest regeneration, reduce fruit productivity, kill seedlings, encourage hardy weeds that grow very well after a fire and may change the overall composition of a forest.

There are strong opposing views on forest fires. It is important to remember that it is a vital factor affecting the health and well being of our forests.

Fires in Indian forests - facts!

- Very few fires in Indian forests are natural. Majority of fires are induced by humans.
- Large areas of tropical forests are affected every year by fire.
- Very little is known about the effects of fire.

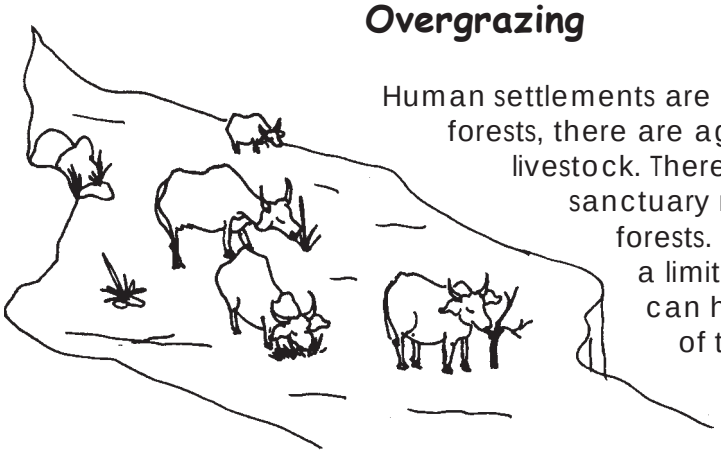
Ill-effects of burning:

- Reduction of some native (local or indigenous) biodiversity, which is not fire tolerant.
- Colonisation by plant species that are fire tolerant.

Benefits of burning:

- Stimulates fresh fodder (grass) growth for livestock grazing.
- Helps collection of non-timber forest products.

Overgrazing



Human settlements are a part of the sanctuary. Along with forests, there are agricultural fields, coffee estates, and livestock. There are about 5000 cattle in the sanctuary now. Many of these graze in the forests. While enough fodder is available for a limited number of animals, overgrazing can have a negative impact on the quality of the forests. It is a sensitive issue but something to be aware of.

A few healthy cattle will be far more efficient than a large number of unproductive cattle.

Researchers report that the greatest negative impact is seen in the foothills, from overgrazing by thousands of cattle belonging to communities settled in 50 – 60 villages on the fringes of the wildlife sanctuary. The core area (deep, remote forest areas) of the sanctuary has better protection. Overgrazing affects regeneration of some plant and tree species. In rare cases, cattle may even infect wild animals with Foot and Mouth disease.

4.2 Flora of Biligiri Rangan Hills

The earlier chapter mentioned that forests are of different types depending on the rainfall, soil, temperature, altitude (height), and geographical location they grow in. In the BR Hills too, there are six broad vegetation types (which include 5 types of forest). Each type is briefly described here.

Structure of a tropical forest

It is important to first get familiar with the structure of a tropical forest, before learning about vegetation types. A typical forest has different layers of vegetation at different heights. The drawing below shows how the trees and plants are generally arranged.

Forest types – Soliga style!

Many indigenous, forest dwelling, tribal communities have their own system of classifying vegetation. This is often similar to the system that scientists devise. Soligas have specific names for the forest types of the BR Hills:

- *Naadu kadu* – open thorn forests (scrub jungle)
- *Male kadu* – thin forests (dry deciduous)
- *Kaanu kadu* – thick evergreen forests (including sholas)
- *Thore kadu* – riparian forests
- *Boli* - grassland

Vegetation (including forest) types in BRT Wildlife Sanctuary

Forest type	Altitudinal range	% of area	Typical species
Naadu kadu Scrub jungle	600-900 m	28%	*kaggali* (*Acacia chundra*), *tubare* (*Diospyros melanoxylon*), *nahinelli* (*Phyllanthus indofischeri*)
Male kadu Dry deciduous	900-1350 m	61%	*bejja* (*Anogeissus latifolia*), *honne* (*Pterocarpus marsupium*), *nayibeete* (*Dalbergia paniculata*), *hitunelli* (*Phyllanthus emblica*)

Forest type	Altitudinal range	% of area	Typical species
Kaanu kadu Evergreen	1200-1600 m	6.5%	*maruli (Schefflera capitata)*, *Xantolis tomentosa*, *mustaka (Meliosma pinnata)*, *arage ambu* (*Gnetum ula)*
Thore kadu Riparian	900-1400 m	-	*kende* (*Elaeocarpus tuberculatus*), *nahi nerale* (*Syzygium malabaricum)*, *baise* (*Salix tetrasperma*)
Kaanu kadu *Shola*	> 1600 m	0.8%	*maruli (Schefflera capitata)*, *Xantolis tomentosa*, *mustaka (Meliosma pinnata)*, *katikarube (Murraya paniculata), kumav (Cinnamomum malabarica)*
Boli Grassland	> 1600 m	3.4%	*porake (Phoenix humilis)*, *handibane hullu* (*Cymbopogon flexuosus)*, *Phlebophyllum kunthianum*
Note: *Nahinelli* and *hitunelli* have been referred to as *nelli* in the rest of the text, since they are closely related.			

The forests in the BR Hills are mainly moist deciduous, dry deciduous and dry scrub forest type, with small patches of evergreen forests, *sholas* (high altitude evergreen forests), and grasslands. There are also plantations of teak, Silver oak, and coffee in the sanctuary. (Refer to map on the next page)

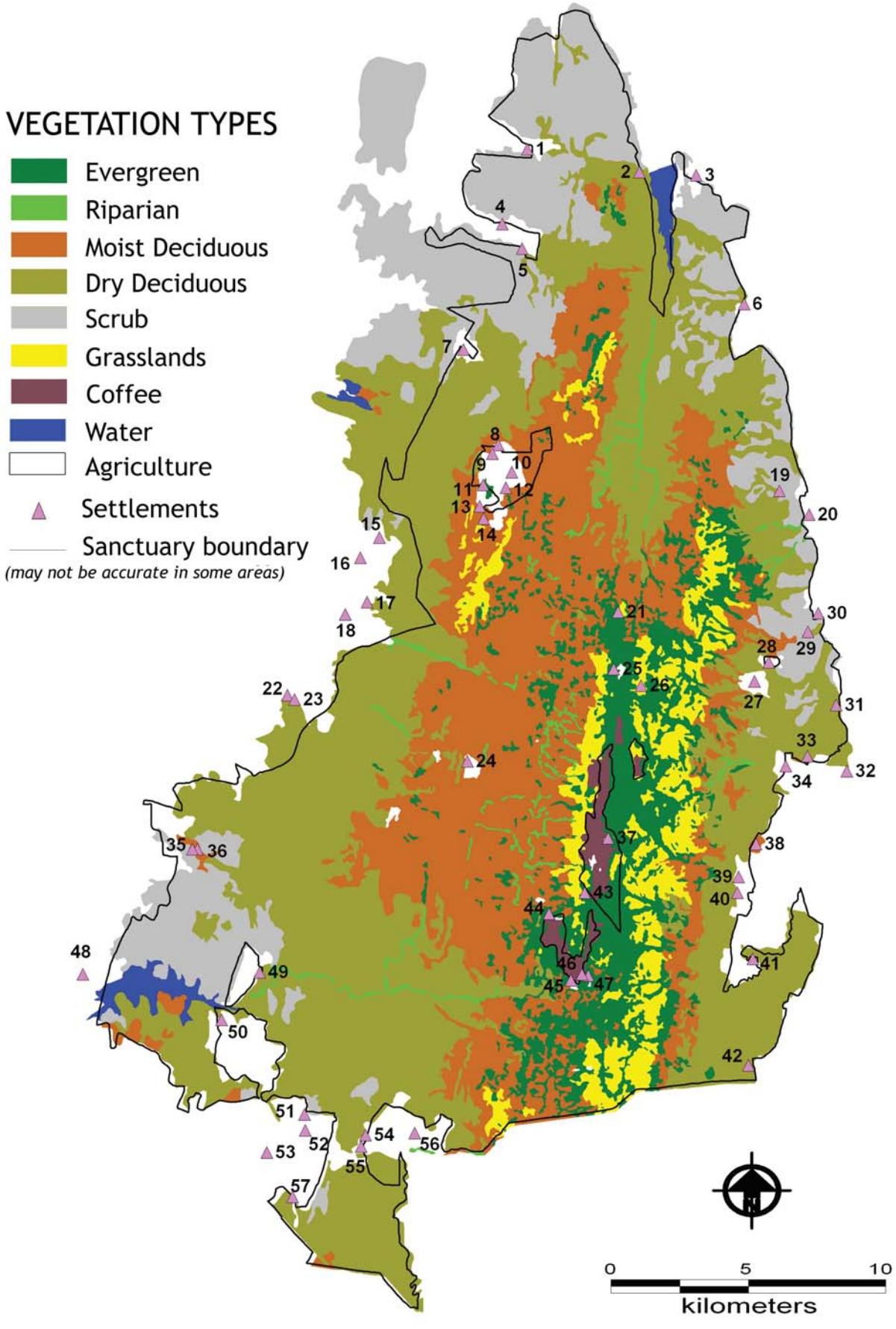
Scrub jungle

As you begin climbing the BR Hills, scrub jungle is the first vegetation type encountered in the foothills. It is found at 600 to 900 msl. Trees are few and are not more than 10-15 m high. Grass and shrubs are quite common here.

Dry deciduous forest

A dry deciduous forest has trees that shed their leaves in summer and become bare. Most of the BR Hills are covered with deciduous forests, found between 900-1350 msl. The canopy is 15-20 m high. Many of the species found here are of great importance as NTFP. Some typical species are *nelli (Phyllanthus emblica), bejja (Anogeissus latifolia),* and *matti (Terminalia crenulata)*. Annual forest fires occur most commonly in the scrub and deciduous forests.

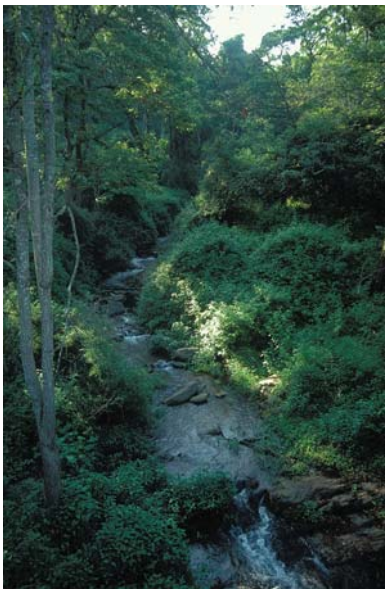
BILIGIRI RANGASWAMY TEMPLE WILDLIFE SANCTUARY



Source: ATREE

Evergreen forest

The trees in these forests do not shed their leaves seasonally and are green all year round. They are found at higher elevations of 1200 – 1600 msl, and occupy only 6.5% of the sanctuary. Very little sunlight filters through the canopy of a good evergreen forest. If the canopy is disturbed and opened, the evergreen forest is gradually replaced by sun-loving weed or deciduous species. Some typical trees in these forests are *kumav* (*Cinnamomum malabarica)*, lianas, *arage ambu* (*Gnetum ula)*, *kesilu* (*Mallotus philippinensis)*, *jenneraku* (*Mallotus tetracoccus)* and *karvadi* (*Persea macrantha*).



Riparian forest

Forests found near streams and rivers are called riparian forests. They are evergreen forests dependent on the high moisture of the soil and are found between 900-1400 msl. In the BR Hills, typical riparian forest trees include *kende* (*Elaeocarpus tuberculatus*) and *baise* (*Salix tetrasperma*). *Nahi nerale* (*Syzigium malabaricum)*, a relative of *nerale* (*jamun*) found here is a rare species of the southern Western Ghats.

Sholas

Sholas are stunted, rich evergreen forests found at elevations of more than 1600 msl. In the Western Ghats, *sholas* occur in the valleys and are surrounded by grasslands. All over South India, *sholas* are a highly threatened forest type and ecosystem. In the BR Hills they occupy only 0.8% of the area. Many uncommon or rare birds like the Tiger bittern and Malabar trogon are found in *sholas*.

Grasslands

Grasslands are a special vegetation type. In the BR Hills, they are found at elevations of above 1600 msl in association with *sholas*. Grasslands provide fodder for several herbivores of the sanctuary. They are also an important habitat for many wild flowers, bird and insect species.

Some interesting trees of the BR Hills

Every plant in the forest has a Soliga name! These existed long before botanists set foot here to name the trees. Soliga lives are intertwined with trees. The names given as the headings are the Soliga names.

Bejje See Plate 1

Kannada/Soliga name: *Dinduga/bejje* or *bejjalu*
English/Common name: Axle-wood
Scientific name: *Anogeissus latifolia*
Flowering: September
Fruiting: December
Special features: Dominating deciduous tree, utilised by Soligas as a strong wood in house construction. Earlier, gum (used in pharmaceutical industry) was collected and sold by them.

Matti See Plate 1

Kannada/Soliga name: *Matti*
English/Common name: Indian laurel
Scientific name: *Terminalia crenulata*
Flowering: April
Fruiting: December
Special features: Dominating deciduous tree, important for bees to collect pollen and nectar. About 4-5 % of trees have the property of storing 'water' in humps on the main trunk. The Soligas are aware of this, and when very thirsty with no other source of water in the forest, tap water from here. Large trees store upto 50 litres of water!

Nelli See Plate 1

Kannada/Soliga name: *Nelli*
English/Common name: Indian gooseberry/*amla*
Scientific name: *Phyllanthus emblica* and *Phyllanthus indofischeri*
Flowering: February and March
Fruiting: November and December
Special features: A very important tree, details of which are given in Chapter 6, "Non-Timber Forest Products".

Bende See Plate 1

Kannada/Soliga name: *Nayibende/bende*
English/Common name: Pula
Scientific name: *Kydia calycina*
Flowering: October
Fruiting: December
Special features: A timber tree, the bark is a favourite with elephants. Soligas prefer this as firewood. Sustains bee populations through the lean period, since they get nectar from flowers in October when there are not too many trees in bloom.

Dadsalu See Plate 1

Kannada/Soliga name: *Dadsalu*
English/Common name: Dhaman

Scientific name: *Grewia tiliaefolia*
Flowering: April
Fruiting: July
Special features: Timber and fuelwood. Elephants like the bark of this tree. Fruits are edible, and are an important source of food for birds.

Honne See Plate 1

Kannada/Soliga name: *Honne*
English/Common name: Indian kino tree
Scientific name: *Pterocarpus marsupium*
Flowering: May and June
Fruiting: October and November
Special features: Important timber tree. Leaves are excellent fodder. Flowers profusely providing bees with nectar. Soligas time their honey harvesting with the flowering of this species since they believe that the honey is maximum during this time. Tree has bright red coloured resin that looks like blood!

Arale See Plate 1

Kannada/Soliga name: *Arale/ alale*
English/Common name: Chebulic myrobalan
Scientific name: *Terminalia chebula*
Flowering: March and April
Fruiting: October and November
Special features: Fruit is an important constituent of the ayurvedic preparation *triphala.* Medicinal tree for the Soligas, the fruits are used as a cure for stomach ache and stomach ulcers. An important source of nectar for bees.

Dolli See Plate 1

Kannada/Soliga name: *Dolli*
English/Common name: Kumbi
Scientific name: *Careya arborea*
Flowering: March
Fruiting: May
Special features: Beautiful white flowers pollinated by bats. Fruiting coincides with the mating season of elephants. Elephants eat the round ball-like fruits.

Chowve See Plate 2

Kannada/Soliga name: *Savaya/chowve*
English/Common name: Udal
Scientific name: *Sterculia villosa*
Flowering: January and March
Fruiting: April
Special features: An attractive tree that is full of flowers between January and March, when the tree is leafless. Soligas claim that the tree harbours a lot of ticks. In Basavanakadu, the *chowve* tree is worshipped.

Nerale See Plate 2

Kannada/Soliga name: *Nerale*
English/Common name: Black plum or *jamun*
Scientific name: *Syzigium cumini*
Flowering: March

Fruiting: June
Special features: Medicinal tree. Ripe fruit is edible and is a favourite of bears, who are important dispersal agents of the seeds. The fruits are also collected by people as NTFP. It is an important nectar source for bees.

Karvadi See Plate 2

Kannada/Soliga name: *Karvadi*
Scientific name: *Persea macrantha*
Flowering: February and March
Fruiting: April and May
Special features: Dominant evergreen tree that is tall and handsome. Distinguishing feature is the white and shiny underside of the leaf. Tree populations have drastically reduced and it is an endangered tree species.

Beete See Plate 2

Kannada/Soliga name: *Beete*
English/Common name: Indian rosewood
Scientific name: *Dalbergia latifolia*
Flowering: March
Fruiting: June
Special features: Valuable timber tree with dark purple-brown wood.

Kesilu See Plate 2

Kannada/Soliga name: *Kumkumada mara/ kesilu*
English/Common name: Kamala or Kumkum tree
Scientific name: *Mallotus phillipensis*
Flowering: January and February
Fruiting: March and April
Special features: Fruits yield a red powder which is used for dyeing silk. Elephants eat the bark.

Antwalkai See Plate 2

Kannada/Soliga name: *Antwalkai*
English/Common name: Soapberry tree
Scientific name: *Sapindus laurifolia*
Flowering: November to December
Fruiting: February to March
Special features: Important non-timber forest tree discussed in Chapter 6.

Kende See Plate 2

Kannada/Soliga name: *Kende*
English/Common name: Deccan olive
Scientific name: *Elaeocarpus tuberculatus*
Flowering: April to May
Fruiting: November
Special features: Delicate, white flowers. Highly medicinal, and often called "*nanjankuntu*". Paste made by rubbing wood on stone, is used to treat coughs, colds and body aches and general conditions of '*sheetha*'.

Tega See Plate 2

Kannada/Soliga name: *Sagwani/ tega*
English/Common name: Teak
Scientific name: *Tectona grandis*
Flowering: April

Fruiting: November
Special features: Important timber tree. Leaves are used as plates by Soligas in the forest, and also stitched with twigs and made into umbrellas for the rains. Tender leaves stain hands bright red when crushed.

Sampige See Plate 3

Kannada/Soliga name: *Sampige*
English/Common name: Champak
Scientific name: *Michelia champaka*
Flowering: May
Fruiting: November
Special features: Tree with deep religious significance for the Soligas. Flowers are fragrant, used for worship, and worn by women in their hair.

Jala See Plate 3

Kannada/Soliga name: *Jala*
English/Common name: Taloora lac tree / lac tree of South India
Scientific name: *Shorea talura*
Flowering: April
Fruiting: September
Special features: Important tree, worshipped in some parts of the BR Hills. Soligas wear the aromatic flower bunches in their ears and hair.

Buruga See Plate 3

Kannada/Soliga name: *Buruga*
English/Common name: White silk cotton
Scientific name: *Bombax ceiba*
Flowering: March to April
Fruiting: June to July
Special features: Pollinated by birds that come for the nectar contained in the large, showy flowers. Cotton is collected on a small scale by Soligas for their own use and for local sale.

Kadugeru See Plate 3

Kannada/Soliga name: *Gudde geru / kadugeru*
English/Common name: Marking nut tree
Scientific name: *Semecarpus anacardium*
Flowering: April
Fruiting: June to July
Special features: Outer covering of nut yields a dye used traditionally by washerfolk to mark clothes. Fruit is eaten by Soligas. Porcupine, deer and hare also feast on the fallen fruit at night.

Gandige See Plate 3

Kannada/Soliga name: *Srigandha / gandige*
English/Common name: Sandal
Scientific name: *Santalum album*
Flowering: April to May
Fruiting: June to July
Special features: Valuable tree that yields sandal oil used in perfumes. The fragrant wood is traditionally used for carving. Tree is a partial root parasite. Sandalwood poaching was rampant in the BR Hills.

Muthuga See Plate 3

Kannada/Soliga name: *Muthuga*
English/Common name: Flame of the forest
Scientific name: *Butea monosperma*
Flowering: April
Fruiting: August
Special features: The flowers are bright orange and bloom in summer. Leaves are harvested by the Soligas to make leaf plates for their own use and for sale locally.

Kanchavala See Plate 3

Kannada/Soliga name: *Kanchavala*
English/Common name: Purple bauhinia
Scientific name: *Bauhinia purpurea*
Flowering: April to May
Fruiting: October
Special features: Attractive mauve flowers. Buds used as a vegetable.

Kakke See Plate 3

Kannada/Soliga name: *Kakke*
English/Common name: Indian laburnum
Scientific name: *Cassia fistula*
Flowering: April
Fruiting: November
Special features: Bright yellow flowers hang down like pendulums. Fruit pulp is a favourite of bears. The dried fruit pulp is used as a laxative to cure constipation. The seeds are roasted and eaten like peanuts.

Kinchaga See Plate 3

Kannada/Soliga name: *Kinchaga*
English/Common name: Spiny coral tree
Scientific name: *Erythrina suberosa*
Flowering: April to May
Fruiting: July
Special features: Tree has thick, corky bark and its branches can be used as swimming floats. Pollinated by birds.

See foldout “Paradise Tree” at the end of the handbook

Bamboo - the giant grass!

Bamboo is not a tree as many people think but a giant grass. The BR Hills used to have a lot of bamboo. Over the last 60 years, 90% of the bamboo has been lost largely due to industrial use in paper and pulp industries. This has resulted in reduction of the food base for wildlife, especially elephants who love to feed on bamboo. It has also resulted in loss of traditional skills of Soligas to work with bamboo. Some important bamboo species of the BR Hills are *he-bidiru* (*Bambusa arundinacea*) and *kir-bidiru* (*Dendrocalamus strictus)* Today, small patches are found in Gundala *halla*, Neerdurgi *halla*, Nellikadaru, and Gundimala. It is crucial that natural populations of bamboo are restored to the BR Hills.

Plate 1

Bejje

Matti

Nelli

Bende

Dadsalu

Honne

Arale

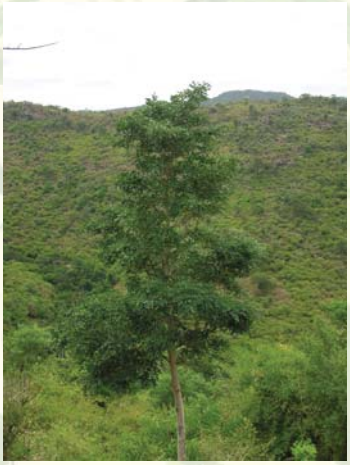
Dolli

Plate 2

Chowve

Nerale

Karvadi



Beete

Kesilu

Antwalkai

Kende

Tega

Plate 3

Sampige

Jala

Buruga

Kadugeru

Gandige

Muthuga

Kanchavala

Kakke

Kinchaga

4.3 Fauna of the Biligiri Rangan Hills

The forests of BRT Wildlife Sanctuary are home to a number of different animals. The different types of forests and ecosystems found in the sanctuary (evergreen forest, dry forest, scrub forest, *shola*, grasslands and lakes) harbour over 25 species of mammals, 245 species of birds, 22 species of reptiles, 11 species of amphibians and 145 species of butterflies.

The Soligas have a rich tradition of folklore about the wildlife that exists around them. There are many stories and songs that they narrate, especially the older people, that indicate how observant they are of the wildlife around them.

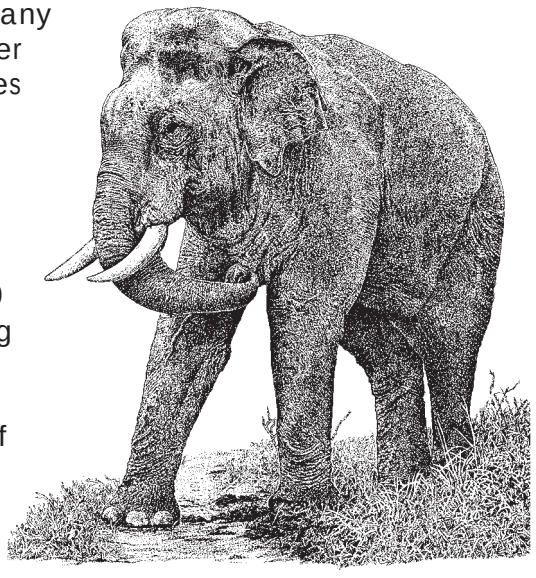
Here are brief descriptions and folklore connected with some of the fauna of BRT Wildlife Sanctuary. They do not cover all the species found here. Against each species name, its protection status under the Wild Life (Protection) Act, 1972, is given. The Act lists species in Schedules I, II, III, and IV, indicating levels of protection (in decreasing order) afforded to them by the law. For example, tiger and gaur are Schedule I species. This means the highest level of protection is afforded to them.
The names of the animals are given in Soliganudi (wherever known) and in Kannada.

Some mammals of BRT Wildlife Sanctuary

Asian elephant (Schedule I)
Elephas maximus
Soliga name: *Aane*
Kannada: *Aane*

GP Sanderson, an Englishman, came to India in 1864 and spent 13 years in elephant catching operations and in sport in the forests around Mysore and in Bengal. He traversed the BR Hills and vividly described his hunts, the forests and the Soliga trackers in his book “Wild Beasts of India”. Read on to discover what he has to say about the number of elephants in the BR Hills!

“Herds of elephants usually consist of from thirty to fifty individuals, but much larger numbers, even one hundred, are by no means uncommon. When large herds are in localities where fodder is not very plentiful, they divide into parties of from ten to twenty; these remain separate, though within two or three miles of each other. But they all take part in any common movement, such as a march into another tract of forest. The different parties keep themselves informed at all times of each other’s whereabouts chiefly by their fine sense of smell.”



This majestic animal, the largest land mammal in India, has faced many threats that have brought down its population in the country to about 27,000 today. The major threats it has faced are poaching for ivory and habitat loss.

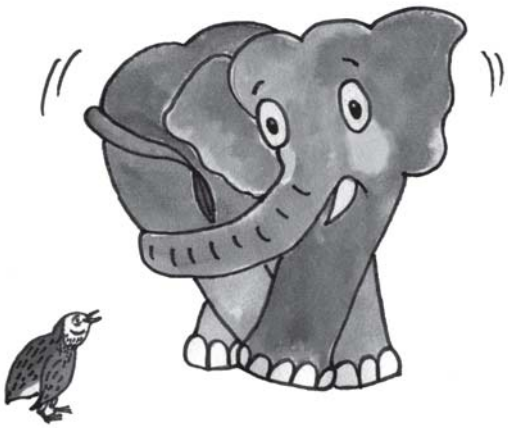
Elephants migrate over long distances in search of food and water. They traverse the same forest patches (called corridors) over many years. Serious problems arise when these corridors are destroyed by humans for various development

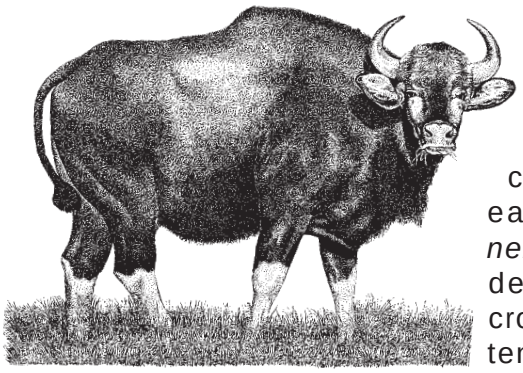
projects (roads, railway lines, dams, canals, etc.) or for human habitation. Elephants are known to raid fields and destroy crops, resulting in human-wildlife conflicts that sometimes end in the elephant's extermination.

The place where Bangalipodu stands today was a corridor for elephants.

When an elephant is serious about attacking or charging at a victim, it will keep its trunk coiled out of the way. In this way it protects a part of its body (the trunk), which it uses for many purposes: breathing, trumpeting, drinking, showering water or mud over itself, breaking off branches and taking food to its mouth.

Soliga folklore includes an interesting story about the elephant and the quail. The quail, a largely ground dwelling bird, is never trampled upon by the mighty elephant. That is because it knows a secret about the elephant! It knows that the elephant's testicles are not outside the body (as is usually the case with most mammals), but concealed under its two-domed forehead. The quail teases an approaching elephant and dares it to trample over it with the threat of revealing its secret! An interesting tale that reveals some natural history observations: the quail is largely found on the ground and the elephant's testicles are inside its body (though not in its forehead, but in the abdomen).



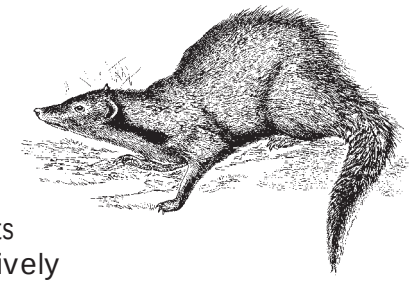


Gaur (Schedule I)
Bos gaurus
Soliga name: *Kaati*
Kannada*: Kadu emmai* (female)*, kadu kona*(male)*, kadu yethu, kartee*

The food of the gaur like that of the elephant, consists mainly of grasses. Additionally, gaur also eat bamboo leaves, twigs, and the bark of trees like *nelli*. While elephants have tried to adapt to a decreasing food base by raiding plantations and crops surrounding forests, gaur, being shy animals, tend to confine themselves to the forests.

One of the big threats gaur have faced is disease. When disease-ridden domestic cattle feed in the forests, gaur often fatally contract the same disease. Sanderson reported that an outbreak of *dod-roga* killed two-thirds of the gaur population in the BR Hills in 1867!

Stripe-necked mongoose
Herpestes vitticollis
Soliga name: *Dodda keera/male keera*
Kannada: *Kemp kerree*



This mongoose is found in dry and moist deciduous forests. Its preferred habitat is along streams and rivers. It feeds extensively on crabs, fish and insects and occasionally hunts black-naped hare and mouse deer. Like the civet, it uses a spray of foul-smelling secretion as a defense measure.

Sloth bear (Schedule I)
Melursus ursinus
Soliga name: *Karadi*
Kannada: *Karadi*

The sloth bear has formidable claws that it uses for digging up insects or tearing termite mounds. The sole of the bear's foot is very much like that of human beings, only a little shorter and broader. Bears help in regeneration of *Cassia fistula* (*kakke* in Soliganudi). The pods of this tree contain a sweet, black pulp between the seeds. Bears are particularly fond of this gum.

Bears are generally peace-loving animals and are not known to be aggressive unless disturbed at very close quarters all of a sudden. In such instances, aggressive attacks by bears can be very dangerous.

The sharp sense of smell that bears have compensates for their weak eyesight and hearing. This acute sense helps them locate honey in trees and insects that are deep in the ground. They can even detect the presence of human beings in the vicinity!

Tiger (Schedule I)
Panthera tigris
Soliga name: *Dodda nayee*
Kannada: *Huli*

The tiger is called *dodda nayee* (big dog) by the Soligas. They believe that any tiger in the vicinity hearing itself being referred to as a 'dog' will slink away in shame as it is a demeaning comparison! This probably is a reflection of the fact that the tiger is a feared animal even though there has never been a man-eater in the BR Hills for as long as people can remember. (However there are recorded instances of man eaters in Dimbum and other close-by areas in the 1930s and 40s).

The tiger prefers to hunt large deer like the sambar and the cheetal. However, it is also known to hunt smaller animals, even fish.

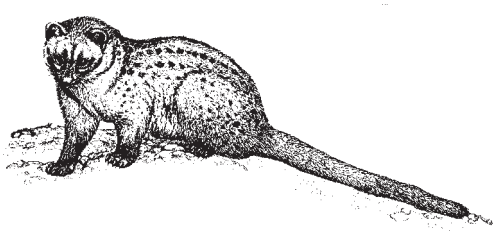
The number of tigers in India declined drastically due to poaching, habitat destruction and reduction of its prey populations. In 1973, the government started Project Tiger in some selected protected areas. As a result the animal received some amount of protection. Today, there are only about 3,750-4,000 tigers in the wild.

Stop press!

The tiger has hit headlines in the recent past. Sariska, a sanctuary in Rajasthan has lost all its tigers due to poaching. A countrywide alert has been sounded. The Government is probing into the reasons for the disaster in Sariska, a tiger census is being conducted in many parts of the country, and a Tiger Task Force has been set up by the Prime Minister to suggest ways to effectively conserve wildlife.

In the BRT Wildlife Sanctuary, a recent census taken by the Centre for Cellular and Molecular Biology, Hyderabad (where faecal samples were tested for DNA), indicated the presence of a minimum of 17 tigers. The forest department, however, says there are over 25 tigers in the sanctuary.

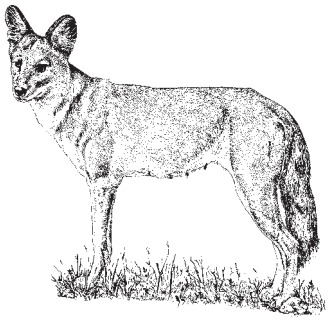
Common Palm civet (Schedule II)
Paradoxurus hermaphroditus
Kannada: *Mara bekku*



Soligas believe the civet to be a kind of cat. This belief, however, is not far off the mark, as the cat family is the closest relative of the civet family! (Even in English it is called a civet cat!) The civet belongs to the family *Viverridae*, while cats such as the tiger and leopard belong to the family *Felidae*.

The palm civet spends the day on trees and hunts at night for its food, which consists of birds and small mammals. It also eats fruit and is known to raid coffee plantations and feast on coffee berries The palm civet is also known as the toddy cat as it raids toddy-tappers pots. When some species of civets face extreme danger, they use a potent defence – stink-glands! A very foul smelling and acrid fluid is sprayed on the attacker, which can even cause blindness.

Dhole or the Asiatic wild dog (Schedule II)
Cuon alpinus
Soliga name: *Seelnayi, bette gara*
Kannada: *Kadu nai, chira nai*



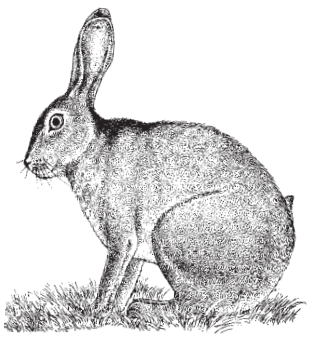
The dhole is a social animal and hunts in packs of 6 to 7. It has an enormous appetite and consumes large quantities of meat. It is known to start eating its prey even before it is dead.

The dhole produces a variety of different sounds (though it does not bark) and uses a peculiar whistling call to communicate with its pack if it gets separated. Another peculiar behaviour of this species is the use of community latrines. Many dholes belonging to a pack defecate at the same spot, maybe to communicate their presence to neighbouring packs!

Indian giant squirrel
Ratufa indica
Soliga name: *Kendaluma/ kendaluga*
Kannada: *Keshalilu*

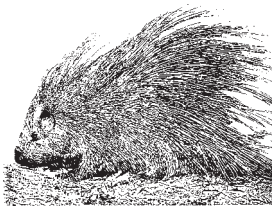
Giant squirrels live in moist deciduous and evergreen forests. They are arboreal creatures and are seldom seen on the ground. You may see these creatures leap from one tree to another with limbs outspread. It often sleeps draped over a branch with its tail hanging down. Giant squirrels build large, globular nests of twigs and leaves. Part of the nest is used as a sleeping chamber and part as a section for the young.

Black-naped hare
Lepus nigricollis
Soliga name: *Mola*
Kannada: *Mola*



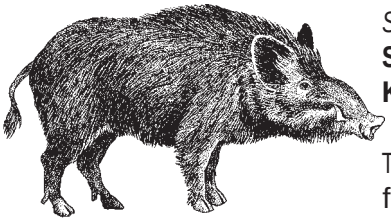
The hare is found in open scrub, short grassy patches and overgrazed forestland. Their colouration helps them evade predators. Hares exhibit 'double digestion'. They first expel wet pellet-shaped droppings, which are then eaten and expelled again in a dry form!

Indian porcupine (Schedule IV)
Hystrix indica
Soliga name: *Mullandi*
Kannada: *Yed, mullu handi*



The quills of the porcupine make it distinct. The quills are actually a modification of the hair on the back of the animal. These are used in defense, and are held erect and rattled to ward off the attacker. If the danger persists, then the porcupine rushes backwards and embeds its quills in the victim's flesh!

Porcupines eat roots, fruits and grain. They have a habit of eating the bark of trees at ground level. The root and the bark of *Randia dumetorum* (*karre* in Soliganudi) are one of the favourite foods of the porcupine.



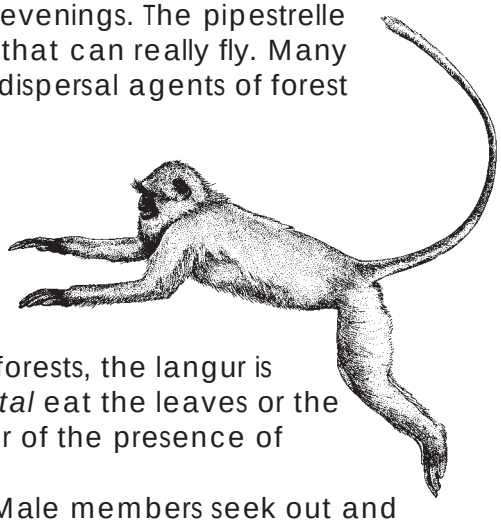
Wild pig (Schedule III)
Sus scrofa
Soliga name: *Kaadandi*
Kannada: *Kadu handi*

The wild pig is a widely distributed animal. It is omnivorous and feeds on crops, roots, tubers, insects and snakes. It loves the maize cultivated in the BR Hills.

Indian pipestrelle
Pipistrellus coromandra
Kannada: *Bavali hakki*

This little creature flies swiftly and erratically in the late evenings. The pipestrelle belongs to the bat family. Bats are the only mammals that can really fly. Many species of bats eat fruit, making them important seed dispersal agents of forest trees. Pipestrelles eat insects.

Common or Hanuman langur (Schedule II)
Semnopithecus entellus
Soliga name: *Musuga*
Kannada: *Mooso, moosoowa, dodda manga*



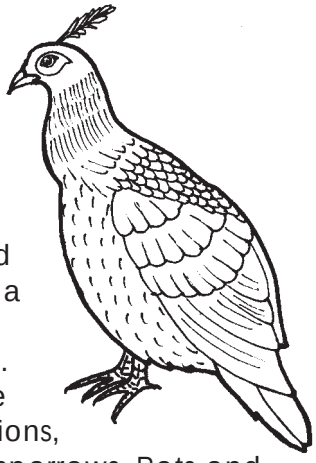
Hindus venerate the common langur as a god. In the forests, the langur is often in the company of *chital* (Spotted deer). The *chital* eat the leaves or the fruit dropped by the langurs, and each warns the other of the presence of predators.
The common langur is known to practice infanticide. Male members seek out and kill children fathered by other males, to improve their success in breeding.

Deer


Barking deer

Of the nine species of deer found in India, three are commonly seen in the forests of BR Hills: *chital* (Spotted deer; *Axis axis*), *sambar* (*Cervus unicolor*), and Barking deer (*Muntiacus muntjak*). All three are listed in Schedule III.
Most male deer have antlers, which are solid and branched. These antlers are shed annually and new ones grow back very quickly. Male deer battle each other at breeding time for access to females.

Birds



Of the 1225 bird species found in India, over 200 species are currently found in BRT Wildlife Sanctuary.

Why are birds important to human beings? Would humans survive without birds? Probably not! Birds have many uses, besides being part of the web of life. Birds help farmers through pest control. Insect-eating birds are known to eat locusts, moths, caterpillars and termites that destroy crops. In the 1960s, Chairman Mao launched a sparrow elimination drive in China blaming the bird for large scale crop damage. Hundreds of thousands of sparrows were destroyed. The farmers heaved a sigh of relief, but not for long, because in the years that followed, there was a dramatic increase in insect populations, which caused far greater crop loss than was allegedly caused by sparrows. Rats and mice, which annually destroy between 10% to 25% of our total food grains, would consume a far greater amount if it were not for owls, hawks and other birds of prey that control their populations.

Birds help trees regenerate by acting as agents of pollination and by dispersing seeds. Birds pollinate the flowers of the silk cotton tree. The large red flowers of this tree attract a variety of birds that carry the pollen of one flower to another on their feathers when they visit the flowers for their nectar. This is an important function as the tree is useful to humans. The wood of the silk cotton tree is used in the match industry. Birds also help in tree regeneration by dispersing seeds after eating the fruit. Bulbuls and barbets eat and then disperse the fruit of the sandalwood tree and thus help in its regeneration.

Some birds like vultures, are scavenger birds. They eat the flesh of dead animals. This is an important function as they help minimise the presence of dead carcasses in forests and in cities. Other birds, especially some aquatic species, provide free fertilizer to the farmers through their droppings. For example, in Kokkarebellur in Mandya district in Karnataka, the villagers protect pelicans and painted storks that visit their village, partly due to the free natural fertilizer that the birds give them.

Migration

Some birds travel long distances (for example from Central or Northern Asia to the Indian subcontinent) to escape cold climates or in search of food. Some species of birds travel shorter distances for the same reason (for example, from higher altitudes to places lower down). Scientists are still studying amazing facts linked to migration: some birds visit the same place year after year; some even visit the same tree! It has been found that birds are guided to their destination by many factors: landmarks, an internal magnetic compass, the position of the sun and stars!
Some migratory birds that visit the sanctuary are the Ashy drongo and the Golden oriole.

Some common birds of BRT Wildlife Sanctuary

Redwhiskered bulbul See Plate 4
Pycnonotus jocosus
Soliga name: *Kottupidiga*
This bulbul is commonly seen in the sanctuary. You can recognise it by its black crest and a red patch just near the eye. It is found in pairs or in flocks and has a lively whistling call described by the Soligas as Ko-ttu-bi-di.

Indian cuckoo See Plate 4
Cuculus micropterus
Soliga name: *Kethana hakki*
You may have heard this bird more often than you have seen it. Its four-note call (sounds like "one more bottle"/kwer-kwah...kwah...kurh/ bo.ko.tako) is heard between April and August. It is often found at the top of forest trees and is a solitary bird. It eats insects and loves hairy caterpillars!
The Indian cuckoo lays its eggs in the nests of drongos, mainly the Ashy drongo and the Black drongo.

Parasitic behaviour in birds

Many kinds of cuckoos do not build their own nests. They lay their eggs in the nest of another bird (called the host) and are hence free of the responsibilities of bringing up young cuckoos. The parasitic behaviour of cuckoos shows how well this behaviour has developed. If the cuckoo is larger than the host bird, the egg it lays is comparatively smaller! The egg that is laid resembles the egg of the host bird even in colouration and markings! The fledgling cuckoo resembles the fledglings of its hosts and even calls like them! In some species of cuckoos, if the newly hatched cuckoo is considerably larger than the fledglings of the host bird, then the fledgling cuckoo pushes out the host's fledgling, and sometimes even an egg from the nest. By doing this, it makes sure that it will have no competition in getting food from its host parents while growing up!

Oriental honey buzzard See Plate 4
Pernis ptilorhyncus
Kannada: *Jen alawa*
The honey buzzard is a large bird with a pigeon shaped head, with a crest that is not very prominent. Look for this bird when you are in an area that has beehives. Its favourite food is honey and the larvae of bees! You may see it soaring high in the sky as it looks for hives. You may even hear its loud single high-pitched whistle *wheeew*. Its nest is usually made of sticks in a large leafy tree.

Drongos See Plate 4
Soliga name: ***Karali***
Drongos are a family of medium-sized insect-eating birds. In the BRT Wildlife Sanctuary you can easily see the **Racket-tailed drongo (***Dicrurus paradiseus*), the migratory **Ashy drongo** (*Dicrurus leucophaeus)*, and the **Bronzed drongo** (*Dicrurus aeneus*). The Racket-tailed drongo is recognisable by its long tail feathers that are racket-shaped at the end. It is a bird that likes company and is often found in mixed groups. The Ashy drongo is a good mimic and has a variety of calls, some of them pleasant to the ear and some of them harsh. The Black drongo is often seen on bare treetops or on telegraph poles. From that point, it suddenly flies up swiftly to catch insects in mid-air.

Indian jungle nightjar See Plate 4
Caprimulgus asiaticus
Soliga name*: Kavutana hakki*
These are birds that are difficult to spot during daytime, but heard at night. That is because these are nocturnal birds like the owl. During the day, they roost on rocky ground or on the branches of trees and remain motionless. They eat winged insects. The Indian jungle nightjar's calls are: a whistling *chuckoo...chuckoo* and a repeated *tuck.tuck.tuck*

Other birds of BRT Wildlife Sanctuary

Crow pheasant See Plate 4
Centropus sinensis
Soliga name: *Kemboota*
Size: Crow +
Call: Deep *coop-coop-coop* repeated 6 or 7 and up to 20 times. Also makes a variety of harsh calls.
Diet: Caterpillars, large insects, snails, lizards, birds' eggs, mice
Habits: One of the non-parasitic cuckoos. Terrestrial; when feeding, stalks along the ground or hops on low branches.
Social unit: Single or in pairs.

Brown-headed barbet See Plate 4
Megalaima zeylanica
Soliga name: *Kuttrakki*
Size: Bulbul +
Call: *Kutroo-kutroo-kutroo; c*alls continuously in summer.
Diet: Mainly fruits (wild figs). Also eats cultivated fruits (coffee berries) **Habits:** Prefers forested areas, but is also seen i n gardens and parks.
Social unit: Pairs or small groups.

Vernal hanging parrot See Plate 5
Loriculus vernalis
Size: Sparrow +/-
Call: Sharp, trisyllabic *chee-chee-chee*.
Diet: Fruit and flower nectar.
Habits: Often seen with head downwards. Usually seen on eucalyptus trees near the VGKK campus.
Social unit: Single or small groups.

Emerald dove See Plate 5
Chalcophaps indica
Soliga name: *Aralakki*
Size: Pigeon -
Call: A soft deep *hoon*.
Diet: Seeds and berries.
Habits: Feeds on the ground. Flight is swift, strong and direct.
Social unit: Single or in pairs.

Plate 4

Redwhiskered bulbul

Indian cuckoo

Oriental honey buzzard

Racket-tailed drongo

Bronzed drongo

Indian jungle nightjar

Crow pheasant

Brown headed barbet

Plate 5

Vernal hanging parrot

Emerald dove

Spotted dove

Asian fairy bluebird

Rufous treepie

Scarlet minivet

Hill myna

Spotted dove See Plate 5
Streptopelia chinensis
Soliga name: *Sore*
Size: Pigeon -
Call: *Kroo-kruk-krukroo…..kroo-kroo-kroo* the number of final *kroos* varying from 3 to 6.
Diet: Grain
Habits: Fairly tame and freely enters gardens. Flight is swift and strong.
Social unit: Pairs or groups.

Asian fairy bluebird See Plate 5
Irena puella
Size: Myna +
Call: *Whit-tu* or *peepit* repeated every few seconds with a jerking of the tail.
Diet: Mainly fruits, berries, flower nectar. Also eats insects.
Habits: Arboreal, often seen in large fruiting trees.
Social unit: Small groups of 6 - 8 birds.

Rufous treepie See Plate 5
Dendrocitta vagabunda
Soliga name: *Narale*
Size: Myna + with 12 inch tail
Call: Has a variety of calls, some are pleasant and some are harsh.
Diet: Omnivorous, eats fruits, insects, lizards, frogs, birds' eggs and young birds.
Habits: Chiefly arboreal, but sometimes comes to the ground to feed.
Social unit: Pairs or small groups.

Scarlet minivet See Plate 5
Pericrocotus flammeus
Soliga name: *Maadi hakki*
Size: Bulbul +/-
Call: A whisting *whee-tweet* or *whiriri-whiriri*.
Diet: Insects and their larvae.
Habits: Exclusively arboreal. Constantly moves about. Sometimes catches insects in air.
Social unit: Flocks.

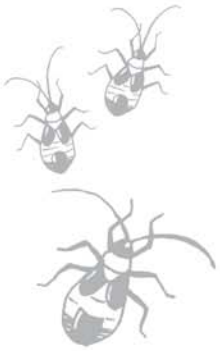
Hill myna See Plate 5
Gracula religiosa
Size: Myna **+/-**
Call: Shrieks loudly.
Diet: Mainly wild figs, also nectar, flower buds and insects.
Habits: Arboreal. Noisy at sunset. A very good mimic and hence a popular cage bird.
Social unit: Pairs or in flocks.

Some smaller wildlife of the BRT Wildlife Sanctuary

See set of 12 laminated flashcards on smaller wildlife of the BRT Wildlife Sanctuary

Southern birdwing See Plate 6
Troides minos
Kannada: *Chitte*
Wingspan: 140-190 mm
This is the largest Indian butterfly. It is abundant in the Western Ghats and is commonly seen during the monsoon and the post-monsoon months. The best time to see this butterfly is in the early morning hours. It usually flies high above the trees but occasionally comes down to suck nectar from flowers of lantana.

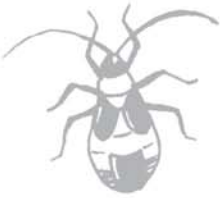
Atlas moth See Plate 6
Attacus atlas
Kannada: *Atlas patanga*
This is the largest moth found in India. It is related to the silk moth. It is difficult to see during the day when it is at rest because of its well-camouflaged pattern.



Giant wood spider See Plate 6
Nepila maculata
Kannada: *Hejjeda*
This large spider is easy to see towards the end of the monsoons. It spins a huge web between trees in the forest. It feeds on flying insects that get trapped in the web. Though it looks fearsome, it is harmless.

Black scorpion See Plate 6
Hetero metrus sp.
Kannada: *Chelu*
Soliganudi: *Iruka*
This scorpion is large and lives in oval burrows on the side of earth banks. It feeds on unwary insects and other small creatures that come near it at night.

Six-spotted carabid beetle See Plate 6
Anthia sexguttata
Kannada*: Dumbe*
This large, carnivorous beetle lives under rocks and in burrows in the ground. It is easily seen at the beginning of the monsoons. It ejects a corrosive fluid from the end of its abdomen when disturbed. This fluid is strong enough to melt certain types of plastic!



Centipede See Plate 6
Kannada: *Bare chelu*
Centipedes are normally found under logs, rocks and the loose bark of trees. This carnivorous creature has poison fangs in front of its first pair of legs.

Land snail See Plate 7
Kannada: *Basavana hula*
Land snails are found in sheltered areas during the monsoons. Some have thick shells, while others, such as the one in the picture, have relatively thin shells. Some snails feed on algae and rotting vegetation, while others feed on plants.

Plate 6

Southern birdwing

Atlas moth

Black scorpion

Giant wood spider

Six-spotted carabid beetle

Centipede

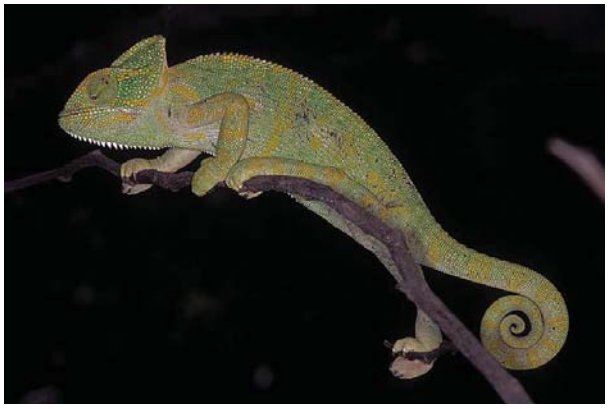
Plate 7

Land snail

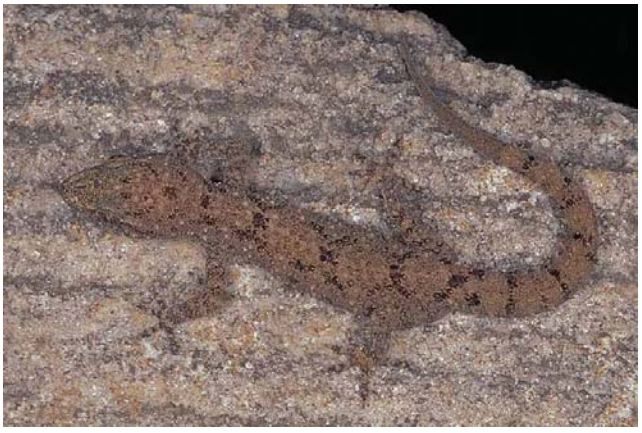
Red tree ants

Land crab

Indian bull frog



Indian chameleon



Brook's gecko

Red tree ants See Plate 7
Oecophylla sp.
Kannada: *Kempu iruvay*
These bright red ants live in nests that they make, by stitching leaves together. Different species of red ants are eaten by tribals and forest dwelling communities.

Land crab See Plate 7
Kannada: *Aedi*
Land crabs are found in streams and moist areas. They live in holes in the ground in the dry season. Some species of land crabs are caught and eaten by local people.

Indian bull frog See Plate 7
Hoplobatrachus tigerinus
Kannada: *Gokara kappay*
This is the largest Indian frog. It feeds on a number of creatures including insects and even small crabs! During the monsoons (breeding season), it turns bright yellow.

Indian chameleon See Plate 7
Chamaleo zeylanicus
Kannada: *Gosumbe*
Chameleons are harmless, relatively slow moving lizards, with excellent camouflage. They can move their eyes independently, in separate directions, at the same time.

Brook's gecko See Plate 7
Hemidactylus brooki
Kannada: *Halli*
The Brook's gecko is one of the most common Indian lizards. It is found in rocky areas and occasionally in houses. Many house-dwelling geckos are excellent climbers and feed on household insect pests.

See foldout "Snakes of BRT Wildlife Sanctuary" at the end of the handbook

Forests and Wildlife of the Biligiri Rangan Hills: Activities

4.1 Handprint peacock

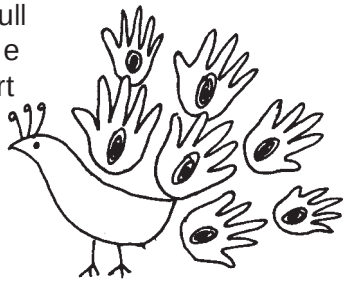
Indoor

Group size: Entire class

Level: Lower Primary

Material needed: Chart paper, colored paper, crayons, scissors, glue

Method: Ask students to draw the outline of their hands on coloured sheets of paper. Let them fill it in with as many colors and patterns as they want. Cut out these outlines and keep aside. On a full sheet of chart paper the teacher can draw the outline of a peacock's body and put the chart paper up on the wall. The students then stick their hand outlines on the chart in a fan like pattern to form the peacock's outspread tail.



4.2 Animal pairs

Indoor

Group size:

Entire class

Level: Lower Primary

Material needed: Two sets of slips with names of animals,one for each child.

Background preparation by teacher: Cut slips of paper. Write the names of common animals on each slip. A suggestive list is given below. Make two sets of animal names so that there are two slips with the same animal name written on it. Each child in class should get one slip. Fold each slip, shuffle and put into a box or bag.

Method: Ask all the students to stand in a circle and distribute the slips among them. There will be pairs of students having the same animal name written on their slip. When the cue is given, ask all the students to open and look at their slips and act out the animal: its sound, its gait, behaviour, etc. No words should be used; only actions and sounds. The aim is for each student to find his or her partner (the other student with the same animal slip) as quickly as possible. The pair that finds each other first is the winner. At the end of the game ask each pair to say a few sentences about the animal they imitated.

Some suggestions for animal pairs:

tiger	elephant	cobra	gaur	bear
wild boar	sambar	langur	squirrel	wild dog
jackal	koel	peacock	crow	dove
myna	frog	cicada	rock bee	scorpion

Note: You can modify this list depending on the level of your class.

4.3 Touch and guess

Indoor

Group size: Individual

Level: Lower Primary

Material needed: Blindfold

Background preparation by teacher: Collect two identical leaves each from 5 or 6 different but well-known trees.

Method: Lay the leaves on the table. Blindfold the children one at a time. Turn by turn lead the children to the table and ask them to feel each leaf, its individual texture, size and margin. Children have to find and pair the leaves by touching them, without looking. They should then guess which tree it belongs to.

Variation: This activity could be done with pieces of tree bark as well.

4.4 Smell and tell

Indoor

Group size: Entire class/ individual

Level: Lower Primary

Material needed: 10 substances with unique smell (see list), a blindfold, blackboard, chalk

Objective: To become aware of the importance of our olfactory (smell) sense.

Background preparation by teacher: Collect 10 strong-smelling items such as herbs, spices, etc. and take them to class. Suggested list: ginger, garlic, flowers or fruits with unique smell (like *malligai*, jackfruit, mango), eucalyptus leaves, *tulsi*, coffee, lemon, *neem*, turmeric.

Method: Talk about the importance of the sense of smell for humans and animals to learn from their surroundings. While moving about in the forest, smells indicate different things. Can the children list out the smells of the forest? Make a list on the blackboard. Some smells that children might suggest are: elephant dung, *hejjenu* (rock bee), rain, fire, ripening fruit, flowers, paddy, stink bugs, snakes, tiger and so on. Tell each child to come one by one to the teacher's table to participate in the smell and tell activity. Blindfold the child. Hold out the substance in front of the blindfolded child and ask the child to guess by smelling and not handling it.

4.5 Memory game with nature cards

Indoor
Group size: One group of 4 – 6 children at one time
Level: Lower Primary
Material needed: Nature cards, set of 40 cards - 20 pairs (provided), notebooks, pencils

Method: Show all the cards to the class. Help them name and identify all the pictures.
The children selected to play in the first round sit in a circle. From the set of 40, choose 10 different cards and lay them out on the table or floor. Allow them to look and memorise all the cards in front of them for one minute. Send them back to their seats to list as many as they can remember. Many rounds can be played until all the children have had a chance to play.

4.6 Guess my card

Indoor

Group size: Entire class, then pairs

Level: Lower Primary

Material needed: Nature cards set of 40 cards - 20 pairs (provided)

Method: Show all the cards to the class. Help them name and identify all the pictures.
Use only 20 cards, one of each pair for this demonstration. Lay them out facing upwards in rows and columns on the table. Ask a child to silently choose one card and not reveal his/her choice to the teacher. The teacher then asks questions to which the child gives yes/no answers. Pointing to each horizontal row systematically, the teacher asks the child "Is it in this row?" "No", "Is it in this row?" "No", "Is it in this row?" "Yes". Then the teacher moves to the vertical columns and continues asking the same question until a Yes answer is obtained. The point where the horizontal and the vertical lines meet indicates the card chosen by the child.
This game shows the importance of using a grid to locate any object or place.

Extension: The class can be divided into two groups and each group given one set of 20 cards to practice this game in pairs.

4.7 Find its pair

Indoor

Group size: One group of 4 – 6 children at one time

Level: Lower and Upper Primary

Material needed: Nature cards, set of 40 cards - 20 pairs (provided)

Method: Show all the cards to the class. Help them name and identify all the pictures.
The children selected to play sit in a circle. Shuffle all the cards and lay them out on the floor face down in the centre of the circle. Play can move either clockwise or anticlockwise. Each child has to pick up and place, facing up, any two cards; if they form a pair he/she keeps it. If they do not form a pair, the cards are replaced in their original position face down. Ensure that the position of the cards do not change when they are replaced. The next player upturns any two cards of his/her choice. This continues until all 40 cards have been upturned and pairs made. The child with the highest number of pairs is the winner.
Tell all the children that this game stimulates observation and memory, so they have to try hard to remember where each picture is located when it was upturned by earlier players.

4.8 Nature rummy

Indoor

Group size: One group of 4 – 5 children at one time

Level: Lower and Upper Primary

Material needed: Nature cards, set of 40 cards - 20 pairs (provided)

Method: Show all the cards to the class. Help them name and identify all the pictures.
The children selected to play sit in a circle. Shuffle the entire set, deal out 4 cards to each child. Keep the rest in a pile facing down in the centre of the circle. The topmost card is kept facing upwards next to the pile.
Play can move clockwise or anticlockwise. The child who begins chooses to pick up either the upturned card or the topmost facedown card from the pile. After this, he/she discards one card from the ones held in hand, and places the unwanted card on the upturned card kept in front. The next player picks up a card and discards another from those held and so on.
The objective of the game is to make sets of four cards as soon as possible. The sets are listed below.

A set cannot contain duplicate cards (for example two soapnut cards). The child who achieves this first is the winner.

Variation: Ask children to write down the names of cards in each set in their notebooks. These could be read out in class.

List of Nature cards provided

NTFPs	Flowers	Birds	Agricultural crops	Smaller wildlife
soapnut	amaltas	drongo	lime	scorpion
soapberry	champak	bluebird	maize	beetle
gooseberry	orchid	minivet	amaranth	gecko
honey	flame of the forest	barbet	beans	centipede

4.9 Leaf printing

Indoor

Group size: Groups of 5-6 children

Level: Lower and Upper Primary

Material needed: White paper, poster paints, paintbrushes, newspaper, assortment of fresh leaves.

Background preparation by teacher: Ask children to collect leaves of different shapes and sizes and bring them to class.

Method: Ask the children if they can identify any of the leaves they have brought. Distribute the material to children in groups. Ask them to apply a thin layer of paint to the underside of the leaf. Place the painted side on the sheet of paper. Keep the newspaper over the leaf and rub carefully . Remove the leaf and you will get a perfect imprint of the leaf on the paper. Similarly, use a variety of leaves and different colors to create beautiful pictures.

4.10 Leaf autograph

Indoor

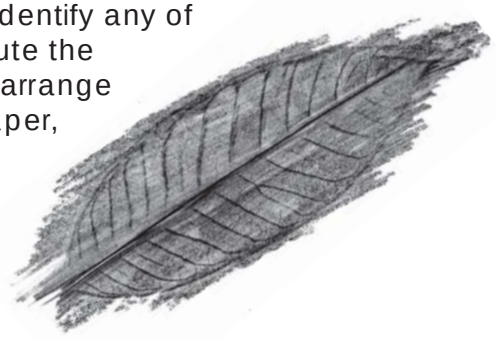
Group size: Entire class

Level: Lower and Upper Primary

Material needed: White paper and newpaper for each child, crayons, leaves of assorted shapes.

Background preparation by teacher: Ask children to collect leaves of different shapes and sizes and bring them to class.

Method: Ask the children if they can identify any of the leaves they have brought. Distribute the material to each group. Ask them to arrange different shaped leaves on a newspaper, cover these with the white sheet of paper and rub lightly on top with different coloured crayons. Wonderful leaf impressions appear with veination patterns highlighted in great detail. Rearrange the leaves and take a variety of leaf rubbings in different colours.



4.11 Spray painting with leaves

Indoor

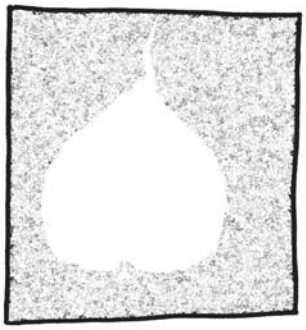
Group size: Groups of 5 – 6 children

Level: Lower and Upper Primary

Material needed: Paper, paints (watercolours are best), old toothbrushes, rags, leaves of assorted shapes.

Background preparation by teacher: Ask children to collect leaves of different shapes and sizes and bring them to class

Method: Ask the children if they can identify any of the leaves they have brought. Distribute the material to children in groups. Ask them to arrange one or a few leaves on the white paper. Dip the toothbrush into the watery paint and using a pencil rub the bristles lightly on top of the leaf taking care not to let the leaf move. A spray of paint will cover the leaf and the paper surrounding it. When the leaf is lifted off the paper carefully, the outline is visible, framed with colourful drops of paint all around. Rearrange leaves and use different coloured sprays to make an attractive picture.



4.12 Leaf and flower pressing

Time: 40 mins x 2 sessions

Indoor

Group size: Entire class/ individual

Level: Lower and Upper Primary

Material needed: Flowers, leaves etc., newspaper, old notebooks or magazines (one per child), bits of card for dry displays

Background preparation by teacher: Ask children to collect leaves of different shapes and sizes, flowers, ferns, grass, etc. and bring them to class

Method: Place the flowers and leaves carefully on different pages of the notebook, taking care not to fold or damage them while turning to the next page. Store in a safe place preferably with a weight on top or under several heavy books. Leave them like this for a week to press and dry. Ask the children if they can identify the leaves they have pressed.

Extension: These pressed leaves and flowers can be arranged and glued on bits of colourful card to make greeting cards, frames, and bookmarks or displayed on charts to hang up in the classroom. They can also be used for the “Leaf zoo” activity given on page 84.

4.13 Leaf zoo

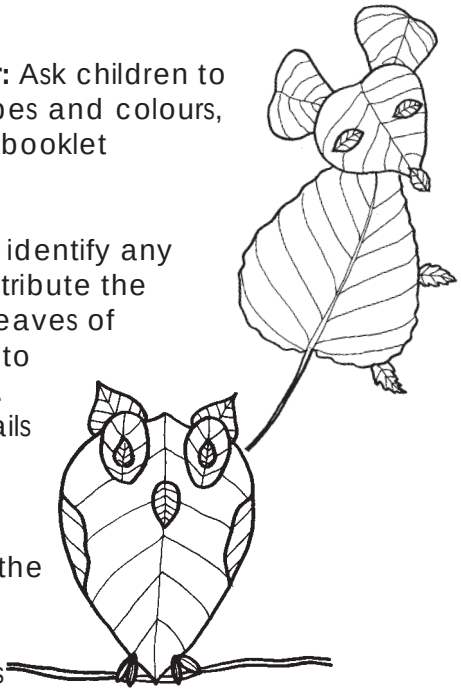
Indoor

Group size: Pairs

Level: Lower and Upper Primary

Material needed: Assorted leaves, pieces of chart paper (a quarter for each pair), fevicol or glue.

Background preparation by teacher: Ask children to collect leaves of different sizes, shapes and colours, even grass. Refer to the "Leaf Zoo" booklet provided.



Method: Ask the children if they can identify any of the leaves they have brought. Distribute the material. Ask each pair to arrange leaves of different shapes on the chart paper to look like some animal, bird or insect. Smaller leaves can be used for details like the eyes, ears, tail, horns, etc.

Show the "Leaf Zoo" booklet to the children to spark off more ideas and variations.

4.14 Tree bark impressions

Outdoor

Group size: Entire class

Level: Lower and Upper Primary

Material needed: Heavy or thick paper, one sheet per child, crayons or charcoal

Method: Go to a spot with a variety of trees. Distribute the paper and the crayons or charcoal. Tell the children to place the paper against the bark of the tree and lightly rub charcoal or crayons over the paper. The texture of the bark will appear on paper. Children can take several bark impressions and write the names of the trees under each bark rubbing.

4.15 Painted stones

Indoor

Group size: Entire class

Level: Lower and Upper Primary

Material needed: Smooth stones, paint, brushes, glue, colorful paper, cloth,string.

Background preparation by teacher: Refer to the "Speaking Stones" booklet provided

Method: Thoroughly wash and dry the stones. Ask children to put together the stones to look like different animals, birds, insects, different kinds of faces, etc. Using their imagination, they can glue stones together, paint features and details, also cut out cloth or string and glue it onto the stones for ears, eyes, etc. Show the booklet "Speaking Stones" to the children for more ideas. Varnish the completed stone creations.

4.16 Thumbprint animals

Indoor

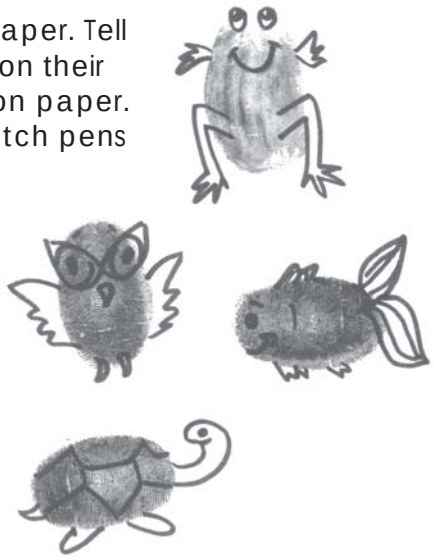
Group size: Entire class/ individual

Level: Lower and Upper Primary

Material needed: Stamp pad or paint or ink in a couple of colours, brushes, rags, drawing paper and sketch pens

Background preparation by teacher: Look at the "Thumbprints" booklet provided

Method: Distribute the drawing paper. Tell the children to apply ink or paint on their thumbs and make a thumbprint on paper. They can add a few lines with sketch pens to make features like eyes, whiskers or tails and transform the print into an animal form or face. Show the children examples from the "Thumbprints" booklet to generate interest and inspire more ideas.



4.17 Bat and moth game

Outdoor

Group size: Entire class

Level: Lower and Upper Primary

Method: The students form a circle around 5 metres in diameter. One student is chosen to play the role of the bat. He/she is blindfolded and stands in the centre of the circle. 3 to 5 students enter the circle as moths. Now the bat must try to trap and catch the moths in the circle. The hunt begins when the bat shouts, "Bat". Each time the moths hear the bat's shout, they must reply with the word "Moth". The player who plays the bat must listen carefully to the responses of the moths in order to follow them within the circle. If the players get too close to the limits of the circle, the other students push them gently to return them to the central area. The bat uses this system to measure the distance to its prey and close in on the moths.

At the end of the game the teacher can start a discussion along these lines:

What is the Soliga name for bats? Have children observed bats around their *podus* or in the forest? What do they know about bats? Are there different kinds of bats?

This game illustrates the echo locating system used by bats to locate their prey and also obstacles that they encounter while flying. Bats do not see very well and hence rely heavily on this system for their survival. The modern day radar is also based on this principle.

4.18 The Queen of BR Hills

Outdoor

Group size: Groups of 5- 6 children

Level: Lower and Upper Primary

Material needed: One copy of the list for each group of students.

Background preparation by teacher: Make a list of assorted items found in and around the school campus. Some suggestions are: a lantana flower, a feather, animal dung or bird dropping, a dry leaf, a piece of plastic garbage, anything red in colour, a piece of paper, a compound leaf.

Method: The groups stand around the teacher. The teacher becomes the Queen of BR Hills and demands certain favours from her subjects. The list is distributed simultaneously to all the groups. They have to find and collect the listed items as soon as possible. The group who brings back the most number of things in the shortest time is the winner.

4.19 Smaller wildlife of BRT

Indoor

Group size: Entire class/ individual

Level: Lower and Upper Primary

Material needed: Set of 12 flashcards on Smaller Wildlife of BRT Wildlife Sanctuary, (provided) notebooks, pencils.

Method: Show the class the flashcards one at a time. Ask children to guess what the picture shows. Then read out the text behind the flashcard. Encourage children to speak about their observations and experiences about the creature in the picture just shown.

Variation: Distribute the cards to children individually or in pairs and ask them to read aloud the text behind the card to each other; or write out the text in their notebooks and make an illustration alongside.

4.20 Forest memory game

Indoor

Group size: Groups of 8 – 10 children

Level: Lower and Upper Primary

Material needed: Cloth, wrist watch, objects from the forest like rocks, pebbles, pods, seeds, leaves, flowers, grass, moss, snail shells, feathers etc., notebooks, pencils.

Background preparation by teacher: Prior to the class collect objects from the forest, arrange them on a table and cover with a cloth.

Method: Request the first group to come forward, surround the table. When the cloth is removed they get 2 minutes to look at all the objects displayed and memorise their names and register as many details as possible. Mention the total number of objects kept on the table and send the children back to their seats to record as many as they can remember in their notebooks. Repeat with other groups. Then take a hand count of who remembered how many objects. Check for details; for example, if seed, then which seed? Feather, then from which bird?

Extension: The game can be made more complex by doing two rounds of observation with each group. In the second round, exchange or remove certain objects and encourage children to observe and note down the changes.

4.21 Silent Pursuit

Indoor/Outdoor

Group size: Entire class

Level: Upper Primary

Material needed: Blindfolds

Method: The class forms a large circle. One of the children volunteers to come to the centre and is blindfolded. This person represents the deer, an animal that does not see well but has excellent hearing. Without the knowledge of the deer, one of the students in the circle is selected to be the tiger. The tiger must approach the prey as quietly as possible. When the deer hears the tiger trying to come near, the deer has to point in the direction of the tiger. If the direction pointed out by the deer is accurate, the tiger is out of the game and another child becomes the tiger. In case the tiger reaches the deer, another child becomes the deer.
This game illustrates the importance of good hearing and the advantage of silent approach in predator-prey relationships.

4.22 Talking fox

Indoor

Group size: Individual

Level: Upper Primary

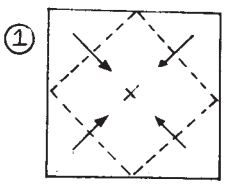
Material needed: 6"x 6" squares of coloured paper – origami paper or glazed paper. Old magazine pages cut into 7" x 7" squares will also do well.

Background preparation by teacher:
Using the instructions given below, make a sample of the origami fox to show in class.

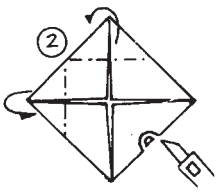
Method: Show the sample and explain that the talking fox was made only by folding paper. No scissors or cuts were used. This art of folding paper into animals and other forms originated in Japan and is called *origami*.
Distribute paper to all children. Each child needs one and a half squares to make the fox. The teacher helps the children make the fox by giving instructions, step by step, for the children to follow.

Talking Fox

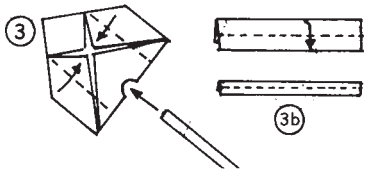
You need one and a half squares of paper to make one talking fox.



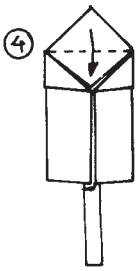
Fold as above



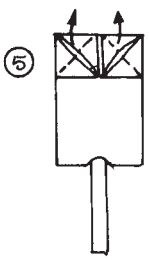
Fold adjacent corners of the square behind



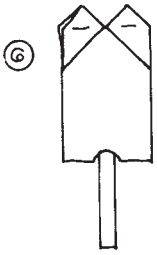
Fold the half-square paper into a strip as shown in Fig 3b. Insert the folded strip into the hole and push it inside the flaps upto the opposite pointed corner. Fold the two sides towards the centre.



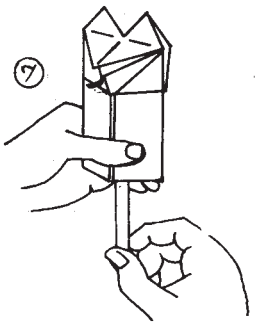
Fold down the top point.



Turn the paper over. Lift the two small diagonal flaps of the squares and press outwards.



Turn the fox over again.



Pull the handle up and down to see the fox talk

4.23 Who belongs where?

Outdoor

Group size: Entire class

Level: Upper Primary and High School

Material needed: Set of slips with living and non- living factors named, music, bell or any device to make sound (for example a plate and spoon).

Background preparation by teacher: Cut paper into slips, one for each child in class. Write the names of various living and non living things on them. A suggestive list is given below.

Method: Begin with a discussion on different ecosystems: forests, oceans, wetlands and deserts; and how each of these is home to different life forms - plants, mammals, birds, insects, etc.
Ask the students to stand in a circle. At four corners, outside the circle, mark the different ecosystems: forest, wetland, desert and ocean. Distribute the slips among the children. When the music/sound begins, they should pass their cards around in a circle. When the music/sound stops, the students look at the slip in their hands and run to the habitat where they think they belong. Many rounds can be played.

Discuss whether all the plants and animals are in their correct habitat. What does the habitat offer to each plant or animal? What is the interdependence between the species in a particular habitat?

Forest	**Ocean**	**Wetland**	**Desert**
soil	salt water	water body	sand dune
tiger	whale	duck	camel
termite	coral	dragonfly	desert fox
leech	jellyfish	reeds	date palm
rosewood	plankton	algae	cactus

4.24 Bird watching

Time: 2 hrs

Outdoor

Group size: Entire class

Level: Lower Primary, Upper Primary and High School

Material needed: Field guide “Birds of the Indian Sub-Continent” by Grimmett, Inskipp and Inskipp (provided).

Background preparation by teacher: Plan an early morning or late evening class. Coordinate with any available resource person (Dr Prashanth or Mr Jadhav)

Method: Ask the resource person to introduce the children to bird watching and accompany them on a walk around campus or in the forest.

Extension: Start a bird watching club. Maintain a checklist of the birds of the BRT Wildlife Sanctuary. Design and make a poster for the rest of the school to sign up for membership. Announce weekly bird watching session timings. Collect and record Soliga songs and stories about birds. Make an assembly presentation or a chart display on the birds seen.

4.25 I am a tree

Indoor

Group size: Individual/ entire class

Level: Lower Primary, Upper Primary and High School

Method: Ask the students to imagine they are trees. They have to individually or in pairs act out what happens to a tree when there is:

- a gentle breeze
- a violent storm
- a forest fire
- a squirrel running up its trunk
- a person plucking leaves and fruit
- a person carving on its bark
- a shower of rain
- a child climbing it
- a man watering it
- a person cutting it

4.26 Identifying animal tracks and signs

Indoor

Group size: Entire class

Level: Lower Primary, Upper Primary & High School

Material needed: "Mammal Tracks from BRT Wildlife Sanctuary" colour poster (provided)

Method: Show the poster to the class. Using the poster get the children to identify the animal and its tracks. Discuss how many animals are not easy to locate and observe. However, all animals leave some signs or tracks which indicate that they have visited or moved that way. Ask children what tracks and signs they have observed around their *podus* or even in the forest. What interpretations are given to these signs? Talk about the importance of being observant and alert to these tracks and signs in order to know the habits and way of life of the animal. Apart from pugmarks and tracks, the following signs reveal a lot about the animal, its food and behaviour: faecal droppings, pellets, scratch marks, drag marks, scent marks, blood spots, depressed grass, mud wallows, shed skin, etc. Can the children recall any other signs?

4.27 Snake talk

Indoor

Group size: Entire class

Level: Lower Primary, Upper Primary and High School

Material needed: "Snakes of BRT Wildlife Sanctuary" colour poster (provided) blackboard, chalk.

Method: Show the poster and talk about venomous and non-venomous snakes. Get the children to identify and remember the names of the snakes depicted in the poster. The teacher can mention the importance of snakes; how snakes perform an important function in the ecosystem and therefore need to be protected. Ask children how many snakes they have seen. What are their Soliga names? Note these on the blackboard. Encourage them to recount snake stories and personal experiences involving snakes.

4.28 Paradise tree

Indoor

Group size: Groups of 5 – 6 children

Level: Lower Primary, Upper Primary and High School

Material needed: "Paradise Tree" poster (provided), paper, colour pencils, crayons or paints.

Method: Show the class the "Paradise Tree" poster. Read out the text on it. Can the students recognise the flowers shown? Explain that this is an imaginary poster showing many species in one composite tree. Divide the children into groups. Let them now make their own Paradise Tree, drawing their favourite flowers on the tree. If there is anything special about the trees they are drawing, they could write the information alongside their pictures. Display the children's drawings in class.

4.29 Joker Jenu nature card game

Indoor

Group size: One group of 4-6 children at one time

Level: Lower Primary, Upper Primary and High School

Material needed: Nature cards, set of 40 cards, 20 pairs (provided)

Method: Show all the cards to the class. Help them name and identify all the pictures.
The children selected to play sit in a circle. One card, the "Jenu" (honey) card of the set of 40 is taken out of the pack. The other lone "Jenu" card is considered the joker in the game. The rest of the set of 39 cards are dealt out equally among the players. One player may get an extra card, which is all right. Play can begin clockwise or anticlockwise. Player A picks one card from player B's hand. If a pair is formed it is kept aside. Next B picks one card from C, C from D and so on. At last, by elimination of pairs of cards, one player is left holding the "Joker Jenu" (honey) card.

4.30 Twenty questions

Indoor

Group size: Entire class

Level: Upper Primary and High School

Method: Ask a child to think of any life form, write the word on paper and give it to the teacher. The child should not disclose it to the rest of the class. She/he is asked to sit in front of the class. The class has to guess which life form it is by asking questions to which the answer can be only "yes" or "no". (eg. Q: Is it a tree? A: Yes; Q: Does it have flowers now? A: Yes; Q: Are the flowers yellow? A: Yes.) The children have only 20 chances to guess the answer. One child could be deputed to keep count of how many questions have been asked. Encourage children to ask questions using some logical sequence; to first narrow down the search by asking general questions about the kingdom to which the life-form belongs, if animal then whether bird, mammal or insect, then ask more specific questions.

4.31 Forest fire

Indoor

Group size: Groups of 5-6 children

Level: Upper Primary and High School

Material needed: Any props that the groups might need for the skit.

Background reading by teacher: Read section on "Forest Fires" on page 50.

Method: Explain this situation to the children: It is summer and a major fire has destroyed hundreds of acres of forest. A meeting is called in the *podu.* The children have to take on different roles and through role-play bring out different peoples' attitudes and views on forest fires. Possible roles could be: old Soliga tribal, a Soliga youth, a forester or forest guard, ATREE researcher, a staff member of VGKK, a school student, a school teacher and so on. Give 10-15 minutes for preparation and let children present their skits. The teacher draws attention to the fact that different people have different views on forest fires. In such a situation, how should the community deal with forest fires? Encourage children to arrive at a plan of action in case of fire.

4.32 Tree walk

Outdoor

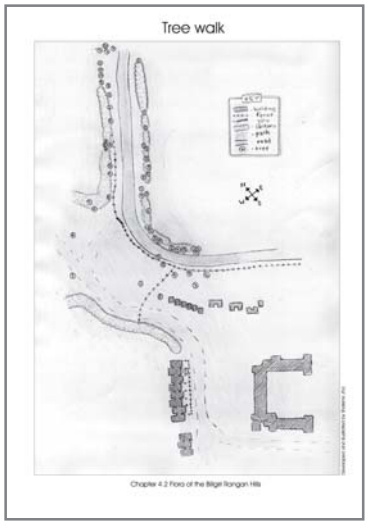
Group size: Groups of 5-6 children

Level: Upper Primary and High School

Material needed: A copy of "Tree Walk Map and Leaf Chart" (provided) for each group of children.

Background preparation by teacher: Make multiple copies of the "Tree Walk Map and Leaf Chart" (provided).

Method: Take children on the prescribed walk and ask each group to identify the trees numbered on the map using the leaf chart.



4.33 How fat is the tree?

Outdoor

Group size: Groups of 5 – 6 children

Level: Upper Primary and High School

Material needed: Metre tape (provided), notebooks, pencils

Background preparation by teacher: Locate 5 trees of different girths on campus for measurement during the class.

Method: All the groups go to the first tree and guess its girth (circumference). Then the tree is measured using the metre tape and compared with the guesstimate. The exact measurement is noted down in the notebooks with the name of the tree. The same procedure is followed for the other 4 trees. Notes can be compared and the fattest and thinnest trees on campus can be identified.

Extension: High school students could compare the five readings and arrive at an average tree girth measurement. Given the circumference data, the diameter of each tree could be calculated using the formula: circumference x 7/22 (pi).

4.34 Water of life

Indoor

Group size: Entire class

Level: Upper Primary and High School

Background reading by teacher: Read up the section on "Biligiri Rangaswamy Temple (BRT) Wildlife Sanctuary" on page 43.

Method: Explain the importance of forests and water to the class. Ask the following questions and write the answers on the blackboard:

- Name the rivers that run through the sanctuary. Where do these rivers finally empty into? (Answer: River Cauvery)
- Name the streams.
- Name the streams near the *podus*.
- Name any large ponds or tanks.
- Name some animals that live in these rivers and streams. For example, fish, eels, snails, turtles, etc.
- What are the names of dams inside the sanctuary? Mention that these dams supply water to Chamarajanagar, Kollegal, and Yelandur.
- Ask the class to imagine what the water situation would be like if there was no sanctuary at all.
- Does anyone know any songs about water or about a particular river in the sanctuary? Can they form a group and sing it to the class? For example, the song about the Bhagirathi.

Extension: Divide the class into groups of 5. Each group should prepare a small chart using the information generated above. They could also write a few lines on the importance of forests and the availability of water. Display these charts in the class.

4.35 Web of life

Indoor/Outdoor

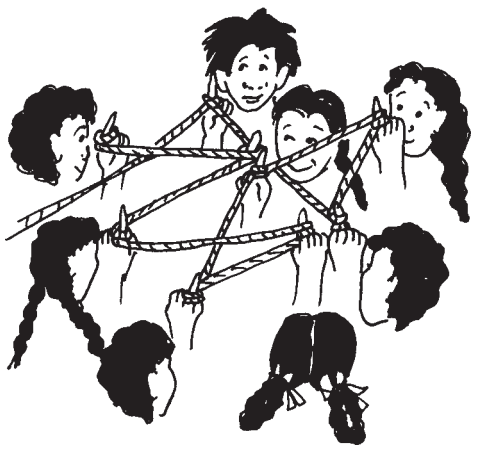
Group size: Entire class

Level: Upper Primary and High School

Material needed: 34 "Web of Life" cards (provided), ball of string

Method: Ask the group to sit in a circle. Explain that they now collectively represent the earth. Distribute the web of life cards, making sure that the sun is included. Each child must wear the card around his/her neck. Tell the children that they have to pretend to be what their card shows. Every child must say a line or two about himself or herself. For example, the 'sun' can say "Without me, there will be no energy on earth, and plants cannot make food."

It is appropriate to begin the game with the 'sun' because all living things depend on the sun for heat and light. The teacher lightly winds the string around the index finger of the student who has just spoken, i.e. the sun, and asks him/her to point to an obvious connection in the web of life circle. For example, he/she may point to a tree since sunlight is essential for photosynthesis. Take the string to the student who is the tree and wind the string around his/her finger. The 'tree' will need to point to something to which there is a connection, for instance, 'fruit', who could



then pass it on to 'elephant'. Continue the game until all the students are part of this web. The teacher can hold the remaining ball of string. Ask the students to raise their hands, holding up their fingers very carefully. See how tightly and intricately the web has been woven. This web represents the relationship amongst different components in an ecosystem.

Then tell the children that a healthy ecosystem has the ability to bounce back. Demonstrate this by pressing the web with your hand. It will easily bounce back. But if even one link in the web is disturbed the ecosystem will become imbalanced and cannot bounce back. For example, if water is polluted (ask 'water' to let go of the string) notice how the string becomes slack. In addition, the direct link with water i.e. 'fish' is also affected and lets go. Gradually the web falls apart and the ecosystem is unable to rejuvenate itself. Point this out to the students.

Ask the students what they have learned from this game. This game illustrates that each thing on earth is directly or indirectly connected to the others. If one thing is affected, the others are affected too.

The following 34 cards for web of life have been provided:

sun	air	water	soil	tree
mango	fish	eagle	honeybee	frog
mosquito	leaf	butterfly	flower	ant
earthworm	grass	gaur	tiger	rat
cobra	scorpion	bulbul	kingfisher	spider
human	wild boar	deer	elephant	bamboo
wild dog	bear	soapnut	lichen	

4.36 Forest quiz

Indoor

Group size: Entire class divided into 4 teams

Level: Upper Primary and High School

Material needed: Quiz questions, wrist watch or timer, blackboard and chalk

Background preparation by teacher: Using the information provided in this chapter, prepare questions for the quiz. Questions could take a variety of forms: written rounds, oral rounds, visual rounds (using flash cards or posters provided) multiple choice questions, fill in the blanks, crosswords, jumbled words, etc.

Method: Form 4 teams. Appoint a score-cum-time keeper and conduct the quiz.

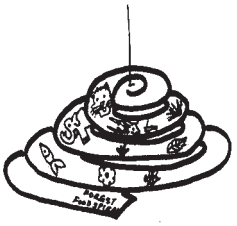
4.37 Forest food webs

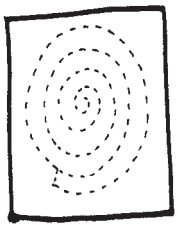
Indoor

Group size: Groups of 5-6 children

Level: High School

Material needed: Chart paper (quarters for each group), pencils, compass, crayons or colour pencils.





Method: Ask each group to draw and cut out a spiral of at least 4 rings on chart paper. Pull out the centre and the spiral comes up in different layers. Each layer can represent one level of the food chain. When the centre is dropped, the spiral becomes flat again.
Children can draw different plants and animals of the food chain on each layer of the spiral. The topmost part of the spiral (the centre) represents the tertiary consumers which are on top of the food pyramid. The table below gives some suggestions to help illustrate the spiral.
A small string can be attached to the centre of the spiral to hang up the spiral.

Primary producers	Herbivores (primary consumers)	Small carnivores (secondary consumers)	Big carnivores (tertiary consumers)	Detritus feeders
grass	hare	snakes	tiger	bacteria
bamboo	deer	jackal	leopard	fungi
herbs	gaur	wild dog		maggot
and shrubs	fly	wild boar		earthworm
trees	elephant	spider		vulture
algae				

4.38 What are protected areas?

Indoor

Group size: Entire class

Level: High School

Material needed: "Map of India's protected areas"

Background preparation by teacher: Read up section on "Protected Areas" on page 48.

Method: Show children the wildlife map. Discuss the different types of protected areas. Identify these on the map. Focus on protected areas in Karnataka. Which is the nearest to BRT Wildlife Sanctuary? Highlight some protected areas for birds like Ranganthittu and Keoladeo National Park. Bring children's attention to the fact that some Protected Areas are also located in marine and wetland areas such as Marine National Park in Gulf of Kachchh and Point Calimere Wildlife Sanctuary in Tamil Nadu.

4.39 The wildlife history of BR Hills

Indoor

Group size: Entire class

Level: High School

Background preparation by teacher: Call any relevant resource person for a class discussion. Some possibilities are Dr Prashanth or Mr Jayadev.
Method: Ask the resource person to speak about the early years of the wildlife sanctuary, the *khedda* operations, the life and work of Morris, the accounts of Sanderson etc.

4.40 The circle of life

Outdoor

Group size: Small groups of 5-6 children

Level: High School

Material needed: Lengths of rope, 1 or 2 metres long (one for each group), note books and pencils.

Method: Tie the ends of each length of rope together. Divide the class into groups and give each group a rope circle. Walk to a part of the forest close to the school. Ask each group to toss the rope circle and kneel down to examine what different life forms they see within the rope circle. Each group should make a list of what is in their circle and group them: plants, animal droppings, egg shells, insects, seeds, etc. If the children know the names of what they see then that is recorded. If they do not know the name of an insect or a plant, ask them to either check with the teacher or to sketch it and write a brief description alongside.
The groups can compare notes at the end. See which group has the longest list. The students' descriptions and sketches of unidentified life forms could become a very useful resource for the future.

4.41 Managing our sanctuary

Indoor

Group size: Groups of 5-6 children

Level: High School

Background reading by teacher: Read section on the "Biligiri Rangaswamy Temple (BRT) Wildlife Sanctuary" on page 43.

Method: Explain to the entire class the basic facts about wildlife sanctuaries and national parks.
Give a brief outline of the BRT Wildlife Sanctuary.
Ask the students if they know who is responsible for the sanctuary. The Forest Department? Soliga tribals? Who else?
Divide the class into groups and let them have group discussions about how a sanctuary is to be managed. What are the various problems or issues that usually have to be dealt with? Do the students have any views on how things are managed currently? Can they come up with a brief management plan if they were to be in charge of the sanctuary? Encourage the students to think freely about this, and come up with imaginative answers or solutions.
Each group can present its plan in the next class. The teacher could select the best plan and share it with the Forest Department or make an article and send it to the local newspaper.

Extension: As a follow up to this discussion, you could invite the Ranger, Forest Guard or anyone else from the Forest Department to the class. They could tell the students about their experiences and their work in managing the sanctuary. Students could ask questions and have a discussion with them.

4.42 Measuring the height of a tree

Time: 40 mins x 2 sessions

Outdoor

Group size: Pairs

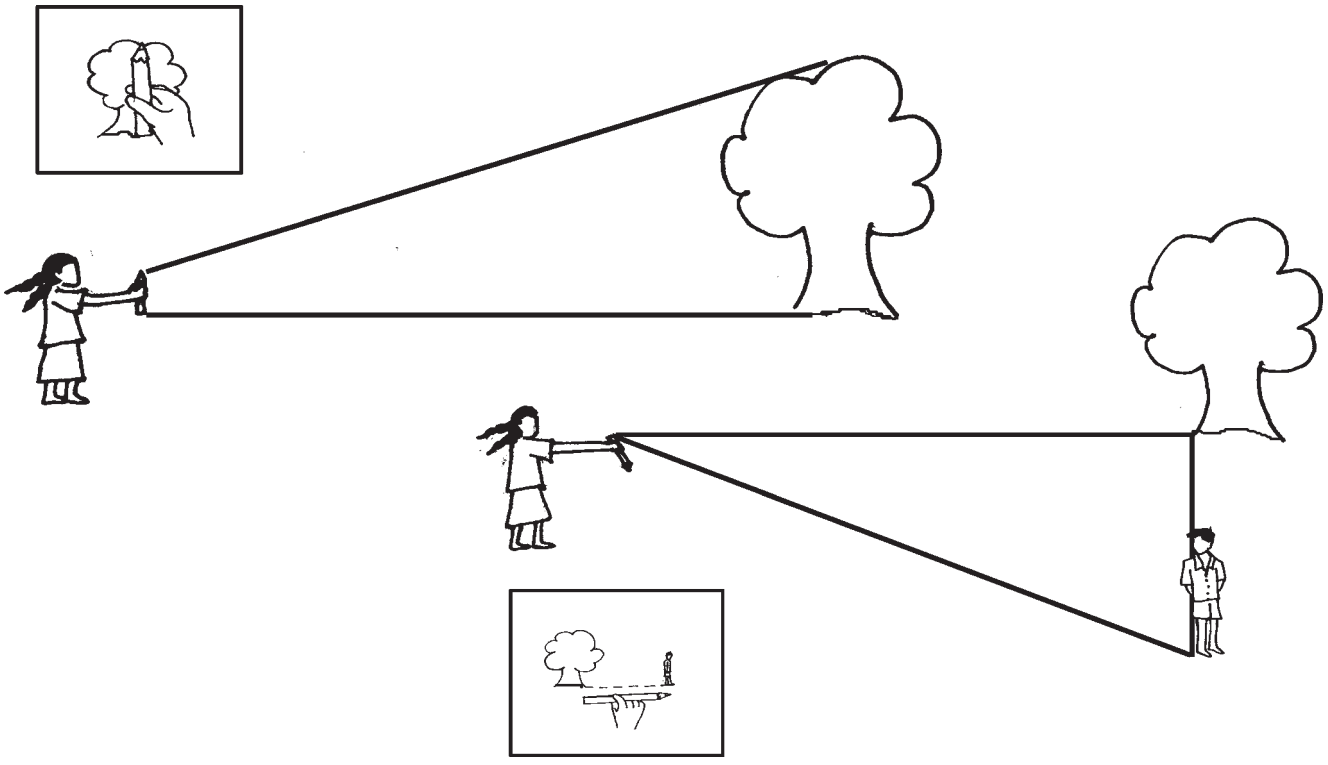
Level: High School

Material needed: Measuring tape (metre tape is preferable) and a pencil or stick for each pair of students.

Objective: Building up visual estimation skills

Method: The teacher can give the following instructions, and do a demonstration if necessary:
Select a tree, which you want to measure.
Stand in front of it. Hold the pencil/stick upright in your hand, which is fully outstretched.
Keep walking away from the tree backwards (keeping your hand outstretched) to such a point where the length of the stick appears to be the same size or more than that of the tree.
Hold the stick so that the top of the pencil/stick is in line with the top of the tree.
Slide your thumb downwards on the pencil/stick until it lines up with the bottom of the tree, where the tree meets the ground.
Keep your thumb firmly in place. Now turn the stick through a right angle, from a vertical to a horizontal position.
Align your thumb with the base of the tree and note the distance that the upper end of the stick appears to cover on the ground.
Ask your partner to walk from where you are standing to the base of the tree. Now ask him/her to walk at right angles to this line, dragging feet if possible to mark a line on the ground.
When he/she appears lined up with the end of your stick, ask him/her to stop, and mark that spot on the ground.
Measure the distance from the mark to the base of the tree and get the approximate height of the tree.

Variation: Similarly the height of a building, or any pole (flag/electric/telephone/antenna) can also be measured. Guess the height of the tree before you begin and later compare results with your measurement.



4.43 Variety of forests

Indoor

Group size: Entire class

Level: High School

Material needed: Map: "Biligiri Rangaswamy Temple Wildlife Sanctuary - Vegetation Types" (provided).

Background reading by teacher: Read section on "Flora of the Biligiri Rangan Hills" on page 52.

Method: Ask the students the following questions: Are all forests are the same; if not, what are the different kinds of forests and vegetation they have seen?
Explain that forests are of different kinds and give a background of the forest types of BRT Wildlife Sanctuary. Show them the vegetation map, and let them look at it to see the distribution of the different kinds of forests. Have the students visited any of these forest types? How does the vegetation change with altitude? When one climbs the ghat from Gumballi and goes up to the BR Hills what changes in vegetation does one notice? What happens in summer to some of the trees? Where is it the coolest – in the scrub or evergreen forest? Ask the students to name trees that they have seen in scrub, deciduous, evergreen, *shola*, and riparian forests. Can they name any grass species found in grasslands? Write this information in a table format on the blackboard.
Do they think any vegetation type is in danger? Why?

4.44 Newspaper watch

Time: 40 mins x 2 sessions
15 mins each day to scan newspapers;
entire duration of the activity is one month

Indoor

Group size: Entire class divided into 4 groups

Level: High School

Material needed: Daily newspapers, scissors, scrap books or files to stick and preserve the newspaper clippings.

Method: Divide the class into 4 groups. Each group takes on the responsibility for one week to scan all available newspapers for any articles about the environment. They have to look for positive and negative perspectives in the news, for example, about organic farming, tree planting, poaching, water pollution, etc. Articles can be arranged thematically or chronologically. At the end of the "Newspaper Watch" month, each group could present their findings in the assembly or in the form of a notice-board display for the school.

4.45 Weeding out lantana

Time: 90 mins (first session)
40 min sessions (once in two months)

Outdoor

Group size: Entire class

Level: High school

Material needed: Spade, sickle, pickaxe, rope, tape.

Background reading by teacher: Read up section on "Invasive species" on page 49.

Method: Identify a patch of forest not far away from the campus that has lantana on it. Make sure that the lantana is not overgrown, because if it is then you will not be able to approach the patch! Demarcate the patch using the rope. Use the tape to measure the area of the patch. Then weed out the lantana plants by the root, and if done carefully you could count them at the end of the session.
Visit the patch once every two months at least. If the children are motivated they could remove the new lantana plants in the patch again.
Observe details about lantana regeneration. How many new lantana plants are there? Do the numbers decrease on every subsequent visit? Do other plants appear?
Record the details as per the table given below:

Area of plot	Month	No. of lantana plants uprooted	Average height of plants	No of new lantana plants sprouted	Other plants observed on site

5 Maps and Map Reading

This chapter was written in order to help children understand maps and to enable them to understand the basic elements of mapping, so that at a later stage they are able to comprehend maps more easily. Often textbooks do not build these basic skills in children. Many of them just introduce maps of the world or of countries and expect children to understand them fully.

In this chapter activities are interspersed within the text and not listed separately. Most of the activities are located in the BR Hills and use familiar features that children can easily identify.

What is a map?

A map is a symbolic representation of the earth or a part of the earth's surface in two dimensions. This could be a very large area like a continent or a country, or a much smaller one like a village, a street, or even a classroom! Maps show the area as if we were looking down on it from above. Imagine being a bird, and being able to fly high into the sky. The view that you would get of the land below is what a map tries to show…of course, often with only some of the details.

The science of map-making is called **cartography**. In ancient times, maps were drawn on skins, parchment and cloth. Some of the very early maps were made on the basis of information provided by sailors. Today, cartographers use highly advanced ways of making maps using images taken by satellites.

5.1 Bird's eye view

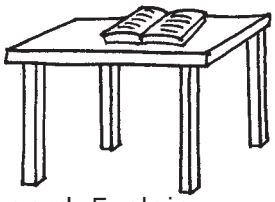
Indoor

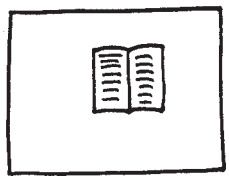
Group size: Entire class

Level: Lower and Upper Primary

Material needed: Blackboard, chalk, notebooks, pencils

Method: Talk about how objects look very different when they are seen from above, from one side, from behind etc**.** Give specific examples – if possible, draw different views of some common objects on the blackboard. Explain how all maps are drawings of an area seen from overhead. Discuss what is meant by 'a bird's eye view'.





Ask 4 to 5 children to stand in small circles and keep four objects in the center of the circle. (For example, keep a compass box, book standing on its spine, a glass, a dustbin, tiffin box, duster, etc.) Ask the children to look down on the objects and observe how the objects look from overhead. How different this view is compared to the side view. The children can then draw these overhead views in their notebooks.

5.2 Comparing a photograph and a map

Indoor

Group size: Groups of 5 – 6 children

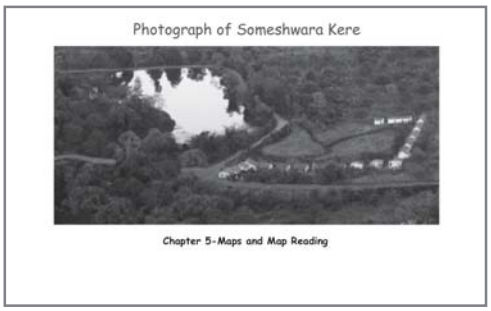
Level: Upper Primary and High School

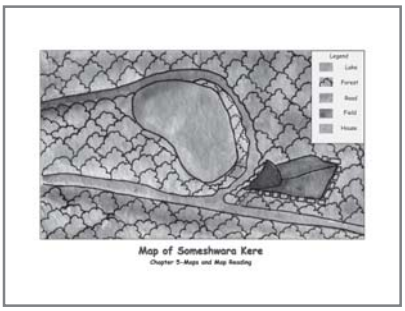
Material needed: "Photograph of Someshwara *kere*" and "Map of Someshwara *kere*" (provided), multiple copies needed, one for each group.

Method: Allow the children to compare the photograph and the map and give the following instructions:
Look at the photograph of Someshwara *Kere* taken from Gangadeshwara *betta*. Now look at the map of the same.

Are the main features that are in the photograph also shown in the map?

- Where is the *kere* in the photograph? Now find it in the map.
- Run a finger along the road in the photograph. Now do the same for the road on the map.
- How many patches of field are there in the photograph and the map?





5.3 Drawing from a photograph

Indoor

Group size: Groups of 5 – 6 children

Level: Upper Primary and High School

Material needed: "Photograph of Ladakh Village" (provided), multiple copies needed, one for each group, notebooks and pencils

Method: Show the children the photograph of a village in the Himalayas taken from one of the surrounding mountains. Tell the children to try their hand at drawing the features they see. Ask them to do this carefully, so that their drawing resembles the photograph as much as possible.

Extension: Collect the children's map work and preserve it in order to do another activity "Make a key for your village map."

Maps are useful

Maps have innumerable uses. Maps help us understand where we are in relation to other places. We use a map when travelling to guide us to our destination, or in planning a building or a house on a piece of land.

5.4 Uses of a map

Indoor

Group size: Entire class

Level: Upper Primary and High school

Method: Talk about the different uses of a map. Get the children to think of some uses of a map also. Ask them:

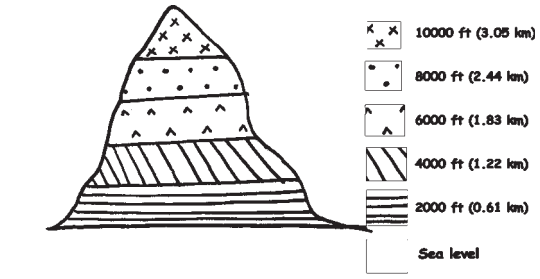
- How they think a map of the VGKK campus could be used?
- How could a map of the BR Hills be used by the Forest Department?

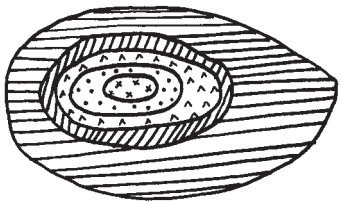
Types of maps

Physical maps are maps that show physical features of an area. These include water bodies like rivers, lakes, ponds and features like mountains, plateaus, plains, etc. Colour is often used to indicate differences in land elevation. Green is usually used for lower elevations and shades of brown for higher elevations. Blue is usually used for water.

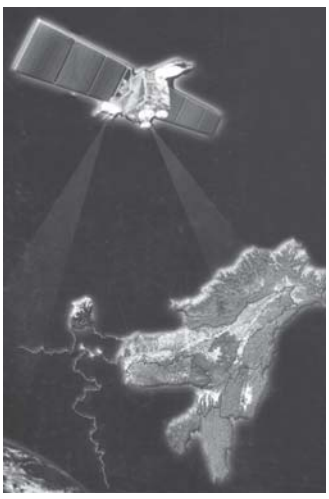
Political maps are maps that show national and state boundaries. Capitals and major cities and towns are marked on political maps. The boundaries on a political map are made by humans.

Topographical maps or toposheets are used to show the shape and elevation of an area. In a topographical map, irregular circles called 'contour lines' join all areas that have the same **elevation**. Elevation is the height (altitude) of the land above a reference point, usually the sea level. Contour lines that are close together indicate steep terrain and lines that are far apart indicate flat terrain. Topographical maps are very useful to persons who trek, especially in areas where there are no signs, and to engineers who construct roads, buildings, etc.





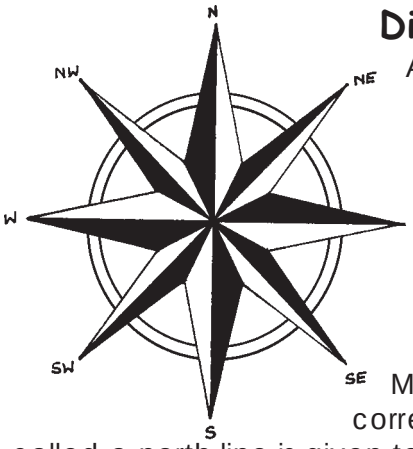
Contour Interval: 2000 ft (0.61 km)



Satellite imaging maps are photos or images that are taken by satellites that orbit high above the earth. Since these are photographs, they show us exactly what is present. However, not all details of the images can be seen clearly. These images could tell us the shape of the land, the extent of the vegetation and the amount of development that has taken place in an area.

Basic elements of a map

There are some basic elements of a map. These are: direction; scale; legend or key; and a grid system. Let us understand each of them using activities.

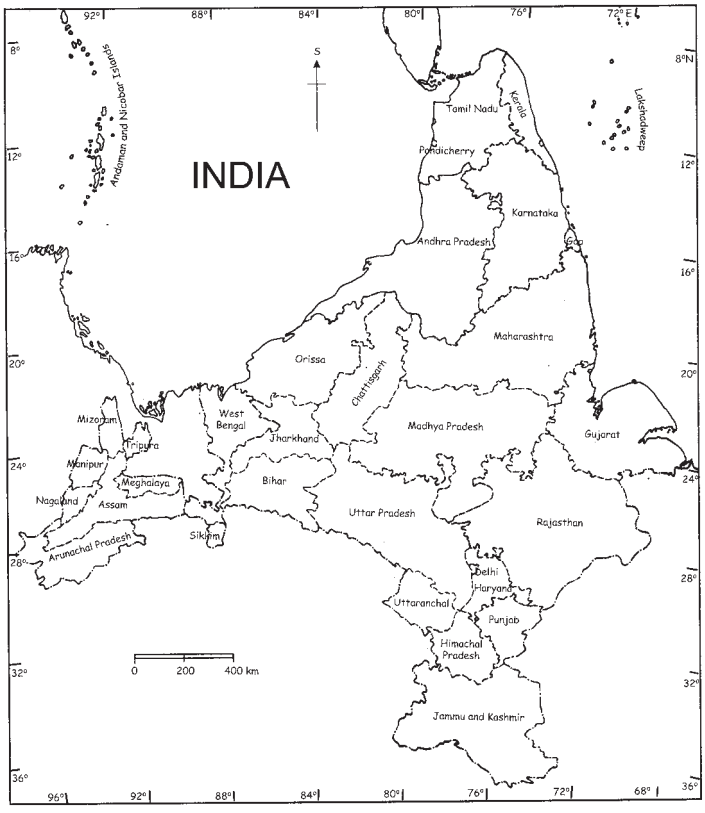


Direction

An important aspect of being able to read a map is being able to tell direction. The four basic or cardinal directions: north, south, east, and west, help locate places on a map. The four cardinal directions are further subdivided into four more directions: northwest, southwest, southeast and northeast. These directions are introduced in class 3. The activities below could be used in addition to what you plan to do in class for teaching directions.

Most maps will show you how a direction on the map corresponds to a direction in the real world. Usually an arrow called a north line is given to indicate the cardinal direction 'north'. Some maps use what is called a 'compass rose'. If neither is shown, then north is usually at the top of the map. We usually think north is the top of the world. But the earth is round and there is no real 'top of the world'. However, to help us understand where places are in relation to each other, all maps generally show north on top. Similarly, the bottom is the south, the left edge is the west and the right edge is the east.

Look at the following map. This is what India would be like on a map if the south were shown at the top of the map. We are so used to seeing north on the top, that the map looks upside down.



India would look like this if South were shown on top of the map!

5.5 Following and giving instructions

Indoor/Outdoor

Group size: Entire class

Level: Lower and Upper Primary

Objective: Following and giving clear instructions

Method: The teacher calls out names of children at random. The child named has to follow instructions given by the teacher. For example, "From your seat turn left, go to the end of the classroom, turn right, take five steps, what do you see there?" Give instructions, which require use of the use of left, right, straight, middle, etc. In case the orientation of the classroom is known, then give instructions using cardinal directions like north, south, east and west.
Then ask the child to give instructions for how to move from his/her seat to a particular child's seat in the same class.

Extension: Once children have had some practice giving instructions you can ask them to give more complicated directions, for example from the school to another location on campus; from the temple to the bus stand, etc.

5.6 Directions with a map

Indoor

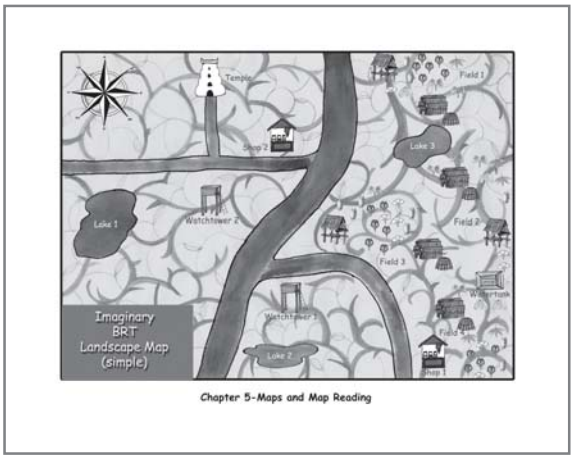
Group size: Groups of 5 – 6 children

Level: Upper Primary Section

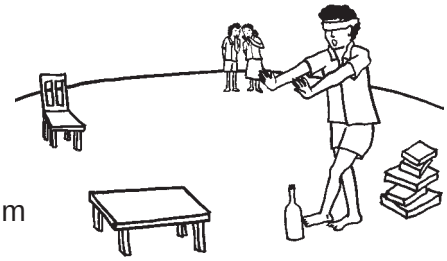
Material needed: "Imaginary BRT Landscape Map (Simple)" (provided), multiple copies, one for each group, notebooks, pencils

Method: Give each group a copy of the map. Test the skills of the children in giving and following directions. (Directions can be left/ right or cardinal directions depending on the level of the children.) Some examples are:

- Shop 2 is to the ——— of the water tank.
- The water tank is to the ——— of watchtower 1.
- Lake 2 is to the ——— of lake 3.
- Write the directions from shop 1 to the temple.
- Write the directions from lake 1 to lake 2.



5.7 Blindfold treasure hunt



Indoor/ Outdoor

Group size: Pairs

Level: Lower Primary, Upper Primary and High School

Material needed: Blindfold, wristwatch

Background preparation by teacher: Plan an elaborate route/path in the verandah, large classroom or in the assembly hall, from one end of the room to the other end. Keep enough obstacles in the way (either physical objects like chairs, tables, books, school bags, etc. or draw and label items with chalk on the floor such as pond, railway crossing, house, etc.). Ensure that the route touches all the obstacles kept in the room. Keep small token gifts such as flowers, stamps, bookmarks, pencils, etc. on the table which children can take away as the treasure.

Method: One child of each pair is blindfolded, the other has to stand at one end of the room and give the blindfolded partner instructions to navigate the route and reach the treasure. The journey can be timed with a wristwatch. The pair that reaches the treasure in the least time with the most direct and simple instructions can be praised.

5.8 The cardinal directions

Indoor

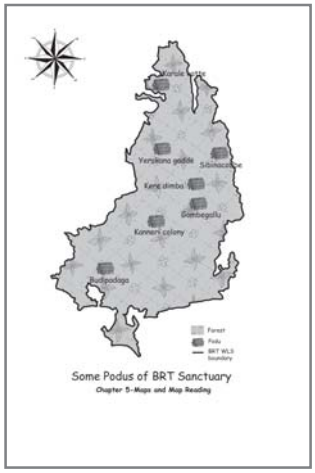
Group size: Groups of 5 – 6 children

Level: Upper Primary and High School

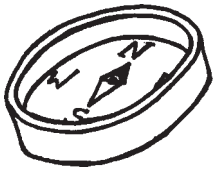
Material needed: Map "Some *Podus* of BRT Sanctuary" (provided), multiple copies of map needed, one for each group, notebooks and pencils.

Method: Ask the children to look at the map of *podus* provided. Some *podus* are marked on them. Tell children to read out the names of the *podus* they can see. Now ask them to answer the following questions either orally or ask them to write in their notebooks:

- Karalekatte is to the ——— of Yerakanagadde.
- Keredimba is to the ——— of Gomebegallu.
- Sibinacobbe is to the ——— of Yerakana gadde.
- Yerakanagadde is to the ——— of Sibinacobbe.
- Budipadaga is to the —— ——— of Kanneri Colony.
- Gombegallu is to the —— ——— of Budipadaga.



Magnetic compass



A compass is a device that indicates direction. The needle of the compass is a small magnet and always points north. Think of the earth spinning on an imaginary axis. The earth also acts like a giant magnet. It has a north pole and a south pole at the two ends of its axis. A magnet that is hung anywhere on earth turns so that its north-south axis is in line with the earth's. That is why the compass needle always points north.

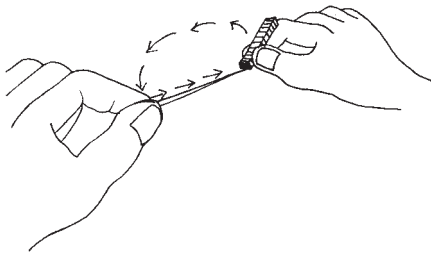
5.9 Make your own compass

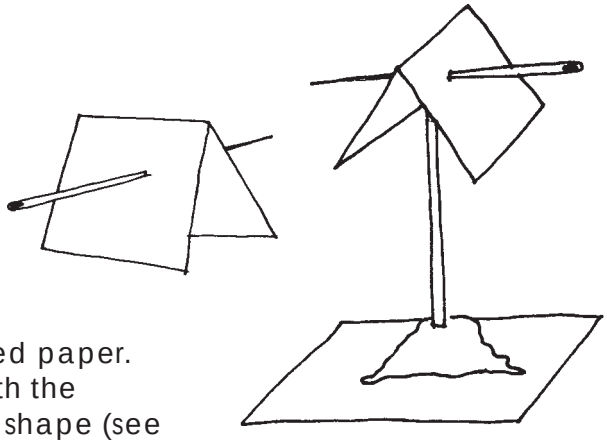
Indoor

Group size: Entire Class

Level: High School

Material needed (one set per group): A sewing needle about 3" long, one magnet (either bar or horseshoe), a broomstick (coconut) or thin bamboo stick 4" long, marble size ball of wet clay or *chapati* dough, slip of paper ¾" x 2" in size, piece of stiff card for a base plate (a square cut from an old carton), blade.





Method: Hold the eye of the needle in one hand. Hold one end (pole) of the magnet in the other hand. Rub the magnet on the needle from the eye towards the tip. Repeat this motion for 5 minutes, about 150 – 200 strokes, always rubbing in the same direction (see illustration). In this way you are slowly inducing 'magnetism' into the needle.

Fold a slip of paper in half and insert the needle through the centre of the folded paper. Open out the folded paper with the needle through it to form an A shape (see illustration).

Place a lump of dough/clay in the centre of the base card. Clean and trim the edges of the broomstick. Sharpen one end and place the stick vertically in the dough/clay, the sharpened tip pointing upwards. Balance the needle-paper A shape on the tip of the broomstick, carefully centering it on the ridge of the folded paper.

Your magnetic compass is ready! The needle tip will always point north.

Check it by moving in any direction you like.

Scale

The features that are shown in maps are usually drawn smaller than their actual size. In other words, they are scaled down. In order to understand maps, children need to understand what scale means. The scale on a map uses a small measure to represent a larger area on earth. For example, the scale on the map (1cm=100 m) means that a distance of 1cm in the map is equivalent to 100 m on the ground.

Scales on maps could be stated in the following ways:

A verbal scale: 1cm =10 km

A linear scale or a line drawn to scale:

Representative fraction: 1: 100

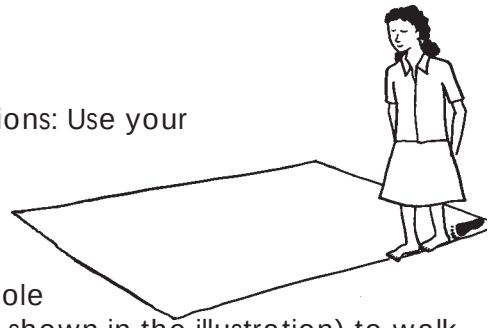
5.10 Measure your classroom

Indoor

Group size: Groups of 5-6 children

Level: Upper Primary and High School

Material needed: Ruler, notebooks and pencils



Method: Give the following instructions: Use your feet as the scale and measure the classroom. You will need a ruler or scale and your feet of course! First, measure your foot on a scale. Record its length to the nearest whole cm. Place your feet heel to toe (as shown in the illustration) to walk the length and breadth of the classroom. Record the number of steps taken for the length and the number for the breadth. Create a scale, for example, 1cm : 1 foot length. Draw a map of your classroom using the recorded measurements. Calculate the length and breadth and area of your classroom.

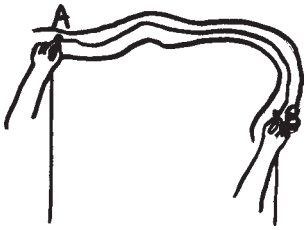
5.11 Map scale

Indoor

Group size: Groups of 5 – 6 children

Level: Upper Primary and High School

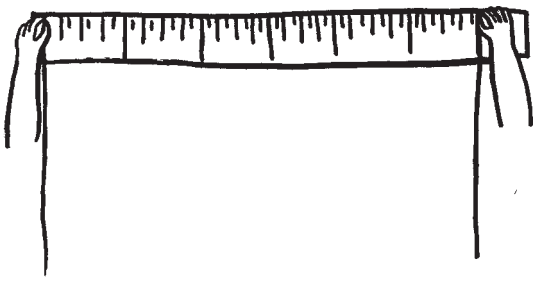
Material needed: "Imaginary BRT Landscape Map (Grid and Legend)" (provided), multiple copies, one for each group, pieces of string , rulers,pencils, notebooks

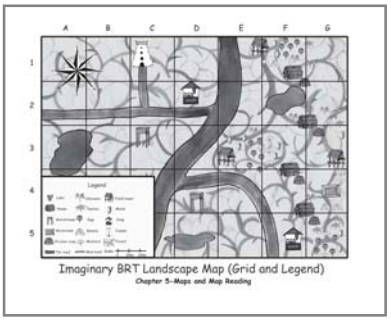


Method: Distribute copies of the map and ask each group to do the following exercise and note down answers in their notebooks:

• Measure the distance between the two shops. Note that the scale on this map reads: 1 cm = 100 m. Measure the distance along the road. Use a piece of string to help you. Also measure the distance as the crow flies. What is the difference?

• Measure the distance you will have to travel to the temple on the mud road from the tarred road.





5.12 Drawing to scale

Indoor

Group size: Groups of 4-5 children

Level: Upper Primary and High School

Material needed: Tape measure and string, notebooks, pencils

Method: Ask each group to measure some objects in the classroom using a tape measure and string. (For example blackboard, photo frame, table, door, window, etc. It is better to initially select objects which have right angles and are not rounded or angular.) The teacher might have to first demonstrate how to do this. The length and breadth of the selected object should be measured and these figures noted down. Then each child should individually draw the same object in his/her notebook using the scale 1 m : 10 cm (the scale can be modified).

See activity 1.16 "Measuring things around us" on page 19.

Map legend or key

The features in a map are often represented by symbols. If symbols are used, maps have a key or a legend that explain the symbols that have been used. It is called a 'legend' because it tells the story of the map, and is also referred to as a 'key' as it unlocks the meaning of the map's symbols. Different maps may use different symbols.

5.13 Around your classroom

Indoor

Group size: Entire class

Level: Upper Primary and High School

Material needed: Notebooks, pencils

Method: Look out of your classroom window. What do you see? Make a list in your notebooks. Now try and draw symbols for everything on your list.

5.14 Make a key for your village map

Indoor

Group size: Entire class

Level: Upper Primary and High School

Material needed: Multiple copies of **"**Photograph of Ladakh Village", (provided) notebooks, pencils

See activity 5.3 "Drawing from a photograph" on page 100.

Background preparation by teacher: Collect children's work from the earlier activity "Drawing from a Photograph" .

Method: Distribute the material and give the following instructions: Look at the map of the Ladakh landscape drawn from the photograph in an earlier exercise. Now create legends for your map.

5.15 Make a key for your classroom map

Indoor

Group size: Entire class

Level: Upper Primary and High School

Material needed: Notebooks, pencils

Method: Draw a map of your classroom. Make sure you represent everything that your classroom contains (tables, chairs, benches) with symbols. Make a legend or key on a separate page for the symbols that you use.

5.16 Map your surroundings

Indoor/Outdoor

Group size: Entire class

Level: High School

Material needed: Notebooks, pencils

Method: Take the children to a high location in the school with a good view. For instance, you could climb up to the prayer room and face the teachers' quarters. Get the children to make a map of what they see. They should make an appropriate legend or key to accompany the map.

5.17 Map legend or key

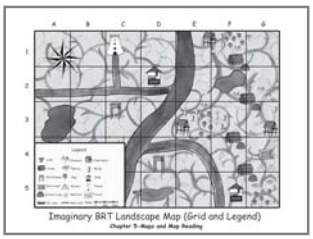
Indoor

Group size: Groups of 5 - 6 children

Level: Upper Primary

Material needed: **"**Imaginary BRT Landscape Map (Grid and Legend)" (provided), multiple copies, one for each group, notebooks, pencils

Method: Distribute copies of the map and ask children to look at the map's legend. Let them locate all the symbols on the map and understand what each represents. The teacher can ask the following questions which the children have to answer in their individual notebooks:



- How many lakes do you see in the map?
- How many field towers are there?
- Count the number of chicken coops you can see.
- How many houses are there in the map?

Grid system

Some maps are often divided into squares of equal size by a grid. These squares are labelled with letters down the side of the map and numbers across the top. The labeling helps to find places on a map by checking the index. You could use the index given at the back of an atlas to explain this to the children. The names of places listed in the maps are given alphabetically in the index. Against each name is a letter-number combination that directs you to a certain square on a map. You will find the place that you want to locate in the square of that letter-number combination.

Most maps use the latitude and longitude system to locate places. Do these grid exercises prior to teaching these terms in the geography class.

5.18 Locating towns in Karnataka

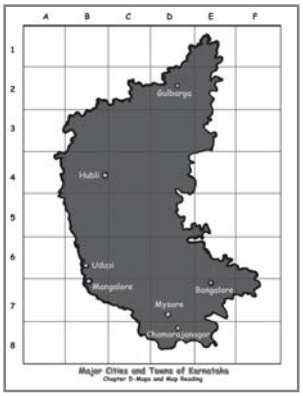
Indoor

Group size: Groups of 5 – 6 children

Level: Upper Primary and High School

Material needed: Map of "Major Cities and Towns in Karnataka" (provided), multiple copies, one for each group, notebooks, pencils

Method: Distribute copies of the map. Ask children to look at the map and locate the following places using the grid: Chamrajnagar, Mysore, Hubli, Mangalore, Udipi, and Gulbarga. In their notebooks they could fill in the grid details for each. For example, Bangalore is located in square E7.



5.19 Locating places using a grid

Indoor

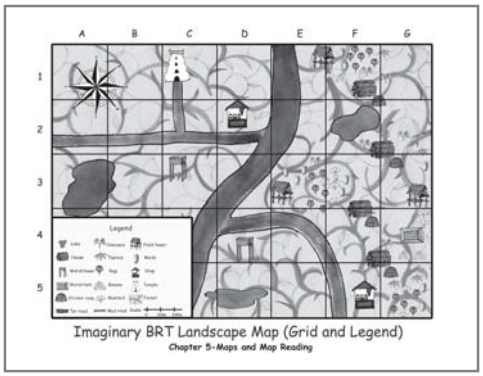
Group size: Groups of 5 – 6 children

Level: Upper Primary and High School

Material needed: "Imaginary BRT Landscape Map (Grid and Legend)" (provided), multiple copies, one for each group, notebooks, pencils

Method: Distribute copies of the map and ask each child in the group to answer questions in their notebooks.
Some possible questions are:

- What are the grid details for the following: the temple, the two watchtowers, the two shops?
- There are three lakes in the map. Which grid squares do they occupy?



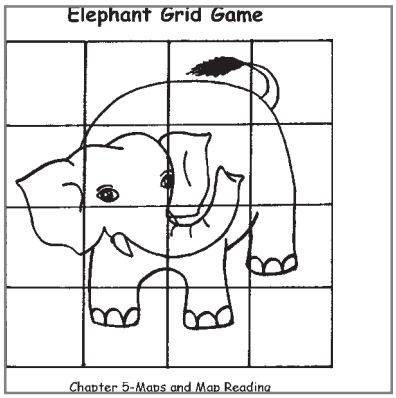
5.20 Grid pictures

Indoor

Group size: Groups of 5 – 6 children

Level: High School

Material needed: **"**Kingfisher Grid Game" and "Elephant Grid Game" (provided), multiple copies, one for each group, white paper for copying /enlarging, one sheet for each child, rulers, pencils.



Method: Copying or enlarging a picture accurately is very easy using this method.

To copy the picture in the same size, ask children to measure the spaces between the vertical and horizontal lines on the printouts given and draw a similar grid with identical spacing on their sheets of white paper.

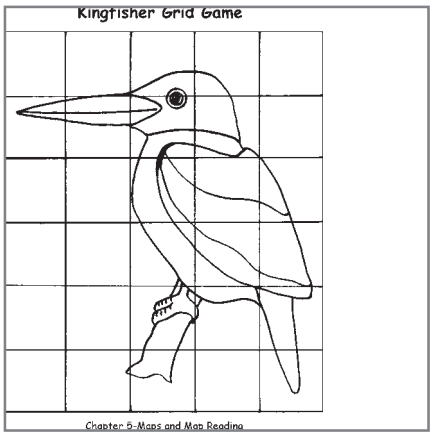
Those who want **to enlarge the picture** should double the space between two lines to get a larger grid. For example, if the space between two lines is 4 cm, they should draw lines at 8 cm intervals both horizontally and vertically.

Ensure that the number of columns and rows are the same as in the picture selected.

Start with a cell in the corner of the picture and reproduce all lines and details in the corresponding cell on the white paper. Slowly move to other cells and complete drawing the picture.

Variation: To make a floor-size enlargement, you need a photocopy of the original grid picture. Cut out all the squares from the photocopied picture and give each child one piece of the original picture to enlarge. (For example, the elephant grid has 16 squares which can be cut up and given to 16 different children to enlarge. The kingfisher grid has 30 squares, which can be cut and given to 30 children.) All the children are told to draw large squares (15 x 15 cm, or 20 x 20 cm) on their paper. This measurement can be decided by the teacher depending on the final size of the enlargement wanted that is, 4 or 6 times the original size.

The children are now told to copy details from their cut picture onto the square drawn on white paper. The enlarged square drawings are then assembled on the floor to get a really big enlargement, which can be coloured and displayed.



Here is an exercise that will help children practice the entire mapping skills mentioned in the chapter.

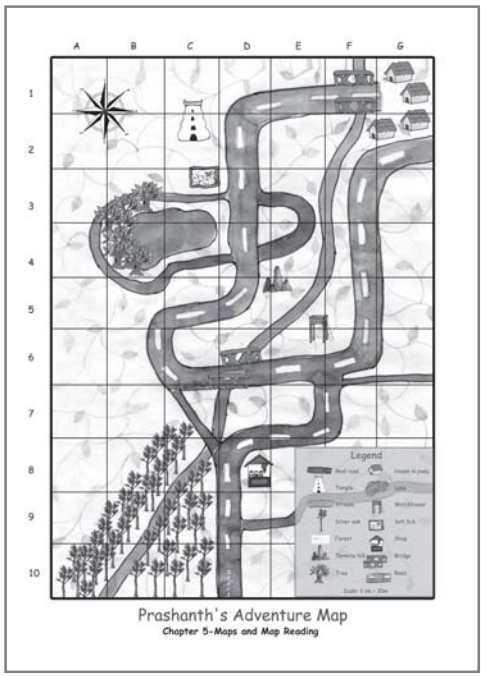
5.21 Prashanth's adventure

Prashanth is a young, energetic doctor at VGKK. He is very interested in wildlife and spends much of his free time walking in the forests of BRT Wildlife Sanctuary to spot and photograph the birds and mammals. Often he is accompanied by one of the young Soliga boys from the Kendra who know a lot about the forests and its inhabitants.

This morning Prashanth wakes up early. He is excited. Basappa, a health worker at the Kendra, is going to show him a Giant squirrel's nest. He plans to photograph the nest. "I hope the light is good for photography," he says to himself, as he starts up his bike. He has to meet Basappa at the bridge.

Before reaching the bridge, Prashanth passes by a shop and a silver oak plantation. At the bridge, Basappa climbs on to Prashanth's bike and the two ride on. They drive up to a termite mound where Prashanth parks his bike. Then, they start walking and soon turn off the tarred road onto a forest path. They walk for almost an hour before reaching a pond.

By the side of a pond are a clump of trees. Basappa points to one of them, and there amongst the leaves is a large nest with baby squirrels. Prashanth is delighted and clicks away! Soon they set off towards the housing colony. They have been invited by a friend to eat *ragi mudde* for lunch. On the way they see a large gaur at a salt lick. "What a lucky day for wildlife watching!" says Prashanth as they ride off to the colony.



Indoor

Group size: Groups of 5 – 6 children

Level: High School

Material needed: "Prashanth's Adventure Map" (provided), multiple copies, one for each group, string to measure, notebooks, pencils

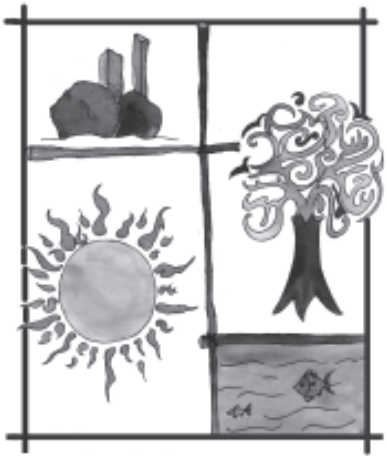
Method: Read out the story "Prashanth's adventure" to the children. Now ask the children to look at the given map and do the following exercise:

- Trace the route that Prashanth takes up to the bridge with your finger.
- On the way to the bridge Prashanth sees a silver oak plantation. Find this on the map.
- Find out what else he passes by before reaching the bridge. Use the key or legend to help you.
- In what directions does Prashanth travel from the bridge to reach the termite mound?
- Trace the route they take to the spot with the giant squirrel's nest.
- Trace the route they take from the nest to the salt lick where they see the gaur. In what directions do they travel to get there?
- What do they see on their way to the colony?
- Use the grid system on the map, and fill in the grid location for the following: shop; bridge; salt lick; housing colony.

- Use the scale given on the map to find out the distance from:
  (a) Prashanth's starting point up to the termite mound
  (b) From the first bridge to the housing colony.

6 Non-Timber Forest Products

What is a natural resource?



A natural resource is anything that is provided by nature. Air, water (for example oceans and rivers), rocks and minerals (for example granite and manganese ore), soil, plants and their products (like timber) or animals, birds, insects are some of the natural resources we have and use. Human beings have a vast and diverse base of natural resources. Our lives would not be possible without this resource base. It will be to our advantage to protect and wisely use what nature has provided to us.

This chapter explores an important natural resource base of the BR Hills - **Non-timber forest products (NTFP)**.

What are NTFP?

All forest products, (plants, animals and their parts), excluding timber, which can be harvested for human use, are defined as **non-timber forest products** (NTFP). NTFP include products that are used as food, fodder, cosmetics, herbs, medicines, firewood, construction material, etc. For people who live adjacent to or within forested lands, NTFP provide subsistence and income. In India, about 500 million people living in and around forests depend on NTFP extractions for their livelihood.

Almost all NTFP are nationalised in India, and can be sold only to government agencies. Prior to nationalisation, NTFP could be sold to anyone. In the BR Hills, the Soligas used to sell forest produce to forest contractors. However, about 30 years ago, a Large-Scale Adivasi Multipurpose Society (LAMPS) was set up. This is a state controlled cooperative body which markets NTFP collected by the Soligas.

The NTFP that are sold through the three LAMPS outlets in the BRT Wildlife Sanctuary are: honey (*jenu*), gooseberry (*nelli*), soapnut (*sigekai*), soapberry (*antwalkai*), lichen (*pashi*), beewax (*jenu mena*), *magali-beru*, *tarre*, *arale*, woodapple (*bela*), and deer antlers (*jinke kombu*).

VGKK set up units where some of these NTFP are processed (for instance, gooseberry is pickled) so that they fetch a higher price in the market and add to the income of the Soligas.

Some NTFP of BRT Wildlife Sanctuary

1) Gooseberry

The gooseberry fruit (*nelli)* is a major NTFP of the BR Hills. In the years 1999 and 2000 alone, over 900 tonnes of this fruit were collected, valued Rs. 31.5 lakhs! Nearly 60% of the Soliga households are involved in harvesting this species. The fruits are rich in vitamin C and are a part of many ayurvedic medicinal preparations like *Triphala* and *Chawanprash*. The fruits are also used for making pickles, jams, shampoos and dyes.

One fruit – two species!

There are two very similar species of trees that yield gooseberry: *Phyllanthus emblica (hitunelli)* and *Phyllanthus indofischeri (nahinelli)*. The former grows in dry deciduous forests and the latter (which is a shorter tree) is restricted to scrub forest. The quantities of fruits varied from 13 kg/ha/yr of *P. emblica* from the dry deciduous forest, to 23 kg/ha/yr of *P. indofischeri* from scrub forest according to studies done in the BR Hills. The average fruit weight of *P. emblica* was 6 grams and *P. indofischeri* 9.6 grams.

Flowering and fruiting

The trees flower from February through March when they completely shed their leaves. The fruits mature in November and December. Each fruit has about six small seeds. Sambar deer, spotted deer, barking deer, mouse deer, and the Indian gaur disperse the fruits.

Amount of gooseberry collected

LAMPS has maintained data on the amount of gooseberry that has been extracted over the last ten years (1993-2002) from the BRT Wildlife Sanctuary.

Quantity of gooseberry extracted:

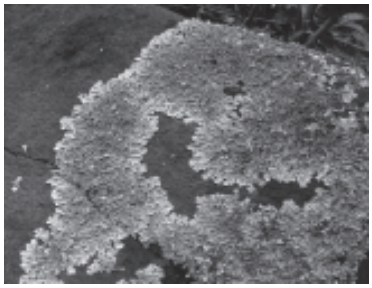
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Quantity collected in tons	118	104	247	210	1010	197	617	319	1493	180

Sustainable harvesting of gooseberry – some tips

Discussions that researchers from ATREE have had with the gooseberry collectors revealed that three actions were important for enhancing the production and regeneration of gooseberry trees. These are:

- Leaving at least 25 % of the fruit on the tree when harvesting.
- Not cutting branches during harvesting, but harvesting by beating the fruits off the branchlets and collecting the fallen fruit.
- Removing parasites from the trees. Gooseberry is often infested with a parasite called *Taxillus tomentosus* (Soligas call it *uppilu*) that affects productivity. Many Soligas believe that forest fires used to help keep this infestation in check, but currently, with the forest department's fire protection measures, the threat from this parasite has increased.

2) Lichen



Lichen (*pashi* in Soliganudi) is the product of a symbiotic association between an alga and a fungus. The fungus and the alga are both dependent on each other. On its own, the algal part of the lichen would dry up and die. Fungal fibres help by saving it from drying up. In return, the alga makes food by photosynthesis and shares it with the fungus which lacks chlorophyll and cannot produce food. You will find lichens growing on rocks and the bark of trees.

Lichen are valuable

Lichen are valuable in the forest as they provide a habitat for various small plants and animals. Lichen can trap and conserve water on surfaces that would otherwise not support the growth of other organisms. Lichen are badly affected by pollution, so their absence in an area where they used to occur, indicates that air pollution levels in that area have gone up.

Harvesting lichen

In the sanctuary, lichen is harvested in September after the rains. Harvesters set off to the forest in groups but only on days that promise to be clear. If it rains then the bark of trees is slippery, making it difficult to climb for harvesting. If the tree on which the lichen is found is tall, then notches are cut into the tree to enable the harvester to climb.

The lichen is sold to the paint and varnish industry through LAMPS. In 2004 harvesters got Rs. 50 per kg from the agent, while the agent made Rs. 5-8 per kg. LAMPS sold it for Rs. 81 per kg. The amount of lichen collected over the last 10 years (1993-2002) is given below. You can see that the quantity is much smaller than that of gooseberry.

Quantity of lichen extracted

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Quantity collected in tons	13	25	18	24	44	59	17	29	35	51

3) Honey

In the old days, the Soligas collected honeycombs which they stored in pots. Honey was consumed in large quantities during the heavy monsoon months, when procuring other foods was difficult. Today, while honey is still used as food and as medicine, it is one of the major NTFP that bring in cash income to the Soligas.

Honeybees

Bees belong to the order of insects that include wasps and ants. In fact, ants and bees have evolved from wasps. Bees have a long tube-like tongue that is suited to gathering nectar from a variety of flowers. There are many species of bees, some live below the ground and some eat wood!

Types of bees

Honeybees are social insects and live in colonies. Hives could be small with about 20,000 bees, or large with over a 1,00,000 (one lakh) bees! Every hive has one queen bee, hundreds of drones and thousands of worker bees.
The queen bee lays all the eggs in the hive. The worker bees, true to their name, do a lot of work: secrete wax used to build the hive, clean and maintain the hive, feed the larvae and the drones guard the hive and collect pollen and nectar from flowers. The drones are male honeybees. Their main function in the hive is to be ready to fertilize a receptive queen.

How bees make honey

Honey is made from nectar gathered from flowers. Nectar consists of about 80% water with some complex sugars. Honeybees use their tongue to suck the nectar from the flowers that they visit and they store this in their 'honey stomachs'. Bees have two stomachs, and one of them is used to store nectar. Honeybees visit about 100 to 1500 flowers to be able to fill their honey stomachs with nectar.
When these honeybees return to their hives, worker bees suck the nectar from the honeybees' stomachs with their mouths. Then, the worker bees convert this nectar to honey by adding an enzyme. This is then spread out into the cells of the honeycomb, where the water evaporates, leaving behind a thick syrup. When the honey is ready, the bees seal the cells with wax, where it is stored till its time for use.

The honeycomb

The honeycomb or hive (made of up small cells that are hexagonal in shape) has separate portions where the honey and pollen are stored and where the brood is raised. Honey is stored in the portion of the comb closer to the point of attachment to a rock or tree trunk. Generally the honey portion is different in appearance, with cells that are long and deep to hold a greater quantity of honey. Below this honey portion, there is a small section of the comb that is filled with pollen grains, which are used by the workers to prepare royal jelly to feed the developing brood, especially for the larva that is going to develop into a queen bee. The larger portion of the comb, below this honey and pollen portion, is used as a nursery to raise the brood. This part of the comb is called the brood portion.

Honeybees and our forests

Just as forests are important to honeybees, so are honeybees important to forests. Honeybees gather nectar and pollen, which are sources of carbohydrate and protein respectively from flowers. The nectar gives them the energy that they need, and the protein is largely used to feed the young and nurture the queen bee. It is the nectar that is turned into honey. While the bees do take back most of the pollen to their hive, they help in pollination of flowers by carrying some pollen to other flowers of the same species. If there were no bees, a number of flowering species would perish. In the forests of the BR Hills, major NTFP species like *arale* (*Terminalia chebula*), *tare* (*Terminalia bellirica*), and *sige* (*Acacia sinuata*) are pollinated by honeybees.

Different species of honeybees

There are four species of honeybees in the BR hills - *Apis dorsata* (*hejjenu*); *Apis cerana* (*thuduve jenu*); *Apis florea* (*kaddi jenu*); and *Trigona sp*. (*nasare jenu*). Of these four species, *Apis dorsata* is economically the most important honeybee for the Soliga honey collectors. *Apis dorsata* is referred to as the rock bee due to its habit of building its comb on rock cliffs. It also builds combs on tall trees usually found along streams.

Comb of *Apis cerana*

Comb of *Apis dorsata*

Comb of *Apis florea*

Bees migrate

Rock bees are migratory. They are found in the BR Hills from March to May, which coincides with the main flowering period. With the onset of the rains (which is also the end of the flowering period) these bees migrate over a hundred kilometres or more to the foothills and beyond. They visit agricultural crops which are in flower. Once the rains have ended in September, a small percentage of the colonies return to the BR Hills, where there is a minor flowering period called the *bende* (*Kydia calycina*) flowering season. The bees migrate downhill once again, only to return to the BR Hills in March for the main flowering season.

Dangers to bee populations

Rock bees are major pollinators of forest trees and agricultural crops and play a very important ecological role. A number of factors could affect and reduce bee populations (and consequently impact ecosystems). Some of them are over-harvesting of honey, loss of adequate forest area, reduction in numbers of nesting trees and the preferred flowering species and use of pesticides on crops visited by the bees. Besides, we still do not know exactly what impact harvesting of honey has on the honey bees' migratory flight. Do the bees migrate for shorter distances due to less honey being available? Does harvesting of honey impact the developing broods in the colony?

Since these are questions to which we still have no answers, it is best to employ harvesting methods that do the least damage to the honeycomb and to the bees.

Harvesting honey

Many honey harvesting practices result in damage to the whole hive, destroying large numbers of bees. It is possible to harvest honey and minimise the damage done to the hive and the bees. It is important to be aware of these practices if we want to continue to collect good amounts of honey from the forests. It is also important that children are aware of these methods from a young age.

a) Timing of harvesting:

If the honey is harvested from the hive before the colony matures, then the brood gets destroyed, thereby affecting bee populations. Usually, it is safe to harvest honey when

the honey portion of the comb bulges out or looks large. By this time the brood has matured.

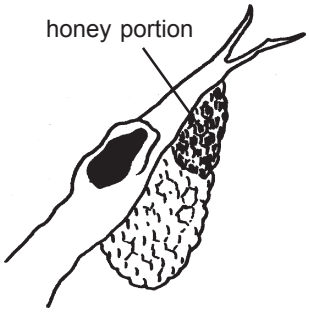
Most of the honey harvesting by the Soligas is done after the *Doddajathray* festival in April. A few isolated beehives may be harvested before the festival to bring in some money to spend during the festival! The rest, specially the combs from the bee colonies, are harvested only after the festival. A *machan* is built close to where there are many bee colonies on trees or rock cliffs, from where the harvesters guard the hives till they mature.

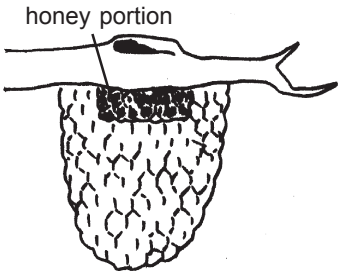
b) Proper smoking

Harvesters drive away the bees from a hive before harvesting the honey. Sometimes, a lighted torch made of green foliage is waved over the comb. This practice could be harmful as it could kill large numbers of worker bees and sometimes the queen bee as well. Smoking from below, at a distance from the comb, is a safer method.

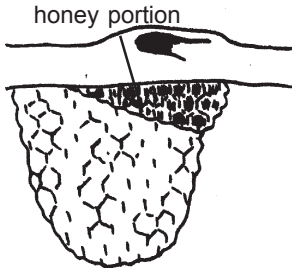
c) Better harvesting methods

The comb has separate portions for storing honey, for pollen and for raising a brood. When the comb is attached to a **slanting** branch of a tree or a rock, the honey portion can be cut away leaving the rest of the hive (and the developing broods) intact. Once the harvest is over, the bees return to the comb, rebuild the honey portion and start storing honey in it again. Within 15-20 days the harvester can collect honey from the same comb again!

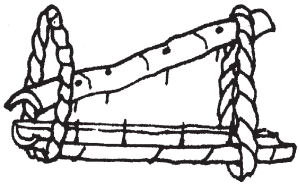




Sometimes the honeycomb is attached to a **straight** branch. If the honey portion is in the center, then it can be removed without damaging the rest of the comb as described above.

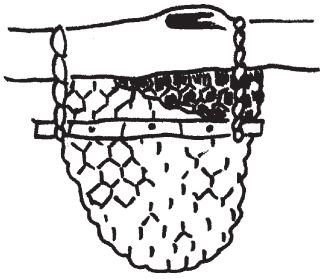


If the honey portion is slanted, then cutting the honey portion will make the entire comb fall down. To save the comb from being destroyed while taking out the honey portion, a clipping method could be used.



Two clips are made using sections of bamboo with nails on the inner side, which are then nailed into the comb just below the honey portion. The clips are then tied to the branch with ropes.

When the honey portion is cut off, the rest of the comb is held in place by the clips and rope. This clipping technique, has been demonstrated to the Soliga harvesters. It has, however, not been used probably due to the effort needed in making the clips and the difficulty in actually clipping the hive. It would, nonetheless, be useful to discuss this with the children, saying that we still need to find workable solutions.



Amount of honey harvested

The table shows the amount of honey that has been harvested over the last ten years (1993-2002).

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Quantity collected in tons	10	10	10	15	16	22	16	15	23	26

4) Soapberry

The detergent based soap that we buy from shops pollute water bodies. The forests of the BR Hills offer a natural solution…the soapberry (*antwalkai*)! Some of the washing soap that we use for clothes are detergents that contain phosphates. When these are discharged into water bodies such as lakes or streams, the growth of algae is encouraged as the phosphates provide the necessary nutrients for their growth. When the algae spreads, less oxygen and light is available for other aquatic life, a process called 'eutrophication'. The presence of such phosphates also makes the water toxic for humans. The production of such detergent is banned in some countries. Some amount of washing of clothes does take place in water bodies within the BR Hills like Someshwara *kere*. One must guard against eutrophication taking place in these bodies.

The soapberry tree (*Sapindus laurifolia*) is a medium-sized tree. It is named after its fruits that have been used as soap to wash hair, clothes and even to clean silver jewellery. The Soligas used soapberry for washing clothes and hair, but this habit is slowly changing.

The soapberry tree is found in the wetter part of the forests - on the banks of streams, semi-evergreen and *shola* forests. The fruits are collected by the Soligas during the months of February and March.

Amount earned by a soapberry harvester

In 2003, a collector received an average rate of Rs. 4.90 per kg which was sold by LAMPS for Rs. 7.80 per kg. A very small percentage (0.39%) of the total income derived from LAMPS comes from soapberry.

Amount of soapberry harvested

Given below is the amount of soapberry that has been harvested over the last ten years (1992-2001).

Years	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Quantities collected in kg	6642	3300	5897	2739	6359	3119	4639	5831	4619	3876

5) Soapnut

Soapnut (*Acacia sinuata*) is a prickly climber found in the wetter part of the forest and also on the edges of the *shola* forests. The fruit of the soapnut (*sige*) is powdered and used to wash hair. This is a good alternative to detergent-based soap and shampoo that pollute our water bodies. The fruits are harvested in March and April.

Amount of soapnut harvested

Given below is the amount of soapnut that has been harvested over the last 11 years (1992-2002).

Years	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Quantities collected in kg	663	150	1521	118	1233	549	10315	2048	2265	1679	1854

Harvesting the year through

Harvesting of some NTFP or the other takes place through the year….a sure sign of the bounty of these forests!

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Honey												
Gooseberry												
Lichen												
Soapberry												
Soapnut												
Arale												
Deer antler												
Broomstick grass												
Magaliberu												

Months of intense harvesting

Sustainable use

The meaning of 'sustainable use'

For years now scientists have debated and discussed issues related to sustainable use of NTFP. There have been many definitions of the term **sustainable use**, one of which is as follows: "the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity [as a whole], thereby maintaining its potential to meet the needs and aspirations of present and future generations." In other words, use of a particular species is sustainable if it does not have any impact on that particular species or other species in the ecosystem, thereby ensuring that they are available for future generations.

Monitoring sustainable use of NTFP in the BR Hills

It is difficult to actually prove what impacts the use of a species would have on an ecosystem. The relationship between species in an ecosystem is complex, and often not known or little understood. When gooseberry or honey is extracted from the forests in the BR Hills, we cannot state exactly how this affects the forest. However, assessments that are easy to undertake are continuous monitoring of extraction levels of NTFP and the condition of the population of harvested species. Such assessments have been done in the BRT Wildlife Sanctuary by ATREE with the Soliga harvesters.

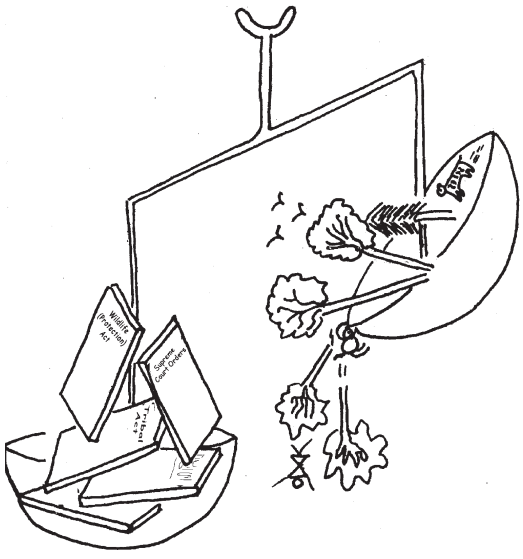
For many years now, ATREE has coordinated research on extraction levels of gooseberry, soapberry, soapnut, lichen and honey. ATREE and VGKK have worked with the Soliga collectors to put in place a system by which the harvesters monitor the production and harvesting of forest resources. Every year before the harvesting starts, a meeting is held where the Soligas discuss estimates of resource availability. They make this estimation by using just their eyes and their understanding of forest resources! These estimates of yield made by the Soligas closely match those made using the scientific method. After the harvesting, a post-harvest meeting is held where they review amounts harvested and techniques used.

There are records of the quantity of production and extraction of each NTFP over the last 7 years! While the research did show that at certain times and in certain parts of the sanctuary, the amount of NTFP sometimes showed an increase and sometimes a decrease, the conclusion was that the current levels of extraction do not significantly affect overall NTFP availability.

This is a unique situation: the BRT Wildlife Sanctuary is the only place in India where production, extraction, and regeneration of NTFP are being monitored and where the local community is involved in such monitoring.

Government ban on NTFP extraction

In early 2004, a sudden ban order on NTFP collection in wildlife sanctuaries was issued by the Forest Department. This was a result of an amendment that was made to the Wild Life (Protection) Act, which was brought into effect from April 1, 2003. According to the amendment, no extraction of any NTFP is to be allowed for commercial use from any protected area.



The Soligas depend on NTFP to add to their meagre income. The ban order will make it very difficult for the Soligas to meet their basic survival

needs. At the moment of writing, it is very difficult to say what will happen; efforts are on to lobby and negotiate with the Forest Department officials. The ban is a big blow to a community that has lived in, depended upon and protected the forests around them for several centuries.

Non-Timber Forest Products: Activities

6.1 Know NTFP

Indoor

Group size: Entire class

Level: Lower Primary

Material needed: Blackboard, chalk, Nature Cards of NTFP (provided)

Method: Discuss with the children and make a list of products that we use from the forest. Introduce the concept of NTFP and through discussions, come up with a simple definition.
Show the pictures (2 pairs each of *nelli*, *sige*, *antwalkai*, *jenu*) and ask children to name them. Talk about where they are found, on trees, climbers, rocks, bark, etc. Ask selected children to pick up one card each and speak 4 -5 sentences about the picture.

6.2 NTFP *mugithu*

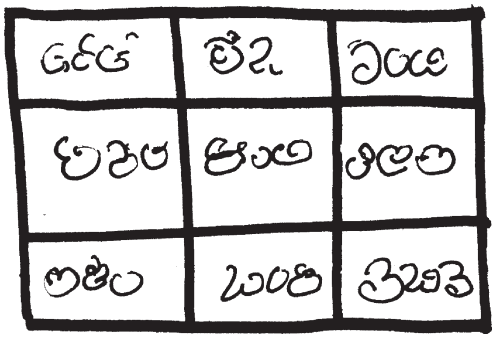
Indoor

Group size: Entire class

Level: Lower Primary

Material needed: Blackboard, chalk, notebooks, pencils

Method: Along with the children create a list of things that are used in daily life which come from the forest.
After 10 minutes, finalise a list of about 10 - 15 items and write these clearly on the blackboard. List words one under the other.
Ask the children to draw a 3 by 3 table (3 columns and 3 rows) in their notebooks. A sample can be drawn on the board.
Tell the children to choose any 9 words from the blackboard and write them into each cell in the table. They should write a total of 9 words in any order they wish.
The teacher then calls out words randomly from the blackboard and the children tick the word called out. The first child to tick all 3 words in a line (either horizontally, vertically or diagonally) puts a hand up and calls out "*Mugithu*" and is applauded by everyone. The game continues until all the words on the blackboard are exhausted.



6.3 NTFP colouring activity

Indoor

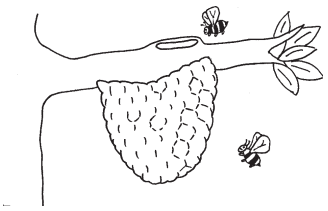
Group size: Individual

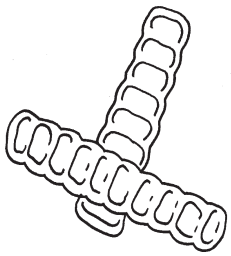
Level: Lower Primary

Material needed: One outline per child, colour pencils/ crayons

Background preparation by teacher: Photocopy, cyclostyle or trace out NTFP colouring outlines provided.

Method: Give children an outline each and ask them to colour it attractively.





6.4 NTFP collage

Indoor

Group size: Individual in groups of 4 -5 children

Level: Lower Primary

Material needed: One outline for each child, old magazines, left over coloured paper, glue

Background preparation by teacher: Photocopy, cyclostyle, or use carbon to trace out colouring outlines provided.

Method: Give each child one outline; give each group an old magazine and some glue. Ask each child to choose colourful pages in the magazine given and tear these into small pieces. The children should arrange the pieces on the picture, covering every part as creatively as possible. Ensure that each child has sufficient coloured paper to make an attractive picture. Glue pieces in place.

6.5 Sige number game

Indoor

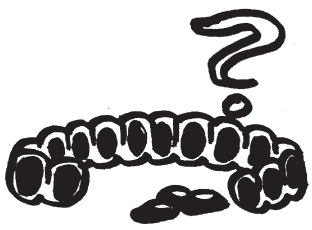
Group size: Individual

Level: Lower Primary

Material needed: 4-5 *sige* pods for each child, notebooks, pencils, blackboard, chalk

Background preparation by teacher: Ask each child to bring *sige* pods to school.

Method: Give each child 4 pods. Ask them to open the pods and count the seeds. In their notebooks, each child has to draw the *sige* pods and write the number of seeds found under each diagram in figures and in words. Then add the numbers in each pod and write the total. The answer can be crosschecked by counting the seeds.



Variation: Find the average
A variation of this activity can be done in Upper Primary Sections by counting the seeds found in each pod and arriving at an average figure.

6.6 Recognise your own

Indoor

Group size: Individual or groups of 10 children each

Level: Lower Primary and Upper Primary

Material needed: A gooseberry fruit for each child, a watch

Background preparation by teacher: Ask children to bring a gooseberry fruit each to class.

Method: Keep all the gooseberry fruits in a pile on the floor. Ask children to sit around in a circle. When the teacher claps, each child has to go and get one gooseberry from the pile. The teacher claps again and for one whole minute the children have to carefully examine their own fruit and try to remember its shape, size, markings and peculiar features with a view to recognising their own fruit later.

After a minute the teacher claps again and all the fruits are returned to the pile.
After another cue, children go to the pile and try to identify their gooseberry fruit and explain why they think it is theirs.

Variation: The same activity can be done with pods of *sige*, or soapnut.

6.7 Bee and flower toy

Indoor

Group size: Entire class

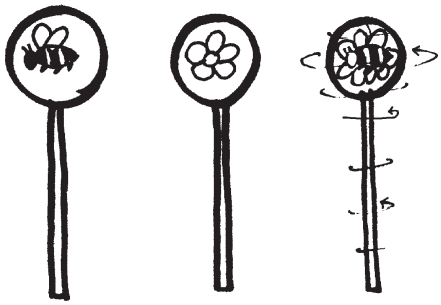
Level: Upper Primary

Material needed: (for each child) Pieces of card board or chart paper 6 x 8 cms, a bamboo stick or straight twig (20 – 25 cms long, thickness less than a pencil) colour pencils/ crayons/felt pens, knife or cutter to be used by the teacher.

Background reading by teacher: Read section on "Honey Bees and Forests" on page 116.

Method: Discuss the importance of bees as pollinators, how all plants, entire forests and crops are dependent on pollinators for survival with the class.

Give each child one piece of cardboard, and one stick. Ask the children to draw a large flower on one side of the card, and a bee on the other side. The two pictures should be aligned exactly, so that on turning the card the bee is exactly behind the flower.



The teacher can help the children make a slit in their bamboo sticks at one end with the knife/cutter.
Insert the card into the slit; centering it and the toy is ready. When the bamboo is twirled between the palms, the bee appears to sit on the flower!
This toy is a simple example of **persistence of vision**.
The retina in your eye keeps the image of an object for a moment after light is removed. You can test this by staring at a light for a few seconds then turning the light off. You will still be able to see the 'image' of light. This is called persistence of vision. This principle is used to make movies.

6.8 NTFP in our homes

Indoor

Group size: Entire class

Level: Upper Primary

Material needed: Chart paper, felt pens

Method: Get the children to talk about how each NTFP is used within the home.
Record their responses on a large chart which can be illustrated by all the children and put up on the notice board.

6.9 Maths with NTFP

Indoor

Group size: Individual

Level: Upper Primary

Material needed: Blackboard, notebooks, pens

Background reading and preparation by teacher: Read up section on "Sustainable harvesting of gooseberry" on page 114. Set arithmetical sums like the following: You are a gooseberry harvester. You want to leave 25% of the trees unharvested to allow for regeneration. Calculate the number of trees you would not climb if there were (i) 100 (ii) 200 (iii) 275 (iv)525 gooseberry trees.

Method: Discuss sustainable harvesting of gooseberry with the students. Ask children to solve the sums. Provide one solved example on the blackboard.

6.10 Draw a beehive

Indoor

Group size: Individual

Level: Upper Primary and High School

Material needed: Drawing books or paper, colour pencils or crayons

Background reading by teacher: Read up section "Different species of honeybees" on page 117.

Method: Discuss the different species of bees and the different locations they choose to build hives. Discuss the hexagonal structure of the cells. Ask children to draw a beehive and colour it.

6.11 Guess-timation

Indoor

Group size: Select 10 children both boys and girls who will be the guessers

Level: Upper Primary and High School

Material needed: Three plates, seeds or beans (numbering about 250 in total)

Background preparation by teacher: Count and keep seeds on the 3 plates as suggested. Plate 1 under 20 seeds, Plate 2 any number between 20 and 50, Plate 3 any number between 100 and 200.

Method: Keep the three plates on a table in front of the children. Draw three columns on the blackboard; label them 1, 2 and 3. Turn by turn ask each child to come and guess the number of seeds on each plate. Write each guesstimate on the board, with the child's initials. After all the children have guessed, reveal the correct answers and check whose answer is the most accurate.

A discussion can follow on the utility in daily life of guesstimates of volume, weight, time, distance, height, age, etc. Have the children observed elders guess?

Discuss how NTFP harvesters are able to fairly accurately estimate the amount of NTFP in a given area in the forest, walking around using only their eyes.

How and why are some people are more skilled/accurate in guess-timation than others?

6.12 Quantities of NTFP harvested

Indoor

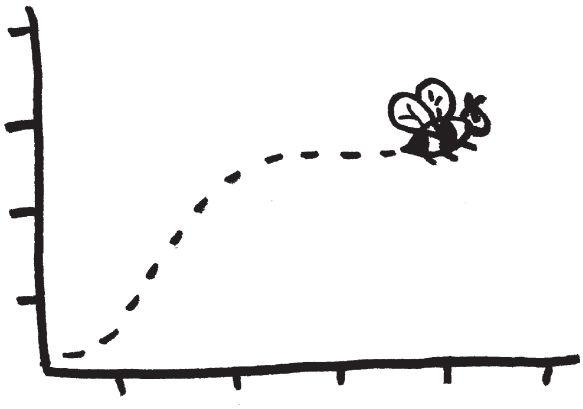
Group size: Individual

Level: High School

Material needed: Centimetre graph paper, notebook, scale, pencils

Background reading by teacher: Under each NTFP read the section on quantities extracted from 19993-94 to 2002-03.

Method: Discuss all NTFP of the BR Hills. Provide NTFP statistics on the blackboard. Show how to plot a sample graph using x-axis for years and the y-axis for quantity. Ask children to complete the exercise for all NTFP.



6.13 Which NTFP takes the lion's share?

Indoor

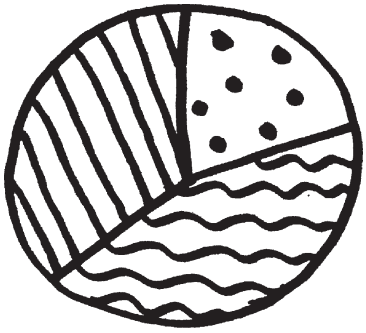
Group size: Individual

Level: High School

Material needed: Compass, protractor, notebooks, pencils, colour pencils

Background reading by teacher: Read NTFP chapter and look at statistics of NTFP extraction levels.

Method: Discuss all NTFP of the BR Hills. Provide NTFP statistics in percentages on the blackboard. Draw and explain a simple pie chart. Show the children how to convert percentages into angles from the centre of the circle. Ask children to complete the exercise in their notebooks.



6.14 Honey harvesting skit

Time: 40 mins x 2 sessions

Indoor/Outdoor

Group size: Groups of 4-5 children

Level: High School

Material needed: Any props that each team might need for enacting their role play

Method: In one session of 40 minutes discuss different methods of honey harvesting, the advantages and problems of each method, the ecologically safe ways of harvesting honey and the rationale behind sustainable methods.
Get the children to recount experiences, anecdotes and stories. Make teams and ask them to enact a situation which brings out the facts of honey harvesting, the humour, the risks and dangers involved (bee behaviour, smoking, climbing, falling off, etc.), the advantages of prescribed methods to the bee population and the forest.
The next class of 40 minutes could be used to present different skits prepared by the teams.

6.15 Whose forest is it anyway?

Time: **40 mins x 2 sessions**

Indoor/Outdoor

Group size: Groups of 4 -5 children

Level: High School

Material needed: Any props that each team might need for enacting their skit/role play

Objective: Understanding a problem from different perspectives.

Background reading by teacher: Read up section "Government ban on NTFP extraction" on page 121.

Method: Discuss the recent ban on NTFP and the situation before the ban.
Get the children to reflect on the implications of this ban for the Soliga household income; the impact on the forest; the contractors; and LAMPS.
Students can share their own experiences if they belong to families of NTFP harvesters. Discuss issues related to sustainable use.
Make teams and ask each one to enact a particular conflict situation. For example, a sudden ban is imposed on honey collection, which affects a group of honey harvesters. The harvesters approach the forest department officials to present their case for continuation of the harvesting. Two children to take on the role of the forest officials and the rest can be honey harvesters.
Another group could put across the viewpoint of the Forest Department official, a Soliga harvester, VGKK staff, ATREE researcher, LAMPS secretary etc.

The second session could be used to present the role-play situations to the rest of the class.

6.16 *Sige* time

Time: 40 mins x 2 sessions

Indoor/Outdoor (recommended during *sige* harvesting season)

Group size: Entire class

Level: High School

Material needed: Notebooks, pencils

Background preparation by teacher: Fix a time when children can visit the *sige* processing unit at VGKK.

Method: The entire class visits the *sige* processing unit on campus. Children can ask questions about when the *sige* is harvested, different methods of harvesting, how much is collected per year. Answers can be noted down.
If possible, children could actually see how *sige* is powdered and what ingredients are added to make it a natural hair wash or dish wash powder.
The teacher can explain how natural hair and dish wash powder is better than artificial shampoos and toxic cleaning agents.
In the next session, the children can write out the information collected on a chart and illustrate it.

6.17 *Nelli* delights

Time: 40 mins x 2 sessions

Indoor

Group size: Entire class

Level: High School

Material needed: Knives, chopping board, plates, *khalbatha/ ammi* for crushing fruits, clean cloth to strain, salt, sugar or honey, small glasses.

Background reading or preparation by teacher: Collect information on the nutritional value of gooseberry and its therapeutic use in diet, tonics and medicine.
Ask children to bring a handful of gooseberry fruits to class for the next session.

Method: Talk about the goodness of gooseberry, King of Vitamin C, its use in *Triphala* and *Chawanprash*. Discuss safe and sustainable harvesting methods.
In the next session divide the class into groups of 4-5 children. Get the children of one group to slice, de-seed the gooseberry, mix with a little salt and sun dry the pieces to make gooseberry *supari*. Another group could crush the fruits, add water, sugar or honey and make juice, which is consumed by everyone at once… an instant vitamin C boost for the class!

6.18 Creating myths and stories

Indoor

Group size: Entire class

Level: High School

Material needed: Blackboard, chalk, notebooks, pencils

Background preparation by teacher: Add to or modify the list of topics given below:
- Why is *amla* sour and sweet?
- How the *sige* (soapnut) got its thorns?
- How Soligas discovered honey?
- Why bears love honey so much?

Method: Discuss and recall well known stories about how things came to be in nature (the rainbow, the hare in the moon, why the sea is salty etc). Read the story about about why the elephant never tramples the quail on page 65. List the topics given above on the blackboard and ask children to choose any one and think up a story and write it in their notebooks.

6.19 The story of my life

Indoor

Group size: Entire class

Level: High School

Material needed: Blackboard, chalk, notebooks, pencils

Method: Discuss the concept of an autobiography or life history. Like people, things too have a life of their own which can be traced from when they were born to when they die or are consumed. Ask the children to choose any one forest product and trace its life history. Some examples that can be listed on the blackboard are: the autobiography of a gooseberry fruit, a pod of soapnut, a piece of lichen, a drop of honey etc. The best essays can be put up on the notice board or read out during the school assembly.

6.20 Growing NTFP

Time: Ongoing activity for one term (monsoon/post monsoon)

Outdoor

Group size: Small teams of 3 - 4 children

Level: High School

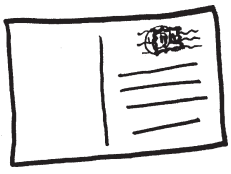
Material needed: Seeds and space for planting. Allocate small patches of nursery/planting area to each team

Objective: Seed identification, observation of germination process

Background preparation by teacher: In the appropriate season, ask children to collect seeds of different NTFP (*nelli*, *antwalkai* and *sige* are preferable). Clean, sun-dry and store in labelled paper envelopes until the monsoon.

Method: Divide the class into small groups. Ask them to:
- Prepare the nursery beds with mud and manure just before monsoon.
- Sow the seeds and cover lightly with earth.
- If the rains come on time, there is no need to water the nursery beds.
- Watch when the seedlings appear.
- Students can keep a record of the following interesting details:
- Species of NTFP seed.
- Number of seeds sown.
- Number germinated.
- Number of days it took for germination to take place.
- Monthly measurements can also be made to monitor growth if students are interested.

6.21 Letter to a forest officer



Indoor

Group size: Individual

Level: High School

Material needed: Notebooks, pencils

Background reading by teacher: Read the section "Government ban on NTFP extraction" on page 121.

Method: The teacher can discuss the background of the ban in some detail. Students write a letter to the Forest Department giving their point of view and suggestions. The best letters can be read out in class or in the school assembly.
The following situations (and more) can be thought about and discussed:
- Reporting tree felling.
- Parasite infestation on gooseberry trees affecting tree population and yield.
- Wild boar raids on fields.

7 AGRICULTURE

Introduction

Many centuries ago, the Soligas, like other forest dwelling groups, lived by hunting, gathering and a form of agriculture called shifting cultivation. All their needs were met from the forests and from the fields they cleared in the forests. When BRT Wildlife Sanctuary came into being in 1974, their nomadic lifestyle and form of cultivation came to an end. They were settled on land allotted to them by the Forest Department and had to cultivate the same patch of land year after year. Today, while some age old agricultural practices still continue, others have changed with time and external influences. As a result, food patterns have also changed.

This chapter looks at the ingenious ways in which the Soligas grow their crops, and the huge diversity of plants they use around them.

What is shifting cultivation?

Shifting cultivation is a very ancient form of agriculture practiced by many people the world over. It is also called 'slash and burn' cultivation as it involves the practice of cutting a patch of forest, burning the cut biomass, letting the ash fertilise the soil, and then cultivating it. After some years, the farmer moved to another patch of land to begin the same cycle. The old patch was left to rest and regenerate, often for as long as 20 to 50 years. Soligas are known to have had 60 – 70 year rest cycles. Then, people returned to cultivate the same patch once more. Due to a number of reasons, these cycles have become shorter and shorter. In India, shifting cultivation has been recorded in the Western Ghats, Northeast India, and Central-eastern India. There are divided opinions on whether shifting cultivation is detrimental to the health of forests. Some people say that the traditional practice, when the rest cycles lasted a long time, did not harm the forests. In recent times, shifting cultivation has become unsustainable due to shortened cycles. In many places shifting cultivation is now discouraged, in others, communities and NGOs are trying to find ways to make it more sustainable, for example, growing a mix of trees and crops which helps to retain soil fertility.

Sowing and reaping a diversity of crops

There are no clear records of what kind of crops were grown in the BR Hills in the distant past. Traditional agriculture, still practiced today, is a remarkable mix of a number of crop varieties, grown together in the same field. This is called '**multi-cropping**'. The agriculture of the drier foothills is different from the hilly areas. Rain fed farming systems are used to grow finger millet (*ragi*), maize (*jola*), niger (*huchuyellu*), field bean (*avaray*), pigeon pea (*togri*), etc. In the hills, where it is cooler and wetter, there is a multi-layered, mixed, relay system of cropping that works. Crops like ragi, maize, mustard, amaranth, tubers, banana, etc. are planted amongst forest trees. No

manure, artificial fertilizers or pesticides are used. A multi-layered system of cropping means the fields have trees and crops at different vertical levels – tall trees, shorter trees, shrubs, herbs on the ground and climbers. This imitates the structure of a natural forest and helps retain soil fertility. It also helps retain the nutrients in the soil for much longer than if only crops were grown.
Crops are supplemented with food gathered from the forests (like honey, tubers and wild fruit). There is diversity in food consumed and enough quantity to ensure a good diet. It is difficult to assess agricultural productivity since very little data is available on the area of land farmed, soil fertility, crop raids, composition of crops sown, etc.

Why is crop diversity important?

A diversity of crops is grown by farmers for several reasons:

- It provides for a diversity of needs, including for food, medicine, fibre, fodder, and even for ritual or ceremonial uses.
- Even if one or two varieties fail, others will grow and provide something to fall back on, thus reducing risk of food shortage.
- Different varieties of a crop sometimes interbreed and produce new varieties with new useful features.
- Different varieties grow in different soil or climatic conditions. Such diversity is also the cornerstone of continuous improvement in agriculture by scientists. They depend on the diverse genetic characteristics of different varieties to develop new varieties with higher productivity, resistance to disease or other desired features.

A rainbow of rains

Since agriculture in the BR Hills is totally dependent on the monsoons and there is no system of irrigation, the monsoons are very important to the farmer here. Rains are classified into different types and any elderly Soliga woman or man will be able to reel off the names easily, tell you exactly when a particular rain appears, its characteristic features, usual duration and the activity undertaken then.

There are about 24 distinct types of rain identified by the Soligas. This follows the traditional Indian almanac (*panchanga*) which associates kinds of rains with specific planetary positions through the year. Some of the rains identified in the Indian almanac are *Ashwini, Bharani, Krutikay, Rohini, Mrugashara, Arudhra, Punnarvasu, Pushya, Aslesha, Magay (Purvaphalguni), Uttare, Hasta, Chittha, Swati* and *Vishaka.*
The ease with which each rain is treated like an old friend, has helped shape the cropping system around it. The Soligas know also what crop to plant in each kind of rain. They have an understanding of which crop has immunity to pests and diseases in a certain kind of rain. There is also intuitive knowledge of certain rains that will give them a good crop, and even if other rains fail, planting is done in time for these rains.

What is planted and when?

The fields are prepared before the onset of the rains and the seeds sown in the month of May if the rains are on time. If not, people wait for the rains that arrive in July and August. Sowing is an ongoing process till August or early September.

Women manage a lot of the farming work and responsibilities. They choose the seeds and decide when and how to plant. Weeds are dried and burned along with half-composted stalks from the previous harvest and added to the land. They believe this increases the fertility of the soil.

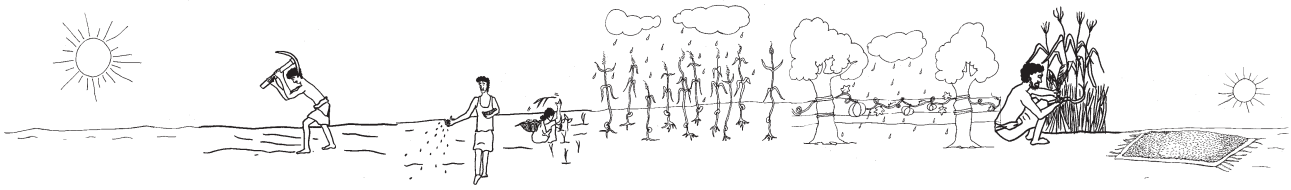
Maize, pigeon pea (*togri*), and field beans are sown first at every step (roughly every 1m). Once they germinate (along with weeds), broadcasting of remaining seeds - mustard, *ragi*, fox tail millet (*navanay)*, amaranth *(edda)* - is done. Weeding is carried out along with broadcasting of seeds. Weeding is a regular activity and lasts till the crops start to mature.

Where there are trees and hedges, climbers like pumpkin, dioscorea (*genasu*), tubers (*totambu*), beans (*hittala avaray, nell avaray*), are planted. Banana, papaya, and guava are some of the fruit trees. The entire family is involved in agricultural work, with women being the mainstay.

Annual agricultural work and rituals of the Soligas of BR Hills

No	Calendar months	Months according to Soligas	Soliga names for the rain	Agricultural activities	Rituals
1.	Feb- Mar	*Ugadi*	*Rashi*	Clearing the weeds and stubble	*Roti habba*
2.	Mar-April	*Dodda jathray*	*Mesura*	Burning the unwanted thorny bushes and stumps	--
3.	April-May	*Teppa*	*Adhri*	Sowing of maize, pulses, castor and gourd	--
4.	May-June	*Adere*	*Dodda adhir-pushia*	Sowing of ragi, mustard and amaranth	*Dulu puje – Boomethayee puje*
5.	June-July	*Kakkata*	*Kakkata*	Removing of weeds	*Pyru puje* (Earth Goddess)
6.	July–Aug	*Shravana*	*Asilesha uppe*	Harvesting of maize	Offering maize cobs to goddesses
7.	Aug-Sept	*Shravana*	*Uppe*	Removal of weeds and threshing of maize	
8.	Sept-Oct	*Marlami*	*Ubbe*	Removal of weeds	--
9.	Oct-Nov	*Devalige*	*Chithe*	Harvesting of millets	*Hosa ragi habba*
10.	Nov –Dec	*Kiri-devalege*	*Sathanega-mpalu*	Harvesting of pulses	
11.	Dec-Jan	*Sankranti*	*Astha*	Harvesting of castor, indigenous tubers	Offering of newly harvested tubers to the Earth Goddess
12.	Jan-Feb.	*Shivoga*	--	--	Collecting of *ragi* and pulses for the *Roti habba*

Information adapted from Jedegowda, M (2000)



Harvest bounty

Post-monsoon, crops are harvested as they ripen, in the following order:
- Mustard
- Maize
- *Ragi* and foxtail millet (*navanay*)
- Amaranth (*edda*)
- Pigeon pea (*togri*)
- Field bean (*avaray*)
- Climbing beans
- Tubers (*totambu, genasu)* during the *Sankranti* festival

Footwear is not allowed in the fields till after the *puje* and harvest. Not a single leaf is plucked or grain picked, not even by children, and no crop theft occurs since there is a strong belief that the deity protects the field. The first harvest is performed for the god and an offering made. Then some of the harvest is distributed to the entire *podu* community. The remaining crop is harvested for the family. A certain portion is kept aside for *roti habba* where relatives and the neighbouring *podu* communities participate. The family eats what remains. This system is age old and is still followed by the Soligas.

Celebrating diversity and venerating the earth

The festivals of *Hosa ragi habba, Sankranti,* and *Roti habba* have been celebrated from time immemorial by the Soligas as thanksgiving for the harvest and to propitiate the gods.

Hosa ragi habba is celebrated after the harvest in winter. People visit each other's homes and there is all night singing and dancing. The famous *Gorukana* song is part of the musical repertoire at this time.

Roti habba involves the preparation of a traditional menu of *ragi roti*, fresh vegetables, *kumbla (*pumpkin) *gojju*, *avaray* (field bean) *kalu*, *halasu* (jackfruit) *palya*, *anna* (rice), *sambar* and *payasa*.

Sankranti is a harvest festival which is celebrated with a feast of tubers (*totambu oota*). A diversity of tubers is harvested, cooked and eaten.

Crop diversity

The Soligas grow an amazingly diverse variety of crops. A sample of what could be found in their fields includes:

Pumpkin *(kumbla)*

Bala kumbla (long)
Sihi kumbla (round, big, sweet)
Chittay kumbla (small)

Tubers

Bella genasu (sweet potato)
M*ara bella genasu* (tapioca)
Tottambu
Tevattiga
Kesu (colocasia)
G*enasu* (3 varieties of yam, dioscorea - *bellaray, nayvay, nooray)*
Alugadde (potato)

Citrus

Heralaykai
Madala
Chakota (pummelo)
Nimbay hannu (lemon)
Kittalay hannu (orange)

Greens (*soppu*)

The Soligas believe that 101 leaves must be eaten to keep away 101 diseases!
Pumpkin leaves
Edda
Ganakay soppu
Onayganay soppu (found in paddy fields)
Other amaranth (called *keeray soppu*)
Tender mustard leaves

Finger millet (*ragi*)

Kari kaddi ragi
Haalu bunduga ragi
Billi bunduga ragi
Kari bunduga ragi
Haalu muddaga ragi
Muddaga ragi
Kari muddaga ragi
Male ragi

Foxtail millet (*navanay*)

Others

Niger (*huch yellu*)

Castor (*haralu*)
Dodda haralu
Sanna haralu
Chit haralu

Fruit trees
Mavu (mango)
Peralay (guava)
Papaya (papaya)
Halasu (jackfruit)
Balay (banana)

Maize (*jola*)

Koore jola
Kempu jola
Bili jola
Dodda jola
San jola (3 month crop)

Mustard (*sasive*)

Malay sasive (small variety)

Field bean (*avaray*)

Sinnuga avaray
Mudde nella avaray
Ginnu nella avaray
Dodda avaray
Naad avaray
Malay avaray
Nell avaray (climber field beans, many varieties)
Seppay avaray (Sanna seppay, Dodda seppay)

Amaranth (*edda*)

Domb edda
Maale edda
Harive
and numerous other varieties

Pigeon pea (*togri belay*)

Malay togri
Nada togri

Look at the variety of bananas grown!

Durga balay
Shakalati
Rasa balay
Puttu balay
Odura
Madranga
Kabbalay
Chandra balay (red)
Boodi balay

Yellaki balay
Pacha balay
Gujja balay (dwarf)
Anay balay (big fruit)
Kadu balay (elephants eat this banana)

Coffee – a recent entrant

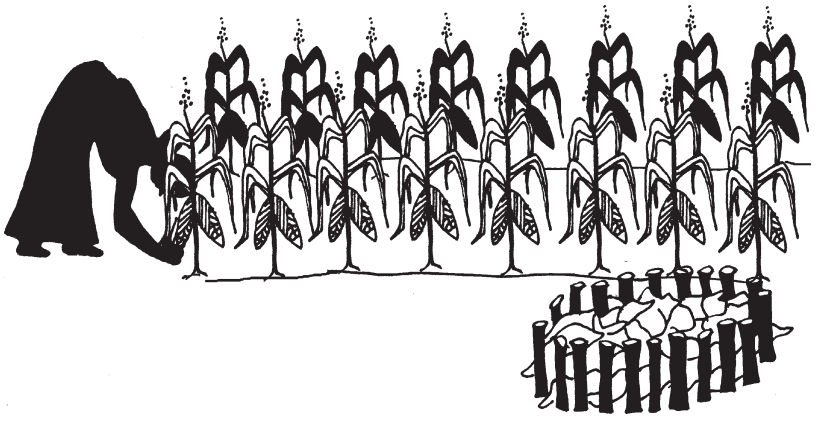
There are older coffee estates inside the sanctuary like Honnemetti, Bedguli, and Biligiri Coffee Estate spread over 2000 acres!
Although coffee estates have existed in the BR Hills for more than a century, the Soligas themselves never cultivated coffee till the 1980s. Today, along with all the other traditional crops you can also see young coffee bushes in many of the *podus*. The dried coffee beans bring in extra income for the family. Some families also grow cardamom and pepper.

T.S. Ganesh of Vathapi has an organic coffee estate where he also produces civet coffee (called *Luak Kopi* from the Indonesian term). Coffee berries are a favourite food of the civet cat, which visits the estates during the fruiting season. Coffee beans are collected from the droppings of the civet and the beans are then processed. Civet coffee has a special aroma and is a novelty prized the world over!

Crop raids by animals

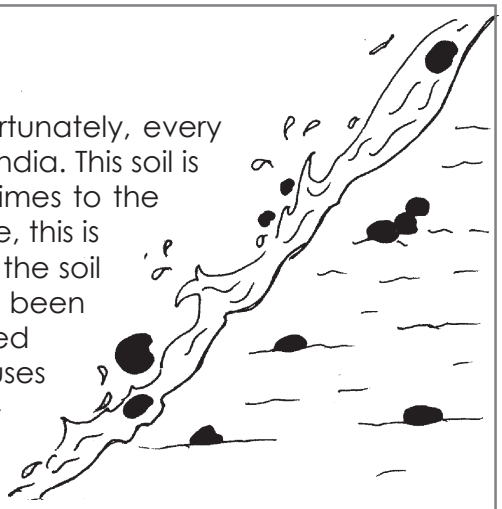
Animals that share the forests with the Soligas get their share of the crops too! Despite all the hard work put into raising crops, families stand to lose a lot if there is a raid by wild animals. Wild pigs and elephants often wander into *podus* for a tasty meal of the ripening crop. Deer, porcupine, monkeys and birds also raid the crops of the Soligas. *Machans* are built to guard against raids. Today one can also see fencing and trenches around *podus*.

New introductions



With the aim of increasing income from agriculture, restoring NTFP species and increasing agricultural and agro-forestry options, field staff at ATREE have introduced a number of simple techniques. Some of these include row sowing with the help of seed drills (to maintain optimal spacing), compost making, including vermi-composting, soil and water conservation. Weeding, digging and thinning, sowing a second crop in winter (which is rain and dew fed), tree planting along bunds and edges of fields, grafting of fruit yielding trees, crop improvement, seed treatment and seed storage through community seed banks, seed melas, community nurseries, capacity building, training, overall promotion of organic farming and sustainable agriculture, are among the other efforts being made.

Soil conservation



Topsoil is precious for plants and agriculture. Unfortunately, every year, rains wash away lakhs of tonnes of topsoil in India. This soil is carried to the rivers with the rainwater and sometimes to the sea. Wind too can blow away topsoil. In either case, this is more pronounced where the vegetation covering the soil has been cut down. This is called **soil erosion**. It has been estimated that every year, more topsoil gets washed away than has been used to build all the brick houses in India. The formation of just 1 cm of soil takes 500-1,000 years but it can be washed away by just one heavy downpour!

The main reasons for soil erosion are deforestation and wrong agricultural practices. In areas like the BR Hills, where there are steep slopes, if there is no vegetation, water will just wash away the bare soil. In fields where there is no input of mulch, compost and organic manure, the water holding capacity of the soil goes down. It also gets easily washed away.

Researchers at ATREE are working in some of the *podus* to conserve soil and water. These practices include the digging of trenches, contour sowing, and building of bunds across slopes. This slows down the force of the flowing rainwater, and allows it to collect in the trenches and percolate down. Any good agro-forestry system should recognise that soil and water are very fragile resources, and must include their conservation.

Seed saving and conservation

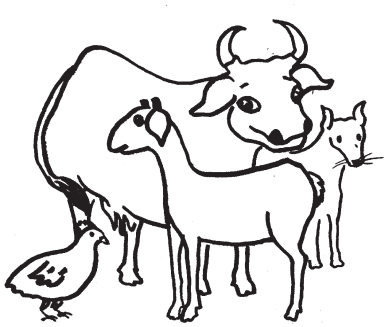
Seeds are the basis of cultivation. In the BR Hills there is a tremendous diversity of seeds of various crops and vegetables. These are often typical of this area and do not occur elsewhere. It is vital to preserve these local seeds so people have continuous access to them and do not lose them. This is especially true today when large multinational seed companies in the agri-business are gaining control over the world's seed resources. Communities have been saving their own seeds for centuries. In recent times, VGKK and ATREE have also set up small seed banks where agricultural and forest tree seeds are stored. People can get seeds for planting or keep seeds for storage.

There are many traditional ways of storing seeds like preserving them in ash, keeping them above the fire place, storing them in pots that are sealed with mud and cow dung and storing the whole fruit (like lady's finger and pumpkin). Different regions have different ways of preserving seeds.

Remember a few small seeds have the power within them to feed a family and a fistful of seeds, the whole community! Our future depends on saving the diversity of seeds around us.

Animal husbandry

Livestock is a part of any agricultural or agro-forestry community. The Soligas keep cows, goats, and poultry for milk, meat, and eggs. *Podus* have special enclosures for the animals. Cows are allowed to graze in the forests. It is interesting to note that milk or milk products were traditionally not consumed by the Soligas. Milk has slowly entered their diet now.



Pesticides are harmful

The harmful health effects of synthetic pesticides like DDT, BHC, and Endosulfan is well documented across the world. Pesticides silently kill our bodies, our crops and our wildlife. From causing skin diseases to chronic ailments and cancer, pesticides are extremely harmful and must be avoided. One needs to be even more careful in the BR Hills as it is a rich sanctuary where there is a lot of wildlife and the streams flow into the Cauvery. In Kaneri colony Soligas use both fertilizers and pesticides, especially for coffee. Many people in BR Village have begun using synthetic fertilizers and pesticides. This is a rampant practice and can cause immense harm.

In the Corbett Tiger Reserve, Uttaranchal, studies were conducted in 1991-1996 on the harmful effects of pesticides like DDT on fishing eagles. It was found that due to the thinning of eggshells, the eggs did not hatch or the hatchlings died.

Agriculture: Activities

7.1 Food we grow and eat

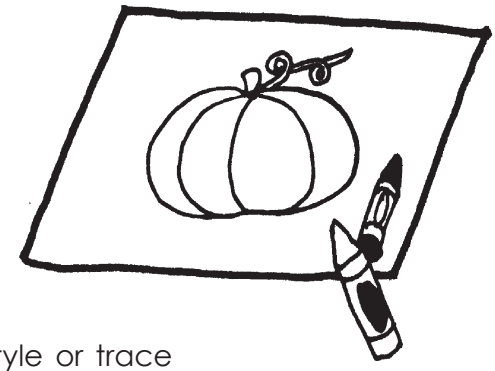
Indoor

Group size: Individual

Level: Lower Primary

Material needed: Blackboard, chalk, notebooks, pencils, crop cards from the set of Nature Cards (provided)

Method: Discuss the various crops grown using the Nature cards (2 pairs each of amaranth, beans, maize, lemons). Write the names on the blackboard. Let children choose one card, and one after the other, speak 2-3 sentences about the crops.



7.2 Colour your crops

Indoor

Group size: Individual

Level: Lower Primary

Material needed: One outline for each child, crayons or colour pencils. For variation: a few pages from magazines or newspapers and glue.

Background preparation by teacher: Select relevant colouring outlines of crops, fruits, vegetables provided and photocopy, cyclostyle or trace out using carbon.

Method: Give each child a sheet to colour. Ask children to write the name of the crop, fruit or vegetable on the top.

Variation: Ask each child to choose colourful pages from newspapers and the magazine given, and tear these into small pieces with their fingers. Ensure that each child has sufficient coloured paper to make an attractive picture. Arrange the coloured pieces on the outline, covering every part of the picture. Glue pieces carefully in place.

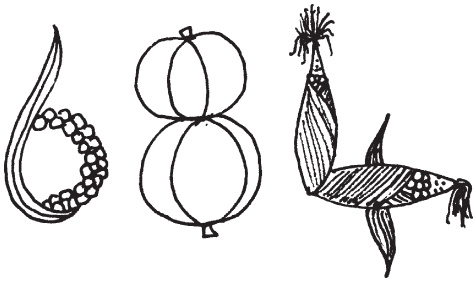
7.3 Counting seeds

Indoor

Group size: Pairs

Level: Lower Primary

Material needed: One cob or head of grain for each pair, notebook, pencil



Background preparation by teacher: Ask children to each bring a maize cob or *ragi* head to class.

Method: Divide the class into pairs. Give each pair a cob/ head. Discuss how many crops are grown. How many different colours do the maize seeds have? Why? Ask each child in the pair to look at the cob/head and guess how many seeds it contains. These figures should be written down next to each child's name. Then the children can actually count the number and check with their guesstimate.

7.4 Grain/seed/spice sampler

Time: 40 mins x 2 sessions

Indoor

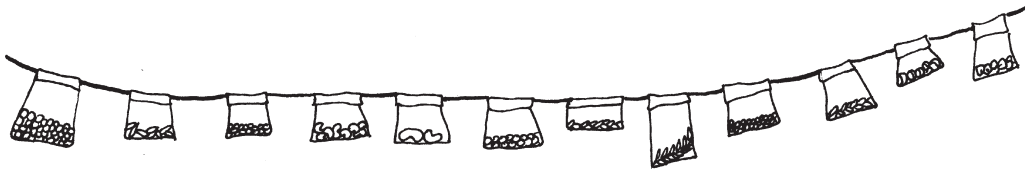
Group size: Individual

Level: Lower Primary

Material needed: A handful millets, lentils, spices,small plastic bags, stapler to seal packets, paper and felt pens to label the packets. To avoid plastic, use leaf cups or plates to display the spices on a table.

Method: Talk about different seeds, grains and spices that are part of the daily diet.
Ask each child to bring a few seeds, grains and spices for the class display.
Collect, clean and pack the samples. Children can help in making labels. Prepare a table for display, put up a chart, or make a long chain of packets and hang them in the classroom.

Variation: Memory game
Arrange some of the above packets or cups with samples on a tray with their respective labels. Ask the children to look at the tray for a whole minute and memorise the number of items kept. After a minute, cover the tray and ask the children to recall all the names. Older children could write down their lists in a notebook.



7.5 Farmer's friends

Indoor

Group size: Entire class

Level: Lower Primary

Material needed: Blackboard, chalk, notebooks, pencils, chart paper, crayons

Method: Ask the children to recall all the friends of the farmer. Which animals, birds, insects, natural forces help the farmer grow food? Some possible answers could be: bullocks, cows (dung), earthworms, rain, sun and so on. Write a consolidated list on the blackboard. Ask each child to copy these in their notebooks.

Extension: The farmer's friends could be attractively drawn on a chart for display in the classroom.

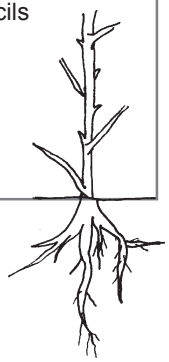
7.6 Root, fruit or seed

Indoor

Group size: Individual

Level: Lower Primary

Material needed: blackboard, chalk, notebooks, pencils



Method: List as many foods of vegetable origin as possible which form part of the daily diet.
On the blackboard draw the table given below.
In the left corner, list out a variety of agricultural produce of the area. Ask the children to sort each food item under the correct category. For example, maize and *ragi* are seeds, *genasu* is a root, pumpkin is a fruit, *edda* is a leaf and so on.

Children are expected to sort items on their own or learn and repeat and write the appropriate name down in the correct category.

Root	Leaf	Seed	Fruit	Flower
				

7.7 Seed art

Indoor

Group size: Individual

Level: Lower Primary

Material needed: Chart paper for each child, fevicol, pencils

Objective: Develop fine motor control

Background preparation by teacher: Ask children to bring a handful of pulses, grains, beans or just collect small size seeds from the campus or forest (*subabul* seeds are easy to locate and found in plenty)

Method: Encourage children to exchange a few seeds with each other so that everyone has a variety of colours, shapes and textures. Ask each child to draw a picture, design or outline on the chart paper and arrange the seeds in an attractive manner on the paper and glue them firmly in place.

7.8 Rain mime

Time: 40 mins x 2 sessions

Indoor

Group size: Individual or groups of 3-4 children

Level: Lower Primary/Upper Primary

Background reading by teacher: Read up section "A rainbow of rains" on page 133.

Method: Talk about the different kinds of rain. Have the children noticed these differences? Are there any other observations about rain? Get them to ask their parents or grandparents about the different kinds of rain.
Form groups and ask each group to enact different scenarios using only actions.
For example how plants feel about the rain. How specific animals, birds, humans, insects, the river, ponds and wells feel?
To make it more interesting, the team can keep their topic a secret and the audience can guess what they are enacting or who they are imitating.

7.9 Agriculture alphabet chart

Time: 40 mins x 2 sessions

Indoor

Group size: Groups of 5-6 children

Level: Upper Primary

Material needed: Note books, pencils, chart paper and sketch pens for each team (for the final version)

Method: Divide the class into teams. Ask each team to list out the alphabet in their notebooks (one alphabet on each line). For each alphabet try to think up the name of a crop, fruit, vegetable that is grown and eaten.

7.10 Plant parts we eat

Indoor

Group size: Individual or entire class

Level: Upper Primary/High School

Material needed: Blackboard, chalk

Method: Draw the table below on the blackboard. Make two teams. Each team has to think of things we eat and fill up the table within a given time limit. Some examples of different plant parts that we eat: *genasu,* a root; *edda*, a leaf; maize and *ragi,* seeds; pumpkin, a fruit; flowers of the banana; onion, a modified stem; cinnamon, a bark and so on.
Several rounds can be played until children run out of ideas.
The fastest, most complete entry wins.

Roots	Leaves	Seeds	Fruit	Flower	Stem	Bark

7.11 Seed to seed

Indoor

Group size: Entire class

Level: Upper Primary/High School

Material needed: Blackboard, chalk, notebooks, pencils

Background reading by teacher: Read up the section "What is planted and when" on page 133.

Method: Draw a simple horizontal line at the left side of the blackboard. Explain to the students that this is the earth during *Ugadi* after the year's harvest is over. The class will tell you how this piece of earth is going to change over the seasons as the planting happens. As the students begin calling out agricultural activities to match the seasons (hoeing, sowing, etc) keep drawing a series of lines and the activity that is happening. You will move through the monsoons, winter and *Sankranti* till you reach *Ugadi* season again. The students will now be able to see on the blackboard how the earth changes from season to season. Ask them if they see how starting with the bare earth and few seeds, the cycle ends with the bare earth and seeds to eat and sow again. This is the endless cycle of agricultural activities! Students can copy this into their notebooks or make their own pictures.

Note: This may be done for just one crop like *ragi* or maize to keep the activity simple. But it is important to realise and point out how diverse the Soliga crops are.

7.12 Model seed garden display

Time: 40 mins x 2 sessions
ideally, during *Dussera* festival

Indoor or Outdoor

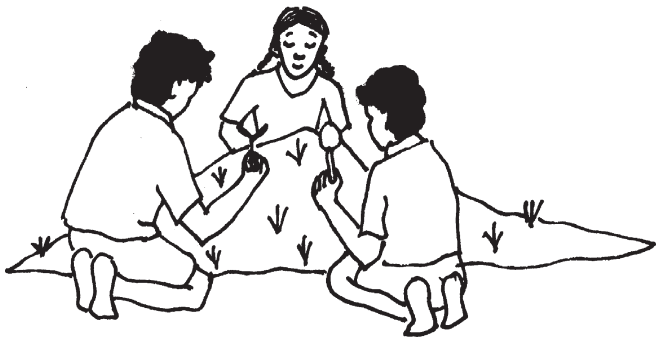
Group size: Teams of 5-6 children

Level: Upper Primary/High School

Material needed: Garden soil, small stones, seeds of different grains like *ragi*, maize, mustard, cardboard, scissors, crayons or paint.

Background preparation by teacher: Select an area outdoors or indoors (a verandah is ideal) where the different teams can make their displays. Provide large shallow plastic trays in which each group can make their gardens.

Method: Allot each team a location and ask them to visualise and create a scene using soil and stones (houses, fields, roads, water bodies, hills, animals, etc.) and plant different seeds. After a few days the seeds will germinate and a variety of beautiful 3D displays (dioramas) will be ready.



7.13 Soil in a sock

Outdoor

Group size: Entire class

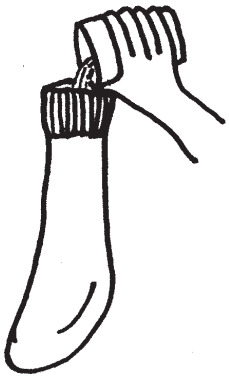
Level: Upper Primary and High School

Material needed: Old socks, rocky, porous soil with no humus, soil with humus and leaf litter, weighing scale (optional), cup

Method: This activity shows how much water different types of soil can hold. Ask the children to collect 2-3 different kinds of soil : rocky soil, soil with a lot of humus, sandy soil, etc. Take one sock and fill it with a cup of one type of soil. Using the weighing scale, check how much it weighs. Now take a litre of water and slowly pour it into the sock. Depending on the type of soil in the sock, the amount of water that the soil retains will differ. Once the excess water has flowed out, weigh the sock again.

If weighing scales are not available, then the students can hold the socks in their hands. Fill one sock with sandy or stony soil and one with humus rich soil. Pour one litre of water into each. They will be able to feel the difference in the weights of both socks immediately. Or, the volume of water draining out of different socks (with different soil types) could also be measured using a measuring flask or cup.

Repeat this procedure for all the different soils collected. Ask the students to record in their notebooks the kind of soil and its weight before and after adding water.
Which kind of soil holds the most amount of water? Why?
(Answer: Soil with humus is likely to hold the most amount of water). Tell the students that humus is very necessary for soil fertility and for its water holding capacity, and for its ability to support plant growth.
Ask students what lessons they have learnt from this activity.



7.14 Enriching the kitchen garden

Time: Several 40 min sessions (ongoing activity)

Outdoor

Group size: Individual or group or entire class

Level: Upper Primary and High School

Background reading by teacher: Read the chapter "Agriculture."

Method: Speak to the class about the importance of a home/ kitchen garden. Ask them to name some things usually grown in home gardens. Visit the VGKK kitchen garden…what is growing there?... groups of students should make a list.
Ask the class to bring some tubers from home to plant in the VGKK kitchen garden. The traditional tubers would be good and would serve to enrich the garden. *Tottambu (*yam*), mara genasu* (tapioca), *sihi genasu* (sweet potato) and other tubers could be brought. Ask the students from outside the BR Hills to name some of the tubers from their area. Students could check with their parents when and where these tubers are to be planted. At harvest time, the class can dig up the tubers, and have the kitchen staff steam/cook them for the class to eat.

7.15 Make a rain gauge

Indoor/Outdoor

Group size: Pairs

Level: High School

Material needed: Empty plastic bottles (drinking water or cold drink bottles), cutter, strip of white paper (10 cm x 1 cm), glue, pencil

Method: Cut an empty bottle about 6-8 cms below the neck of the bottle using a cutter or hacksaw. The top part with the neck acts as a funnel. With a ball pen mark a strip of paper at half centimetre intervals up to 10 cms. Glue the strip on the outside of the bottle so that 0 cm touches the bottom. Invert and place the funnel into the bottle. The rain gauge is ready.
Take the bottle outside. Locate level ground and place the gauge in the soil so that the rim of the bottle is a little above the top of the soil. (See diagram) Wait for it to rain.
The next day, read the level of water in the bottle and note it down. If you take this reading over a period of time, you can see how the amount of rainfall changes through the year.

7.16 Sketching plants

Time: 40 mins (activity can be repeated for 2 or 3 sessions)

Indoor/Outdoor

Group size: Individual

Level: High School

Material needed: Blackboard, one plant part for each child, drawing books/ plain paper, pencils

Background preparation by teacher: Make a selection of plant parts: leaves; flowers; or root-systems (for example tap root, runners, rhizome, aerial, etc.).

Method: Give children a sample and ask them to observe carefully and sketch the part, or take the children outside and let them choose their own sample to sketch. On the blackboard show how much detail is expected from them and show how to label the parts.

7.17 Pesticides are harmful!

Time: 40 mins x 2 sessions

Indoor/Outdoor

Group size: Groups of 8 – 10 children

Level: High School

Material needed: Any props that the teams may need for their role play

Background reading by teacher: Read up the section "Pesticides are harmful" on page 140.

Method: Discuss the issue of pesticides, the poisoning of soil, water sources, our food and our bodies, how benign and useful insects, birds and microorganisms are destroyed along with the unwanted pests.

Ask the groups to prepare a role play based on a given situation. For example, the Agriculture Department along with a pesticide company wants to introduce pesticides for coffee and other crops in the BR Hills. The characters can be from the Soliga community, a coffee planter, village *sarpanch*, VGKK worker, ATREE researcher, Government Agriculture Officer and a representative of the pesticide company. The best role play can be staged in front of the entire school.

7.18 Food then, food now

Indoor

Group size: Entire class

Level: High School

Material needed: Chart paper, pens

Method: Ask the children to list grains that they eat. Ask them what their parents and grandparents ate. If they do not have this information, then ask them to talk to their parents and grandparents. List these to make a complete chart. Discuss how food habits have changed. Ask children to think why these habits may have changed. Get them to reflect on any changes in the health of the community that could be attributed to changes in dietary habits.

7.19 Water runs fast

Outdoor

Group size: Entire class

Level: High School

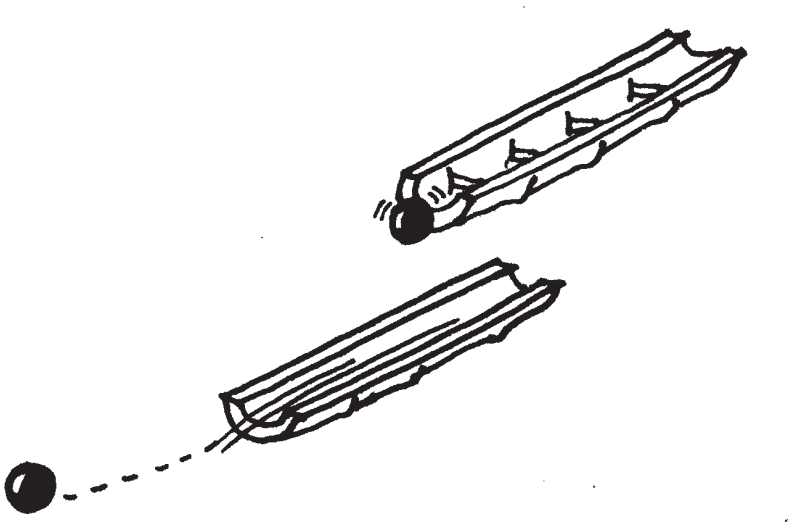
Material needed: Length of bamboo 3 feet long, spilt in half (remove the internal partitions/nodes of one half and clean the inside completely; the other half is to be left with the nodes intact), a small plastic or rubber ball

Method: This activity demonstrates how fast water runs off a slope. Ask the students if they have observed how rainwater runs off level ground and off a slope.

Take a piece of bamboo that has been cleaned and where the nodes have been removed. Place it against a wall almost vertically. Gently let go of a ball along the bamboo from the top. See how quickly it rolls down. Mark the spot where the ball comes to a stop on the ground. Tell the students that the bamboo is like a steep hillside with no vegetation. The ball is like the rain that falls on a bare, steep slope and runs down without having a chance to soak in.
Now place the bamboo against a wall, angled so it has a milder, gentler slope. The ball rolls down slowly this time. Mark the spot where it comes to a stop on the ground. Now keep the bamboo almost flat and allow the ball to roll along the bamboo from the top. The ball hardly rolls at all. What do the students understand from this?

Repeat the same activity with the other piece of split bamboo, which has its internal partitions (nodes) intact. The ball rolls slowly even when the bamboo is inclined at a steep slope. Ask the students why this is so. This is because the partitions or nodes create an obstruction and the speed of the ball is reduced. Similarly, if there are bunds and trenches, the force and speed of rainwater going down the slope is broken.
Check if students have seen trenches and bunds in some of the *podus* where ATREE has been working. Ask what they have learned about water and soil conservation from this activity. Do they feel good vegetation cover and proper management of steep sloped land will help prevent soil erosion? Do they think soil erosion is bad and why?

Now students can try this bamboo and ball activity themselves, one by one, after the teacher has demonstrated it to the class.



8 Health and Nutrition

Many communities across the world have a rich history of traditional health care systems. They have accumulated a deep knowledge of the availability and use of resources around them. Eating local plant and animal foods, learning to make medicines from plants and minerals and living healthy lifestyles have all contributed to a good health profile of a lot of communities. A healthy ecosystem contributes to generating and preserving community and family health. This chapter looks at the Soligas, their traditional health care system and some of the health issues affecting them. Other communities could use many of these lessons.

Overview of health and common health issues among the Soligas

The Soligas have had a healthy lifestyle overall. Their common health problems are comparable with tribal communities in other parts of the country. Some of the important aspects of their health issues include:

• **No dependence on hospitals for deliveries.** The traditional squatting position is used for delivery and has been found to be very effective.

• **No 'urban lifestyle' induced illnesses** like diabetes mellitus (type 2), obesity, or cancer. Type 1 diabetes occurs in some Soligas, who are born with it. Colonic cancer is absent because of the high fibre content of diet. Rheumatic and congenital heart diseases are seen. Heart problems and hypertension are slowly creeping in, perhaps because of alcohol and smoking of *beedis.*

• **Sickle Cell disease**. This is a hereditary condition where the red blood cells are not able to carry enough oxygen to the different parts of the body. A severe form of the disease affects about 1% of the Soligas, while close to 30% are affected by a milder form and lead near normal lives.

• **Anaemia**. This is a condition where the haemoglobin count is very low in the body. The normal count is between 12-16. Anaemia is mainly caused by worm infestation (especially hookworm), poor nutrition and a diet that lacks iron. It is also prevalent because of sickle cell disease. People with anaemia show symptoms of being tired and weak. Many women are anaemic. This is often because they do not eat enough foods rich in iron to replace the blood lost during menstrual periods or childbirth. Anaemic women run a greater risk of dangerous bleeding during childbirth and of miscarriage.

• **Malnutrition**. This occurs when the diet is unhealthy and lacking in proper nutrients, and calorie intake is not enough or of the right quality. This is especially common among women. Anemia is often coupled with malnutrition and is a serious issue.

• **Alcoholism** is another issue affecting health and leading to nutritional disorders. Traditionally psychotropic products of plants like cannabis (*ganja*) were used to make *ramras.* Alcoholism is a recent problem since alcohol has only recently become available. It drains meagre income and causes people to behave belligerently. With low economic security, daily wage dependence and no concept of savings, health problems set in. All these are interlinked.

• **Mental health**. Soligas have been less prone to mental health disorders. However, in recent times, alcohol abuse and cannabis abuse (especially among adolescents) is becoming a problem leading to acute mental health conditions.

• **Tuberculosis** (TB) is also a problem. Respiratory illnesses like pneumonia and chronic bronchitis (amongst older people) are prevalent. Smoking of *beedis* and smoky homes aggravate respiratory disorders.

• **Gastro-enteritis**, an infection of the intestines, occurs in the monsoons. This is rare among the Soligas, since temperatures are low, there are no clogged drains and hardly any food from outside the home is eaten.

• **Diseases of the skin and bones**. Scabies and fungal infections are common. Broken bones often occur because of animal attacks (especially bear attacks).

Today, the VGKK hospital serves as a medical center and their mobile medical service is valuable for the Soliga communities living deep in the forest. Yet, it is important to remember and endorse traditional systems of medicine and health care.

Some traditional health practices

Soligas have an extensive knowledge of medicinal plants and have used over 300 herbs from the forests for various cures. They accord their gods and goddesses a significant role in the cause and cure of illnesses. There are herbal remedies for non-poisonous bites, stings, allergies, fungal infections and skin problems. Very few Soligas are allergic to bee stings.

Some folk medicine preparations commonly used are:

- Applying castor oil to the body and exposure to the sun to ward off tick infestation.
- Making a poultice of *ragi* flour (*ragi hittu*) for treating abscesses.
- Grinding a special herb with saliva and applying the paste on broken bones. This sets like plaster.
- Using the sap of *kallihaalu* plant for effective cauterisation.

Jallesiddamma – The amazing medicine woman!

Jallesiddamma, a Soliga woman of Yerkangadhe *podu* was one of the finest traditional health practitioners. She was a tribal birth attendant (*dai)*, and also helped deal with a lot of community health problems. She had a deep knowledge of the forests, medicinal plants and plant preparations. She was a Rajyotsava awardee. She passed away in 2004. Her daughter Jeddemadi continues to conduct deliveries.

It is necessary for the younger generation to be aware of their health traditions, and the importance of conserving forests and their medicinal plants. This information will otherwise just die with the elder who has it and will never get passed on.

The traditional health system of the Soligas is so impressive that several people have studied it in detail. VGKK has been documenting these practices for over a decade. The Bangalore Ayurvedic College has brought out a report on the subject.

However, the traditional knowledge base has steadily been eroded because of easy access to allopathy and its quick efficacy. Traditional systems are labour intensive whether it is locating and collecting plants from the forest or preparing medicines. It may take longer to effect a cure.

Conservation of medicinal plants

India has a treasure trove of medicinal plants. With forests and other natural habitats fast disappearing, these plants have to be protected. Many pharmaceutical companies indiscriminately harvest medicinal plants from the wild, not ensuring their long-term survival. Trade in medicinal plants runs into crores of rupees each year.

The medicinal garden on the VGKK campus has been set up with the purpose of cultivating some important medicinal plants. Another medicinal garden has been established in Gumballi. VGKK has stressed the importance of local health traditions; of the urgent need to conserve rare and threatened species of medicinal plants; to have a nursery of medicinal plants; and carry out documentation work.

There are various efforts all over India and the world for the conservation of medicinal plants. The Foundation for the Revitalization of Local Health Traditions (FRLHT), based in Bangalore, has done a great deal of work in this area. One important method they promote is having first aid gardens at home (*prathama chikitse thota*) instead of relying too much on hospitals. Every village could have a complete herbal garden pharmacy of its own.

Soliga Forest Pharmacy

Some medicinal plants widely used by the Soligas are:

- ***Tumbe*** (*Leucas aspera)* – Herb, whose leaves are ground and poured into the nose to cure headache.

- ***Yebbatumbe*** *(Leucas zeylanica)* - Leaves of herb have good antiseptic value and are used to treat wounds and cuts.

- ***Dadasalu*** *(Grewia tiliaefolia)* - Bark of the tree is used on hair, especially as a cure for dandruff.

- ***Bejja*** (*Anogeissus latifolia)* - Bark of the tree along with the resin, is softened in water and used as a remedy for leucorrhoea (white discharge from the vagina).

- ***Navaladi*** *(Vitex altissima)* - Deworming agent. Bark of tree is boiled in water and decoction drunk as a cure for abdominal pain.

- ***Sipre*** *(Asperagus racemosus)* - Root of the herb is dried, powdered and taken with water to counter fatigue, especially in pregnancy.

- ***Kaggali*** *(Acacia catechu)* - Root of tree is powdered and a moistened paste applied on the forehead to cure headache.

- ***Tore maavu*** (*Mangifera indica*) and ***nerale*** (*Syzigium cumini)* - Bark of the tree is powdered and taken with water to cure diarrhoea.

- ***Mande sige*** *(Acacia sinuata)* - Tender leaves of this climber are boiled and taken to increase/initiate milk production. A decoction prepared from this is used to induce labour pains in those with delayed labour.

- ***Uttrani*** *(Achyranthes aspera)* - Root of herb is powdered and made into a decoction for quick post-partum (post-delivery) recovery.

- ***Joojakki*** (*Lantana indica*) - Fruits of the herb are eaten for strong, healthy teeth.

- ***Nelli*** *(Emblica officinalis*) - Leaves of tree are ground and the paste is used to cure diarrhoea.

- ***Nagadale*** *(Ruta graveolens)* - Leaves of herb are ground and the paste is applied on the forehead to cure fever, cough and respiratory tract infections.

- ***Kakke*** (*Cassia fistula*) - Bark of the tree is ground to a paste and applied on burn wounds, and even given orally to promote appetite in burn victims.

- ***Panchapatre*** (*Altissima parviflora*) - Juice of leaves of this herb is applied on blisters formed after burns.

- ***Bevu*** (*Azadirichta indica)* - Multi-purpose medicinal tree, good to cure skin problems (fungal and viral infections like chicken pox).

- ***Arale*** (*Terminalia chebula)* – Fruit of tree widely used in the case of severe cough, respiratory and fungal skin infections.

- ***Lolesara*** *(Aloe vera)* – Leaves of this fleshy herb are widely used to remedy menstrual problems and skin eczemas.

- ***Tulasi*** (*Ocimum sanctum)* – Herb widely used in the case of respiratory infections.

- ***Dalimbe*** (*Punica granatum)* - Fruit peels of this tree are used orally to control increased menstrual bleeding.

Contributed by: Dr. N.S. Prashanth and H. Ramachari, VGKK

Traditional diet

The traditional Soliga diet is characterised by the absence of oil and too many spices (except chilli!). *Ragi* dominates along with green vegetables. As seen in the chapter "Agriculture", lentils (*dal*), vegetables, and animal meat form a part of the fibre rich diet. Forest fruits like jamun (*neralay*) are also eaten.

In the days before the area was declared a wildlife sanctuary, forest animals formed a part of the diet. Birds like pigeons (*soray*), doves, spurfowl, quails (*kurli*), partridges (*gowjallu*) and jungle fowl (*kadu koli*) and mammals like wild boar, sambar, barking deer and hare were hunted and eaten. Fish, crab, domestic fowl and eggs of the monitor lizard (*uda*), bulbul and lapwing were also eaten.

Sari Jeddiah, the priest, is a good source of information on traditional Soliga foods. Bassappa of the VGKK hospital also has a good knowledge of the subject. It would indeed be an interesting (and tasty!) project for the teachers and students to study and document Soliga foods and cuisine in detail. Basappa may be able to arrange a typical Soliga lunch at a *podu*.

'Ragi' - the wonder food

Ragi (finger millet) has been cultivated by many Indian farming communities for generations. It is easy to grow and harvest, and is an affordable and vital source of many valuable nutrients. *Ragi* is rich in iron, calcium, and fibre. In Karnataka, it is consumed as *ragi* balls (*ragi mudhe*), *ragi* porridge (*ragi ganji*), and *ragi roti*. Nowadays, *ragi ladu*, *ragi chakuli*, and even *ragi bread* have become popular! Some people sprout *ragi* and make it into flour (malt); which increases its nutritional value tremendously. Farmers who do a lot of physical work benefit a great deal from eating *ragi*.

There is even a devotional song: "*Ragi thandiru*" dedicated to and praising the goodness of *ragi*!

It is fortunate that the Soligas still cultivate and consume *ragi* as one of their main foods, along with maize. This practice should continue. In other parts of India, *ragi* cultivation has reduced in favour of rice and wheat. This will have negative health impacts. In cities today, there is a revival of eating healthy foods. Many people who are health conscious have begun to include *ragi* in their diet. The Japanese import *ragi* from India to prepare baby food!

Current diet habits

The diet of the Soligas of the BR Hills is quite good even today with *ragi*, vegetables and occasionally meat. To improve it, there could be an increase in the intake of milk and eggs of domestic fowl, vegetables, greens, and if possible lentils. Rice consumption has increased amongst younger Soligas, and food from outside varies from *podu* to *podu* depending on how close the community is to the road and shops. Fortunately, they hardly eat processed foods – a habit that will contribute to good health if continued. An important (and simple) intervention is for people to eat thrice-a-day instead of the current twice-a-day practice.

It is important for everyone to grow up with healthy eating practices. This, along with protecting the environment will go a long way in keeping the entire community healthy.

Anaemia can be prevented

Soligas and many other Indians face the problem of anaemia. This is especially prevalent amongst women, and persons with a poor diet. Fortunately in the BR Hills the Soligas have access to many natural foods that can help prevent anaemia.

The main issue here is eating the **right food** and being **dewormed** so that the body is free of intestinal worms (like hookworm).

Iron with Vitamin B12, and folic acid are needed to prevent anaemia. Some foods that can help control anaemia are green leafy vegetables like amaranth (*edda*) and coriander eaten with something sour, fruits like papaya and guava, beetroot, jaggery, and an overall diet which has cereals, millets, fruits, vegetables and lentils.

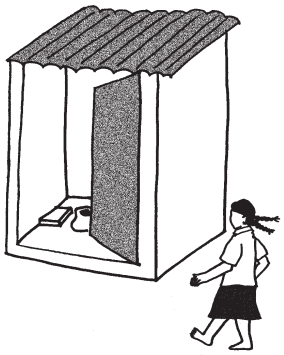
Soligas believe that coriander powder is good for general weakness. Indeed, the herb is rich in iron and good for anaemics. *Chakramoni soppu* (vitamin greens or 'haemoglobin *soppu*') is also another excellent leafy vegetable to eat, and grows easily in the BR Hills.

Health and hygiene

Good health is closely linked to good hygiene. Many traditional health systems take into account hygiene practices along with folk medicines. In the context of the BR Hills, the three most important principles of hygiene to highlight are those of having a daily bath, proper toilet habits and drinking boiled water (where it is possible).

Bathing

To have a bath regularly is important to keep the skin clean and ward off fungal and other infections. Students must be encouraged to do this. What did the Soligas use earlier instead of soap? In many places, even today, people use bath powder, which could be a mix of chickpea flour (*kadlay hittu*) or soapberry and soapnut (*antwalkai* and *sige*) mixed with a little turmeric. This is very good for the skin. If there are practical difficulties in having a daily bath, then a bath at least twice or once a week is a must.



Toilets

Many infections like cholera, typhoid and gastro-enteritis are water borne and spread as a result of human waste not being disposed off in the right way. Hookworm infestations also spread through poor toilet habits, leading to anaemia. It is crucial to make sure human waste does not harm or pollute. Good health depends on good toilet habits.

If forests or open grounds are used as an open toilet, the waste should be fully covered with soil or leaves to prevent flies from sitting on the excreta. Regular toilets should be kept clean and septic tanks sealed. Campus children must be encouraged to use toilets. Using roads as toilets is a very unhygienic practice and efforts must be made by all at VGKK to explain the harmful effects of such actions to the people.

Ecological dry toilets

Dry toilets are a cost effective way of maintaining hygiene.
A pit (3' x 3' x 4') is dug and a rough wooden frame with a hole is placed on it. The pit should not be located near a water body or a drinking water source. A cloth or bamboo wall can be used to screen the pit. This space makes a good toilet. After each use, soil has to be sprinkled over. Ash may be added from time to time as a disinfectant, to keep the pit dry. In the monsoons, a roof of any material could be erected over the pit to prevent flooding.
When the pit becomes full, a tree could be planted over this nitrogen-rich fertilizer, and another pit dug. The same wooden framework and screen walls can be used for the new toilet. The full pit could also be left unused for 12 months and then the compost emptied and used as fertilizer for trees.
A family of four could use a dry toilet of this size for about 8–10 months. There are several designs for sealed dry toilets, which, although more expensive, would be better then the unsealed ones described above.

Health and Nutrition: Activities

8.1 Plants that cure

Indoor

Group size: Entire class

Level: Lower Primary

Material needed: Blackboard, chalk, notebooks, pencils

Method: Talk to the children about how in the old days there were no hospitals and doctors like today. Sick people were looked after at home. There were experienced elders sometimes called medicine men/women who knew more about treating illnesses than others. Most people knew how to use plant leaves, roots and herbs, which grew in the forest to cure different diseases. Ask the children if they know of any plants that cure. Make a list of 5 – 6 plants and herbs commonly used in homes on the blackboard. Alongside write what they are used for. Ask the children to copy this into their notebooks.

Extension: A trip could be organized to the VGKK medicinal herb garden to show the children the plants talked about in class.

8.2 Caring for our bodies

Time: 40 mins x 2 sessions

Indoor

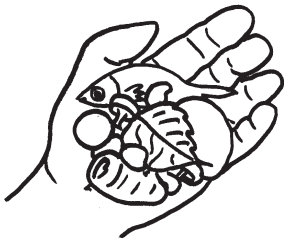
Group size: Groups of 5 – 6 children

Level: Upper Primary

Material needed: Any props that the groups may need

Method: Start a discussion on how good health is closely linked to hygiene. Read aloud the section on 'Health and hygiene' on page 155 to the class.
Next, split the class into groups. Ask each group to choose any one of the topics given below and discuss its importance to health. Chits listing these topics could be picked out by the groups: 1) bathing 2) hair and skin care 3) care of teeth 4) regular toilet habits 5) drinking water. After some amount of discussion, they could try to communicate their ideas through small humorous skits, mimes and dance!
Each group could present their skits to the rest of the class in the next session.

8.3 Wild foods



Indoor

Group size: groups of 5 – 6 children

Level: Upper Primary

Material needed: Note books, pencils

Method: Divide the class into groups. Tell the children that the day's discussion is about the kinds of foods they eat from the forest and foods that grow wild around their *podus*, and are not usually cultivated. Wild foods could include vegetables, tubers, leaves, greens, mushrooms, honey, forest fruits, eggs, insects, fish, snails and other animals.
Does their wild food diet vary from season to season? Are there special wild foods harvested and eaten at certain festivals?
Each group can then make a table of all wild foods in their notebooks. They can do this according to the season in which it is eaten, so that they know what is available in summer, monsoon, and winter. Drawings can also be made if the students wish.
Display the wild foods list in class.

8.4 Make your own herbal medicine

Indoor

Group size: Entire class divided into 2 groups

Level: Upper Primary and High School

Material needed: A bottle each of honey and coconut oil, teaspoons, cups, mortar-pestle, clean piece of cloth to strain.

Background preparation by teacher: Ask children of group 1 to bring a half inch piece of ginger each for the class. Ask children of group 2 to bring half a teaspoon of turmeric powder each for the class.

Method: Tell group 1 that they are making a **cough syrup**. Crush the ginger with the mortar and pestle, place on cloth piece and squeeze the juice into a cup. (The cloth acts like a sieve and retains all the ginger fibre). Measure out 1 teaspoon of honey per child and add this to the ginger juice. Mix well and give this home made cough syrup to all the children to taste. Explain how the ginger-honey combination acts as an expectorant.

Tell group 2 that they are making an **ointment** for cuts and wounds. Measure out one teaspoonful of coconut oil for each child into a cup. Ask the children to add turmeric powder brought from home (about two pinches of powder per teaspoon of oil). Mix well and give this to the children to apply on cuts, wounds, bites and rashes. Explain how turmeric has antiseptic qualities. (Note: the two groups could work simultaneously.)

8.5 Anaemia campaign

Time: 40 mins x 2 sessions

Indoor

Group size: Entire class / groups of 5 – 6 children

Level: Upper Primary and High School

Material needed: Chart paper (quarters), crayons or colour pencils, sketch pens for each group.

Background reading by teacher: Read sections on "Overview of health and common health issues among the Soligas" on page 149 and "Anaemia can be prevented" on page 154.

Method: Ask if the children have heard of anaemia as a health problem. Does any family member have this problem? Talk about anaemia, its symptoms, causes and prevention. Link it to changes in diet. Discuss the iron-rich foods that are available.

In the second session, divide the class into groups and distribute the material. Ask each group to create a poster about anaemia, its prevention and the importance of proper diet. Apart from drawings, they could also think of slogans and use these in their posters.

8.6 Meet the nurse

Indoor

Group size: Entire class

Level: Upper Primary and High School

Background preparation by teacher: Request a health centre nurse to come to class for an interview cum discussion with the children.

Method: Tell the children that they have to interview the guest for the day. Initially let the children freely ask questions. Later the teacher could provide some questions to guide the interview. What is a typical nurse's day like? How many patients are treated in a day? What illnesses did they have? What are the symptoms, the causes of these diseases? What kind of treatment was given to each patient? Let children take notes during the interview.

Extension: In another session these notes could be written up as an essay, newspaper article or an autobiography of a nurse.

8.7 Soliga recipe book

Time: 40 mins x 2 sessions

Indoor

Group size: Pairs

Level: Upper Primary and High School

Material needed: Blackboard, chalk, notebooks and pencils, paper

Method: Engage in a class discussion about the unique recipes of the Soligas.
Make a list on the blackboard of foods that include daily food items and special preparations for weddings, festivals and other celebrations with suggestions from the children. Find out what are special foods for infants; the sick and elderly; for use during pregnancy and lactation.

Divide the class into pairs. Ask each pair to select one item from the list made and find out and write down the recipe to make that particular food item. Parents and village elders could be consulted for this task. Ask children to bring this information to the next class. The following format could be suggested to record the recipe:

- Ingredients or raw materials
- Material needed (such as a knife, vessels, grinding stone)
- Method (the step-by-step procedure to prepare the food item)

Recipes thus collected could be written out neatly on and bound together in the form of a book entitled "Our Soliga Recipes".

8.8 Garden pharmacy

Time: 40 mins x 2 sessions

Indoor/Outdoor

Group size: Groups of 5 – 6 children

Level: Upper Primary and High School

Material needed: Notebook, pen, pencil, plain paper

Method: Take the class to visit the VGKK medicinal plant garden. Explain why the garden was set up. Explain how useful it is to have basic knowledge of medicinal plants.
Divide the class into groups. Tell the groups to go around and identify and write down the names of the plants growing there. If there is a problem, someone from the hospital can help.
Discuss the medicinal properties of each plant and what each is used for.
Ask if the children have seen medicinal plants anywhere else? Explain that there are hundreds of valuable medicinal plants in the forests.

In the second session, ask each group to write up what they saw. They could make a simple chart listing the medicinal plants seen and their respective properties. Sketches and drawings can also be included. Each chart can be displayed in class.

Extension: Find out if the students are convinced about the value of medicinal gardens. Suggest that they can have garden pharmacies at home, or even convince the *panchayat* and *podus* to have village level medicinal gardens.

8.9 Discovering home remedies

Time: 40 mins x 2 sessions (if needed)

Indoor

Group size: Entire class / individual

Level: Upper Primary and High School

Material needed: Blackboard, chalk, one sheet of chart paper for final list

Method: Create a list of common, effective home/herbal remedies for the following problems: cough, wounds, leech bites, bee stings, diarrhoea, stomach ache, flu, head lice, ear ache, sprains, etc. Draw a table format on the blackboard and fill in the information. Get children to do the same in their notebooks and fill the gaps in information in consultation with other adults on campus or in the *podus*.

Extension: At the end of the session, depute some children with good handwriting to transfer this information onto a sheet of chart paper. Suitable illustrations can also be made.

8.10 The goodness of *ragi*

Indoor

Group size: Entire class

Level: Lower Primary, Upper Primary and High School

Background reading by teacher: Read sections on "Traditional diet" on page 153 and "*Ragi* the wonder food" on page 154.

Method: Talk about *ragi* and its place in the Soliga diet. What is the significance of the *Hosa ragi habba.* Do the children like to eat *ragi*? Ask children about the various ways *ragi* is prepared and eaten in their homes. Discuss the nutritional content of *ragi.* Mention how easy it is to grow *ragi* compared to rice and wheat.
Read aloud relevant portions of the text from the manual.

Variation: Ask if there are any proverbs, idioms, riddles, poems or songs about ragi. The children could spend another 40-minute session recalling and reciting these or composing some of their own simple poems or jingles on the 'Goodness of *Ragi*'. These could be written up and displayed on the notice board.

8.11 Doctors of the forest

Time: 40 mins x 2 sessions

Indoor

Group size: Entire class

Level: High School

Material needed: Notebooks, pencils

Background preparation by teacher: Invite a well-known Soliga healer from a nearby podu to come to the class. If needed, the hospital staff (like Basappa) can help with this. Explain to him/her that the objective is for the children to grow up appreciating and valuing the folk system of medicine.

Method: Tell the class that you have invited a Soliga healer to come and share his/her experiences.
The medicine man/woman can talk about how they collect medicinal plants, prepare the medicines, kinds of ailments they treat and some details of their own lives as well.
The students can then ask them questions and have a discussion.
Tell the class to prepare for a writing activity in the next session. The topic will be to write about any traditional healer they know or have heard of.
In the second session the students will write their essays in class.
Go through their written work, discuss any interesting issues raised and give it back to the students for their scrapbooks.

8.12 More poster campaigns

Indoor

Group size: Groups of 5 – 6 children

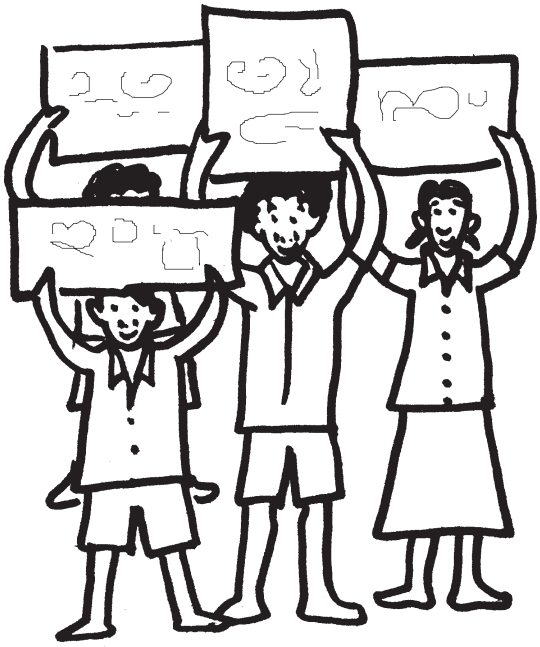
Level: High School

Material needed: Chart paper (sheet cut into quarters), crayons or colour pencils, sketch pens for each group.

Background reading by teacher: Read sections on "Overview of health and common health issues among the Soligas" on page 149 and "Health and hygiene" on page 155.

Method: Begin with a discussion on alcoholism, smoking and good toilet habits. If necessary read out relevant sections from the text. Get children to share their views and understanding of these issues. Encourage questioning. Tell the children that they have to share this discussion with more people, the larger public in the form of a poster campaign.

Form four groups and distribute the paper and art material. Write out 4 topics on chits and ask the groups to pick their topic. Ask the children to think of catchy slogans that can accompany their illustrations on the posters. Display the finished posters on the main notice board of the school.



BR Hills - Development or Destruction?

The Urban Concrete Jungle

9 Environment and Development

Development – what does it mean?

We all assume that a country like India needs to develop. But let us pause and ask ourselves what 'development' really means. Are we really developing in the way we want?

The term 'development' actually means to 'unfold', and was probably initially used in the sense of opening up opportunities for people to improve their lives. One can improve one's life through greater awareness and education, through better health care, by drinking and eating healthy food and by undertaking enjoyable and exciting activities. Such all-round development of the intellectual, cultural and material aspects of life, to increase well being and happiness would be welcomed by all.

Industrial society has mostly focused on technology that does not consider the damage done to the environment. Countries are considered 'developed' or 'underdeveloped' depending on the amount of electricity consumed, vehicles owned, money earned and generated. Rarely, have other aspects of well-being been considered!

What such a view of development fails to take into account is the impact of increasing material wealth on the environment and on people themselves. This current model of development has led to a rapid plunder of the earth's resources. Destruction of forests, pollution of water, soil and air, poisoning of food, over-exploitation of fisheries and minerals and other such negative impacts are obvious for all to see. The latest global survey of these trends by the United Nations shows that humanity is already straining the earth past breaking point. **Today's development path is ecologically unsustainable.**

Another aspect not considered is, whether all people are able to obtain the benefits of development? While a small percentage of people are getting richer, the poor stay where they are or actually become poorer. More than half the world still does not have enough food to eat, nor enough shelter; not because there is too little food or there are too few houses, but because some people are consuming and wasting too much. **In this sense, today's development is causing greater inequalities.**

We need to make better choices in our own lives, by utilising as few resources as we can, by saving and re-using resources and by recycling material like paper, water, plastics, metals, electricity, and so on. We also need to spread this idea to everyone around us, our students and teachers, our friends and relatives.

Governments should also make the right choices and lay greater emphasis on education, health care, and environmental protection, than on producing mere material wealth. Our society has to find a way to live less wastefully and more in tune with nature…otherwise we are doomed to extinction!

Development and the BR Hills

The environmental and social problems related to development that the world is facing, are also reflected to some degree in the BR Hills. It is important for the local people to understand these issues, and ask themselves what kind of future they want. How would the environment and wildlife of the region, and the culture and livelihood of the Soligas be affected, in the face of all the development related threats? What kind of health, economic, educational, communication facilities, and other inputs be availed of by the Soligas, without destroying the forests? Who would decide this: government agencies, NGOs, the Soligas or someone else?

Environment and development issues affecting BR Hills

There are several issues that affect the BR Hills and the wildlife sanctuary.

BR Hills - Development or Destruction?

Increasing numbers of pilgrims

For centuries, the Biligiri Rangaswamy Temple has been visited by devotees and pilgrims from nearby villages and faraway places. In recent years, these numbers have swelled and negative impacts are being felt. The temple and surrounding *mantapas* receive the maximum visitors.

Visitors to the Biligiri Rangaswamy Temple



Busiest Months	Festival	Numbers of Pilgrims
January (after *Sankranti*)	*Chikka jathray*	15,000 over two days
End April – first week of May (4 days)	*Dodda jathray*	• 25,000 on *jathray* day • 3000 to 4000 on the other 3 days • 5-10% stay overnight
August (5 Saturdays)	*Shravana jathray*	5000 every weekend (Friday evening to Saturday evening, with special buses coming, overnight stay, and cooking of food)

Source: Mallesh (personal communication), VGKK 2004

The effects of such large numbers of visitors on the local environment is extremely disturbing:

- Noise from buses and people.
- Huge amounts of unregulated firewood collection from the forests.
- Waste (like plastic bags and broken glass bottles) thrown all over.
- Pollution of water bodies (especially Someshwara *kere*).
- Lack of sanitation because of inadequate toilet facilities and disposal of human waste.
- Lack of clean drinking water.
- Outbreaks of infections like gastro-enteritis.

The local human communities are harmed and wildlife threatened. The increasing number of pilgrims may seem like a problem without an easy solution, but with planning, awareness programmes, and cooperation of the local people, this issue can be sorted out and controlled. There are examples of responsible temple tourism in Karnataka, as in Sringeri, that can be emulated.

Wildlife tourists

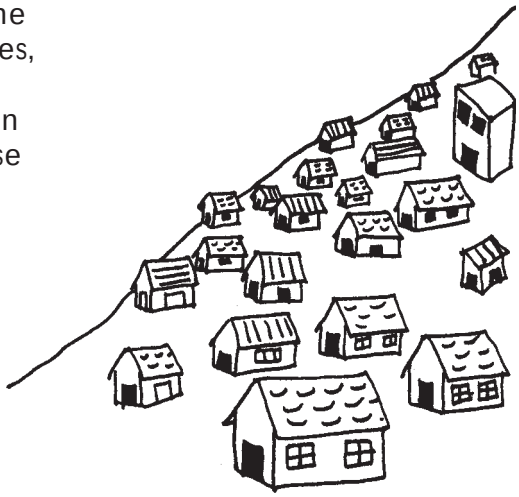
Each year people also come to enjoy the natural beauty of the BR Hills and view the wildlife. The boarding and lodging options available to them are at Jungle Lodges (K.Gudi), and the Forest Guest Houses at K. Gudi, the BR Hills, Budhipada, Bedaguli, and Buradaybangli. These can accommodate a total of about 11,500 tourists per year (assuming each person stays only one night). The Inspection Bungalows (IB) of the Public Works Department (PWD) and Temple Trust are also used.

Wildlife tourism conducted well can make people aware of the importance of ecological conservation, while providing enjoyment. It can also provide employment and livelihood options to locals, like the Soligas, who know a lot about forests and wildlife. In the sanctuary, the wildlife tourist numbers have been significantly lower than the pilgrim numbers, and so far there has been no great negative impact.

It is a well-documented fact that tourists arriving in large cars or jeeps can have a negative impact on wildlife and the environment. The jeep rides into the sanctuary can cause great harm such as compaction of soil, air pollution, and scaring away wildlife. Wildlife tourism must be approached with caution and careful planning.

Expanding human settlements

Human numbers have been steadily increasing in the BR Hills. In areas like BR Village and the coffee estates, the growth has been significant. One of the main reasons has been the influx of settlers from outside. In BR Village itself, the last decade has seen a rapid rise in the number of people who have come to live here.



It is important to understand the population issue in the context of the wildlife sanctuary. More people leads to higher pressure on the resources of the sanctuary for example, water, fuel wood, etc. This will result in a negative impact on the forests and wildlife. There will also be an increase in the problems associated with human settlements, like garbage, sewage, etc. It would be wise to limit the number of humans living in the BR Hills. The area has a limited capacity to provide for the needs and wants of people – this is called the 'carrying capacity'. Care should be taken not to exceed this carrying capacity.

Quarrying

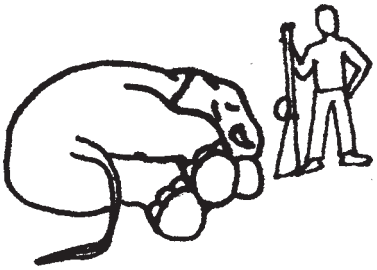
Quarrying is a term used to describe the extraction of stone or metal ore from under the earth. In the BR Hills, quarrying for black granite started in 1980-81 but has now been stopped within the sanctuary. The most well known quarries were Karadi Gudda inside the sanctuary (owned by Prasad Granite), and Krishnayan Katte (owned by Evershine Quarry). The latter was closed in 1985. Today, no quarrying takes place inside the sanctuary.

The negative effects of quarrying black granite reported in Chamarajanagar District include:

- Groundwater being affected.
- Bore wells becoming dysfunctional.
- Crops being ruined because of high dust levels.

Laws and policies pertaining to mining and quarrying around protected areas in India are still unclear. Unfortunately for the BR Hills quarrying was taking place within about 15 metres of the wildlife sanctuary boundary! There are also places around the BR Hills where people have quarried down to 60 feet below the ground. Quarrying brings in hundreds of crores of rupees as revenue, and is closely linked to strong political lobbies. It is a tricky situation to deal with. Teachers should sensitise the students to be aware of the seriousness of the issue.

Poaching



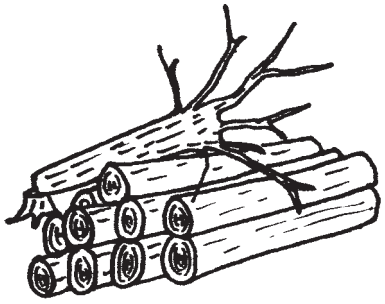
Veerappan was a name that was greatly feared and became synonymous with poaching and smuggling within the BR Hills and the Male Madeshwara Hills. The dreaded poacher was nicknamed '*molaka*' partly because he was thin and tall like a green chilly and partly because of his chilly like temperament! Veerappan was involved with poaching elephants in the 1980s, but in the last few years of his life, he was known to have stopped indulging in these illegal activities. His presence in the BR Hills and MM Hills till his death in 2004, is believed to have given some protection to the forests and wildlife; other poachers were too scared to enter these forests!

Poaching of wild animals is an offence under the Wild Life (Protection) Act (1972).

Many methods of poaching have been recorded, including laying traps, poisoning waterholes with urea, poisoning the prey of a tiger or leopard, using nets or wire, and even the use of country-made guns.

Statistics maintained by the Forest Department over 10 years (1990-1991 to 1999-2000), show that 20% of the elephant deaths in BRT Wildlife Sanctuary have been a result of poaching.

Tree felling

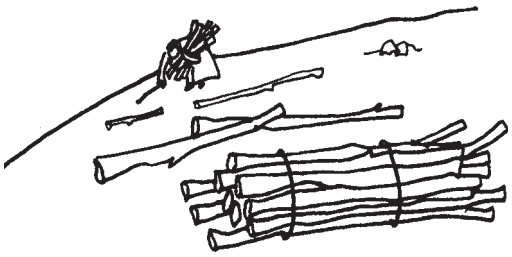


Illegal tree felling is an issue that most wildlife sanctuary authorities have to deal with. In BRT Wildlife Sanctuary today, there is hardly any sandalwood left, partly due to the smuggling by Veerappan and his gang.

Data available with the Forest Department on sandalwood, timber and firewood smuggling over four years is as follows:

Year	Sandal (tonnes)	Timber & firewood (tonnes)	Total
1996	10	75	85
1997	3	115	118
1998	10	79	89
1999-2000	2	57	59
Total	25	326	351

Firewood collection



Firewood is the most important source of energy in the homes of people living in the BR Hills. These include both Soligas and non-Soligas. Thousands of people (from within and outside the sanctuary) depend on the 540 sq. km sanctuary for fuel wood. About 86% of the collection takes place on the edges of the sanctuary where human numbers are greater, and people from the surrounding villages come in. About 14% of fuel wood is collected from the forest core or forest interior.

The demand for fuel wood is over 50 tonnes per year. Forests can only yield a certain amount of wood and over-harvesting will result in severe loss of forest cover. The BR Hills too, face this problem and need to look at controlling fuelwood collection. Regulating use of firewood by pilgrims, providing alternative sources of fuel like LPG gas or biogas, and popularising fuel-efficient, smokeless stoves like the ASTRA *olay* are some ways to handle the problem.

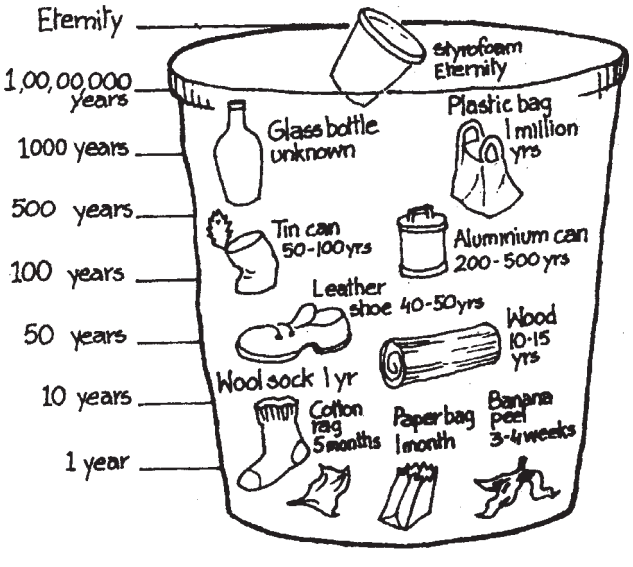
Biogas could become a powerful way to reduce dependence on fuel wood from the forest, especially for areas like BR Village, and the coffee estates.

Waste

Pilgrims, wildlife tourists, local residents, and campuses like VGKK generate tonnes of waste each year in BR Hills. This is an extremely serious issue as lack of waste management could end up turning this beautiful place into an ugly, dangerous place.

Garbage or waste is of two kinds:

- **Biodegradable waste** (like vegetable, fruit or organic matter) that can decompose into compost and fertilizer
- **Non-biodegradable waste** (like plastic, glass, metal, thermocol or styrofoam) that does not decompose (or does so over a very long period) and stays in the environment for years. In this category we also have toxic waste (like batteries, paints and other chemicals) which greatly harm the soil and water. A lot of non-biodegradable waste can be recycled.



When will these things degrade ??!!

India and other countries are struggling to cope with their garbage issues. Yet, we continue to generate more and more garbage because of the increasing number of products we use. In a wildlife sanctuary this is especially dangerous. Waste can irreparably harm the wildlife and forests, and pollute the water and soil. In Periyar Tiger Reserve, Kerala, the plastic waste of the Sabarimala pilgrims has greatly harmed the wildlife habitat. It has posed a threat to the elephants. There are recorded instances of elephants dying a painful death due to large amounts of plastic consumed, which clog their intestines.

In the BR Hills, the problem of waste management can be controlled with the cooperation of the temple authorities, village *panchayats*, Forest Department, staff and students of VGKK, and pilgrims. In 2004, a waste campaign began in the BR Hills around the temple area. It was initiated by ATREE researchers and some VGKK staff with the school children. There were plans to have separate containers to throw different kinds of waste like paper, plastic, metal, glass and organic matter. Shop keepers were educated and asked not to give plastic disposable carry bags, but to use paper or cloth ones instead. The Forest Department issued a ban on plastics in the wildlife sanctuary following an order to all protected areas in Karnataka. This is a good start but will have to be sustained for long-term positive results. Wildlife tourists and pilgrims can be asked to carry back their garbage. This system is being followed in Corbett Tiger Reserve in Uttar Pradesh.

Other changes (coffee estates, roads)

While the list of problems affecting the BR Hills could become endless, it is important to look at issues that may escape notice. Roads for instance are essential for transport and connection. Often having a road means, that we can get a sick person quickly to hospital and save his/her life. But it also means that increasingly more areas of the sanctuary get disturbed with speeding, noisy vehicles and becomes accessible to poachers and timber smugglers. Speeding vehicles are a big threat to wildlife.

The number of coffee estates inside the wildlife sanctuary is also an issue of concern. They exert pressure on the sanctuary and many of them use pesticides that are extremely harmful to the environment.

There are always many questions for which ready answers are not available. What is important is that development issues can form an important part of the learning of school students and the local community to enable them to be aware, and take action in a more pro-active and informed way.

Revisiting 'development' in the BR Hills: what should be done?

Having reviewed the various developmental problems that face the BR Hills, the question is how should they be tackled? And who will decide the future of the region?

Currently, the government takes most decisions regarding conservation and development. In the case of the BRT Wildlife Sanctuary, they are taken by the Forest Department. In areas around the sanctuary, it would be a number of other government agencies that decide. *Panchayats* and other institutions also take some decisions. People coming from outside the sanctuary cause most of the problems. However, by and large, local people (especially the Soligas) are not part of the decision making processes. They have views on the damaging activities and behaviour of the pilgrims, the tourists and the mining and coffee estate companies. They have their own way of looking at the roads crisscrossing the sanctuary, or on their own activities such as firewood and NTFP collection. They should be part of the decisions that affect the hills.

Perhaps the Soligas, along with the government and non-government agencies working in the hills, should try together to understand the impact of current activities and work out a future vision that could help avoid some of the problems that these activities create. It is time that the *adivasis* are given some power and authority to decide their own future and the future of the BR Hills.

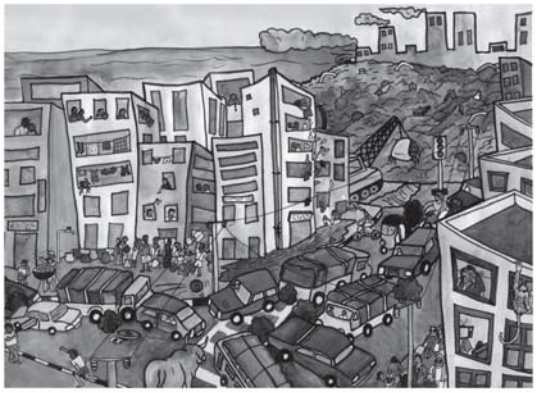
Ecological footprint

"The Ecological Footprint is a measure of the burden (or load) imposed by an individual, population or economy on nature. It represents the land (and water) area necessary to sustain a certain level of resource consumption and waste discharge by that population. It is an accounting tool that allows us to estimate the resource consumption and waste generation of a particular country or human community in terms of corresponding productive land area."* In other words, it represents how much of an area's natural resources a population consumes and how much waste it generates, compared to how much the area can provide and support.

Compared to Americans, Canadians or even rich Indians, the ecological footprint of the Soligas would be very tiny indeed! This is because they lead very simple lives and hardly put any stress on their natural resources.

*Source: "Our Ecological Footprint - Think of your city as an ecosystem" Centre for Science and Environment

Urban environmental issues



The Urban Concrete Jungle

The rapid way in which India is becoming urbanised and cities are growing is an issue to be considered. Cities also have their own set of environmental and development problems. Mysore, for example is a fine city with all the modern conveniences and a rich history and culture. Bangalore, the state capital, is also a fine city. For many people from small rural areas and remote forests, life in the cities may seem the answer to all problems. Yet these cities have certain critical issues they have to deal with and because they are big, these problems are on a scale that is difficult for many to imagine.

Some of the typical urban problems include:

- Overcrowding and lack of adequate living space.
- Large number of vehicles, air and noise pollution, and road accidents.
- Water scarcity.
- Sewage and sanitation problems.
- Garbage and waste management issues (including huge amounts of land being used as land-fills).
- Flies, mosquitoes and diseases.
- Migrant human populations living in slums in very poor living conditions.
- Large number of homeless people living on the streets.
- Factories, smoke, and pollution.
- Sad plight of both domestic animals (like cows) and wild animals (like monkeys).

Water wars

Most of the earth's water is sea water (97%), which, being salty cannot directly be used. Fresh water forms only 3% of the total water and is locked up (frozen) in the polar ice caps, or is present as surface and underground water or rain.

All over the globe, water has become a scarce resource. The Cauvery river issue, and the battles between Karnataka and Tamil Nadu over its use, is a good example of how water can cause violence and tension amongst human communities. Ironically, India receives among the highest amounts of rainfall in the world. Yet, we are constantly facing water problems and shortages. This is due to mismanagement of land, forests, and collection and storage of water. Traditionally, many communities made facilities to adequately store rainwater. This was done by channeling it into tanks, lakes or by recharging wells. Nowadays, many city people have begun **rainwater harvesting** by allowing water from their roof tops to be piped into storage tanks. This practice is very effective and can help alleviate the acute water crisis.

Careful planning on the use of water is needed for the BR Hills. As more and more borewells are dug which go deeper and deeper it wont be long before all the underground water supply runs out.

Environment rights and laws

India has a large number of laws and policies relating to the environment. The Indian Constitution gives citizens the right to life, which can be interpreted to include the right to a healthy environment. It also gives the citizens the responsibility to protect the environment, including wildlife. In addition, we have policies and laws relating to the environment. Some of the main laws related to protected areas are listed below:

- **Indian Forest Act 1927**: This is the main law governing India's forests, providing the Forest Department full powers to manage them.

- **Forest Conservation Act 1980**: This law was brought in much later to control the diversion of forest lands for non-forest purposes and has helped to reduce deforestation caused by mining, dams, industries, and other 'development' purposes.

- **Wild Life (Protection) Act 1972**: This law provides protection to listed species of animals and plants all over India, and authorises governments to create reserves specially meant for the protection of wildlife (such as BRT Wildlife Sanctuary).

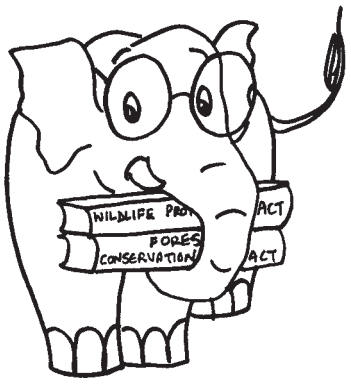
- **Biological Diversity Act 2002**: This law aims to conserve biological diversity, regulate the transfer of biological resources and knowledge outside India and control the use of such resources within India.

There are also a number of laws and policies relating to social justice and decision-making by *panchayats* and other citizens' bodies, which would also have an impact on how the environment is managed. Two of the main laws regarding this are:

- **The Constitution Seventy-Third Amendment Act 1992***:* This law provides village *panchayats* (councils) powers or functions to manage village affairs, including some natural resources like water bodies and forests on *panchayat* land.

- **Panchayat (Extension to Scheduled Areas) Act 1996***:* This law is similar to the *Panchayat Act,* except it is applicable to areas in 7 states where mainly tribal people reside. It gives more powers and functions relating to natural resources like non-timber forest produce, than the *Panchayat Act.*

Citizens have the right to act under most of these laws, However, most people are not aware of these rights and hence the laws are under-used. It is important for everyone to be aware of laws and policies to help implement them. In case they are deficient in some respect, it is important for us to ask for their amendment.



Environment and Development: Activities

9.1 Squeezed in

Indoor

Group size: Entire class

Level: Upper Primary

Material needed: 2 classroom benches

Objective: To understand the implications of over-population and the pressure on limited resources

Method: Position the 2 benches in the centre or in front of the class. Ask one group of 10 children to sit on the benches. They are the first, the original inhabitants of Kallandur town. With time their population increases. Ask 5 children to join this group. Another 5 students join; these are people who buy land around the town and move into Kallandur. Is everyone comfortably seated? Soon, a factory is set up in Kallandur and another 15 people migrate and rent houses in the town. Ask 15 children to find sitting space on the two benches. Does everyone find sitting space? Is it a tight squeeze? Now, two families decide to move out to Mysore (allow 5 children to leave the benches). Is there a sense of relief?

Explain the parallel between this game just played and the real problems facing our cities and towns: overcrowding leading to pressure on land, water, civic amenities, fuel, etc. What would happen if one child decided that he/she owned half the bench and did not allow the rest to share his/her property? Is it not true what Gandhiji said: "There is enough for everyone's need, but not for everyone's greed"?

9.2 What rubbish!

Time: 40 mins x 2 sessions

Indoor/Outdoor

Group size: Groups of 5 – 6 children

Level: Upper Primary

Material needed: Notebooks, pencils

Background reading by teacher: Read section on "Waste" on page 168.

Method: Divide the class into groups. Send each group to different parts of the school and campus. Ask them to make a note of the kind of garbage found. Explain the terms biodegradable and non-biodegradable. Also introduce the term recyclable or reusable. To record their observations, children could use a format like the one given below.

After the groups reassemble, let each one present their findings. Discuss which of the items listed could be recycled and how?

Extension: Arrange for the class to view the CD "*Nagara Nirmalaya*" (provided). The CD talks about waste segregation. The film could be followed by a short discussion.

Garbage survey sheet		
Name of surveyor:	Place:	Date:
Biodegradable	Non-Biodegradable	
Fruit/vegetable peels, old food, egg shells, dung, leaves, wood, paper, any others	Plastic bags, wrappers, bottles, used batteries, electric wire, nylon fabric or netting, aluminum, iron or tin items, glass, rubber, styrofoam/ thermacol, any others etc	
Notes:		

9.3 Recycling paper envelopes

Indoor

Group size: Groups of 5 – 6 students

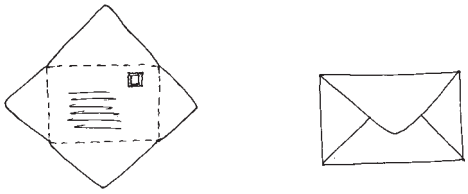
Level: Upper Primary

Material needed: Used envelopes, scissors, gum or *maida* paste, pencils, rulers, for each group

Background preparation by teacher: A week or fortnight in advance, arrange with the VGKK Trust office to keep aside all used postal envelopes meant to be discarded. Ask one group of children to collect these and bring them to class before the session.

Method: Demonstrate to the class how to carefully slit open a used envelope, turn it inside out and glue edges again to form a perfectly usable new envelope. Divide the class into groups, distribute the material and ask each group to recycle the old envelopes. If they like, children could decorate and embellish the new envelopes with sketch pen designs and patterns.

Extension: This could become an ongoing activity and the new envelopes could be used by the school office or gifted to the VGKK office on a regular basis.



9.4 Make your own compost

Time: 40 mins x 2 sessions initially, later can become an ongoing activity

Outdoor

Group size: 4 groups of 7-10 children

Level: Upper Primary

Material needed: Garden tools for digging, vegetable and fruit peels, dung, eggshells and other organic matter from the school kitchen, staff quarters, etc. to put into the compost pit on a regular basis.

Background preparation by teacher: Get permission from the VGKK office to start 4 compost pits in different corners of the school.

Method: Explain how organic matter decomposes very quickly and makes good compost or fertiliser, which is very useful in the garden, fields and plantations.
Divide the class into groups. Allot different areas for the compost pit. Each group is to dig pits (about 4 cubic feet) and pile up the soil removed next to the pit. They take turns to collect organic matter from the school and campus premises and put it into the pit. Each time a layer of soil has to be sprinkled over the organic matter. The entire contents of the pit have to be turned over once a fortnight for airing. In 2 – 3 months, dark, soft and fragrant compost will be ready for use. If you examine the pit closely, you will find earthworms, the best friends of the soil, helping to make the compost in your pits!

Variation: In the monsoons, these groups could organize a tree planting activity on campus. Saplings of native tree species could be obtained with the help of ATREE or the Forest Department and compost could be offered as fertilizer.

9.5 Two faces of the city

Indoor

Group size: Groups of 5 – 6 children

Level: Upper Primary and High School

Material needed: Poster of "The Urban Concrete Jungle" (provided), multiple copies, one for each group, notebooks and pencils.

Background reading by teacher: Read up section on "Urban environmental issues" on page 171.

Method: Ask the children if any of them has visited any big cities. Which ones? What were the highlights of their visit? What things did they find attractive? Divide the blackboard into 2 columns; one column for the good things of the city, the positives, the other column for the negative aspects. In the positive column, jot down the main/common points of the children's responses.
Form groups and ask the children to study the poster of the urban concrete jungle closely. Tell them to try and list out the problems of the city in their notebooks. After 15 minutes get the different groups to read out their responses. Jot these down in the second column (the negative aspects of the city) on the blackboard. Towards the end of the class, revisit the issues in both columns, which show the two faces of the city. Ask children to suggest appropriate headings for these two columns.

9.6 A teaspoon of water

Indoor

Group size: Entire class

Level: Upper Primary and High School

Material needed: 500 ml bottle or tin filled with water, one teaspoon.

Background reading by teacher: Read section on"Water wars" on page 171.

Objective: This activity demonstrates how little fresh water there is on earth and how important it is for us to conserve fresh water.

Method: Are the children aware of how much fresh water is available on earth? Suppose, all the world's water was to fit into a 500 ml bottle, then the water available to us for use is only 1 teaspoonful. The rest is sea water (97%), or locked up in icebergs, (as frozen water 2%). Only 1% remains (underground water, river water and rain) as fresh water for our use.
From the filled bottle remove one teaspoonful of water. As you do this, explain to the class that you are holding the world's entire fresh water stock in your hand. Should your hand shake for any reason and the water spill from the teaspoon, humans would be left with even less or no fresh water. Are the children aware that such little fresh water is available? Are they surprised or worried? Ask the children to list out ways they could help save water in their everyday lives.

Extension: See activity 3.15 "Every drop counts" on page 42.

9.7 Reading time

Indoor

Group size: Entire class

Level: Upper Primary and High School

Material needed: Reading material for the entire class

Background preparation by teacher: Locate relevant books on the environment from the school library**.** Some titles have been provided such as: *Kadina Kathaygalu* (Vol. 1 – 4), *Parisara Kathay*, *Hakki Pukka* by Purna Chandra Tejaswi; *Pashchima Ghatada Jeevavaividhya* by Manjunath Hegde Hosbale; *Chandamama – Vasudha* – Biodiversity Special Issue.

Method: Distribute these books among the children. Allow them to form groups or pairs and spend the 40-minute session browsing through the books or reading extracts to each other. Children can note down the title they read in this session and borrow the book to complete reading it.

Variation: Interested students could write book reviews and present it to the class or during the school assembly.

9.8 BR Hills: Development or destruction?

Indoor

Group size: Groups of 5 – 6 children

Level: Upper Primary and High School

Material needed: Poster of "BR Hills - Development or Destruction?" (provided); multiple copies needed one for each group, notebooks, pencils**,** blackboard, chalk

Background reading by teacher: Read chapter "Environment and Development".


BR Hills - Development or Destruction?

Method: Divide the class into groups. Ask each child to carefully study the picture given to the group. What are the problems faced in the BR Hills area that are shown in the picture? Can the students identify and list these? After 20 minutes the groups present their lists and the teacher writes a consolidated list on the blackboard. This list could be copied out on a large sheet of paper and put up on the notice board for the next activity.

Extension: See activities which follow: "What is development?" and "Minister's choice".

9.9 What is development?

Indoor

Group size: Entire class

Level: High School

Background reading by teacher: Read section on "Environment and development issues affecting the BR Hills".

Method: Using the perspective given in the chapter and the teacher's own understanding of the situation, begin a discussion on each of the issues affecting the BR Hills area. In the previous activity session, children would have already arrived at a consolidated list of problems. Encourage children to speak their minds and add to the overall understanding.

Extension: See activity which follows: Minister's choice.

9.10 Minister's choice

Indoor

Group size: groups of 5 – 6 children

Level: High School

Material needed: List of issues which affect BR Hills, paper slips, pencils, blackboard, chalk

Objective: to develop ranking skills and the ability to prioritise issues

Method: Let the children sit in groups, distribute paper to make slips. Put up the list of issues, which affect the BR Hills, or write points on the blackboard. Ask each group to list each problem on a separate slip of paper. If there are 10 problems, each group will have 10 slips of paper.
Explain that each group represents a cabinet of ministers with different portfolios. Their task is to attend to the overall development of the BR Hills area. They have to take critical decisions. Which problems, amongst those listed would they tackle first and why? They have to rank each problem according to the level of importance. Each ministerial cabinet has to present its plan of action for the BR Hills to the class by the end of the session.

9.11 Shrinking habitat

Indoor/Outdoor

Group size: Entire class

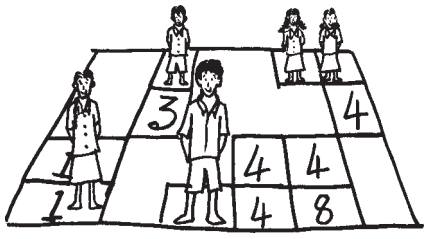
Level: High School

Material needed: Newspaper sheets (18 - 20 sheets), markers, music or any device to make sound

Background preparation by teacher: Take several newspaper sheets and tear each sheet into half to make 2 sheets. Number them as per the table alongside. For example, mark 4 sheets with the number 1, 8 sheets with the number 2, etc.

No.	Threat	No. of sheets
1	Elephant poaching is rampant	4
2	Deforestation is taking place near human settlements	8
3	A part of the area where you live has been converted into fields.	3
4	Many villages are coming up in your area.	4
5	A dam being constructed in the area	3
6	A railway line is being built across the forest	4
7	No threat; they are needed to fill up the empty spaces in the rectangle	10

Method: Before beginning the game, spread all the numbered sheets of paper randomly on the floor so as to make a large rectangle.
Tell the students that the large rectangle created by placing the newspapers on the ground represents the place where elephants live. The students are the elephants living in their habitat and moving around to fulfill their daily requirements of food and water. The game is similar to musical chairs. As the music plays, they should move around randomly, just as elephants move about in their habitat.



When the music stops, the teacher reads out a threat from the list given above in any order along with the threat number. The newspapers corresponding to that number will be removed from the large rectangle. The elephants standing on those newspapers will have no place to go, they will be considered dead and will have to leave the game. Anyone stepping out of the newspapers or onto the blank spaces created on the floor by removal of newspapers will be considered dead. Students should stand with both feet on a single sheet. Count the number of elephants at the beginning of the game and at the end.
This game illustrates the effects of human activities on populations of animal species.

9.12 The BR Hills 2050

Indoor

Group size: Individual

Level: High School

Material needed: Paper, pencils, art material (if needed)

Method: Tell the children that they have to imagine what the BR Hills will be like in 2050. Allow 10 minutes for some discussion to spark off ideas. They have to predict, visualise and think of various details such as living conditions, technology, kinds of employment, diet, mode of transport, social relations, etc. Each child could choose whether he/she would like to present ideas in the form of an essay, a drawing, or a poem. Distribute material accordingly.

Variation: The scenario that they present of 2050 could be a picture of what they would like the BR Hills to be i.e. their dreams for the place.

9.13 Class debate

Time: 40 mins x 2 sessions

Indoor

Group size: Entire class divided into two teams

Level: High School

Material needed: Blackboard, chalk

Method: Choose any **one** of the 3 topics given below for the debate:
a) There should be a limit on the number of pilgrims allowed to enter the BRT Wildlife Sanctuary on any given day (there should be a limit even on *Chikka jathray* festival)
b) Killing of wild boar should be allowed freely in the sanctuary as they destroy the crops.
c) Soligas should not be relocated from BRT Wildlife Sanctuary unless they wish to move out themselves.
Announce the topic for debate. Form two teams: one which will speak **for** and the other **against** the topic selected. Write the topic on the blackboard and allow both the teams to discuss and put their arguments together. Teams could take the help of adults or of material from the library to help formulate their ideas. Fix the date and time slot for each presentation.
In the next session both teams present their ideas. Then ask the entire class to decide which argument is stronger. Take a spot vote by counting hands raised and declare the results of the class debate immediately.

9.14 One person, different perceptions

Indoor

Group size: Entire class divided into 6 groups

Level: High School

Method: Talk about leaders, heroes, people with charisma and how all these people are perceived in so many different ways. Their personality is one but different people have a variety of attitudes towards them. Take for example the notorious forest bandit Veerappan. Different groups of people see him in many diverse ways: a) his family members b) his own gang of men c) the Forest Department d) The Special Task Force e) the tribals who inhabit the forests f) the actor Rajkumar who was kidnapped by Veerappan, etc.

Write down the names of these 6 different groups of people on chits. Ask the 6 groups to pick up one chit. Each group has to try to imagine and put across their unique way of perceiving or understanding the personality of Veerappan. Groups should decide on a spokesperson who will present the group's perceptions and feelings in the last 15 minutes of the session.

9.15 Letter writing

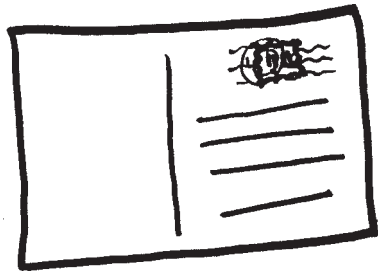
Indoor

Group size: Entire class / individual

Level: High School

Material needed: Paper or notebooks, pencils

Method: Instruct the children to pretend they are studying in a city school. Ask them to write a letter to their parents back in the BR Hills telling them about life in the city. They should write about a typical day in their lives.



9.16 Environment campaign

Time: 40 mins x 4 sessions, or as needed

Outdoor

Group size: Entire class grouped according to interest

Level: High School

Method: Discuss the possibility of putting up a stall for 2 days during *Chikka jathray* festival so that environmental concerns discussed in the class could be shared with the larger public. Activities such as poster and slogan displays, exhibition of material made by children during their EVS classes, campaign marches on different issues, songs, street plays and skits could be planned over the two days. Some tree planting activity could also be undertaken. Saplings of native species of trees can be arranged through the Forest Department and ATREE. Children could group themselves according to their interest and begin preparations well in advance!

Extension: Upper Primary students could be enlisted for additional support

Forests of the BR Hills

A1 Matrix of activities and suggested levels of usage

Chapter	Activity number	Title of activity	Lower Primary School (Std 1 – 4)	Upper Primary School (Std 5 – 7)	High School (Std 8 – 10)
1. Soligas and their *Podus*	1.1	Calendar time	√		
	1.2	Art with hands and feet	√		
	1.3	Draw a Soliga house	√	√	
	1.4	Building our houses: Discussion	√	√	
	1.5	Building our houses: Making models	√	√	
	1.6	*Podu* word scramble	√	√	
	1.7	Make an illustrated wall diary	√	√	
	1.8	*Soliganudi akshara mala*	√	√	
	1.9	Make your family tree	√	√	
	1.10	Songs of the Soligas	√	√	√
	1.11	Know your directions		√	
	1.12	Know our *podus*		√	
	1.13	Megalithic site visit		√	√
	1.14	Write a letter about the megalithic site		√	√
	1.15	Plot your personal time line		√	√
	1.16	Measuring things around us		√	√
	1.17	Typical features of our *podus*		√	√
	1.18	Mapping *podus*		√	√

	1.19	The *podu* versus the colony			√
	1.20	Magic squares			√
	1.21	Soliga settlements in Karnataka			√
	1.22	Other ways of seeing			√
2. Religion and Nature Conservation	2.1	Our *Doddasampige*	√	√	
	2.2	Conservation story time	√	√	
	2.3	*Doddasampige* collage	√	√	
	2.4	Creation stories and legends			√
	2.5	Loudspeakers are a nuisance!			√
	2.6	Forest clean-up			√
	2.7	Poetry writing			√
3. The VGKK Campus	3.1	Reusing waste	√		
	3.2	Collage with waste	√		
	3.3	Cowshed puzzle	√	√	
	3.4	Campus pairs		√	
	3.5	Recyclable litter collection		√	
	3.6	Craft with waste		√	
	3.7	Tree bio-data		√	
	3.8	Make a weather calendar	√	√	√
	3.9	Tug of war	√	√	√
	3.10	BR Hills *antakshari*	√	√	√
	3.11	Rope in a tree		√	√
	3.12	Know the campus		√	√
	3.13	Campus blindfold game		√	√
	3.14	Litter walk			√
	3.15	Every drop counts			√

4. Forests and Wildlife of the Biligiri Rangan Hills	4.1	Handprint peacock	√		
	4.2	Animal pairs	√		
	4.3	Touch and guess	√		
	4.4	Smell and tell	√		
	4.5	Memory game with nature cards	√		
	4.6	Guess my card	√		
	4.7	Find its pair!	√	√	
	4.8	Nature rummy	√	√	
	4.9	Leaf printing	√	√	
	4.10	Leaf autograph	√	√	
	4.11	Spray painting with leaves	√	√	
	4.12	Leaf and flower pressing	√	√	
	4.13	Leaf zoo	√	√	
	4.14	Tree bark impressions	√	√	
	4.15	Painted stones	√	√	
	4.16	Thumbprint animals	√	√	
	4.17	Bat and moth game	√	√	
	4.18	The Queen of BR Hills	√	√	
	4.19	Smaller wildlife of BRT	√	√	
	4.20	Forest memory game	√	√	
	4.21	Silent pursuit		√	
	4.22	Talking fox		√	
	4.23	Who belongs where?		√	
	4.24	Bird watching	√	√	√
	4.25	I am a tree	√	√	√
	4.26	Identifying animal tracks and signs	√	√	√
	4.27	Snake talk	√	√	√
	4.28	Paradise tree	√	√	√
	4.29	Joker Jenu nature card game	√	√	√

	4.30	Twenty questions		√	√
	4.31	Forest fire		√	√
	4.32	Tree walk		√	√
	4.33	How fat is the tree?		√	√
	4.34	Water of life		√	√
	4.35	Web of life		√	√
	4.36	Forest quiz		√	√
	4.37	Forest food webs			√
	4.38	What are protected areas?			√
	4.39	The wildlife history of BR Hills			√
	4.40	The circle of life			√
	4.41	Managing our sanctuary			√
	4.42	Measuring the height of a tree			√
	4.43	Variety of forests			√
	4.44	Newspaper watch			√
	4.45	Weeding out lantana			√
5. Maps and Map Reading	5.1	Bird's eye view	√	√	
	5.2	Comparing a photograph and a map		√	√
	5.3	Drawing from a photograph		√	√
	5.4	Uses of a map		√	√
	5.5	Following and giving instructions	√	√	
	5.6	Directions with a map		√	
	5.7	Blindfold treasure hunt	√	√	√
	5.8	The cardinal directions		√	√
	5.9	Make your own compass			√
	5.10	Measure your classroom		√	√
	5.11	Map scale		√	√
	5.12	Drawing to scale		√	√
	5.13	Around your classroom		√	√

	5.14	Make a key for your village map		√	√
	5.15	Make a key for your classroom map		√	√
	5.16	Map your surroundings			√
	5.17	Map legend or key		√	
	5.18	Locating towns in Karnataka		√	√
	5.19	Locating places using a grid		√	√
	5.20	Grid pictures			√
	5.21	Prashanth's adventure			√
6. Non-timber Forest Products	6.1	Know NTFP	√		
	6.2	NTFP *mugithu*	√		
	6.3	NTFP colouring activity	√		
	6.4	NTFP collage	√		
	6.5	*Sige* number game	√		
	6.6	Recognise your own	√	√	
	6.7	Bee and flower toy		√	
	6.8	NTFPs in our homes		√	
	6.9	Maths with NTFPs		√	
	6.10	Draw a bee hive		√	√
	6.11	Guess-timation		√	√
	6.12	Quantities of NTFP harvested			√
	6.13	Which NTFP takes the lion's share?			√
	6.14	Honey harvesting skit			√
	6.15	Whose forest is it anyway?			√
	6.16	*Sige* time			√
	6.17	*Nelli* delights			√
	6.18	Creating myths and stories			√
	6.19	The story of my life			√
	6.20	Growing NTFP			√

	6.21	Letter to a forest officer			√
7. Agriculture	7.1	The food we grow and eat	√		
	7.2	Colour your crops	√		
	7.3	Counting seeds	√		
	7.4	Grain/seed/spice sampler	√		
	7.5	Farmer's friends	√		
	7.6	Root, fruit or seed	√		
	7.7	Seed art	√		
	7.8	Rain mime	√	√	
	7.9	Agriculture alphabet chart		√	
	7.10	Plant parts we eat		√	√
	7.11	Seed to seed		√	√
	7.12	Model seed garden display		√	√
	7.13	Soil in a sock		√	√
	7.14	Enriching the kitchen garden		√	√
	7.15	Make a rain gauge			√
	7.16	Sketching plants			√
	7.17	Pesticides are harmful			√
	7.18	Food then, food now			√
	7.19	Water runs fast			√
8. Health and Nutrition	8.1	Plants that cure	√		
	8.2	Caring for our bodies		√	
	8.3	Wild foods		√	
	8.4	Make your own herbal medicine		√	√
	8.5	Anaemia campaign		√	√
	8.6	Meet the nurse		√	√
	8.7	Soliga recipe book		√	√
	8.8	Garden pharmacy		√	√
	8.9	Discovering home remedies		√	√
	8.10	The goodness of *ragi*	√	√	√

	8.11	Doctors of the forest			√
	8.12	More poster campaigns			√
9. Environment and Development	9.1	Squeezed in		√	
	9.2	What rubbish!		√	
	9.3	Recycling paper envelopes		√	
	9.4	Make your own compost		√	
	9.5	Two faces of the city		√	√
	9.6	A teaspoon of water		√	√
	9.7	Reading time		√	√
	9.8	BR Hills: Development or destruction?		√	√
	9.9	What is development?			√
	9.10	Minister's choice			√
	9.11	Shrinking habitat			√
	9.12	The BR Hills 2050			√
	9.13	Class debate			√
	9.14	One person, different perceptions			√
	9.15	Letter writing			√
	9.16	Environment campaign			√
Total number of activities: 178					

A2 List of educational material

Note: All the material listed below has been especially produced for the "Learning for Life – Nature as our Teacher" programme in BRT Wildlife Sanctuary. They are to be used along with activities listed in the handbook.

Chapter no.	Chapter name	Educational aid
1	Soligas and their *Podus*	1. An imaginary map of a *podu*
4	Forests and Wildlife of the Biligiri Rangan Hills	1. Nature Cards (40) 2. Flash Cards (12) 3. Mammal Tracks from BRT WLS (Poster) 4. Snakes of BRT Wildlife Sanctuary (Poster) 5. Paradise Tree (Poster) 6. Tree Walk Map and Leaf Chart 7. Web of Life Cards (34)
5	Maps and Map Reading	1. Photograph of Someshwara Kere 2. Map of Someshwara Kere 3. Photograph of Ladakh Village 4. Imaginary BRT Landscape Map (Simple) 5. Some Podus of BRT Sanctuary Map 6. Imaginary BRT Landscape Map (Grid and Legend) 7. Major Cities and Towns in Karnataka (Map) 8. Kingfisher Grid Game 9. Elephant Grid Game 10. Prashanth's Adventure Map
6	Non-Timber Forest Products	Colouring Outlines (3)
7	Agriculture	Colouring Outlines (7)
9	Environment and Development	1. BR Hills - Development or Destruction? (Poster) 2. The Urban Concrete Jungle (Poster)

A3 List of resources

The material listed below was provided to VGKK during the "Learning for Life – Nature as our Teacher" programme:

Books

1) Story of Cauvery (English)
2) From Bone to Stone (English)
3) Insect Book (English, large format)
4) Birds of the Indian Sub-Continent by Grimmett, Inskipp and Inskipp (English)
5) *Pashchima Ghatada Jeevavaividhya* by Manjunath Hegde Hosbale (Kannada)
6) *Chandamama – Vasudha* – Biodiversity Special (Kannada)
7) National Book Trust Titles (story books) – 6 nos. (Kannada)
8) Speaking Stones by Arvind Gupta
9) Fun with Seeds by Arvind Gupta
10) Thumb Prints by Arvind Gupta
11) Leaf Zoo by Arvind Gupta
12) CEE's Elephant Book (Kannada)
13) *Kadina Kathaygalu* by Purna Chandra Tejaswi (vol. 1 – 4) Kannada
14) *Parisa Kathay* by Purna Chandra Tejaswi (Kannada)
15) *Hakki Pukka* by Purna Chandra Tejaswi (Kannada)
16) *Hasiru Honnu* by B.G.L. Swamy (Kannada)
17) *Namma Hotayali Dakshina America* by B.G.L. Swamy (Kannada)
18) *Mushtiyalli Millenium* by Nagesh Hegde (Kannada)

Games

1) Coir rope with knots (*gunt hagga)*
2) Memory game (marine life - 55 pairs)
3) Endangered animals - magnetic jigsaw puzzle
4) Spell and build words with pictures
5) Rainforest jigsaw puzzle

Other Resources

1) Handmade paper sheets
2) Craft paper/pieces of cardboard
3) Labels with environmental themes
4) Inflatable globe
5) Magnetic compass - 2 nos.
6) Bug box with attached magnifying glass
7) Crayons and colour pencils
8) CEE garbage posters (Kannada)
9) Metre tape
10) Map of India's protected areas
11) *Nagara Nirmalaya* (CD of Kannada film on solid waste management)

A4 References

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