Creative Lesson Plan on

Tree

for teachers, educators and community workers

'Creative lesson plan on TREES' ('Basbhumi' Series – No.1)

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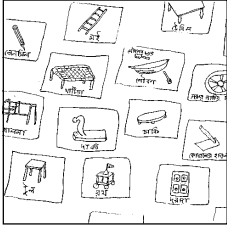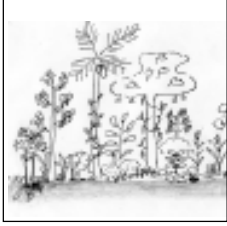Cover design : Abhijit Das , Manab Pal

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Contents

About this booklet —

All lesson plans included in this booklet were developed by ENRE team and tried out (and sometime modified) by teachers and children's groups in ENRE network. Originally these lesson plans were provided to a network of teachers as model lesson plans targeted for class 4-9 children in shape of bi-monthly ENRE newsletter 'Basbhumi (Living Places)'. Along with ENRE teachers' training which guides teachers about concepts and skills of 'active learning methods', they have tried out each activity with their students in their class or as extra curricular activity for last 2-3 years. Their feedback makes this booklet more unique and life related.

12 topics related to Natural resources and their utilization / management etc. were discussed in various issues of 'Basbhumi' (in Bengali). 'Trees' is the first topic centred booklet in English & Bengali.

We hope this booklet is useful for other teachers and educators as well as community workers and even for those parents who are actively involved in environmental education or environmental activity in own local community. And we shall be delighted if this booklet can help in nurturing the mind & spirit of young generation who can take key role for caring about own environment and community life.
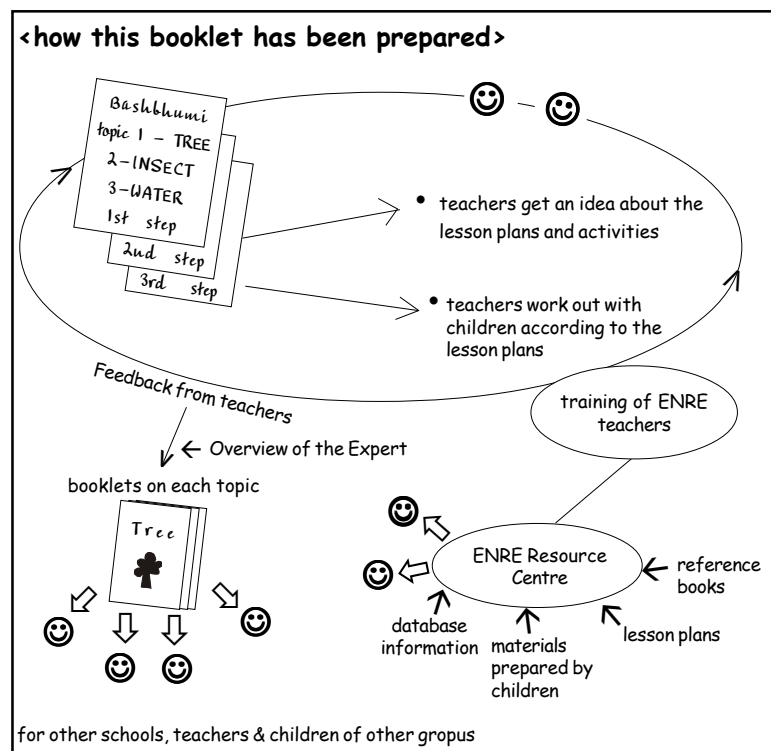
(Please see page 93 for forthcoming issues)

How to use this booklet —

The lesson plans in this booklet are designed step wise (see page 8 & 9). We suggest that you try out these activities step by step, but you can also adapt each core idea according to your local context.

Regarding teaching & learning process :

➤ You can get some ideas here on how to prepare your own lesson plan promoting action learning.

➤ You can try out several participatory learning & sharing tools (eg, brainstorming, making charts & graphs, mapping, ranking, timeline, data collection, interview, presentation etc.) for your class.

➤ You can get ideas on how to connect your class room to your community.

➤ You can use these lesson plans both for school curriculum and extra curriculum work and obviously you can generate children's interest & enthusiasm on Environmental issues and activities.

For community aspects :

➤ You can help children to collect local data on natural resources in community and to know more about their surroundings.

➤ You can organize children's group to improve community environment through collective action.

➤ You can grow community members 'awareness on environment through children's' activity.

For home :

➤ You can try out some of these activities with children in your home during their school holidays. We are sure you can design your own home –based activity for a greener world, because we have already got good feedback about this from various people.

In 'reference' section we included **expert's view point on the topic** and introduced some useful documents. You can get some ideas how your community based activity can be related and contribute to global environmental issues etc. and hopefully you can utilize these resources & information to strengthen your capacity of facilitating activities.

About lesson plan —

Through activity of ENRE project we have realized that creating & developing own lesson plan is extremely difficult for most of the teachers participating in the network. Primarily because they don't have the habit and experience to do so. The situation must be more or less same for other teachers in our country. Though Environmental Education as a subject has been brought into the school curriculum, the teaching method is text book centered, memorizing & repetition based and examination oriented just like the other subjects. But can children develop their interest about any issue by memorizing names of trees, birds, and animals etc. or just by copying the text book's drawing of seed germination or insects' metamorphosis etc. ? Unfortunately for children (fortunately for teachers?) all answers are already given and always appear on the text books. We wish the learning process could be more exciting and open ended process rather than 'being hammered by more and more information'.

What is 'creative lesson plan' ?

We think that good lesson plans provide children with the opportunity of discovering and searching out the fact by themselves. Children can chose their favorite learning process and context and the teachers only need to facilitate it, rather than impose uniform style & pace.

Creative lesson plans have the following aspects.

- Starting from what children already know and what children have experienced / felt; This helps to enhance children's interest about the topic.

- Having the overall goal for both 'Social / Environmental' and 'Scientific'. For example on the topic Tree, social / environmental goal can be <stop soil erosion by planting and conserving trees> <increase natural resources by planting and conserving trees>, and scientific goal can be <identify multipurpose trees suitable for a site> <learn about trees' function and use> etc. Setting up goals help the children to be aware that they can do something to improve their environment and solve some of the problems.
- Including group activity as well as individual activity. Through group discussion, planning, and activity children can find out better ideas and solution and also can grow their cooperative attitude and collaborative skills. They can learn to respect

other's opinion, too.

- Children can have fun and relish the moments of discovery in their learning process.
- Children's learning activity links their class room and community. This is essential for Environmental Education because we need more action for better environment.

  Using active learning methods with children (eg, brainstorming, making charts & graphs, mapping, ranking, timeline, data collection, interview, presentation & sharing skill etc.)
- Using local materials and examples for activities. You can make the activity more low – cost and eco-friendly by using wastes also.

Curriculum connection

Creative lesson plan has also integrated curriculum approach. This helps you to weave what you are doing in science or EVS (environmental studies) with math, language, social studies, geography and art etc. We illustrate below how each activity in this booklet can be connected to school curriculum.
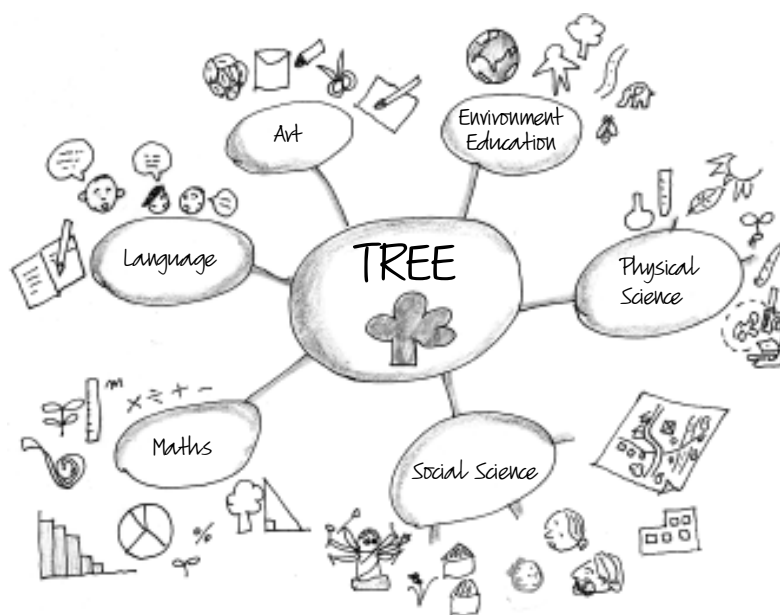
Tree

■ **Overall goal**

The study of trees is a wide topic & familiar one in environment studies. Within the framework of ENRE we mainly focus on MPTs (Multi Purpose Trees), since they have several useful functions in agriculture, homegardens & for our environment in general.

As a teacher you do not need to teach the children what an "MPT" is or which trees are "MPT". The term is not of importance. The series of activities that follow are specifically designed so that the children can find out for themselves, the importance of the trees functions through hands on work. In the process, they will learn that those trees are valuable natural resources & will begin to feel that they should be propagated & protected in their own communities.

■ **Activity Steps**

To reach our overall goal, we designed the activities to follow 3 steps. In each step, two kinds of activities (A) & (B) related to the topic are covered, so you can choose any one of them.

Each activity in steps 1 & 2 will take up about 2-3 class periods. For the project type activity in step 3, you will need more time.

Step 2 ▷ Further enquiry

to collect more information/data children of trees. Children can recognise which life through ranking.

Activity (A)
'Ranking trees according to usage'

observation, interview, group work, ranking

Tree's function & usage, Tree's part (EVS), Social Studies

Step 1 ▷ Preparatory work

to raise children's interest and to know what children already know. Children observe common trees surroundings & keep their record more scientifically.

Activity (A)	**Activity (B)**
'Top 10 most common trees'	Visiting your 'friend tree'
observation, ranking, bar graph	observation, resource mapping, keeping records, comparing
Common Trees (EVS)	Plant Growth (EVS)

■ **Changes Expected**

More childrens' eco-groups can be created and children can actively involved in better natural resource management in our community.

More trees and more greener community.

Step 3 ▶ **Investigation/Project Work**

to create child-oriented activity. Children can apply their & collected information into propagate trees which are more valuable for community.

Activity (A)
'Let's make a Seed bank'

☞ out door activity, group work, keeping records

📖 Seed & Seed Germination (EVS), Art, Language, Maths

Activity (B)
'Let's start a school tree nursery'

☞ group work, keeping record, school gardening, site mapping

📖 Trees Life Cycle Tree propagation & protection (EVS), % (Maths)

consider & survey the usage
trees are more useful in their daily

Activity (B)
'Products made of woods in our surroundings'

☞ observation, listing, interview, categorizing, sketching object

📖 Tree's usage (EVS), Art

Concepts and techniques which you can develop in activities

	Step 1		Step 2		Step 3	
	(A)	(B)	(A)	(B)	(A)	(B)
Tree/Plant Profile	✓	✓	✓		✓	✓
Multi Purpose Trees			✓	✓	✓	✓
Tree Propagation (Nursery Techniques)					✓	✓
Seed Collection		✓			✓	✓
Agroforestry					✓	✓

We got a feedback from different Organisations —

Even if we all do the same activity, our results could be different, depending on where one lives or the children's abilities. It's quite natural for this to happen. The results that you obtained and data collected which is specific to your locality will become a valuable case study. In this booklet, we will share with you the feedback we got from different ENRE network groups. You can compare your results with theirs.

We would like to learn more about the urban school situation & about hill areas from the other groups, since we do not work in these areas yet. So, it would be nice if you would share your experiences.

India

West Bengal

Gandhi Vichar Parishad group
Bankura district

4 teachers were involved in conducting various activities. This district is located in a dry-land area. The Vegetation & soil there is rather different from that of other groups. Fortunately, a beautiful river runs through their villages and provides and important water source including for drinking water.

Kajla Group
Midnapore district

5 teachers & their students conducted the activities within their E.E. school curriculum in 6 villages. About half the children belong to Hindu families and the rest are Muslim. The area is located in the coastal area and regularly hit by cyclones. As a result it does not have irrigation facilities. Agriculture, Small scale industries (handicraft) and fisheries are the main sources of livelihood in this area.

Chandannagore group
Hooghly district

One of the staff from ENRE team tried out these activities with her children as home-based activity. Children study in English medium schools unlike the other children in network. Chandannagore is a small town and located on the bank of Ganga river. Many trees and ponds are observable like in other towns in this district. Many commuters go to Calcutta everyday by train from here.

Swanirvar group
North 24 Pargana district

4 network teachers in association with 13 other teachers conducted activities with children in 8 villages. All the children study in government schools & are aged between 10 & 16 years. Intensive agriculture is the main occupation of this area and the farmers used to apply large amounts of chemical fertiliser & pesticide. Arsenic in the ground water is one of the major environmental problem in this district.

Ashurali group
South 24 Pargana district

2 teachers conducted activity with 15 children in two villages, Sudarika, Karaghata. Children study in NGO-run primary schools. Their area is mainly agricultural land but industrial estate is also located nearby. Villagers learn their livelihood from agriculture and working in factory.

Step - 1
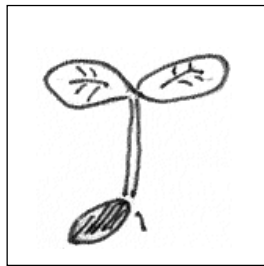
for growing childrens' interest

♣ TREE — Step 1 — Activity (A)

TOP 10 MOST COMMON TREES

Let's find out which are the most common trees in our home-garden or surroundings and make a list of the ten most popular ones.

[both for rural & urban schools
for class 4 - 6]

Motivation: raising questions

Have a discussion on different things found in our surroundings. Help the children choose the "top ten" amongst them and think about different criteria for their choices. Give the children an idea about choosing and sorting things according to different criteria like number, height, popularity, frequency etc.
Ask the children to guess what are the kinds of trees that are the most popular (i.e. found in the largest number) in their area and why.

♣ Data Collection:

Ask the children to observe the different trees in their home-gardens and make a list of these trees in their notebooks. They should also mention how many of each tree there are. (If they don't know the name of the tree they can collect some of its leaves and write out a description of the tree and its fruits and flowers and location for identification later.)

♣ Summary of Data Collected

Divide the children into groups (5-6 children per group). Ask each group to give a summary of the data collected by its members. The children can exchange information and ask each other the names of unknown trees.
Then summarize all the information as a whole class, combining the data of each group.
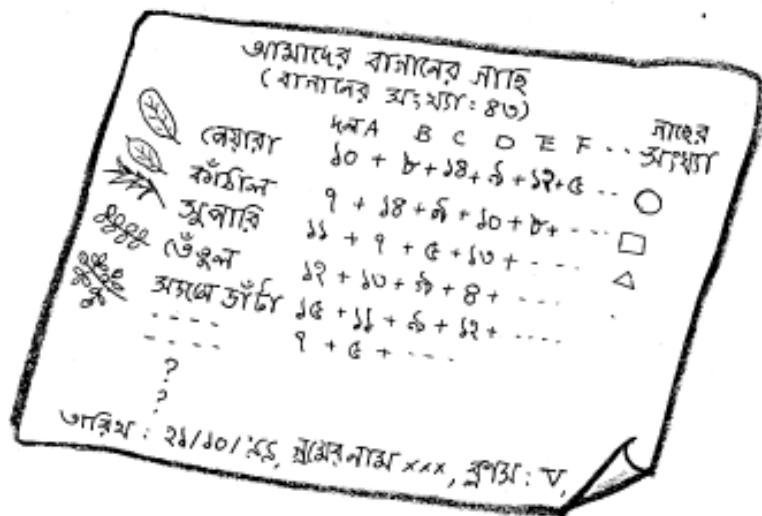
♣ **Processing and Analyzing Data**: [Ranking, Graph-making, bar-graph]

Making of a presentation chart of "Top 10 Most Common Trees" (i.e. those trees that are found in the largest number). It might be better for each group to put together their ideas and make a chart. (If there is not enough chart-paper for each group to make a chart, discuss together how a chart can best be made)

The teacher should respect the ideas given by the children, and explain that the most important thing is for the chart to be simple, easy-to-read and attractive. A simple method of making bar chart or graph can be introduced.
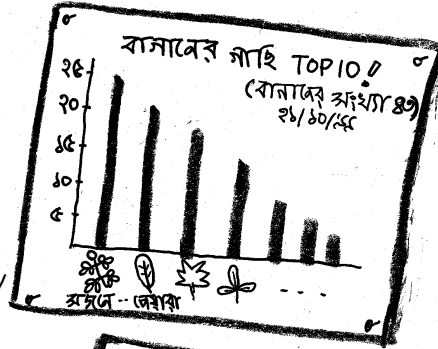
☼ Don't forget to include some basic information on the charts like survey date, name of village, number of participating children, class/school number of gardens and Teacher's name etc.

☼ Don't use too many colours in the chart. Why? Think about it!

After making the chart, discuss with the children why they think those 10 trees are the most popular. Make a list of the different reasons given.
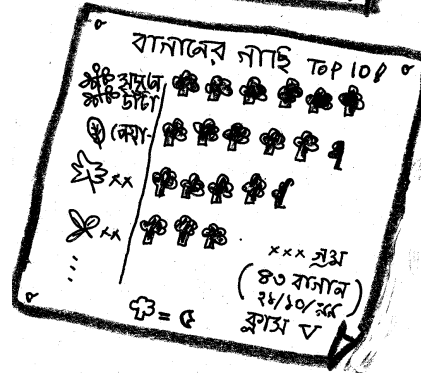
♣ **Further Activity**

In the same way, make a list of the TOP 10 commonly found trees in a certain area like along the roadside, around a pond or by the river, in the playground, in agricultural fields etc. (according to the age and abilities of the children). Different groups can go to different locations.

This data can be used later when we will learn and think about the role and function of the TREE in Step 2.

Feedback

TREE — Step 1 — Activity (A)
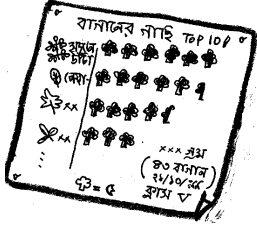
The aim of this activity is to know about the trees usually found in children's home gardens.

During teachers network meeting we found out surprisingly high number of mango trees. Usually the mango tree needs a lot of space and this is not suitable for home gardens. Then we realized there was confusion regarding the bengali terms 'bagaan' & 'gaach'. 'Bagan' is used both for a garden & also an orchard in bengali and 'gaach' sometimes include wide range of plant in Bengali. We explained our priority is to get the data of popular trees in each child's 'barir bagan'. One teacher reconducted the activity.

To raise children's interest, one of Swanirbhar group conducted children's favourite trees Top 10. This is good introduction. Later teachers can try out with children, numberwise Top 10 trees in some gardens.

But we could not get the various Top 10 trees according to the different site like along road side, surrounding pond or in/around a rice field.

Trees which have high number means people like that trees or people want to grow those trees for some reason. Through this ranking activity, if children can start find the reason from various aspect including trees usage then this activity will be successful.

♣ Feedback Summary

	Ashurali	Swanirvar			Kajla	Gandhi Vichar
1) **Village**	not mentioned	Beliakhali			Bakhsishpur	No written reports were received. Only a chart was prepared
2) **Children's class/number**	not mentioned	class IV to X 20 children			-	
3) **Class/Period spent**	4 periods	6 periods, 1 period = 1 hr. 30 m.			3 periods 1 per = 2 hrs	
4) **Products/ Result (List of Top 10 Trees)**	1) Mango 2) Palm 3) Coconut 4) Rain tree 5) Betel nut 6) Babla 7) Neem 8) Guava 9) Hog plum 10) Pomello	Top 10 Trees chosen by children 1) Mango 2) Guava 3) Coconut 4) Jackfruit 5) 'Najne' 6) Jamrul 7) Betel nut 8) Bael 9) Sapota 10) Sisoo	Top 10 Trees according to use 1) Coconut 2) Mango 3) 'Najne' 4) Jackfruit 5) Guava 6) Neem 7) Betel nut 8) Bael 9) *Ber* 10) 'Jibani'	Top 10 Trees grown in local area 1) Coconut 2) Mango 3) 'Najne' 4) Sisoo 5) Betel nut 6) *Ber* 7) Guava 8) Jackfruit 8) Bael 10) Jamrul	1) Coconut 2) Mango 3) Shirish 4) Tamarind 5) Neem 6) Babla 7) Date palm 9) Sajne 10) Arjun	1) Mango 2) Eucalyptus 3) Babla 4) Date palm 5) Guava 6) Papaya 7) *'Palash'* 8) Neem 9) Indian jujube 10) Palmyra Palm
5) **Children's Interest**	Children lacked interest at the beginning but later they started to show interest	The children enjoyed the work. Took note of any tree they noticed in & around the playing field.				
6) **Teacher's opinion/ difficulties**	Lacked confidence at the beginning, developed interest later	Did not have idea about trees. Got focus on trees after the training of ENRE. Engaged in other activities, so less time for this. Children worked on medicinal plants on their own before working for 'Bashbhumi'.				

Summary Chart

Top 10 trees appeared in this activity

☐
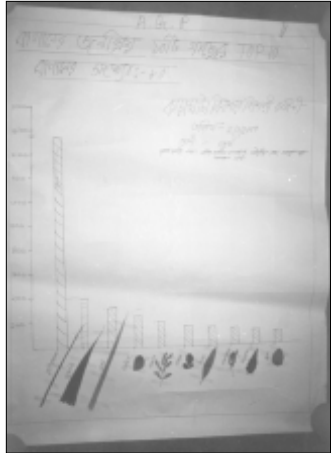
They put dry leaves along with their names

[Ashurali]

Top 10 popular trees in garden
Number of gardens : 80

Karaghata Kishor Kishori Bahini
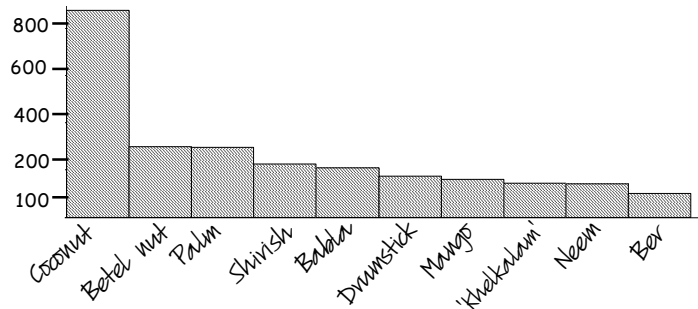
(The graph on the chart has been enlarged here)

☐ They made leaf impression of Top 10 trees

"Village - Beliakhali, Kishor Kishori Bahini, Swanirvar
date : 30.01.2000"

1. Coconut
2. Mango
3. Najne
4. Sisso
5. Betel nut
6. Ber
7. Guava
8. Jackfruit
9. Bael
10. Rose apple

[Swanirvar]

(The Chart has been prepared with leaf impression of 'Top 10 Trees')

☐ The students have made a chart on 'Top 10 Trees' based on the numbers, use and production

[Gandhi Vichar]

TOP 10

Name of Tree	Number of Trees	Uses	Conditions required for Production
Mango	345	fruit as food, many things are made from the mango tree, wood used as fuel	Grow in any type of soil, medium rainfall and ample sunshine
Eucalyptus	312	Used as fuel, construction material	Grow mostly in Red soil & less rainfall
Babla	260	The trunk can be used in making furnitures and as fuel. The wood used in making cart.	Sandy loamy soil, medium sunshine, less water
Date Palm	242	Sugary sap from the tree. The trunk used to make furniture & fuel	Any kind of soil, less rainfall, ample sunshine
Guava	215	The fruit from tree, the wood used as fuel	Fertile soil, medium rainfall, any kind of climatic condition
Papaya	175	Papaya used as fruit and vegetable	Mostly grown in sandy soil, less rainfall
Flame of the forest	151	Wood as fuel, gum extracted tree	Red & sandy soil, medium are the favourable conditions
Neem	103	Oil extracted from seed, wood used to make furniture. The twigs used to brush the teeth.	The sandy soil of this area is suitable for its growth, requires less water
Bar	180	Fruit, wood used as fuel	Any soil, but mostly sandy soil, less rainfall
Tal	75	The fruit from the tree, the flesh of the fruit used as food, the bark used as to make furniture	Any type of soil, less rainfall

(The chart has been enlarged here)

☐

Trees of Garden
(TOP 10)

Based on abundance

400
350
300
250
200
150
100
50

Coconut · Mango · Betel nut · Babla · Neem · Khivish · Jhow · Palm · Cashewnut · Tamarind
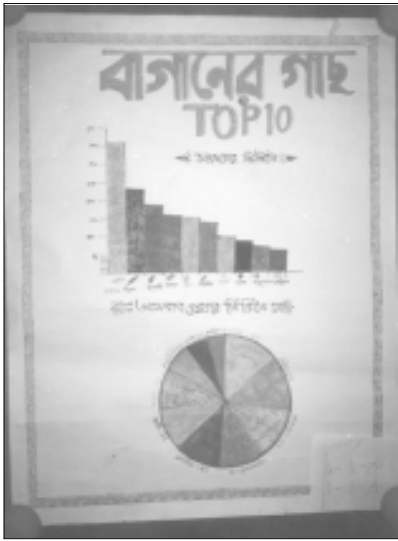
The students have made Bar-graph of 'Top 10 Trees' based on the no. of trees and circular representation of 'Top 10 Trees' based on their use in making furniture.   [Kajla]

On the basis of making of furniture

Gulmohar–17° · 'Sampo'–49° · Neem–48° · Egyptian mimosa–47° · Darwin black wattle–41° · Mahaneem–41° · Jhow–38° · Arjun–32° · Mehogoni–28° · Sapota–20°
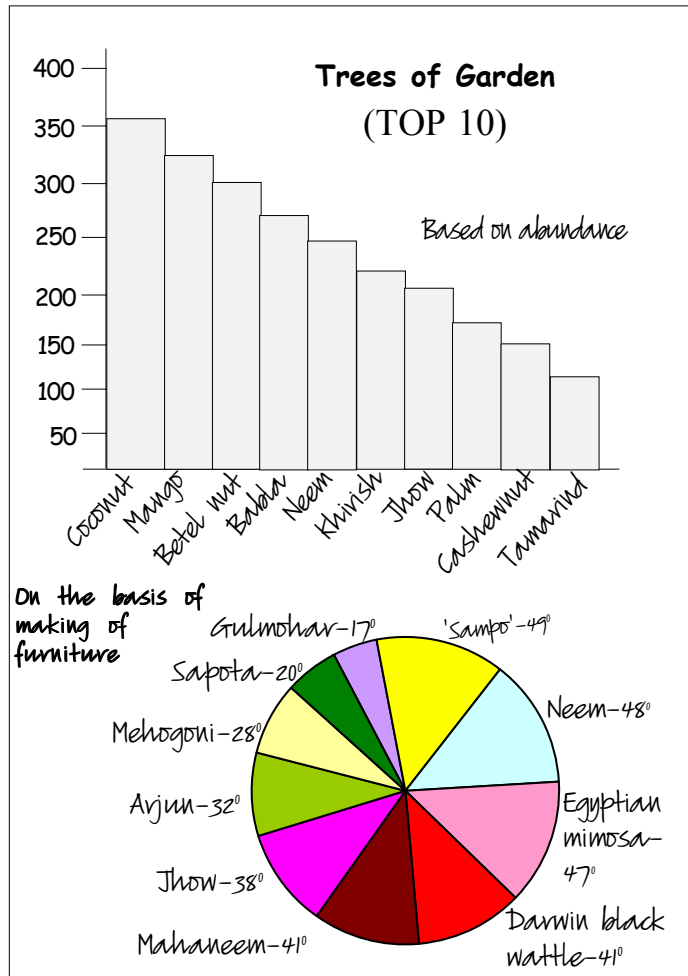
(The graph of the main chart is enlarged here)

Sharing Ideas

Making leaf print, leaf impression & press is enjoyable & useful activity among children to identify trees.
Instead of on the paper, leaf print can be done on the clothes by using fabric paints. This 'cloth hanger' can be used longer & in various way as self learning materials.

Some graph & chart can be improved by —

- Use only a few colours (too many colours create only confusion) & colour effect.
- Use proper letter size according to the importance of information.
- Do not forget to put basic information like who collect the data, from whom & how many samples, Title of chart / graph, who made the chart & date of making the chart.

leaf impression on the cloth

TREE — Step 1 — Activity (B)

VISITING YOUR "FRIEND" -TREE

To acquaint yourself with your tree you need to observe it and describe it. Let's make a tree-profile together!

[both for rural & urban schools
  for class 4 - 6]

♣ Motivation: Building interest, Raising questions:

Have a discussion on the process of making new friends. Assume that the trees are our friends. Tell the children that we are going to get to know our "friend"-tree a little better.

▶ Before visiting a tree it is better to know its "address". Walk around the surrounding area and make a "tree-map". (There should be at least as many trees included in this map as there are children – i.e if there are 20 children there should be at least 20 or more than 20 trees in the map, even if they are the same type of tree.

In case there are not enough trees to have one per person, 2-3 children can share a common tree-"friend").

Symbols used in Map

Map

♦ পরে বিভিন্ন গাছের বিভিন্ন রঙ দেওয়া যেতে পারে।

♦ খুব গুরুত্বপূর্ণ হলে, সব বাড়ি দেখান‍ো দরকার এই ।

▶ Number the trees

▶ Now each child can decide which one his/her partner or friend-tree will be

OR,

▶ Each child can choose their favorite tree from the total list of trees made in 1 – 1 – A.

In this case children can cover many different types of trees, but home-activity is required.

🔔 Careful!! Children should not make any marks (by carving or scratching) on the bark of their partner tree.
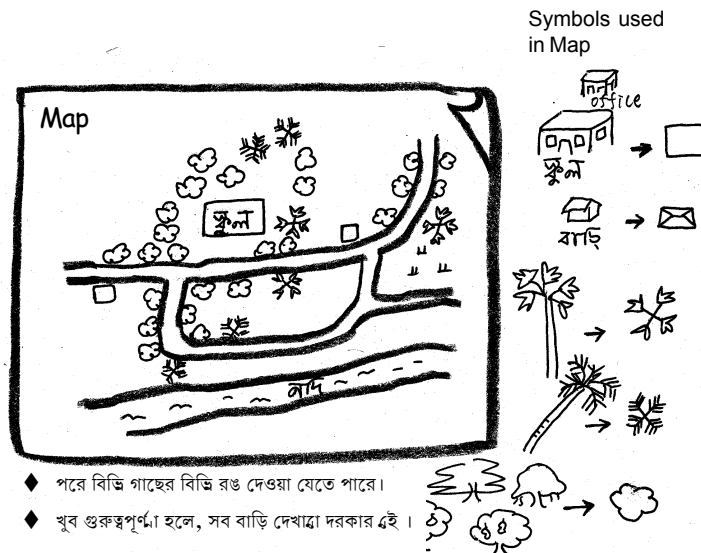
♣ Observing: Making a Tree-portrait

Discuss with the children how they can identify and describe a tree.
Tell them about the kinds of names we give to trees.
(Full name = scientific name, Name it is called by = Common name, Nickname = local name.
There is no need to teach what the scientific name is, just let them know that it is a way of naming a tree)

The parts of a tree can be compared with the parts of the human body:

E.g: Face → leaf,
       Eye→ flower,
       Mouth→ seed-pod,
       Teeth→ seeds,
       Hand → branch/
       canopy,
       Leg→ root

Next, ask children to each make a portrait of their partner tree. Explain several ways of making a portrait for each part for example:

LEAF : leaf-prints, pressed-leaf, sketching, leaf-impression

FLOWER: pressed-flower, sketching

SEED-POD & SEED: sample-collection, sketching

BARK : bark impression

how are you ?! friend ?

great, thanks !

full name	scientific name
Santonu Chatterjee	Spondias Pinnata
first name	common name
Santonu	Hog plum
nick name	local name
Tonu	Amra
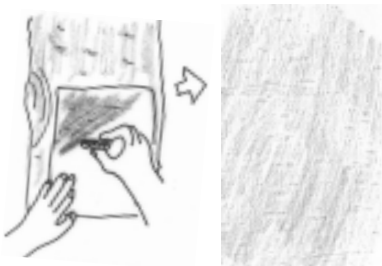
How will you do this ?
Hold a sheet of paper flat over a part of the tree's trunk and with a wax crayon. Slowly rub untill you see the impression of the bark all over the sheet. On the other side of the paper you can later add the name of the tree, date impression was taken and the location.

Let the children then exchange and compare the portraits done by them with others.
Point out to them that there are different leaf-shapes and certain ways in which they are arranged on the branch.
Bigger children can then categorize the different types of leaves (on the basis of arrangement, structure, shapes, tips of the leaf, margin & venation) and even make a summary chart out of the leaves they have collected. The same can be done for flowers and fruits.

Several ways of Leaf Impression (Bauhinia)

Leaf Impression (1)

paint the reverse side of the leaf using colours or poster paints. Then quickly (before it dries) place the painted side on a sheet of paper to get your leaf impression.

Outline drawing

You can draw the outline of a leaf on cloth and sew along the lines to make a leaf design.
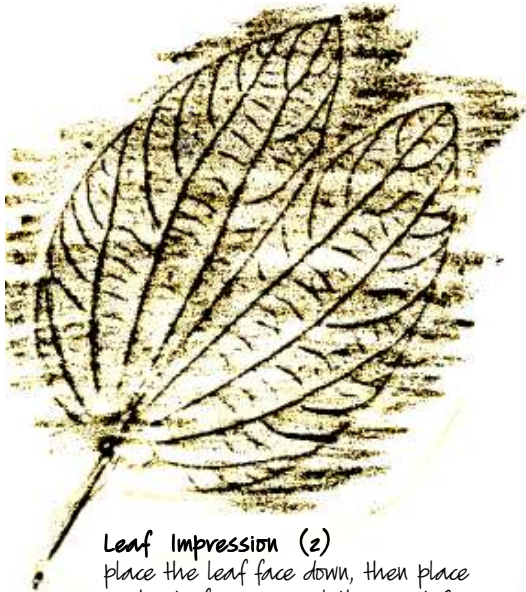
Leaf Impression (2)

place the leaf face down, then place a sheet of paper or cloth over it & using wax crayons or colour pencils, slowly rub over the area where the leaf is. make sure that the direction of your stroke is always the same. This is another way of making a leaf impression.

Press dried leaf

Leaf Description

Arrangement পত্রবিন্যাস

opposite   Alternate   whorled

Structure গঠন

মৌলিক Simple

Compound যৌগ

Even Pinnate   Odd Pinnate

Palmate   Bipinnate   Tri pinnate   Trifoliate

Shape আকৃতি

Margins পত্রকিনারা

সমতল   ঢেউ খেলানো   ঝাঁঝালো   ঢেউ খেলানো   ছুঁচালো

tips পত্রাগ্র

Venation শিরাবিন্যাস
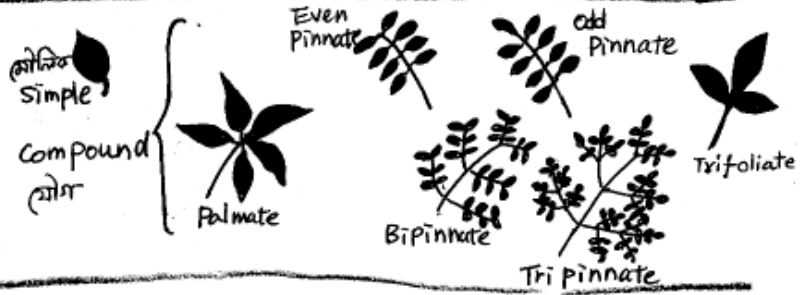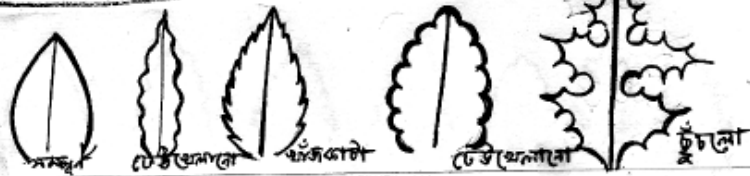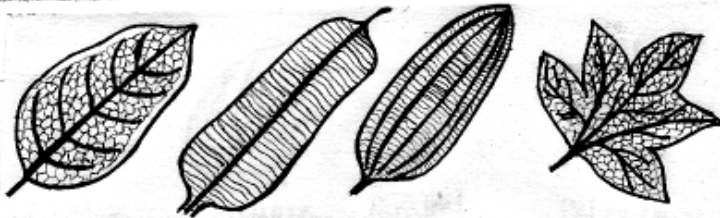
Reticulate venation   Parallel venation   Parallel venation   Reticulate venation

♣ Record-Keeping: "Maintaining a Tree-Profile"

After finishing making portraits for their partner tree, the children can decide on a "visiting date", fixing one for each month or every alternate month. Encourage the children to keep visiting their "friend"-tree for a period of one year and keep a record. This record will be useful for understanding the seasonal patterns of the tree like when it flowers and bears fruits. (in Step 3)

Later on, more information regarding the tree's role and function, old-sayings and stories related to that particular tree etc will be added on to this preliminary profile (in Step 2). Think about a good design for making this record note/profile.

Information needed for Tree-Profile :
(first discuss this with the children and add any missing/additional points)

Name of the person who is recording _____

class _____ school _____

Teacher's name _____

Visiting date _____ time _____

Weather _____

— —

Name of Tree _____

Location _____ (number on the tree-map)

Height of the Tree _____

Size of the tree-trunk _____ Shape of the canopy/crown _____

Nature of the bark _____

Details of the leaf _____ shape _____

smell _____ colour _____ texture _____

venation _____

Details of the flower _____

size _____ colour _____ structure _____ smell _____

Seed - pod

size _____ colour _____ shape _____

Seed

size _____ colour _____ shape _____

Observations about other visitors (birds, insects etc)

Feedback

TREE — Step 1 — Activity (A)

🍀 In this activity children choose their own partner tree and keep record for one year.

This is a long term activity, but it will become very important data to understand life cycle of each species of tree and their growing condition. By gathering children's data they can recognise flowering time & seeding time of each tree. This will be helpful for seed collection of Multi purpose trees in future.

Through this activity children can grow observation skills & keeping records skill too.

🍀 **Feedback Summary**

	(Ashurali)	(Swanirbhar)
1) **Village**	not mentioned	Beliakhali
2) **Children's class / number**	15 students from class II to IV	20 students from class IV to X
3) **Class / Period spent**	4 periods	8 periods (1 period = 1 hr. 30 m.)
4) **Products / Result (Self designed Tree's record card)**	not mentioned	The work was done according to the example of identification profile given in Bashbhumi
5) **Children's Interest**	The students are interested.	The students are interested to the work, according to them the work is not at all tough
6) **Teacher's opinion / difficulties**	No problem was faced to do the activity	The time taken for the work was too much. Difficulty faced to understand the identification profile of tree.

♣ Summary Chart

☐ The students of Swanirbhar have prepared a map of the useful trees found around their school-building.

Then they have taken leaf impressions of those trees

Students are learning how to take impression of the bark of friendly trees. (Children's Camp, Kajla)

☐ A student of Gandhi Vichar has collected leaves of various trees and prepared a note book.

This is a different process for collecting leaves. Instead of drying and pasting the leaves, they are fixed by sewing. The description of leaves is also given.
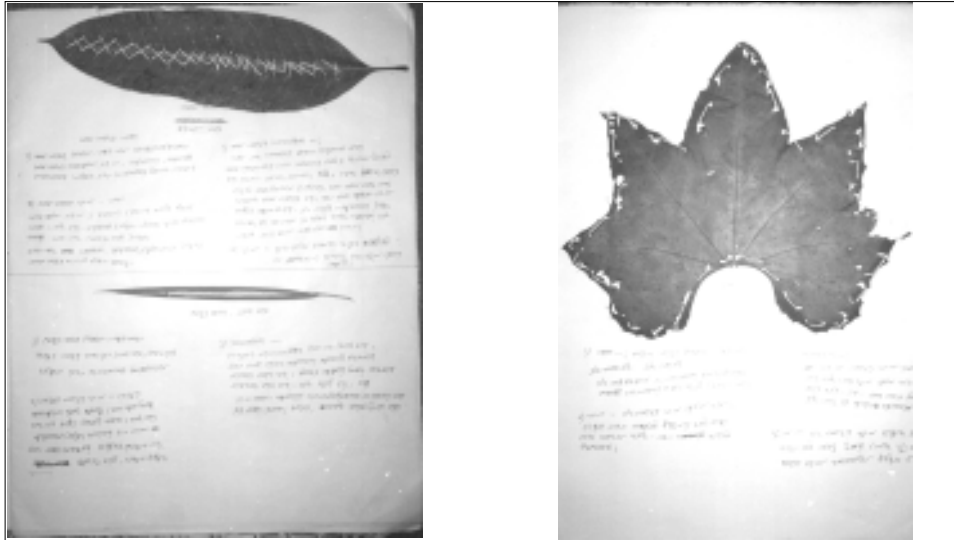
Simple leaf of Mango

1) The leaves of mango are simple, the venation is reticulate
2) Fruit
Simple fruit and drupe (fleshy), seed within fruit, seed Dicotyledonous, fruit is very tasty.
3) Utility of Mango Tree
Mango tree is very useful. The wood is used to make chair, table, window, bed frame, door etc. The wood-bark has a seperate use and also used as fuel.
4) The flowers are yellow

The leaf Parol Tree

1) Circular leaf, reticulate venation, dicotyledonous seed
2) fruit
Green fruit and elongated, eaten as vegetable
3) Utility
The fruit eaten as vegetable, the flowers are also eaten, it does not have any twig
4) Flower
yellow coloured, dioceous

Leaf of Date Palm

1) Simple leaf, venation parallel
2) Fruit: tasty and sweet fruit, seed within fruit, unripe fruit is yellow, Dicotyledonous seed.
3) Utility: The sugary sap used to prepare many things. Leaves dried and used as fuel, Mattresses are made by the leaves.

♣ Sharing Ideas

- To identify a tree, impression of leaf is taken and leaves are dried & stored in various ways. This method of identification of trees is very attractive and interesting for the students.

- Since freind trees record keeping is a long term work, we could not get complete children's work. We need to check how many children are keeping even now. But it seems very few cases are going on and teachers themselves mentioned that it is very hard to encourage children to keep continuing their record whole a year.

Children can start off according to the example given below, but it is not quite possible for them to keep record for a long time, although it is a great fun to have a friend tree around. Occassionally children are quite attentive to their friend tree. In a few cases, they record the information on friend trees and care for them throughout their life.

Hello friends,

This is my friend-tree 'Champa' in my garden. We purchased the seedling from tree nursery and transplanted. I started to keep record when I was in class 3. Sometimes I forgot visiting my tree. After 8 months I completely forgot to keep record.....partly because I didn't like 'measuring tree' because of mosquito bite!

Now I am in class 6 and my friend-tree has already reached upstairs of our home. I can see his pretty flowers from the window & enjoy the nice smell.

I really surprise my friend tree is growing much faster than me.

How about your friend-tree ?

(Shantonu, July 2002/Chandannagore)

Tree height 1m 34 cm
(05.11.1999)

Tree height 1m 83 cm
(13.06.2000)

Champa (Michelia Champaca) - known as flower tree

Tree height 5m 20 cm
(15.07.2002)

- As a reference we mention here a record kept by one of the staff of ENRE. You can see how the tree grows and tree's seasonality. The note book for this kind of record we recommend big size & plain pages notebook instead of small size & lined pages notebook.

My Friend Tree

Name of the Tree	• Common name : Annatto • Local name : • Scientific name : Bixa orellana
What do we get from tree :	Coloured Dyes are made from plant
Place of Growth :	In the backyard of my house. The soil at this place is fertile, many earthworm can be seen. This place is bathed by sunlight in the morning.
How the tree is grown :	The seeds are collected from Babli in Shantiniketan. Only one seed out of 10-12 seeds, germinated. The seedling was transplanted to another place before rainy season. The age of the trees is 10 months.
Caring for the Tree :	Watering the plant during the drier part of the year.
Keeping of Records :	Recorded the details on 20th of every month
Identification flower :	Attracive, cream - white in colour (10.09.2000)

Information collected by : Satoko Chatterjee   Class/School/Name of the teacher :
Village/District : Garer Dhar, Chandannagore, Hooghly   Work started on : 20.09.1999

Month	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
Date	20	31	28							13			1000	1800	800
Time	11.30 am.	10.00 am.	10.00 am.							11.10 am.			11.00 am.	10.30 am.	
Weather															
Weather of last month	31° 75%	27° 85%	26° 62%							34°			good rain	30°	23°
Height of the tree	91 cm.	109 cm.	112 cm.		114 cm.					177 cm.					250 cm.
Circumference of the bark	3 cm.	5.5 cm.	5.7 cm.		20 cm.										16 cm.
Flower	No	No	No		No					No			Started	12 flowers	finished
Fruit	No	No	No		No					No				small, green	

Observation

20.09.1999

11 cm.

Lower part is greenish violet in colour
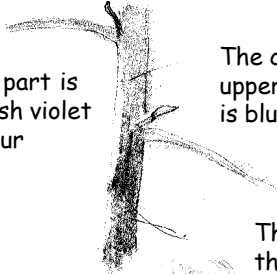
The central part of the upper portion of the twig is bluish green and soft.

Length 18 cm breadth 25 cm

The upper part of the tree

broad leaf

Colour of the leaf is violet-greenish

02.03.2000

28.11.2000

Mnay leaves have sprouted in the upper part of the tree

18.10.2000

5 cm.
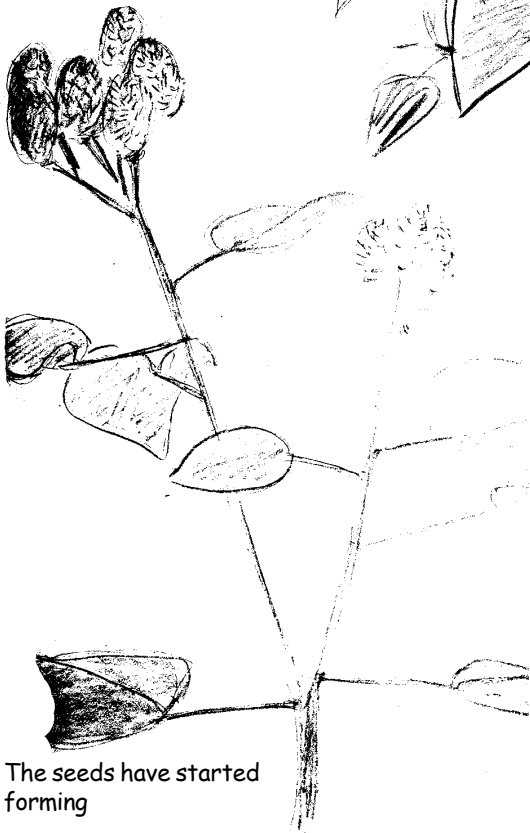
The seeds have started forming
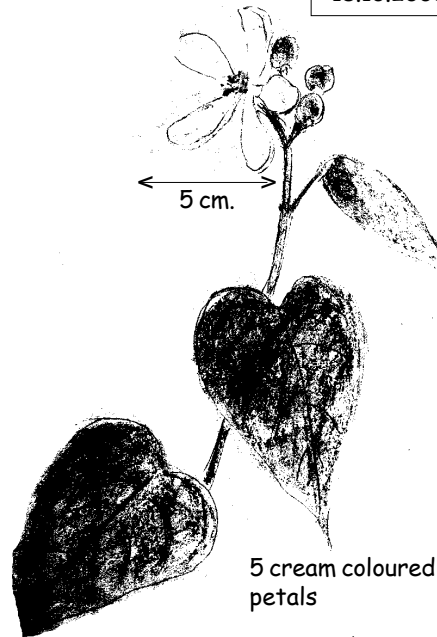
5 cream coloured petals

Step - 2
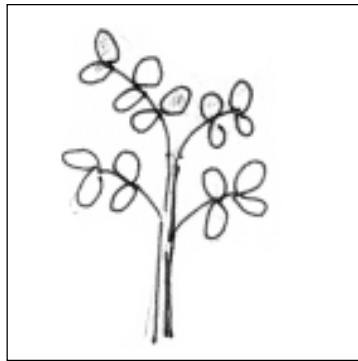
for collecting more Information

♣ TREE — Step 2 — Activity (B)

RANKING OF TREES ACCORDING TO USAGE
To learn about A Tree's value and role in our locality

[▦ both for rural & urban schools
  ☺ for class 5 - 7]

♣ **Motivation: Building interest, Raising questions** – What is your favourite fruit?

▸ Ask children to name their three favourite fruits
List those names and rank them in the order of the children's preferences.
The most popular fruit-trees among children can be seen from this.

▸ Ask children what we can get from trees apart from fruits.
List these items at random at first, then categorise them into the following groups:

FOOD   –   (fruits &vegetables)
MEDICINE   -   (for humans, for animals..)
MATERIALS   -   (Fodder, fire-wood, building materials, furniture &tools, dye material,
                 oil, gum, fibre...)

▸ Discuss the other roles of the tree like:
Providing shade, as a living fence, protecting soil, as a cultural symbol, beauty etc.

♣ **Information Collection**: "Trees that fulfill our needs"

Divide children into groups.
Each group should take the responsibility for 2-3 items provided by trees.
For each of the items, each child in each group is to ask 5 people (could be family members, neighbours...) for the names of 3 trees that provide these items.

In this way, they can collect data on which tree is popularly used for which particular purpose.

In collecting this information, the children need to ask which part of the tree is used for which purpose and include the names of the person they spoke to in this regard.

If the name of the tree is not known, the child needs to collect the leaves/flower/fruit/seed of the tree for later identification.

Mother, can you tell me which 3 trees you mostly use ? Which part of these trees you use as fuel.

Ok, can you show me those trees, I will fix some leaves in my note book

The best trees are -- & xx. Then ...... But I don't know the name

?!

May be one of children's notebook is like this !

for Fire wood　　　　　　date ....

　　　　　　　　　　　　　　Name ....

　　　　　　　　　　　　　　Group ....

From	Name of the tree			Reason for use it as firewood
1) Mother (housewife)	A (B)	B (T)	🍃 (B, L)	....
2) Father (farmer)	A (T, L)	C (T, B)	B (T)	....
3) Uncle in next house (carpenter)	B (T, B)	🌿 (L, B)	A (T)	....
4) Pishi (Maid servant)	A (B)	C (T)	B (T)	....
5) △ � X	C (T)	🍃 (B, L)	B (T, B)	....

T - Trunk, B - Branch, L - Leaf

♣ Summary of Data Gathered

Each group is to summarise the information that they have collected. They are to include in this summary the tree's name, number (in tree-map –for location), which part(s) of the tree is used.

In the cases where the name of the tree is not known, paste the leaf etc.

[example:]

Firewood

　　　　　　　　　1 0　　2 0
Tree A ▦▦▦▦▦▦▦
Tree B ▦▦▦▦▦▦
🍃 ? ▦▦▦▦▦
Tree D ▦▦▦

Main reasons for use as firewood:
- burns slowly without too much smoke
- easily available
- less smoke
- etc...

Interviewed 30 people in our neighborhood(housewives –10, farmers-6, carpenters-2, shop-keepers-3...)

Group		Student's name	
Class		School	
Teacher's name			
Village		Date	

▶ Put all these group summaries together to make a Class Summary which will cover all the uses of the tree listed in initially.

▶ Ask the children to see from the summary which trees appear several times as being used for different items. For eg. Tree A's name appears as being used for medicine, fruits, and dye material as well.

▶ Tell the children to convert this class summary chart into another form – this time done tree-wise as opposed to the previous use-wise. (10-15 trees can be chosen) (sample ranking sheet attached)

Survey Sheet [Tree & its Usage]

Class		No. of students		School	
Teacher's name				Village	
Informant member		Survey date			
Date of making this sheet					

Trees' Usage Ranking Sheet

Usage	Name of trees				
	Drumstick				
Fruits					
Vegetables	❁🍃🌲🍃🍃 (5)				
Medicine	🍃 (1)				
Vetinarary medicine					
Fodder	🍃🍃 (2)				
Fire wood					
Construction materials					
Furnitures & Tools					
Dye (Colour)					
Oil	🍃 (1)				
Gum					
Fibre	🌿				
Providing shade	(1)				
Living fence	🌳 (1)				
Soil conservation	🌳				
Symbolic use	🍃 (1)				
Total point Usage	8/13				

Symbol of tree parts	🍃	❁	🌱	🍃	⬚	🌿	🔧	🌲	🌳
	leaf	flower	seed pod	seed	trunk	bark	brunch	root	tree

♣ **Analysis of the data :**

After completing the Tree-wise usage sheet, give the tree 1 point for each usage.

Add up all the points each tree has. In this way you can find out which is the most useful tree in your area.

▶ Is there any relationship between the usage-wise ranking and the order of the Top 10 most common trees? (in activity Step 1 – A)

▶ If the children are keeping "my friend-tree record" (in activity Step 1 - B) they can
add   to their records the information on the uses of their partner tree.

Teacher's Note

Multipurpose trees (MPT) and Non-timber Forest Products (NTFP)

As you may have realised while making the tree-usage profiles, many trees provide several different items and serve several purposes to us. Such trees are known as "Multi-purpose Trees" (MPT). When we propagate trees in our community, priority should be given to MPT's.

In the same way, other than timber, forests provide us with subsistence items. These forest goods are referred to as Non-Timber Forest Products (NTFP). Examples of NTFP's are animals, leaves, building materials, sponge fibres, oil, gum, dyeing-materials, medicine, food etc.

They are particularly important among rural communities. We need to know of their value and need to maintain them in a sustainable manner.

Feedback

Tree — Step 2 — Activity (A)

This activity is aimed to learn about Tree's value & role (function) in own local area.

Children are encouraged to collect information regarding various tree usages from their own experience or from family members, neighbours.

Teacher can conduct this activity by focussing on the specific usage (like using as fuel, for working) and guide children to collect necessary information on these trees. OR another way is to choose the trees and then children can collect information on the uses of each tree.

Feedback Summary

	(Ashurali)	(Swanirbhar)	(Gandhi Vichar)	(Gandhi Vichar)
1) **Village**	not mentioned	Beliakhali	not mentioned	not mentioned
2) **Children's class/number**	class II to IV	class IV to X 20 students	class VIII to X 11 students	class V to VIII 16 students
3) **Class/Period spent**	4 periods	8 periods	not mentioned	not mentioned
4) **Products/Result (tree's usage ranking)**	not mentioned			
5) **Children's Interest**	Students showed interest in the activity	Students showed interest to do the work	not mentioned	not mentioned
6) **Teacher's opinion/difficulties**	not mentioned	The children did not know the multiple uses of trees before this activity of Bashbhumi. The students understood the role of trees in not mentioned human life through this practical exercise.	not mentioned	not mentioned

♣ Summary Chart

Each group prepared interesting summary chart on tree's usage.

Use / Tree's name	Fuel	Fruit (Vegetable)	Timber	Medicine	Furniture
mango	🔥	🍎	✓		🏠
subabool	🔥		✓		🏠
jackfruit	🔥	🍎	✓		🏠
'chatka'	🔥		✓		🏠
Gulmohar	🔥		✓		🏠
Bael	🔥	🍎	✓	🫙	🏠
Neem	🔥		✓	🫙	🏠
Indian nettle tree	🔥		✓		🏠
'Kaetbael'	🔥			🫙	
coconut	🔥		✓	🫙	🏠
date palm	🔥	🍎		🫙	
Agathi	🔥	🍎	✓		
java plum	🔥	🍎	✓	🫙	🏠
sisso	🔥		✓		
copper pod	🔥		✓		🏠
babla	🔥		✓		🏠
sal	🔥		✓		🏠
tamarind	🔥	🍎	✓	🫙	🏠
'bal'	🔥		✓		🏠
guava	🔥	🍎	✓	🫙	🏠
ber	🔥	🍎	✓		🏠
hog plum	🔥	🍎	✓		🏠
palmyra plum	🔥	🍎		🫙	
olive	🔥	🍎	✓		
sapota	🔥	🍎	✓		🏠
'Bilati kul'	🔥	🍎	✓		🏠
drumstick	🔥	🍎		🫙	🏠
'dalod'	🔥	🍎	✓		
sweetsop	🔥	🍎	✓	🫙	🏠
'kacha'	🔥			🫙	
'madar'	🔥		✓	🫙	
arjun	🔥		✓	🫙	🏠
night jasmine	🔥			🫙	🏠
sour lime	🔥	🍎		🫙	
'jiboli'	🔥		✓	🫙	🏠
red silk cotton	🔥		✓	🫙	🏠

☐ One of Swanirbhar's group surveyed on 36 trees as fuel, fruits, wood, medicine, furniture and put their data on chart. Here we rearranged their data for presentation.

It's pitty that the basic information (like which classes children prepared the chart) is missing to mention on the chart.

From their survey we can find out among them all trees have more than two uses and especially Bael, Java plum (jamun), Tamarind, Guava are very useful trees.
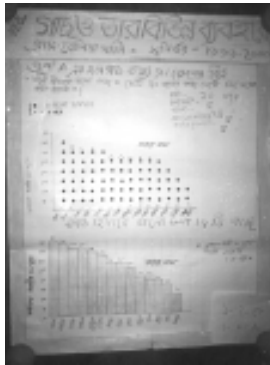
☐ According to the usage of the trees for making medicine, furniture, the fruit and fuelwood, the students of Swanirbhar, have graded the 1st 14 trees in the form of bar-graph. The gradation of use is quite clear from the bar graph.

The concept of bar-graph is clear to almost everyone. The use of bindi, to make the graph has added a new dimension to the chart and other points like the number of trees and gradation in terms of use can also be clearly understood.

Plants used for Medicinal Purposes
Information collected from 40 persons

Index / key
● = 5 persons
• = 1 person

Plants used for Timber

Index / key
2 cm = 5 persons

Kāì[¹ •à³

Top 14 trees used for **Fuel**

Tree's name

40	
34	
30	
26	
22	
18	
14	
10	
6	
2	

Mango · Subaabool · Jackfruit · 'Chatka' · Bael · Neem · Indian nettle tree · Elephant apple · Coconut · Date palm · Swamp pea · Gulmohar · Palm · Copper pod
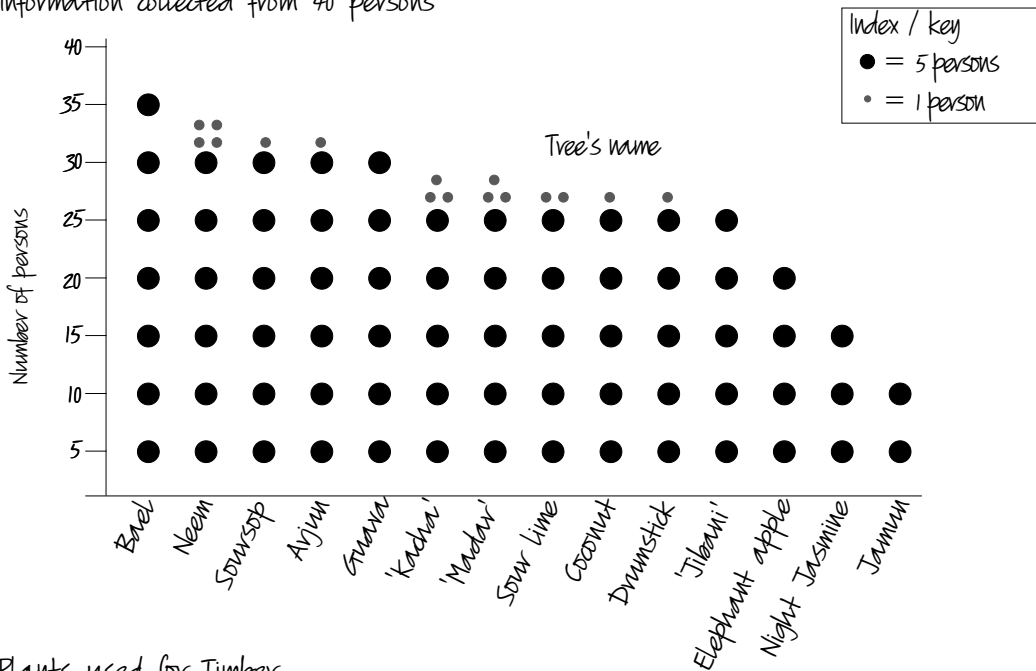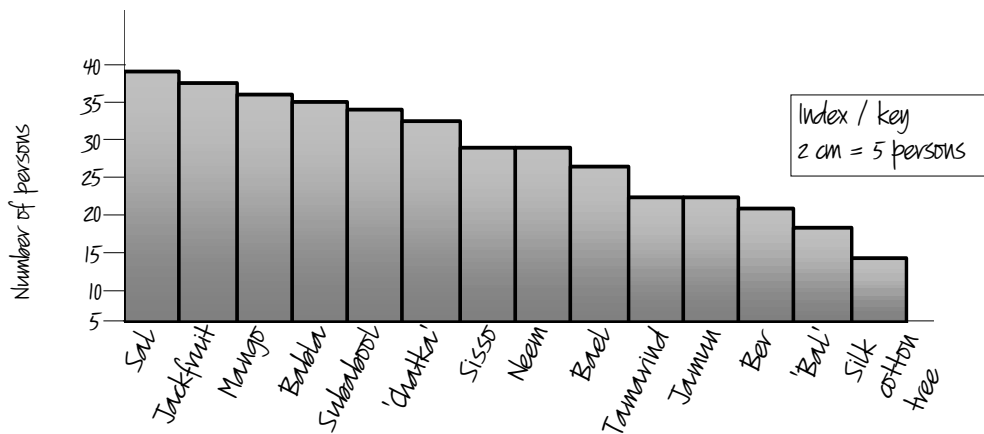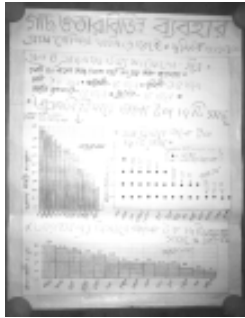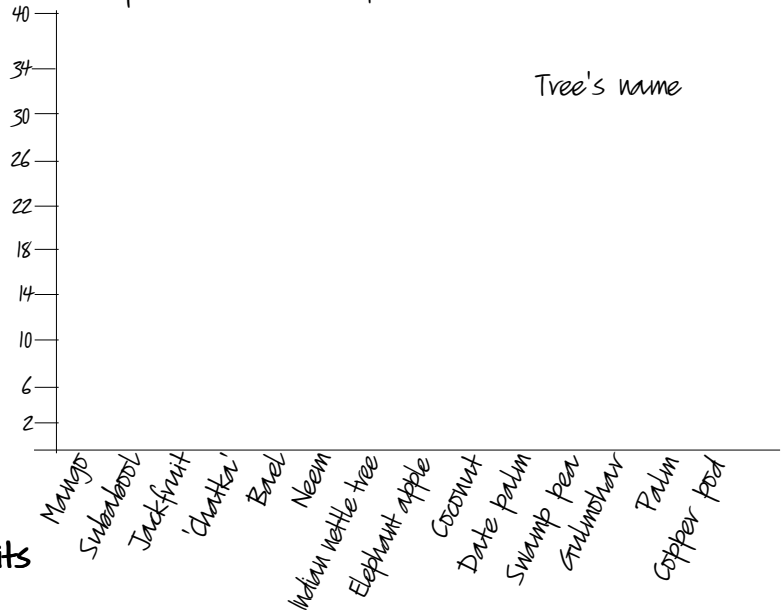
Top 14 trees, whose **fruits** are good to eat

No. of persons

No. of persons
- ● = 10
- + = 1

Mango · Jackfruit · Bael · Coconut · Guava · Ber · Tamarind · Lichi · Palm · Date palm · Sapota · Olive · Drumstick · 'Daboi'
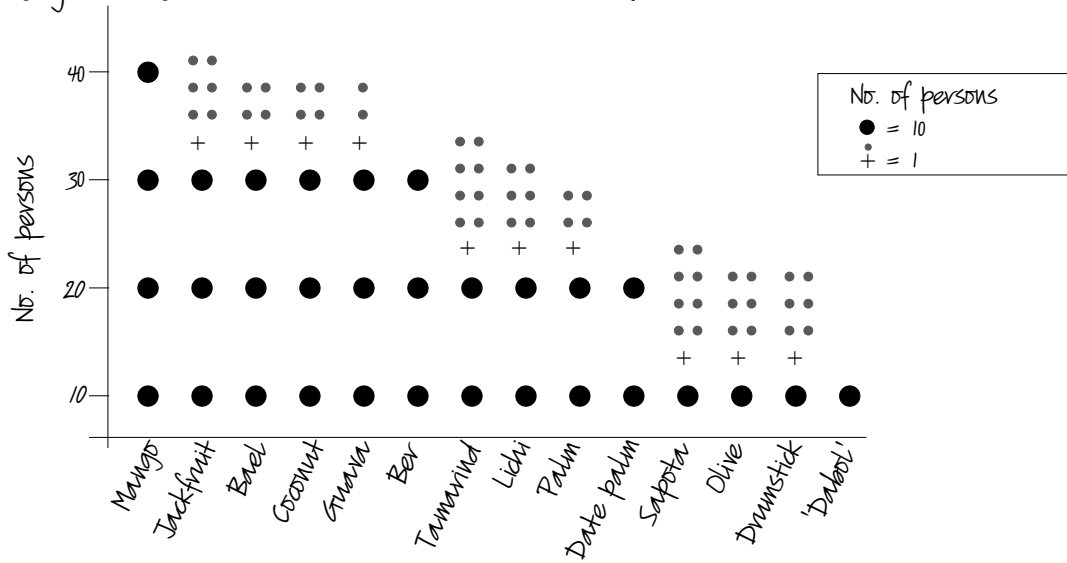
Top 14 trees, used for making **furnitures**

No. of persons

Name of Trees

Jackfruit · Mango · Jamun · Subaabool · 'Chatka' · Sisso · Gulmohar · Babla · Sal · Neem · Bael · Tamarind · 'Bai' · Copper pod
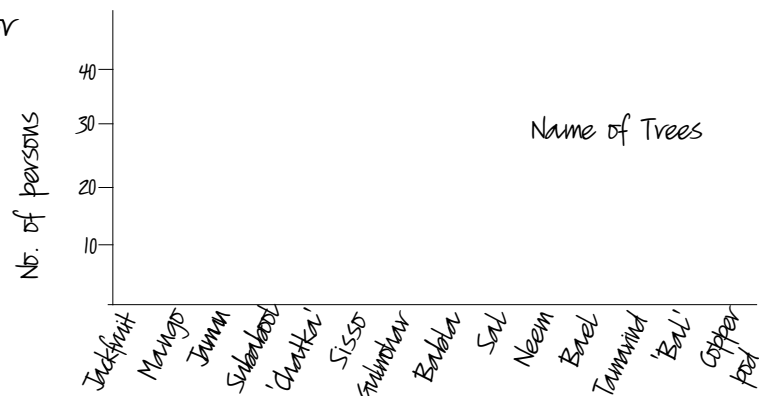
No. of trees according to their usage				
	Medicine	Timber	Fruit	Furniture
1.	Bael	Sal	Mango	Jackfruit
2.	Neem	Jackfruit	Jackfruit	Mango
3.	Soursop	Mango	Bael	Jamun
4.	Arjun	Babla	Coconut	Subabool
5.	Guava	Subabool	Guava	'Chatka'
6.	'Kacha'	'Chatka'	Ber	Sisso
7.	Indian Corel Tree	Sisso	Tamarind	Gulmohar
8.	Sour lime	Neem	Litchi	Babla
9.	Coconut	Bael	Palm	Sal
10.	Drumstick	Tamarind	Date palm	Neem
11.	Indian Nettle Tree	Jamun	Sapota	Bael
12.	Elephant apple	Ber	Olive	Tamarind
13.	Night Jasmine	'Bal'	Drumstick	'Pal'
14.	Jamun	Shimul	'Dabol'	Copper pod

List of 14 trees according to the information of the Bar graph

☐ A student of Gandhi Vichar group has made another type of chart. This is rather general information on tree's usage & function.

But to put together children's opinion & information this is very easy to look our view.

A tree – A life

Maintaining the existence of animals ←

Nest for birds ↑

Purity of environment ↗

Environmental balance ↗

Flowers ←

Natural beauty →

Conserving ecosystem →

Fruits ↖

Medicine →

Honey collection →

Conserving of mineral salt ↖

Shade →

Taking in of CO_2 ↖

Materials for motorcars →

Food production ←

Wood for making houses ↗

Collection of mineral salt ←

Fire wood →

Furnitures →

Evapotranspiration causes rain ←

Liberates oxygen →

Protect soil erosion ↗

□ The students of Gandhi Vichar have made a chart on the use of 8 trees. But it is not mentioned in the chart that on what criteria these trees are selected.

If the selection of trees were linked with previous work like 'Top 10' or 'My Partner Trees' it would have been attracting and interesting.

Name of tree	leaf	stem	branches	flower	fruit	seed	root
1. Mango	Used in worship of food, used as fuel	mainly used as furniture	used as fuel	Used in worship of god	used as food, also in propagation	Used as toys	Used as fuel, check soil erosion
2. Jackfruit	Used in worship of god, used as fuel	making of furnitures, used as fuel	used as fuel	not used in any form	used as offering to god as food	eaten as fried	used as fuel
3. Jamun	Generally used as fuel	Used to make furnitures	Used as fuel	not used	used as food	used to make oil	used as fuel
4. Coconut	The veins used make broom, also used as fuel	old stems used as post/log & fuel	not good	not used	used to make sweets and as offering to god	used to make oil	used as fuel
5. Eucalyptus	Used as fuel	furnitures are made, but the quality of wood is not good, used as log/post and fuel	used as fuel	not used	not used	propagation of plant	used as fuel
6. Kend(u)	used as fuel, used to make bidi	costly & strong furnitures are made, like chairs,tables etc	used as fuel	not used. Bees collect honey	used as food sap	propagation of plant, used to make oil	used as fuel
7. Sal	Used to make plates, used as fuel	used to make furniture, used as logs/post in bridges.	used as fuel	not used. Bees collect honey	sap from fruits used to make dhuno	propagation of plant	check soil erosion

Sharing Ideas

The names of the persons from whom the information are taken is not clearly mentioned in the reports & charts received from the teachers.

It is also important to give the details of the procedure of information collection alongwith the use of the trees. Most of the charts and posters are made by the teachers themselves. Several times we have discussed in network meetings that the teachers should encourage the students to make their own designs and charts. It is also important that students should learn the different steps of making a chart.

We do not expect that the charts will always be beautiful and precise. It is important that the students will compile charts from the information collected by themselves. The teachers have to consider the age of the students, before asking them anything to do. Actually the role of teacher of ENRE will be to assist and help the children to do their work/activity.

TREE — Step 2 — Activity (B)

PRODUCTS MADE OF WOOD IN OUR SURROUNDINGS
To know about what kinds of trees are used for making the wooden items in our surroundings and why

[both for rural & urban schools
 for class 4 - 7]

Motivation:Building interest and Raising questions: Listing all the wooden items

▸ With the children, list all the items made of wood in their houses and surroundings.

▸ Divide children into groups. Each group takes the responsibility to draw different items. Make picture cards of these drawings with the name of the item depicted on it.
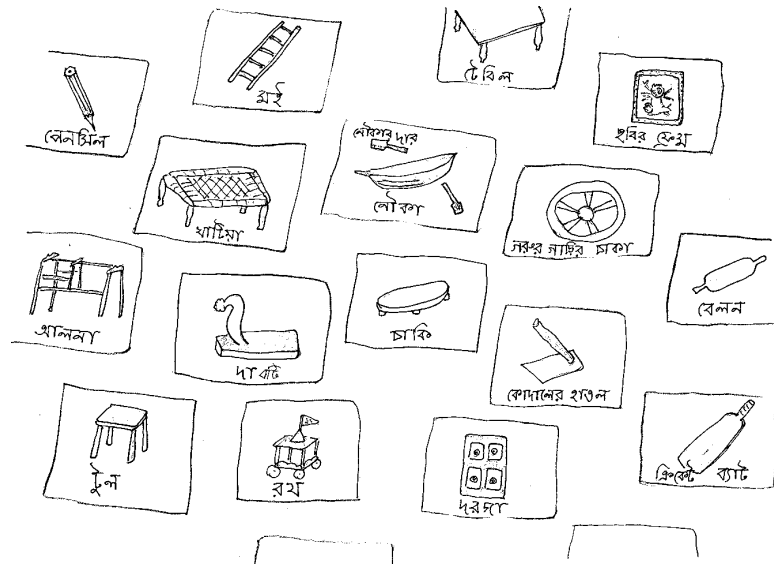
▸ Groups these items. The picture-cards of the items that fall into the same category are to be put together. So all furniture items are in one category, kitchen-items in another and so on. Examples of other categories are agricultural tools, transport, toys and playthings, house construction items etc.

Information Collection:

▸ Each group works on one of the item categories

▸ Each child in a group is to talk to family members, neighbours, carpenters, farmers etc to know more about the items and which kinds of trees they are made from. For each item, ask which is the best tree to make it from, the second choice, and third choice in tree as well as the reasons for this. They should also find out if those trees mentioned are grown in the locality or if their wood is brought in from another area, as well as the cost of the item and who is making it in the child's village/area.

♣ **Summary of Data gathered**:

▶ First summarise the date group-wise. This data should be added on to the back of the picture-card referring to that item. Then proceed to make a class summary chart. An example of the top of such a chart is:

Category	Items	Wood	Reason	Where tree grown	Cost of Product	Made by	Remarks
House Constuction	Door	Wood A Wood B Wood C		Local Kashmir	Average Expensive Cheap		
	Window Frame						

▶ Discussion on "what did we understand from the chart"

♣ **Developing Ideas**:

Ask children to give ideas on how they can make a bookshelf for the classroom using low-cost materials, waste or scrap materials, or other discarded or unusable materials that can be found locally.
Note down the design, the measurements and estimated cost for it.
This bookshelf design, size and cost should be manageable enough for the children to make it themselves, perhaps with the help/guidance of a local carpenter.
If possible, this should be done as a final activity. (Part of the cost can be provided by ENRE)

Feedback

TREE — Step 2 — Activity (B)
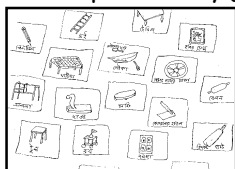
♣ This activity is another way to look the trees usage & role in our daily life.

We focussed on woody produces which are used commonly in household & community.

Through this activity we encourage children to look more detail of each product's materials and to think & find out why specific trees are used for certain products.

Children can also find out whether these trees are growing in their area or not. If they find out some trees were growing before but not anymore now, it would be good motivation for children to think about better natural resource management.

♣ Feedback Summary

	(Swanirvar)	(Gandhi Vichar)	(Gandhi Vichar)
1) **Village**	Beliakhali	not mentioned	not mentioned
2) **Children's class/number**	class IV to X 20 students	class VIII to X 10 students	class V to X 16 students
3) **Class/Period spent**	7 periods	not mentioned	not mentioned
4) **Products/Result (List of Woody products by children)**	It is there	A list of materials used in agriculture, cooking, making furniture & toys	List of materials used in agriculture, cooking & making furnitures
5) **Children's interest**	The children enjoyed in doing the work. They came to know from where the wood for making these things are procured from the elder persons	not mentioned	not mentioned
6) **Teacher's opinion/ difficulties**	An array of information has been colleceted. More information will flow in if the activities are performed in a schedule	not mentioned	not mentioned

♣ Summary Chart

☐ A group of Gandhi Vichar has made this chart. The materials used in agriculture, cooking, making furniture & toys, are illustrated and from which wood these are made is also mentioned. Amal, Bijoy, Lakshman, Prosenjit, Rajib are included in this team. They took 4 periods to do the work. They have collected information on this from the carpenters and the elder members of households.

A group of Swanivar has made 3 charts of materials made from wood. The content of the chart is typed below for your understanding.

Class	Articles		Wood			Reasons for selection
Agricultural Tools	Plough	1st	Babla	Local	Carpenter	Locally available, strong, durable
		2nd	Neem	,,		Locally available, strong, not durable
		3rd	Shirish	,,		Locally available, more or less strong, not durable
	Bota	1st	Babla	local	Carpenter	locally available, strong
		2nd	Neem			
		3rd	–			
	Apex of the plough	1st	Sal	local	,,	strong with soil & water
		2nd	Akashmoni	,,		cheap, cannot withstand water
		3rd	Eucalyptus	,,		cheap, cannot withstand water
	Boal	1st	Kul	local	,,	cheap, easily available
		2nd	Proproot of Banyan tree			cheap, not so easily available
	Ladder	1st	Sal	local	Carpenter	strong, durable
		2nd	Kul	,,		locally available, cheap, strong
		3rd	Akashmoni	,,		Water withstanding, capacity less
	Handle of Spade	1st	Babla	,,	in house/ carpenter	Strong, easily available
		2nd	Akashmoni			Strong, not so easily available
		3rd	Neem			Not suitable
	Wheel of cart	1st	Babla			Strong, easily available
		2nd	Neem			Strong, costly
		3rd	Shirish			Cannot withstand water
	Frame of cart	1st	Bamboo & Babla	,,	in house/	Strong, locally available
		2nd	Neem & Bamboo		Carpenter	strong but costly
		3rd	Other wood			Used in household
	Handle of cleaver	1st	Babla	,,	in house/	Strong, not durable
		2nd	Neem			strong, breakable
		3rd	Lower part of Bamboo			used when quality wood is not available

Class	Articles		Wood			Reasons for selection
Construction Materials	Mudun	1st 2nd 3rd	Akashmoni Mol Eucalyptus	Local ,, ,,	Carpenter	Locally available, strong strong, costly Locally available, not so durable
	Bhagtan	1st 2nd 3rd	Tal Khejur Eucalyptus/ Bamboo	Local	Carpenter	Locally available, strong, costly, light weight strong strong, easily available
	Batam	1st 2nd 3rd	Tal Chakmata Bamboo or any other wood	local	Carpenter	strong, durable strong, light weight strong, easily available
	Pela	1st 2nd 3rd	Tagar Akshmoni Kusum	local	in house / carpenter	strong, termite proof strong, locally available strong, costly but not easily available
	Par kori	1st 2nd 3rd	Tal Khejur Mol	local	carpenter	strong, light weight, termite proof strong, light weight, termite proof ,, '' easily available
	Doors/ Windows	1st 2nd 3rd	Shirish Jam Mango	local	,,	strong, termite proof, easily available ,, '' '' ,, '' ''
Furnitures	Bed	1st 2nd 3rd	Segun Chalklata Shirish	local	carpenter	strong, light weight strong heavier Heavier
	Chair	1st 2nd 3rd	Charhrah Eucalyptus Shirish	,,	,,	good colour, light weight, cheap cheap, light weight, easily available light weight, strong, costly
	Table	1st 2nd 3rd	Kanthal Charhrah Shirish	,,	,,	costly, easily available light weight, strong, cheap heavy
	Almirah	1st 2nd 3rd	Sal Segun Mango/Shirish	,,	,,	costly, light weight, strong more costly, strong light weight, termite proof
	Stool	1st 2nd 3rd	Mango Shirish Akashmoni	,,	,,	light weight, easily available more heavy, strong heavy & strong

Class	Articles		Wood			Reasons for selection
Cooking Utensils	Frying pan	1st 2nd 3rd	Tamarind Shirish Jam	Local	Carpenter	light weight, easily available more heavy, strong strong, light weight
	fish-knife	1st 2nd 3rd	Jam Kaet bael Babla	,,	Carpenter	light weight, locally available strong strong, easily available
	Cutting board	1st 2nd 3rd	Guava Chalklata other wood	,,	,,	strong strong
	Rolling pin	1st 2nd 3rd	Guava Kul Proproots of banyan tree	,,	,,	light weight, strong, durable light weight, strong, durable light weight, strong, durable
	Dress stand	1st 2nd 3rd	Kul Chalklata Shirish	,,	,,	strong, light weight, easily available ,, ,, ,, ,, ,, ,,

অ্যানের ফ্রেম

The best wood for making frame of van is Sal, since this wood is very strong and do not bend or develop cracks. It is also termite proof. The frame is also made from the wood of locally grown trees like jackfruit, mango, jamun, neem.

The handle of umbrella is mainly made from sal wood. The wood is almost flawless. It is termite proof, durable. Besides Sal, the wood of neem tree is also used to make the handle of umbrella.

ছাতার বাঁট
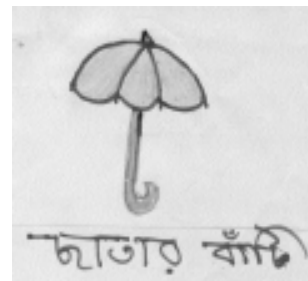
The children have made cards with illustrations of the materials made from wood. They are given below

♣ Sharing of Ideas

The teachers have expressed their difficulty in drawing the outlines of the materials made from wood in the network meeting in ENRE. Infact the teachers are not confident enough to draw that kind of illustrations.

It is recommended that illustrations should not have to be perfect.

Step - 3
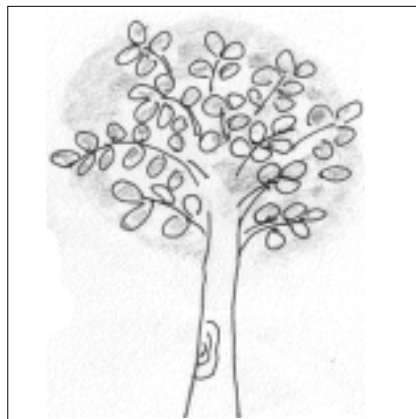
for creating child oriented activity

♣ TREE — Step 3 — Activity (A)

SEED COLLECTION

Let's make a trip and gather seeds of several different kinds of trees that are useful in our locality. We can then make our own "Seed Bank".

[▦ both for rural & urban schools
☺ for class 5 - 8]

♣ **Motivation : Raising questions, Building interest** : "Why collect seeds?"

In previous activities (step 1 & 2) we were trying to understand and make a tree-profile. Ask the children if they would like to increase the number of valuable trees (those that got a high ranking for daily use step 2-A) in their area and what we can do about it.

Most trees can be propagated by sowing seeds and some can also be grown from cuttings. Suggest taking a walk in the surrounding area to collect seeds, especially from those useful trees.

Make sure that the children have understood the purpose of seed collecting by having a discussion on some of the following reasons:

* for growing trees in our school-garden, roadside etc
* to establish a school "Tree Nursery"
* to exchange seeds with children from other school-children (SEED BANK)
* for providing or selling trees (especially Multipur-pose Trees - MPT) for community development activities

♣ **Preparation:** "Calendar and Record sheet"

Choose and make a list of tree-species of which we want to collect seeds.
Why do we choose these particular species? **Our priority is MPT species**. (see attached sheet list)

Make a chart of the selected trees. Are they now in the seed-pod stage (cf. 1-B).
Include this information also. This can automatically become a "Seed Collection calendar"

Our Seed Collection Calendar

Name of tree (Scientific name)	Seed Stage (month) 1 2 3 4 5 6 7 8 9 10 11 12	USE	Mother tree
1. Akashmoni (Acacia auriculaeformis)	⟶ ⟵		
2. Babla (Acacia nilotica)	⟷		

We also need to make a "Seed Collection Record".

Ask the children what information they think we need to design a record card before adding the following to their list.
For this we need:

- Name of tree
- Date and Place seed was collected
- Site condition
- Name of collector

Remarks (the result of germination test - see example sheet)

🍀 **Activity : (stage 1) "Seed Collection Trip"**

The most suitable season or seed collection is Feb-Mar in West Bengal. It is possible to see some Tree or the other in seed-stage all through the year (except perhaps in the rainy season). Go out and collect seeds from your selected tree species.
Don't forget to carry bags (preferably cloth or bags that are used to carry cement) as well as record cards.

Remember!

▶ Seed should be collected form a tree that
- is adequately mature
- has the proper shape
- is disease-free (healthy)
(need to decide on 2-3 trees that can serve as "Mother Trees" for each species.

▶ Seed should be collected from several trees (to avoid genetic failure)

▶ Seed-pod should be fully mature and dry

▶ The most suitable time for seed-collection is after 10 A.M and before 3 P.M

Each seedpod has so many interesting designs. What could be the reason for this ?!

♣ Activity - Stage II : "Seed Drying and Storage"

It is important to dry the collected seedpods completely.

DRYING
Spread the seedpods on a mat/ old newspaper.
Dry them in a semi-shaded place where there
is good air circulation for at least 5-7 days.
(Do not expose them to too much sunlight - seeds will
crack)
Take them inside in the evenings.
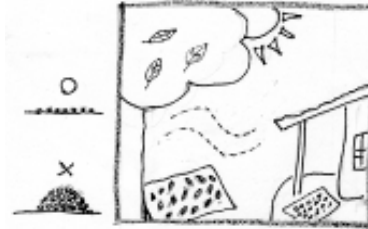
SELECTING
Remove seeds from the seedpods. Select only the good seeds
(proper size, shape, colour, surface)

STORAGE
Keep the seeds in either a cloth bag, a glass/plastic bottle,
or an earthen jar. To avoid moisture, use roasted charcoal
or roasted rice covered in a cloth bag.
To avoid insect attack, use neem-oil/mustard oil (5-10 ml per 1 kg
of seeds)
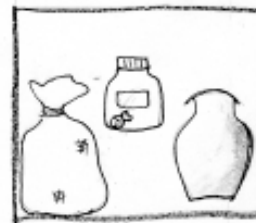
LABELLING
• Registration number (based on the list)
• Seed Name
• Date (collecting date and bottling date)
• Place where it was collected

GERMINATION TEST
It is useful to test how many days it takes for germination and the
rate of germination of the seeds. Sow 10-20 seeds and observe.
Usually the seeds of trees have a hard coat and some seeds need
pretreatment.
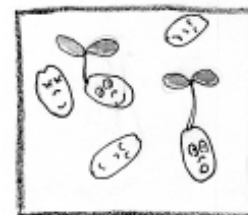
SEED PRETREATMENT:
Put seed in warm water (36-38°C) and soak overnight.
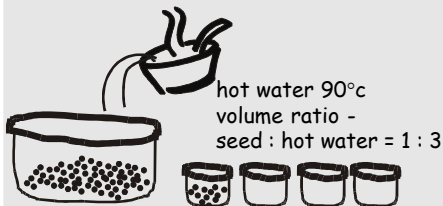
hot water 90°c
volume ratio -
seed : hot water = 1 : 3

Scratch the seed with the nail. If it gets
scratched, the seed can be sown. If not, do 'hot
water treatment'.
Leave for 24 hours. If the seeds do not swell,
repeat.

[cf. Plant Propagation p33]

♣ **Further Activity**

■ **Seed Bank**

For exchanging/providing/selling seeds, it would be interesting to make our own "SEED BANK". Let's make a seed packet with a special and original logo!
Children can make an "explanation slip" for each seed packet, using all the information collected while doing these activities on the tree.
Information that should be included on this slip:

- Description of tree (drawing of leaf, flower, seed-pod or fruit)
- Growing condition (sun, water, soil requirements)
- How and when to sow seed and about germination
- For the "Seed Bank" it is better to keep a stock-list of seeds (just like an account sheet of an ordinary bank) to know how many seeds we have.

e.g.:

Date	Reg. #	Seed name	Storage /distribution	IN (kg)	OUT (kg)	Balance (kg)	Price	Income
12.2.00	01	"àAìàÅ³áo	Storage	1.5				
28.2.00			Storage	0.8		2.3		
03.3.00			given to other school	0.5	1.8			
05.3.00			Sold to farmers group	0.5	1.3		Rs.xx.xx	Rs. xx.xx
15.3.00			Storage	2.5		3.8		
18.3.00			Sold to Service Centre		1.0	2.8	Rs.xx.xx	Rs. xx.xx
	02							

When your seed bank has stocked enough seeds for exchange or selling, let us know!

Survey Sheet

one number for one species, eg: *01*   ①

species   *collected from tree #*

SEED COLLECTION RECORD
(Ref No. ....)

☐ **Tree Name**
- ■ local name
- ■ common name
- ■ scientific name

☐ **Place of collection**
- ■ Site (e.g. behind the temple)
- ■ Village   ■ District

☐ **Site Description** (circle)   *(for understanding growing condition)*
- ■ Soil - sandy / loamy / clayey
- ■ Soil Colour - black , brown, red, yellowish...
- ■ Water - Dry / moist / wet
- ■ Sun - Sunny/ semi-shade / shady

to understand the growing condition

☐ **Size of tree**   *(to know whether tree is mature or not)*
- ■ Height   (m)
- ■ Trunk   (cm) diameter at chest-height

Whether the tree is mature or not

☐ **Use/ Character**

Fuel, fodder, living fence, medicine...

☐ **Seed pod**   ☐ **Seed**

(mention colour & size)

drawing of an average size seed pod

☐ **Date of collection**

☐ **Weight of total seeds collected of the tree (kg)**

☐ **Collector's information**

name

class   school

village   district

☐ **Pre-treatment of seed**   needed/not needed

☐ **Germination Rate**   %

☐ **Checked by**

name   date

Example of our
seed packet

GANESHA SEED BANK
Babul Gate, Boro Diwt (w)
Chander nagore - 712136

Growing condition:

Grows well in most soils,
even heavy clayey soil, so
you could even plant it
on the edge of paddy
fields

Use/Function:

Food (flower, Leaf), Fod-
der, Gum, Tanin
Suitable for home garden
and agro-forestry

বকফুল
Sesbania grandiflora

Propagation:

Direct sowing of seeds
or by cutting

**Seasonality/
Remarks:**

Plantinng season –
Flowering season –
Height of mature tree –
10–15 m
etc....

Example of a slip with
information on seed/
description of tree

Feedback

TREE — Step 3 — Activity (A)

This is aimed to create children's activity for multiplying useful trees like MPT in our local area.

Children can apply all knowledge & information what they learnt in previous activities in step 1 & 2 into this seed collecting activity.

Feedback Summary

	Swanirbhar	Gandhi Vichar	Gandhi Vichar
1) **Village**	Beliakhali	not mentioned	not mentioned
2) **Children's class/number**	class IV - X 20 students	class VIII - X 11 students	class V - VIII 16 students
3) **Class/Period spent**	6 periods 1 period = 1hr. 30 min.	not mentioned	not mentioned
4) **Products/Result (seed collection information & result)**	see pg ---	see pg----	not mentioned
5) **Children's Interest**	students got interest to collect seeds	not mentioned	not mentioned
6) **Teacher's opinion/ difficulties**	not mentioned	not mentioned	not mentioned

♣ Summary Chart

☐ Information on Seed Collection : A group of Gandhi Vichar has collected some seeds and kept information for the same.

Tree's Name	Place of collection	Growing place & condition	Tree's height	Pod	Seed	Date
1. Bel	The bank of pond in Nandigram – Bankura	soft soil, ash in colour, moist, bright sunshine	25 ft	–	flatened white	18th March
2. Drumst-ick	The temple in Nandigram – Bankura	Sandy soil, ash coloured, dry, bright sunshine	15 ft	black	black	2nd April
3. Tamarind	The bank of pond in Nandigram – Bankura	Soft soil, black, moist	28 ft	ash coloured	black & flatened	10th April
4. Papaya	The garden of Nandigram – Bankura	Sandy soil, ash coloured, dry, bright sunshine	7 ft	–	black glistering	5th April
5. Radha-chura	The hermitage of Nandigram – Bankura	soft soil, black moist	28 ft	black	brownish and elongated	15th April

(1. Samapti Goswami - class VIII, 2. Munmun Mukherjee - class VII, 3. Gita Bauri - class VII, 4. Haradhan Goswami - class VII)

☐ **Schedule of Seed Collection** : A group of Swanirbhar has prepared a Schedule of seed collection

Name	In month seeds are collected	Uses	Growing place
1. Jackfruit	May to September	· Good furnitures are made · used as fuel · used as vegetable · used as fruit · Leaves used as fodder · the twig of jackfruit used as vegetable	· In the garden · In front of the house
2. Tamarind	April & May	· the wood of the tree used as fuel · the wood is used to make furniture · the ripe and unripe fruit of tamarind used as food · the tamarind used to make pickles and jelly	· in the backyard of household
3. Subabool	May & June	· the wood used as fuel · the wood used to make furniture · the leaves used as fodder for cattle	· In & around the house-hold
4. Mango	May, June	· The fruit used as food · the wood used to make furniture the wood used as fuel · the unripe fruit used as vegetable · the leaves used as fodder for cattle	· In & around the house-hold
5. Arjun	January & February	· The wood used as fuel · the wood used to make furniture · the bark of the tree used as medicine	· In the road-side places

☐ **Making of Seed Packets :** The students of Swanirbhar, Kajla and Gandhi Vichar have made seed packets as an example.

Subabool Seed

• Can be grown in any type of soil

• Takes much less time to grow

• Use

    used as fuel

    used to make furniture

• Ideal for growing in the garden & for agroforestry

• Propagation

    germinates directly from seed
    height of the tree is 30-40 ft.

Bael
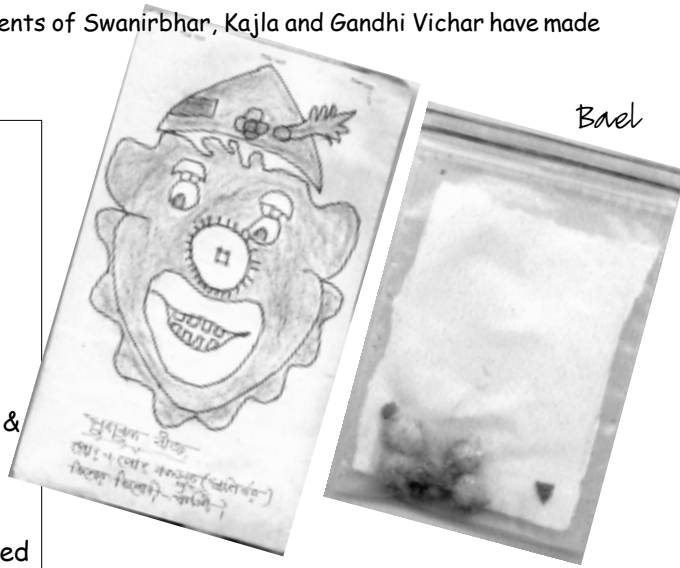
Neem Seed

The conditions of growth

Can be grown in any type of soil, grows in clayey soil, can be planted in and around the household garden

Use & Utility

food (fruit, seed), medicine (bark, leaf), furniture (wood), other parts of the tree are also used

Neem leaf

Fruit

Propagation

plant grows directly when the seed falls on the soil
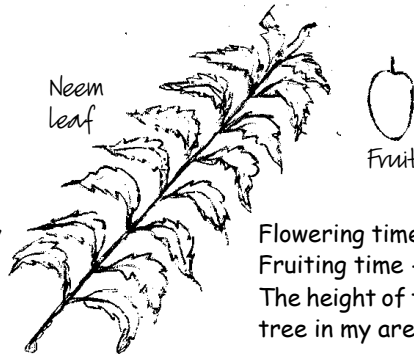
Flowering time - January
Fruiting time - May
The height of the matured tree in my area - 80ft.

♣ Sharing Ideas

A group of children of Kajla Janakalyan Samity have made packets of dried neem seeds. But one cannot use these seeds ! Do you know why ? Mr. Ardhendu S. Chatterjee (DRCSC) have explained the reasons in a network meeting of ENRE.

There are several steps before seed packets are made. Our objective is not only to make seed packets, but also to know, about how the informations are collected and packets are made through the 1st and 2nd steps.

If both the teachers and students come to a conclusion, that there is importance of Neem on their locality and need to propagate them, then you should document and survey the neem trees of your area (find out how the seeds germinate). The next step will be to collect information from the elders on this and encourage the children to do the activity. Although dried neem seeds will not be ideal to prpagate, but in the way making these seed packets the children will learn many other things.

> The seeds of neem do not have the potency to germinate for long. Neem seed have stored oil and such seeds cannot be stored for long. Seeds should be planted within 2 weeks after collection. But we can use dried neem seeds for other things, for example as medicine or natural pesticides or insecticides.

♣ **TREE — Step 3 — Activity (B)**

LET'S START A SCHOOL TREE-NURSERY

Let's grow some tree-seedlings in the corner of our school-garden for planting more trees in our community area. One small seed will become a big and useful tree in through our own hands. It's amazing!

[🖽 both for rural & urban schools
☺ for class 5 - 9]

♣ **Motivation - Building interest, Raising questions**: "Tree-species selection"

Discuss with the children what kind of trees would be better to grow in our area.

Based on our previous surveys (TREE Steps 1 & 2), select and make a list of tree species for the Nursery.

Points to consider : tree's usage, ranking and popularity (refer to attached sheet). Check the method of propagation of these trees as well. If necessary, the children can ask the advice of farmers and villagers.

Tell the children that we are going to try to grow the tree seedlings by ourselves.

e.g. Selected tree species for our Tree-Nursery:

Tree's name cutting	Use/ Function	Propagation	Source of seeds or
Aakasmoni	Firewood, furniture, soil conservation	from seed	1. Behind the temple 2. 3.
⌐	⌐	⌐	⌐
15-20 species	Reason for choice	Seed, cutting etc	Neighbourhood trees from which seeds collected or other seed banks

♣ **Understanding concepts**: "What is a Tree Nursery and why have a Tree Nursery?"

Some children may not understand what a tree nursery is or why we need to make one.
If some of the children have already seen a tree nursery before in your area, ask them to explain what they saw there.
Discus with the children the function and importance of a tree nursery:
If we compare the tree seedling with the human body, it would perhaps be easier for them to understand.

Some factors to consider are:

■   Importance of small-stage period:

   the rate of growth is very high in the beginning.

Soon after germination, it becomes clear that the 'Aakasmoni' (Acacia auriculaeformis) is leguminous.

3 times
2 times

Just born
3.4 kg

6 month child
7 kg

1 year child
9.4 kg
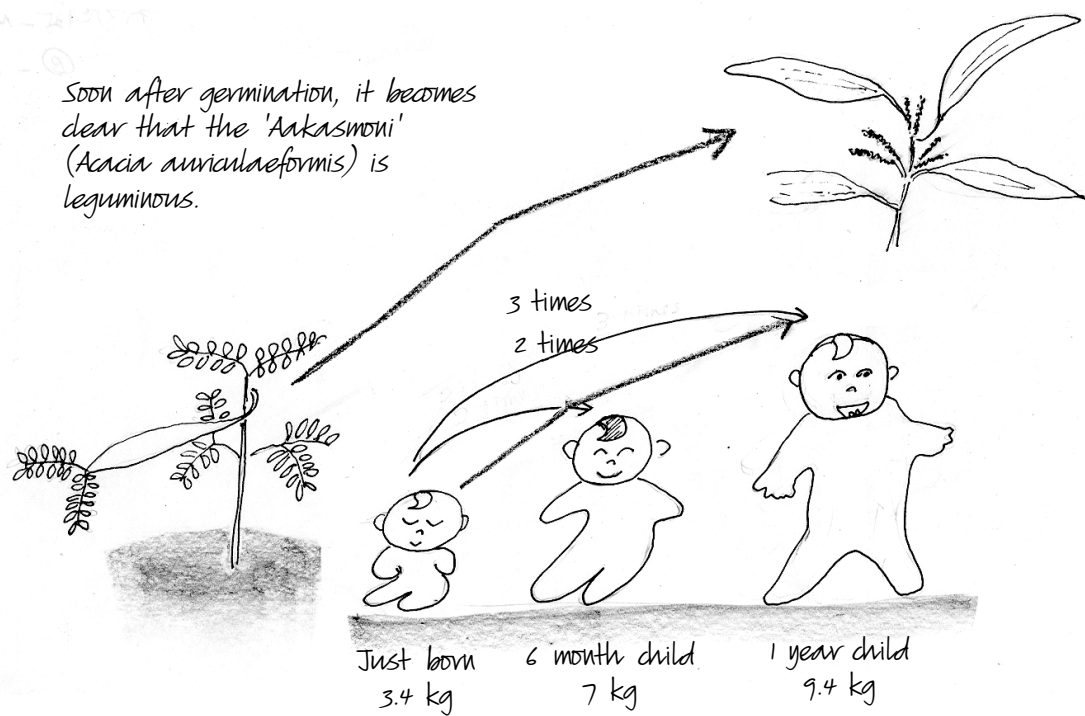
■   Need special care when tree/human is small, otherwise they cannot survive
■   It is easier to care for a number of seedlings grown together in one place (for

   watering and protection)

■   We can transplant tree seedlings at the right time to the required place so the chance of survival is high. We can provide and sell tree seedlings. This creates income and ensures that there are more trees in our surroundings

... Can you add any more?

♣ **Information Collection / Preparation : things we need**

Before setting up our tree nursery we need to think about all the things that we might need.
if there is a tree nursery in your area, it is worth taking the children there for a visit.
Observe the site and collect the information that you will need to start work on your nursery
i.e what materials, tools will be needed and what the condition of the site should be etc.

What is needed (materials)	Site Conditions
- Soil	- water access
- Sand/ Rice husk	- semi-shade
- Compost (raw cowdung)	- protection (fencing)
- Polythene bags/ Alternative container	
- Water can/ bucket & mug	
- Seive	
- Seeds/ Cuttings	
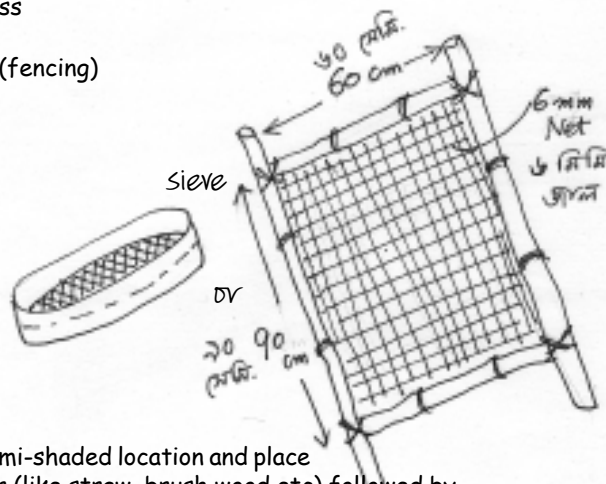
If you want to make compost:

For a compost heap, choose a semi-shaded location and place
1) a layer of dry organic matter (like straw, brush wood etc) followed by
2) a layer of wet/fresh organic matter (leaves, water hyacinth etc), followed by
3) a thin layer of soil.
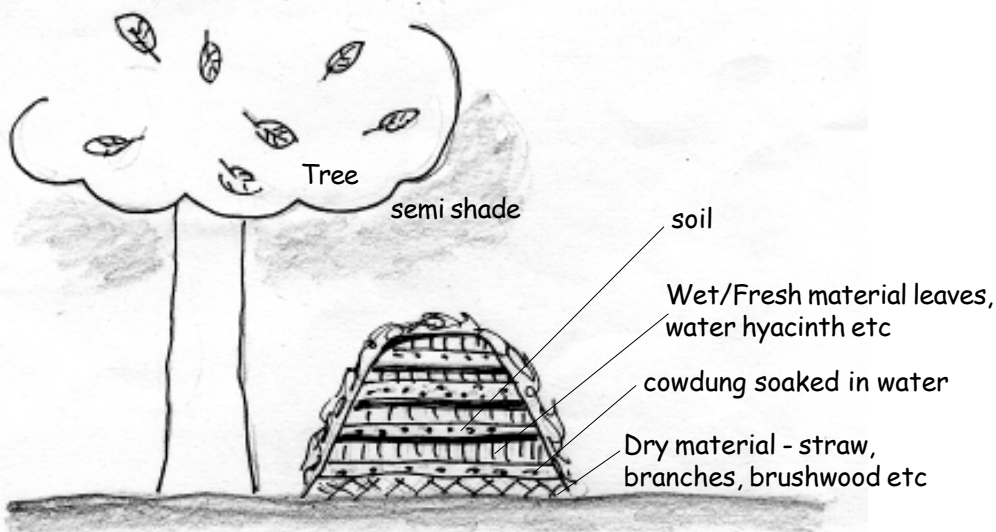
It is then time to mix and turn the heap. This process is repeated until the compost is ready after 2-3 months.

[Source: Nurseries and Propagation No.2 p18]

♣ Activity : Setting up the Nursery

Tree Nursery
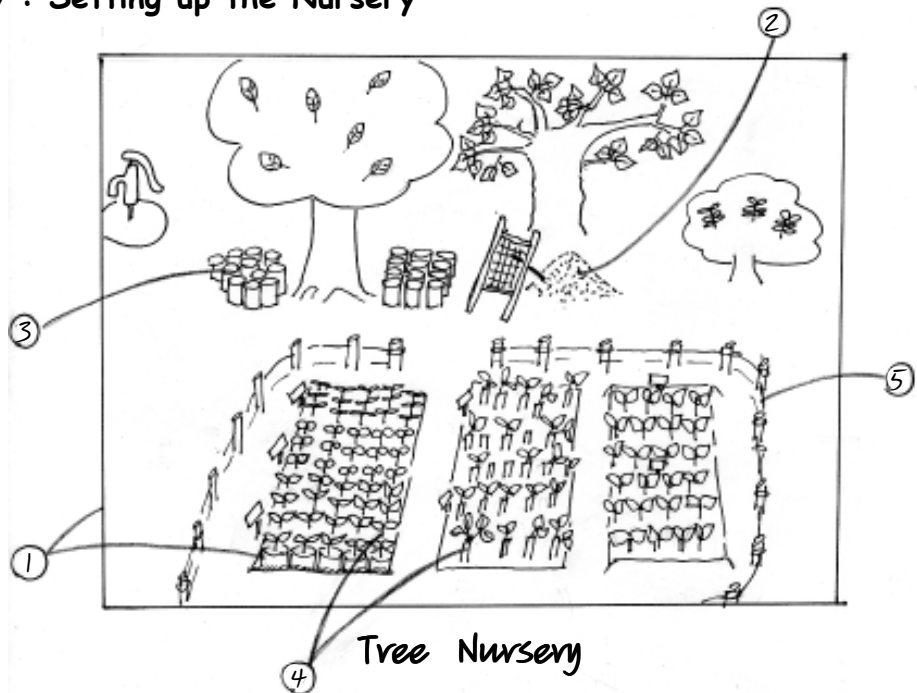
① Site Selection and Preparation

Choose a corner of your school which is

- semi-shaded (preferably gets morning sunlight)
- easy access to water
- safe, not much frequented

and start with a small and manageable area first.

Prepare the beds for keeping bags of seedlings (width 1 m X length 2-3 m, dig 5 cm deep)

Path between beds 50-60 cms.

bamboo sticks

rope

Seedling bed for direct sowing for trees having
- Low germination rate
- very small seeds
- long germination time
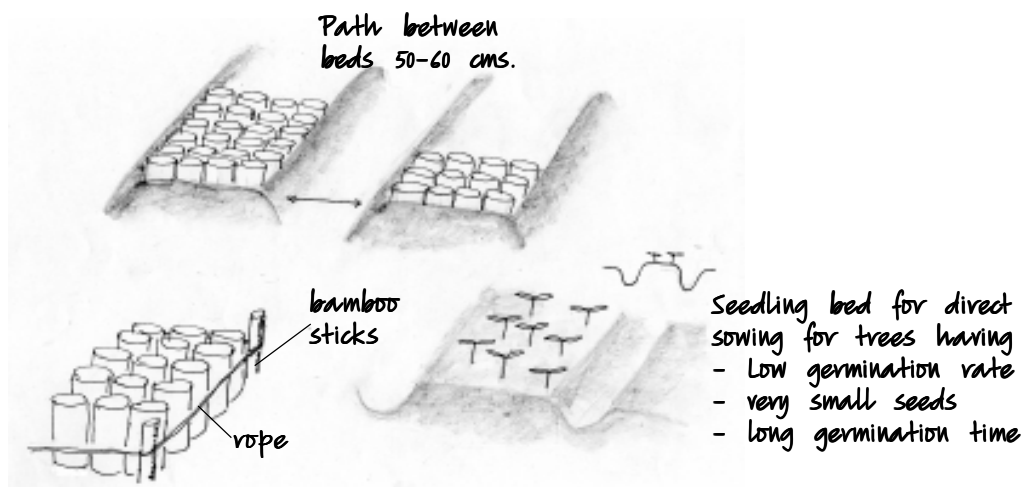
② **Soil Preparation**

Mix an equal portion of soil, compost and sand and sift

sand 1

:

compost 1

:

soil 1

or

soil mixture
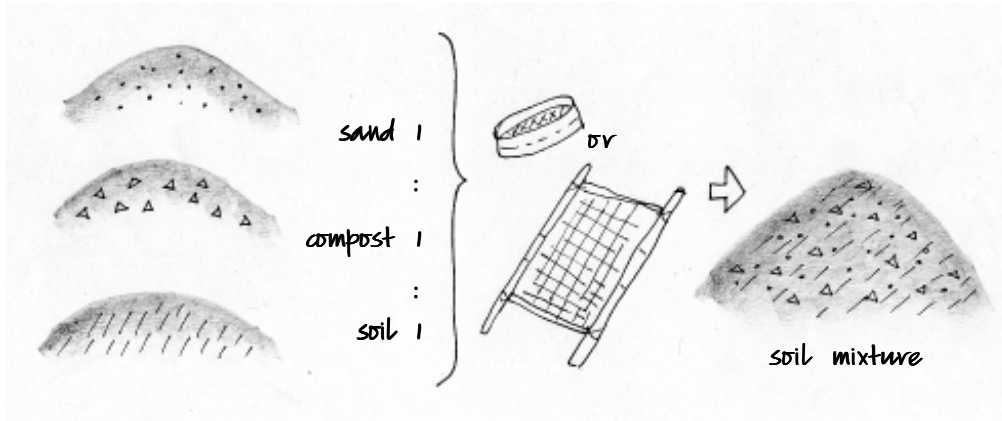
③ **Seedling bag preparation**

12–15 cm

20 cm

make 2
holes in
plastic bag

pour in soil
mixture

Press the two
bottom corners
inwards with
fingers

5 cms

plastic bottle
with top cut off

tin
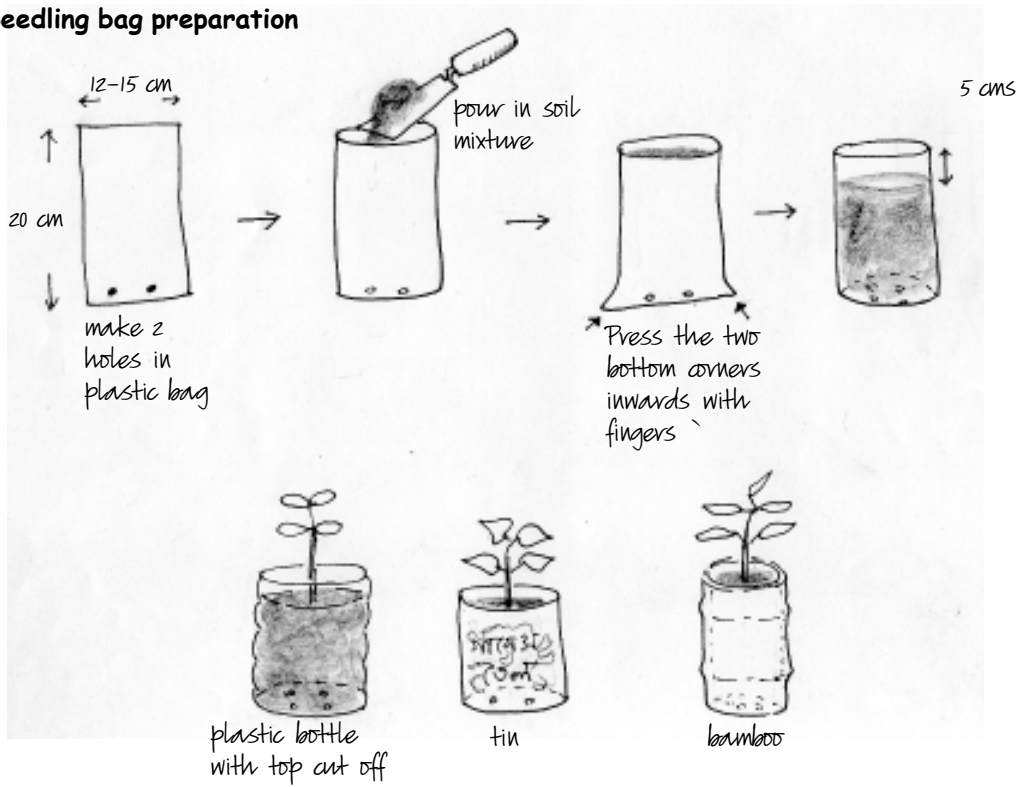
bamboo

We can also use discarded materials like plastic bottles, tins or natural materials like
bamboo.

④ **Placing seeds in bags**

The seed should be placed at a depth which is 3 times its own size.

2-3 seeds are to be placed in one bag.

making name
cards to tell you
which tree is a
good idea

depth seed sown = 3
times its size
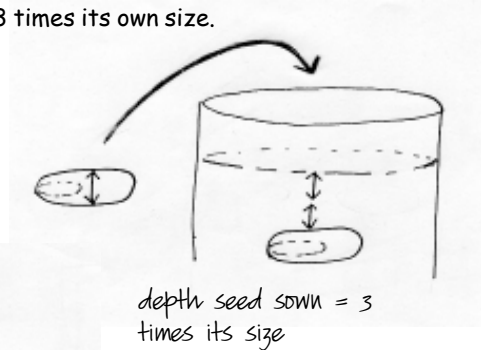
Cutting
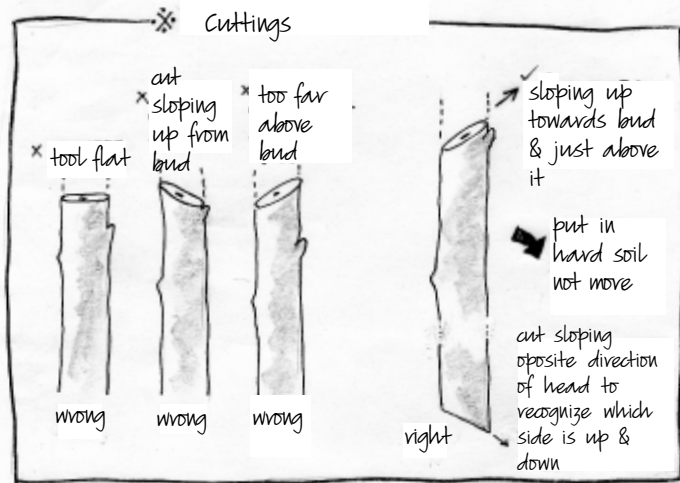
[Source : People's Work Book, p.186]

⑤ **Protection**
If there is a chance of intruding animals (or even people), a fence needs to be made to keep them out.
If the site located in a sunny area, a cover made of palm leaves etc needs to be made to protect the seedlings from the full strength of the sun's glare.

♣ Record Keeping: Germination Record

To maintain a tree nursery and to share information with others, ask the children to keep a germination record.

Example of a   **TREE SEED GERMINATION RECORD**

Name of Seed	Source	seeds sown / bag (number)	Date of sowing	Date of germination (no.)	Rate of germination (%)	Pre-treatment
Acacia	tree behind the temple (vill/dist)	60 / 20 bags	14.02.2000	25.02 (18) 27.02 (32) 1.03 (48)	48/60 (80%)	hot water

It is convenient to make a **site map** to better understand the use of the Tree Nursery site.

Bed	No. of bags
A-1 Akashmoni	20
A-2 Babla	20
A-3 Empty	

♣ Further Activity
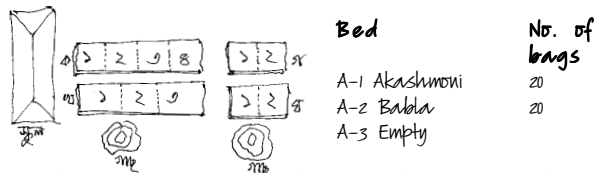
The rainy season is the best one for tree planting. Are your seedlings ready? Prepare the site before the rain starts. Dig the holes (30-40 cm and 30 cm wide) and put in some compost.

After a few days of rain you can transplant the seedlings.

How to plant trees
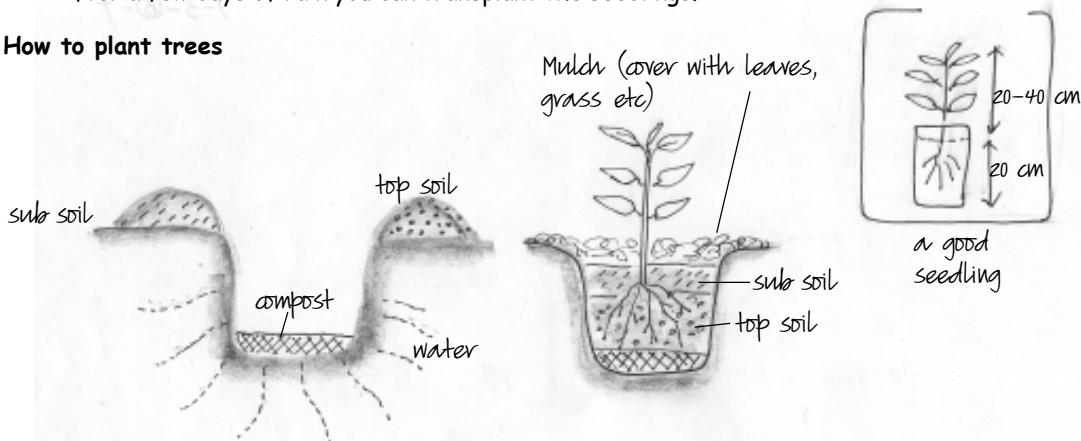
If the children want to plant trees along the road side or in an empty common plot of land, it would be better to discuss this first with the village leadersthe children will now be equipped to answer and explain to them why we need to plant more trees. If they ask, "Why do you want to plant trees?", after having done all the surveys and activities in Basbhumi, the children will now be equipped to answer and explain to them why we need to plant more trees.

"BECAUSE a Tree can protect the land from getting degraded
BECAUSE a Tree can provide the conditions needed for farming
BECAUSE a Tree can produce many of the necessities of our lives"

Any More you can add...?!

Remember !

Planting positions (for open space):

--> There should be 2-4 m between trees (depending on tree species)

--> Need protection in small stage

--> When planting mix several kinds of trees. Avoid planting the same species in one area only.

--> Before planting, find out about each tree's preferred growing condition (soil, water, sun) -check the site to see if these conditions are met.

Teacher's Note

Agroforestry

Have you ever heard the word "Agroforestry"? As the word suggests, it signifies "agriculture" combined with trees (hence "forestry"). Agroforestry is one of the methods followed in Ecological and Sustainable Agriculture. In agroforestry, seasonal plants (vegetables) and perennial plants (trees, shrubs, creepers and climbers) are combined. These plants are grown in a multi-storey arrangement (as shown in illustration) - this makes more efficient use of space, water and soil nutrients. Compared to growing only vegetables or rice, this system provides a year-round supply of food, fodder, fuel, medicines etc.

Of course, not all species can be planted together. There are certain trees that are suitable for agroforesty - most of the MPT (Multi Purpose Tree) can be used in this system.

The Service Centre has been promoting the system of agroforestry amongst farmers in West Bengal - perhaps even in your area!) under the SAN (Sustainable Agriculture Network) program. Some of your colleagues may be involved in this activity. They would surely be able to tell you about some useful trees and their role in agriculture. So, for this for this tree nursery activity you should be albe to get a lot of help from your colleagues.

There is no real need to teach the children the term "Agroforestry", but you could try to discover with the children, how trees are an effective component of agriculture, even their usefulness in home vegetable gardens and the different things innovative farmers are trying out with this combination. It is important for the children to keep observing and familiearising themselves with the trees around them, since many of them will be involved in agriculture in the future.
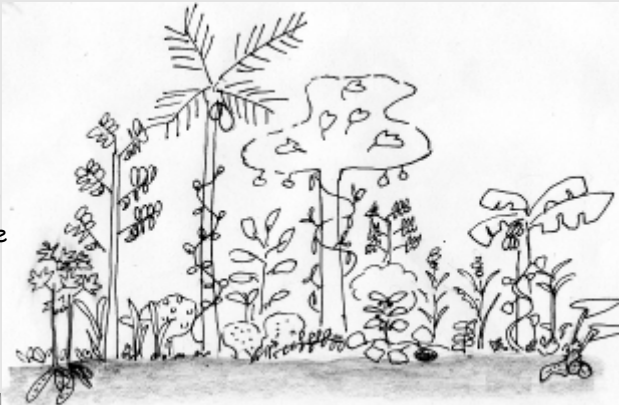
Feedback

TREE — Step 3 — Activity (B)

🍀 Students can have a practical work experience setting up a nursery.

It will be beneficial for both the society and themselves, if the students are able to set up a nursery. This will also lead to the conservation of natural resources.

It is recommended to start a nursery in a small piece of land.

🍀 Feedback Summary

	Swanirbhar	Gandhi Vichar
1) **Village**	Beliakhali	not mentioned
2) **Children's class/number**	class IV to X 20 students	class VIII - X & V - VIII 11 & 16 students
3) **Class/Period spent**	10 periods	6 periods
4) **Products/Results (site description for nursery)**	see page ----	Not mentioned in the report whether the students have visited any tree nursery in their area. It is only mentioned what type of environment is required to set up a nursery.
5) **Children's interest**	The children are not interested to do all the works of the nursery. They have divided the activities among themselves	not mentioned
6) **Teacher's opinion/ difficulties**	The teachers themselves have never initiated to set up a nursery. As a result many problems faced. Before the nursery became fully functioned, the flood has washed everything away. The teachers requires training on nursery making.	not mentioned

♣ Report of the Activity

☐ The children of Swanirbhar have written a report after surveying a nursery. The children visited a commercial nursery. There they came to know about 25-30 types of trees. They learnt the following things after talking to persons who look after the nursery and are adept in doing all its activities.

(a) An open space is required for setting up of nursery, but a shaded area will also serve the purpose. Place should not get water logged.
(b) The site should enough sunshine in the morning and also in most part of the day.
(c) Necessary water source for nursery should be nearby.
(d) Trees for nursery should be selected according to the nature of the site.
(e) Seed selection
(f) Protection of the trees from destruction by animals
(g) Committment of the purpose

☐ **Example of Information Collection on Germination of seed**

Name of the plant	Source	No. of seeds sown	Date of sowing	Date of Germination	Rate of germination
Seed of Jackfruit	Grown in the garden in my uncle's house	100	07/08/2000	18/08/2000 50 nos.	50%
Subabool	In the backyard	70	26/08/2000	02/09/2000 28 nos.	80%

☐ A girl student has set up a nursery in her household garden. But the flood water in 28.9.2000 has destroyed her nursery. (Name of the student - Menoka Parvin)

Map of the Nursery
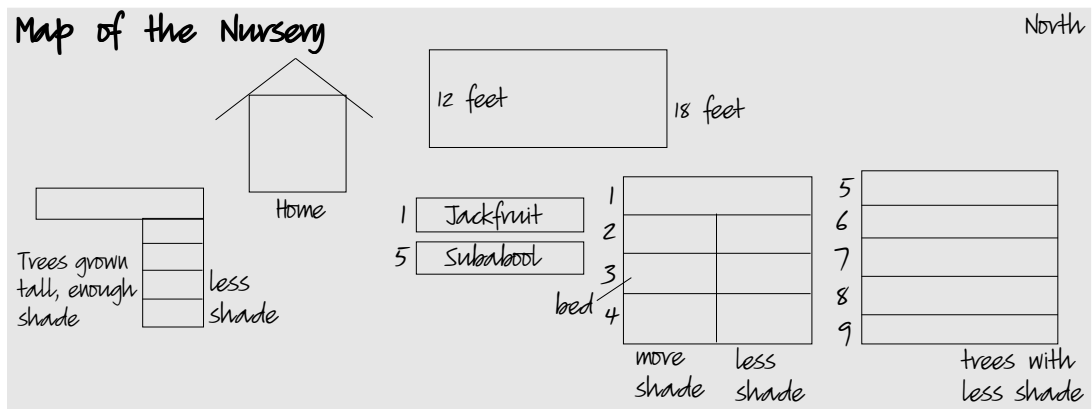
☐ **Nursery at School —**

The students of Beliakhali village have selected 8 trees for their nursery. They are — **subabool, neem, 'chatka', silk cotton, jackfruit, jamun, guava and wood apple**. They had either bought saplings from the market or prepared seedlings and then planted them. But the whole nursery was destroyed by flood. They have started to set up nursery at a different place. They have selected **coconut and betel nut** for the newly constructed nursery.

A list of 30 selected trees for seed collection and making tree-nursery at school

— Plant more multipurpose Trees in your locality —

1. Akashmoni	11. Bombay black wood	21. Curry leaf
2. Babla	12. Sisso	22. Drumstick
3. Lebbeck	13. Gulmohar	23. 'Jilipi'
4. Rain Tree	14. Indian Goosebery	24. Guava
5. Bael(stone apple)	15. Jamun	25. Egyptian sesban
6. Jackfruit	16. Indian CorelTree	26. Hog plum
7. Neem	17. Gliricidia	27. Tamarind
8. Pink bauhinia	18. White teak	28. Arjun
9. Silk cotton	19. Subabool	29. Teak
10. Monkey stick	20. Mango	30. Indian jujube

1. Akashmoni, Acacia auriculoeformis, Darwin black wattle ↕ 15-25m

2. Babla/Babul, Acacia nilotica Egyptian mimosa/Thorn ↕ 6-8m

	Bengali name	Scientific name	English name	Use/Importance	Propagation	
1.	Akashmoni	Acacia auriculoeformis	Darwin black wattle	wood, pole, fuel, fodder, gum. bark extract etc.	seed/sapling	
2.	Babul / Babla	Acacia nilotica Thorn	Egyptian mimosa/	wood chips, fuel, fodder, bark extracts,	seed	
3.	Shirish	Albizzia lebek	Lebbek, Women's tongue	agricultural equipments, cart wheels, honey	seed/cutting	
4.	Khirish	Samanea saman (syn. Albizia saman)	Rain Tree	furniture, wood engraving, fodder, gum. bark extract, agroforestry (honey)	seed	
5.	Bael	Aegle marmelos	Stone-apple			
6.	Kanthal	Artocarpus heterophyllus	Jackfruit	fruit, wood chips (for musical instrument) fodder, dye staff, agroforestry/ backyard garden	seed to be planted within 1 month after extraction	
7.	Neem	Azadirachta indica	Neem	wood, fuel, food, fodder, medicine, insect repellent	–	
8.	Rakta kanchan	Bauhinia variegata	Pink bauhinia (spring)	agricultural equipments, flower, medicine, fodder (agroforestry)	seed	

3. Shirish, Albizia lebek, Lebbek, Women's tongue ↕ 15-20m

4. Khirish, Samanea saman, Rain Tree ↕ 35-40m

5. Bael, Aegle marmelos, Bael fruit ↕ 9m

6. Kanthal, Artocarpus heterophyllus, Jackfruit ↕ 15-20m

Seed pre-treatment	Condition for growth	ENRE Feedback							
		leaf impression	Top 10 trees	Agriculture	Transport	Furniture	Utensils	Toys
warm water (50^{0}c - 60^{0}c)	sandy alluvial soil, sunshine	-	-	1	-	2	-	1
-	loamy soil, enough sunshine	-	③ ④ ⑤	6	5	1	-	-
–	any kind of soil, medium sunshine	(leaf)	⑥	1	1	6	3	-
soak in warm water for 3min / normal water overnight	sandy alluvial soil, marshy area, sunshine	-	④	-	-	-	-	-
		(leaf)						
–	well drained sandy loam soil, medium sunshine	(leaf)	④ ④ ⑧	4	3	9	2	2
–	any kind of soil, except salty soil medium to high sunshine	(leaf)	⑤ ⑧ ⑨ ⑨	3	3	-	1	-
–	–	–	–	–	–	–	–	–

[arranged by alphabetical order of scientific names]

7. Neem, Azadirachta indica, Neem ↕

8. Rakta kanchan, Bauhinia variegata, Pink bauhinia (spring) ↕ 5m

9. Shimul, Bombax malabaricum, Red silk cotton ↕ 25m

10. Bandar lathi, Cassia fistula, Golden shower ↕ 7-9m

	Bengali name	Scientific name	English name	Use/Importance	Propagation	
9.	Shimul	Bombax malabaricum	Silk cotton tree	gum, medicine, cotton (agroforestry)	seed	
10.	Bandar lathi	Cassia fistula	Golden shower/ Monkey stick	flower, medicine	seed	
11.	Minjiri	Cassia siamea	Bombay black wood	wood chips, pole, fodder, bark extracts, honey (agroforestry)	seed	
12.	Sishu	Dalbergia sissoo	Sissoo	agricultural equipments, furnitures, fuel, fodder, bark extracts, honey	seed	
13.	Krihnachura	Delonix regia	Gulmohar / Flamboyant flame	flowers bloom in summer, good as avenue tree	seed/cutting	
14.	Amloki	Emblica officinalis	Indian gooseberry	fruit has food	seed (seedling)	
15.	Jam	Eugenia jambolana	Jambolana / Java plum	fruit tree		
16.	Madar	Erythrina variegata	Indian coral tree	agroforestry, live fence, use in festivals	seed	

11. Minjiri, Cassia siamea, Bombey black wood ↕ 20m

12. Sishu, Dalbergia sissoo, Sisso ↕ 15-18m

13. Krishnachura, Delonix Regia, Flamboyant ↕ 8-12 m
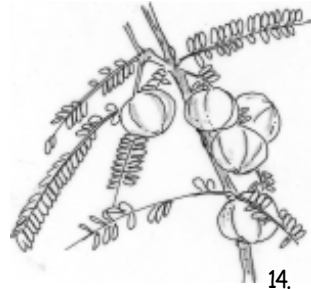
14. Amloki, Emblica officinalis, Indian gooseberry ↕ 6-25 m

Seed pre-treatment	Condition for growth	ENRE Feedback						
		leaf impression	Top 10 trees	Agriculture	Transport	Furniture	Utensils	Toys
–	–	(leaf)	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–
–	well drained soil, sunshine	–	–	–	–	–	–	–
soak overnight	well drained soil, sunshine	(leaf)	④ ⑩	–	–	–	1	–
–	–	–	–	–	–	–	–	–
–	–							
–	sunshine	-	–	-	1	3	-	4
–	sunshine	(leaf)	-	-	-	-	-	-

[arranged by alphabetical order of scientific names]

15. Jam, Eugenia jambolana, Java plum ↕ 10-15 m

16. Madar, Erythrina indica, Coral tree ↕ 10 m

17. Gliricidia, Gliricidia sepium,
    Madre de cacao ↕ 10-12m

18. Gamar, Gmelina arborea,
    White teak ↕

	Bengali name	Scientific name	English name	Use/Importance	Propagation	
17.	Gliricidia	Gliricidia sepium	Madre de cacao	pole, fuel, charcoal, food (flower), fodder, honey (agroforestry)	-	
18.	Gamar	Gmelina arborea	White teak	wood, paper pulp, charcoal, plywood, fodder, honey	seed/cutting	
19.	Subabool	Leucaena leucocephala	Ipil ipil	scrap wood, fuel, fodder (agroforestry)	seed/cutting	
20.	Aam	Mangifera indica	Mango	fruit, furniture, utensils, honey (agroforestry, pollination by bees)	seed (seedling)	
21.	Choto kamini/ Bara Suranga Girinim	Murraya koenigii	Curry leaf	medicinal plant (agroforestry / homestead garden)	-	
22.	Sajne	Moringa oleifera	Drum stick	fuel, fruit, fodder, oil (seed), medicine, water purification (agroforestry)	-	
23.	Jilipi	Pithecellobium dulce		log, fuel, food, fodder (agroforestry)	seed/cutting	
24.	Peyara	Psidium guajava	Guava	fruit, medicine (homestead garden)	seed/cutting	

19. Subabool, Leucaena leucocephala,
    Ipil ipil ↕
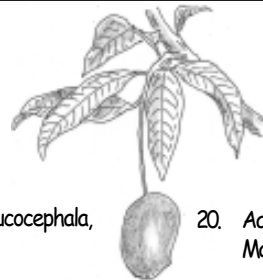
20. Aam, Mangifera indica,
    Mango ↕

21. Choto kamini, Murraya koenigii, Curry leaf ↕

22. Sajne, Moringa oleifera, Drumstick ↕ 7m

Seed pre-treatment	Condition for growth	ENRE Feedback						
		leaf impression	Top 10 trees	Agriculture	Transport	Furniture	Utensils	Toys
–	sandy alluvial soil medium-high sunshine	-	-	-	-	-	-	-
soak in water overnight for for 1-2 days	well drained & deep soil, medium sunshine	[leaf]	-	-	-	-	-	-
soak in warm water for 2-3 min. normal water for 2-3 days	bright sunshine	[leaf]	①	-	1	7	1	1
–	well drained soil, bright sunshine	[leaf]	①①① ②②② ⑦	2	-	7	1	1
–	–	–	–	–	–	–	–	–
–	infertile soil, drought tolerant	[leaf]	③③⑤ ⑥	-	-	-	-	-
–	drought tolerant, less sunshine	[leaf]	-	-	-	-	-	-
–	good for acidic soil	[leaf]	②⑤⑤⑦⑤	-	-	-	2	2

[arranged by alphabetical order of scientific names]

23. Jilipi, pithecellobium dulce ↕ 18m

24. Peyara, Psidium guajava, Guava ↕ 3-6 m
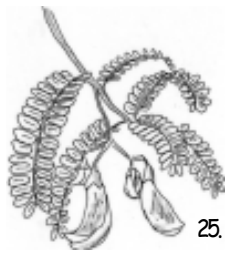
25. Bakful, Sesbania grandiflora, Egyptian sesban ↕ 6-8 m

26. Amra, Spondias pinnata, Hog plum ↕ 18 m

Bengali name		Scientific name	English name	Use/Importance	Propagation	
25.	Bakful	Sesbania grandiflora	Egyptian sesban	food, fodder, gum, bark extract, agroforestry/homestead garden	seed/seedling creeper	
26.	Amra	Spondias pinnata	Hog-plum	food, fruit	seed/cutting	
27.	Tentul	Tamarindus indica	Tamarind	fruit, charcoal, food, fodder	-	
28.	Arjun	Terminalia arjuna	Arjun tree	medicine, bark extract, food for silkworm (leaf)	seed (seedling)	
29.	Segun	Tectona grandis	Teak	doors, windows, furniture, log,	seed	
30.	Kul	Zizyphus mauritiana	Indian jujube	fruit, food, wood for making handles for instruments, fuel, fodder, food for silkworm (leaf)	seed/cutting	

27. Tentul, Tamarindus indica, Tamarind ↕ 25m

28. Arjun, Terminalia arjuna, Arjun tree ↕ 25m

29. Segun, *Tectona grandis*,
     Teak ↕
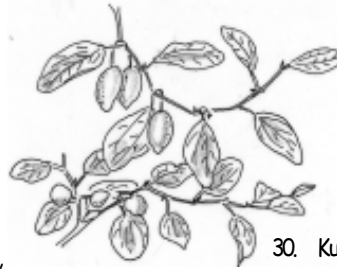
30. Kul, *Zizyphus mauritiana*,
     Indian jujube ↕ 4-6 m

Seed pre-treatment	Condition for growth	ENRE Feedback						
		leaf impression	Top 10 trees	Agriculture	Transport	Furniture	Utensils	Toys
-	clayey soil & any kind of soil	🍃	-	-	-	-	-	-
-	-							
warm water scratched	for drought prone areas							
-	-	🍃	①					
soaked many times/dried	sandy loamy soil, sunshine							
scratching of seed	any kind of soil, drought tolerant sunshine							

A list of 30 useful trees are given selected from Feedback Reports of ENRE. We expect that you will also identify the multipurpose trees in your area after going through the activities given in 3 steps.

Reference Materials

- "Growing Multipurpose Trees on Small Farms" (USAID, 1992/FAO)
- "Bangladesher Proyojoniya Gach-Gachra" (Tapan Kumar De)
- "Indo Hana Tsuzuri, 1 & 2" (Japanese) (Nishioka, naoki, 1988) etc

30 Useful Trees (Compiled Chart)

f - fruit, seed, flower l - leaves r - roots s - seed b - bark, wood c - cutting	fodder	food	timber	fuel	medicine	dye	ornamental	shade	nitrogen fixer	live fence	cultural	others	propagation
1. Acacia auriculiforms	•		•	•		•		•					s
2. Acacia milotica	•		•	•		•			•			honey	s
3. Albizia lebek	•		•	•	b,r		•	•		•		honey	s,c
4. Albizia saman	•		•			•	•	•	•			honey, gum	s
5. Angle mamelos		f									•	gum	s
6. Artocarpus heterophyllus	•	f	•	•			•		•			latex	s
7. Azadirachta indica	•	l	•	•	f,l			•			•		s
8. Bauhinia variegata	•	f	•		b		•	•					s
9. Engenia jambolana		f			f							insecti-cide	
10. Bombax ceiba					b	•						cotton,gum	s
11. Cassia fistula					f	•	•	•					s
12. Cassia siamea	•	f	•	•		•	•	•	•			honey	s
13. Dalbergia sissoo	•		•	•	f	•				•		honey	s,c
14. Delonix regia							•	•					s
15. Emblica officinalis		f											
16. Erythrina variegata	•	s			•	•		•		•	•	honey	s
17. Gliricidia sepium	•	f	•	•					•	•		honey charcoal	c,s
18. Gmelina arborea	•		•									pulp,honey	c,s
19. Leucaena leucocephala	•		•	•					•	•			s
20. Mangifera indica		f	•	•				•			•	honey	s
21. Murraya koenigii		l			•								seedling
22. Moringa oleifera	•	f,l			•							oil,fiber	s,c
23. Delonix Regia	•	f	•	•						•			c,s
24. Psidium guajava		f	•		l								grafting
25. Sesbania grandiflora	•	f,l			f,b,l	•	•		•	•		honey	s,c
26. Spondias pinnata		f											
27. Tamarindus indica	•	f,l	•		l							charcoal gum	s
28. Terminalia arjuna					b,f	•				•		silkworm	s
29. Tectona grandis			•		b	•		•					s,c
30. Zizyphus mauritiana	•	f	•	•	l							silkworm	s

Resources
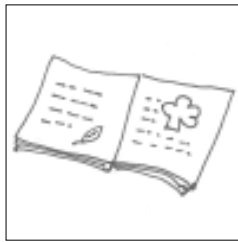
for strenghtening your guiding role

Trees and Our Environment
by Ardhendu S. Chatterjee

Trees are planted by us for many reasons; to harvest timber, fruit, medicine, oils & resins, dyestuff etc.; to make our surroundings beautiful; to protect our houses from dust & noise; to protect a hillside or stream bank against accelerated erosion; to ensure supply of flowers, leaves etc. used in festivals & ceremonies and so on.

The good thing about tree planting is that, no matter which objective is uppermost in our mind; when we plant a few trees & start taking care of them, many of the other benefits flow naturally to our household, to our neighbors; to wild birds, animals & insects; and to our earth as whole. As the saying goes we can "think globally and act locally". [for details see diagram]

Good to remember though, we are not the only ones who plant trees. Birds, bats, squirrels, rats, ants & many other insects, all help plants to spread. Often the task of protecting such old and new naturally growing trees in a particular site is even more important than planting new trees, as the multiple benefits of trees usually become available only when they are mature, and this takes time. For socio-economic benefits planting short cycle firewood plantation, fruit-tree orchard etc. is necessary, but these plantations do not serve much ecological function, especially if the tree species used are exotic and the trees are cut after 5-6 years. Artificially created orchards & timber plantations cannot act as substitute for natural forest or woodlands. We need to create multi species, multi storey plantation using combination of trees, shrubs, climbers, creepers, grasses etc.

Let us now look a little deeper into the various objectives and purposes of planting trees.

Economic value : Trees supply us with a valuable range of products. **Mango, Jackfruit, Guava**, 'Ber/**Kul' Tamarind, Jamun**, Papaya, Custard Apple, Pomelo are some of the common **fruit** trees of Bengal. 'Chalta' , 'Phalsa' , 'Dahuk', 'Aanshphal' , 'Gaab', 'Kamranga' etc. were also common once, but now we can see very few of these trees in our villages. Fruit trees not only provide nourishment and variety in our diet, they can become important source of income, especially in areas with low rainfall, poor soil, sloping lands etc. where cultivated field crops don't yield much.

Some trees seeds yield oil which are used as cooking medium (Mahua. Coconut, Oil palm etc.) . Other seeds and leaves yield oils that are used as insect repellent / insecticide or base for making soap (Neem, Karanj or Pongamia, etc.). The oilseed cakes of these trees are often used to improve soil fertility.
Common **timber** trees of Bengal are '**Sal**', '**Teak**', '**Gamar**', '**Sishu**', '**Siris**' etc. Timber

Multipurpose Benefits of Planting Trees

Trees clean atmosphere by removing & storing carbon & manufacturing oxyzen.
They remove many toxins & pollutants, and also filter dust particles.

They provide Shelter & Food for wildlife

Trees store solar energy, and can be source for renewable energy both directly & indirectly.

atmosphere

Trees Recycle water

Long lifecycle trees, especially when they cover hilltops, intercept rainfall, prevent fast water flows & landslides. Thus they keep rivers clean and sustain streamflow.

Trees along rivers & lakes reduce bank erosion, reducing risks of flood, their leaves often supply food for fish.

Tree reduce soil erosion and arrest surface flows, recharging groundwater

Trees create recreational spaces and opportunities

Wind breaks protect crops from strong winds & act as shelter for pollinators as well as predators, thus contributing to enhanced yields

← water — Benifits to the global environment **— soil →**

Trees, particularly, fast growing nitrogen-fixing types, enrich soil & pump nutrients from deeper layer to topsoils on surface.

What do we gain by

planting more trees

source of food, fodder, fuel, timber, medicine, fibre, gums, dyestaff, oils, spices, construction materials etc.

watershed

survival

Benifits to local community / environment

Benifits to individual households

income

Earning from raw or processed tree products eg. leaf, timber, roots, barks etc or tree based products eg. honey, lac, silk etc.

farms

urban areas

health

trees reduce temperature, absorb pollutants, provide habitat for birds, squirrels etc.
Trees beautify cities

screens house from noise & dust pollution, hedgerows give privacy

To get these benefits, trees must be chosen carefully. When choosing trees for a particular site/location, consider its shape (width & height) at maturity, consider their suitability to local climate & soil, consider the functionsof the particular species (shade, flowering period, leaffall etc.) as well as the degree of protection needed from grazing etc.

from mature Palm trees are also used in construction. For doors, windows, small furniture etc. Wood from Jackfruit, Mango, Jamun etc are also used.

Small timber for agricultural implements etc. is harvested from '**Minjiri**', '**Babla**', '**Bael**', 'Sondal', 'Jarul' etc. Some trees are valuable source of ingredients for medicine '**Arjuna**', 'Ashoka', 'Amlaki' or 'Aonla', 'Haritake', 'Bahera' , 'Kuchila', **Neem**, Mahanim, etc. are important sources.

Many other trees & shrubs are used to produce food, spices, fodder, firewood, gums & resins, dyestuff, fiber, washing soap or shampoo, aromatic compounds etc.

Some trees provide **indirect** benefits or sources of income. They provide food & shelter to honeybees, silkworm, Lac insect etc. Fodder leaves are converted to milk, egg & flesh by animals, birds & fishes. Trees thus provide useful things and create livelihood opportunities for large number of artisans both in the rural & urban areas.

Ecological value : Trees are oxygen manufacturing factories; in addition they work as air conditioners, noise & dust filters & pollutant remover all-in-one units; moreover these machines run without consuming petrochemicals or electricity. If planted near households or farms, they also reduce the speed of dust storms and cyclonic winds and thus protect our crops, vegetables, animals, granaries & homesteads etc from serious damage.

An acre of mixed forest can **transpire** more than 7,500 liters of water on a sunny day and as a result cool the surroundings by 5 to 10 degrees. Trees also **intercept** rainfall & reduce the rain drop velocity before it hits the soil. Under a tree, much more water is absorbed by the soil, especially if it is covered with deep layer of leaf mulch. The combined cover reduces surface runoff & consequent soil erosion. Tree root zones act as water filter by holding back dust particles and by removing excess Nitrogen & Phosphate from organic or inorganic sources.

A mature tree can remove about 25 to 30 kilos of carbon dioxide every year and convert this into stored energy and **release Oxygen** through the process of Photosynthesis, the most important biochemical reaction ensuring survival of all living things on earth. Tree leaves also trap suspended dust particles in air, which can cause TB, Asthma & wide range of respiratory infection. Tree leaves can also remove Nitrogen oxides, Sulphur, Ammonia and other pollutants & trap them in the leaves. Later when the leaves drop, these chemicals/minerals are returned to the soil through bacterial & fungal decomposition.

Neem, Figs, Tamarind, Flame of the Forest (Palash), Teak, Gulmohar, Jarul etc are especially efficient in trapping dust & removing pollutants from the air. These should be planted on roadsides in villages and cities. In urban area we must select trees that can survive in a dusty/polluted environment. 'Babla' or 'Babul' , Arjun, Radhachura (Peltophorum Pterocarpum), Siamese Cassia, Pongamia, Casurina, Ber, Mulberry, Guava, Mango, Jackfruit etc are suitable for Urban Gardens.

A 10 ft. high, double or triple line living fence or hedgerow can reduce **wind speed** to about half up to 20 ft. distance. Such tree-shrub barriers prevent crops from falling over and also reduces **evaporational losses** from the soil surface.

A single tree becomes an ecosystem.

Blocks of closely planted trees can significantly reduce **noise pollution**. Calulations show that a 30 – 40' high and 100' wide patch of forest can reduce noise by 50% as it passes through.

Trees are also valuable **habitat**. Many birds, insects, reptiles & animals need trees to provide them food & shelter, both in the urban and rural areas. Trees like Neem, Banyan, Fig, 'Jamun', 'Bakul', 'Peepal', or 'Aswatha', Mahua etc. as well as 'Palmyrha palms' & 'Date palms' are valuable trees for sheltering wildlife. As trees grow older, the branches, the small cavities and hollows of tree-trunk all support a wide range of living organisms. Even a single tree becomes an **ecosystem**, such mature trees become like a housing colony, with food stores, playgrounds etc for birds, animals and insects.

Why plant?

Perhaps now you can explain to everyone in detail the value of planting and protecting trees. You can also help others realize that trees become more valuable when they are together (in a multistory / multi-tier arrangement) & when they become mature and start yielding. Eventually when the trees have completed there life cycle, timber can be harvested and utilized, but for long period preceding that trees can supply many products, perform several ecological functins, provide us with a place for rest and recreation, fill our soul with joy and wonder, inspire us to compose songs and poems. If a day comes when we look around us and find no trees, imagine how lonely and desolate our environs would be!

Where to plant?

Whether we live in cities or villages there are many opportunities to plant & protect trees. In the **towns and cities**, trees can be planted along roadside, around lakes & ponds, in parks & school/college campuses and even on the rooftops. Every high-rise building, every factory, every municipal office should be legally required and technically suported to plant trees along their perimeter.

In villages also, trees can be planted along roadside, canal and stream banks, playgrounds, compounds of temples and other places of worship, graveyard etc. There are additional opportunities to mix trees with other crops (called **agroforestry** systems) mixed orchards, fuel and fodder trees alongwith forage crops/grasses on grazing lands, tree lines along farms & living fences around households are some examples. In most of these systems trees need to be repeatedly pruned/coppiced/pollarded.

Trees can help to **convert degraded lands** into productive ecosystems when they are planted in combination with grasses, creepers, shrubs etc. To ensure survival in such areas trees have to be planted at right time of the year and protected from open grazing, burning, repeated cutting etc. when they are young.

When to plant?

In West Bengal and most of North India the best planting period [for comunity woodlots, roadside plantation, regenerative forestry etc.] is from mid June to end June, when the first rains usually arrive. Tree pits must be dug in advance and supply of compost kept ready to take advantage of this period. Usually 12 to 18 inch tall saplings are planted (for some species it takes only 3-4 months, while for others about 10-12 months in a nursery bed or pot). For roadside planting even 3-4' tall saplings are transplanted (this costs a lot in terms of money & manpower). Some trees are propagated from 5-6ft tall stumps / tree branches and need protection only for 1 or 2 seasons ('Madar', 'Jiol' are some examples). Trees which have large seeds, like Tamarind, Raintree, Arjuna, Custard apple etc are often planted direct; seeds which contain much oil such as Mahua, Neem, Karanj, Cashew, Sal; seeds which should not be allowed to become dry like Jackfruit, Mango, Jamun, Bael fruit etc. are also planted direct during the rainy season. If you and your friends want to plant a lot of trees you sould learn how to raise seedlings in a nursery and how to transplant them properly. It is really wonderful to see how fast the trees grow with little bit of care. **Try it**.

When you want to get the multiple benefits of tree you must choose well and protect what you plant.

In conclusion —

Our country is seriously threatened by desertification, soil erosion & consequent siltation of lakes & rivers that result in floods & droughts. To combat these problems we need to reforest fallow lands & hilltops with a wide range of trees and shrubs. To get multiple benefits of trees we must choose well and protect what we plant. While choosing trees to be planted the following factors must be considered.

a) **Utility** : Use as food, fodder, firewood etc. used for rearing insects for producing honey, silk, lac etc, use for cultural reasons – special leaf/fruit/flower etc used in festivals etc

b) **Site limitations** : Quality of soil, availability of light; risk of fire, waterlogging, grazing damage etc, risk of interference with overhead electrical/phone wires etc.

c) **Life cycle & characteristics of tree** : How fast it grows, how tall & wide it will grow, whether it sheds leaves, whether the tree branches break easily? etc.

d) **functions it can perform** : Shade, windbreak, beeforage, beauty (foliage, flower, shape), habitat for widlife etc.

There are two widespread misconceptions which we must get rid of: (1) 'Don't cut any trees' — the goal should be to plant more & cut more, this can happen if we plant more trees in our villages, towns & cities as well as wastelands, hills & marshy areas. Old trees in forests should be left alone. (2) 'Planting any tree is beneficial' — this is not the goal. If we want economic & ecological benefits; trees must be chosen carefully as explained above. Exotic species may grow fast, but they can cause many environmental problems.

Note for Group Leaders/Educators

Hope this will help you to explain to children the importance of planting & protecting trees, if you need more help do get in touch. ☐

Ardhendu Sekhar Chatterjee is the Director of Sustainable Agriculture Programme/ Projects of DRCSC, ENRE project is one of them.

He has a wide range of working experience & knowledge on issues related to Agroforestry & NRM (Natural Resource Management). He had been working on the wasteland regenerating project & was involved in the creation of 'Green Work Resource Centre' in Auroville, South India during 1989-1993 and involved in conserving community forest (NTFP - Non Timber Forest Product project) in Cambodia, 1994-1997.

Presently, beside DRCSC's work, he offers training & workshop on these topics for other organisations in India as well as neighbouring countries. He is also good at designing teaching materials.

♣ References

To develop lesson plans on TREES we have looked through the following resources. If you are interested to see these materials, all resources listed here are available through ENRE resources centre EEL (Environment Education Library).. E.E.L also stores topic related articles from several magazines and newsclippings. Please enquire us

Books and Booklets on Trees:

For your convenient we put some categories.
Category (A) useful for producing materials, (B) useful for teachers & (c) materials for children

_ recommended materials for Environment Education   P recommended for school library

- Eyewitness Handbook – TREES / Allen J. Coombes, 1992, DK, 320p; (A)
- Trees Commonly Cultivate in South Asia / Michael Jensen, 1995, RAP, 229p; (A)
- Forest Tales / Meena Raghunthan et.al, 1995 CEE, 47p; (A), (B), (C) P
- TREES – An Ecology Book for children / 1995, ACCU & NBT, 65p; (A), (B), (C) P
- TREE TALK – Nature Diary / Amrita Bogra, Madhuban Educ. Books, 56p; (A), (B), (C) P
- Tree Growing By Rural People / FAO forestry Paper-64,1985, 130p. (A)
- Focus On People And Trees / Solveig Freudenthal et. Al, 1991, Swedish Univ. 50p. (A)
- Trees And Forest – Book 5 / School Environemnt Network, 1993, 24p.   (A), (B), (C) P
- Trees In Society In Rural Karnataka, India / Clare V. Bostock Wood,
  ODA-NRI, 223p. (A) (B)
- Common Trees / D.H. Santapan, NBT, 1966, 118p.   (A), (B), (C) P
- Joy of Learning ; Standard 3 to 5 (Activity 10,11,14,29,30,31,32,44,46,47) /
  1995 CEE, 87p. (A) (B)
- Joy of Learning ; Standard 6 to 8 (Activity 9,10,22,28,42,44) /1996 CEE, 67p. (A) (B)
- Non-Timber Forest Products in South Ghana / ODA Forestry Series No.2 1992, 23p. (A)
- Preparing to Plant Tropical Trees / K.A. Longman 1995, CSC 238p. (A)

- Preparation and Use of Compost / AGRODOK 8, 1990, CTA 28p. (A)
- Plant Propagation / Browse,Philip M. 1979, The Simon & Schuster step
  by step encyclopedia,96p. (A)
- Agroforestry Seeds Circular No.3- Supplement (Seed source-Philippines) / 20p. (A)
- Growing Multi Purpose Trees on Small Farms / FRED – USAID & FAO   (A)
- 'Trees' (People's Work book p.p 183-222) / Robert Berold, 1981 (A) (B)
- Exploring A Tree : Teacher's Manual / 1993 Cee, 32p. (A) (B) P_
- A Tree in My Village / Paritosh Sen , 1996 Tulika , 32p. (A) (B) (C) P
- Leaf Life / Sirish Rao 1998, Tara   (A) (B) (C) _P
- 'Tropical Forest' (Treasure Island ! An Environmental Handbook for Teachers
  in the Andaman & Nicobar Island p.p 37-53) / Sunita Rao, 1996 ANET 94p. (A) (B) _
- Eyewitness & Guides TREE / 1998 ,DK 63p. (A) (B) (C)
- Neem – Free no more / A Green Health Campaign Series, 10p. (A) (B)
- Summer Tree Contest, The / M.Radha , 1982 NBT 32p   (A) (B) (C) P
- Trees   / NBT Team 1996, 66p. (A) (B) (C) P
- My Book of TREES / Nimret Handa , 2001 Scholastic 75p. (A) (B) (C) _P
- 'Trigonometry ' (Everyday Mathematics – Chapter 6 p.p 72-77)* For measuring tree's
  height/ R.M. Bhagwat 1995 NBT,   (A) (B)

Bengali Books

- Bangladesher Brikkha / 2001, Sahitya Prakash   (A) (B) (C) _P
- Bangladesher Prayojoniya Gach Gachra / Tapan Kumar Dey, 1995, 380p. (A) (B)
- Samajik Banayan / Tapan Kumar Dey, 1996, 286p. (A) (B)

Interesting Lesson Plans on Trees :

You can find out a lot of Websites on Environment Education and related activities. The following are the examples of useful lesson plans. You can directly access to each website or contact us for detail.

Lesson plan	Level	Source	Web site
• Water Flowing in Trees	class 3+	Can Teach	ww.track0.com
• In what Direction Do Seeds Grow ?	class 1-3	Can Teach	ww.track0.com
• Planting Seeds in a Baggy Worksheet	Elementary	Web of Life	weboflife.arc.nasa.gov
• Shuttle / Mir Seed Germination Activity	class 5-8	Web of Life	weboflife.arc.nasa.gov
• Seed Germination	class 5-8	USOE	www.usoe.k12.ut.us
• Seed Germination	Elementary	Plant world Today	wvnvm.wvnet.edu
• Measuring Germination Rates	class5-8	horizon	horizon.nmsu.edu
• Vegetative Propagation	class 5-8	Humanity Development Library /	media.payson.tulane. edu:8083
• Seeds	elementary	earth foot	www.earthfoot.org
• Celebrating Seeds	Elementary	nga	www.wowpages.com:80
• Digging Deeper with Seeds	Elementary	nga	www.wowpages.com:80
• Lesson to Dye for	class 5-8	nga	www.wowpages.com:80
• Ethnobotony : the People / Plant Connection	class 5-8	nga	www.wowpages.com:80
• The Tree Gardens of The Chagga	class 7-9	* article of 'Footsteps – no.41'	
• Shade of Green	elementary	* book from " widowsill Science Centre "	
Bark Hunters & Tree's Company	class 3-6	* book from "Creative Science Classroom "	

(* book available at E.E L)

Books and References on Environmental Education & creative lesson plans (Concept, Ideas & Theory) :

Chapter / Book	'What is Environmental Education' ("Environemtal Education in Schools") / Judy A. Braus / 1993, Peace Corps / p.p.5-14 (A) (B)
Booklet	"The Green Reader – An introduction to Environmental concern and Issues" / Meena Raghunathan / 1999, CEE / 204p/ (A) (B) _
Booklet	"Environmental Orientation to school Education : A Programe of Ministry of Human Resource Development – Some experience and learning"/Meena Raghunathan / 1999, CEE / 92p/ (A)
Handbook	"Green Minds : A Reference Handbook for Environment Educators in Kalimpong" / Yusuf Simick / Ashok Trust or Research in Ecology and the Environment (ATREE) (A) (B) _
Picturebook	" PACHAMAMA : Our Earth Our Future – by young people of the world " UNEP/1999, Evans / 95p. (A) (B) (C) P
Book	"Environmental Education An Approach to Sustainable Development " OECD/ 1992 (A)
Guidebook	" Idea's Environment Action Program , Issues, Approach, and Initiatives towards Sustainability " CEE 1995 (A) (B)
Guidebook	" The Green Club : A Guide to Setting Up and Running Clubs for the Environment" / CEE 1999 / 78p (A) (B) _
Guidebook	" The Green Action guide : A Manual for Planning and Managing Environmental Improvement Projects " CEE, 1997 / 92p. (A) (B) _
Guidebook	" A Guide to Green Material ; Experience and Learning in Developing Effective Environmental Education Materials " CEE, 1999 / 66p. (A) _
Report	" Environment & Development : Traditions, Concerns and Efforts in India" (National Report to UNCED, June 1992 / Ministry of Environment and Forest – govt of India / 63p. (A)
Handbook	"Ecology : Principles and Applications " J.L. chapman et al, 2000, Cambrodge University / 330p. (A)
Handbook	"Earth Education : a New Beginning " Steve Van Math, 1999 / 334p. (A)
Curriculum guide	"Connections , Cycles, and Cities ' (" Living Lightly on the Planet – volum 1, Grades 7-9 – Unit 4 " Haura O'cinnor, 1985, Schilits Audubon Center / p/p/ 76-98 (A) (B)
Book	'Curriculum Planning' (" A Children's Food Forest " Carolyn Nuttall, 1996, FeFl Books / p.p 53-72 (A) (B) _
Booklet	"Toward a Green Future : A Trainer's Manual on Education for Sustainable Development " CEE, 1999 / 111p. (A) (B) _
Handbook	"Treasured Islands! An Environment Handbook for Teachers in Andaman & Nicobar Island " Sunita Rao, 1996, Kalpavrksh Anet / 94p. (A) (B) _
Handbook	"Our Ecological Footprint; think of Your City as an Ecosystem " CSE, 2000 / 61p. (A) (B) P _
Handbook	"Basic Instructor Orientation Scheme " WWF / 100p. (A) (B)
Internet paper	"Classroom as Learning Laboratories" & "Core Practices" / foxfire.org / 3p.
Book	" Science is ..." / Susan V. Bosak / Scholastic, 1991 / 515p. (A) (B) _ ☐

♣ ENRE Partner Organisations' Contact Address

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♣ From ENRE

Forthcoming issue of 'Creative lesson plan -Basbhumi series' are
2) Insects, 3) Water, 4) Medicinal Plants, 5) Birds, 6) Energy (Fuel), 7) Fish,
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Please send back the 'feedback slip' alongwith your comment and suggestion on this booklet 'Tree' to us. We will put your name on our mailing list and send you a free copy of the next booklet on ' Insects' for your reference!

We have also created extra issues of ' Basbhumi Newsletter ' on Sharing & Presentation skills and Documentation skill for child-managed library. Also some posters and cards (on Birds, Insects, and Fish) as self learning materials aare available from ENRE. If you are interested in , please contact us.

Memo Page

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If you would like to be included on 'Basbhumi Series' mailing list and receive forthcoming Creative Lesson Plans booklet then please fill up this slip and return it, in the envelope address to :

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