An Inventory for Environment Education

Thaat Van Panchayat (VP) Tour

Developing Compass of Environmental Education Tourism in Community Forests (Van Panchayats): Learning to Sustainability

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Introduction

Forests are an important ecosystem and source of livelihoods and resources. This environmental education tourism programme is designed to familiarise school students with forest environments, local village livelihoods and practices used to conserve them.

Time Schedule for the visit

	Location	
Time	**Group 1**	**Group 2**
10:30 - 11:00	1. Group briefing	
11:00 - 11:30	2-5 - Ratura village and CHEA work	8, 19 - Forests of VP and carbon sequestration
11:30 - 12:00		
12:00 - 12:30	8 - Forests of VP	2-5 - Ratura village and CHEA work
12:30 - 1:00	10 - Lunch in Thagura village	
1:00 - 1:30	Talk with SHG	
1:30 - 2:00	11-16 - Walk to plantations	10 - Lunch in Thagura village
2:00 - 2:30	16-19 - Plantations, micro reservoir and carbon sequestration	11-16 - Walk to Plantations
2:30 - 3:00		16-19 - Plantations, micro reservoir and carbon sequestration
3:00 - 3:30	22. Group discussion and feedback	

1. **BRIEFING POINT** by side of Lamgara-Almora Road.
    - Divide class into groups based on date of birth.
    - Introduction of VP members to the school group.
    - Introduction by teacher to VP members.

a) What is a VP?

VPs were first introduced following the Van Panchayat Act of 1931 in response to agitation against the British who had restricted forestry rights. G. B. Pant (1887-1961) influenced this act by arguing strongly against the total British control of the forests.

VPs are community forests owned by the government but with village communities responsible for managing the forest. In Uttarakhand there are over 12000 community forests covering over 25% of the forest area of Uttarakhand and over half a million hectares. VPs help to conserve the forests through micro-reservoir, planned extraction of fodder and fuel wood and the planting of tree and fodder species. VPs help to prevent forest fires and damage to forests due to loping and grazing. VP management has important implications locally (livelihoods and environment), regionally (soil and water to the Gangetic plain) and globally (carbon sequestration).

The VP council consists of 9 members, including at least 4 women, elected by the community. The head is selected from among these 9. Thaat VP was formed in 1946. The VP has an area of 101 Ha at roughly 1800m above sea level, includes 152 households and has a total population of 714.

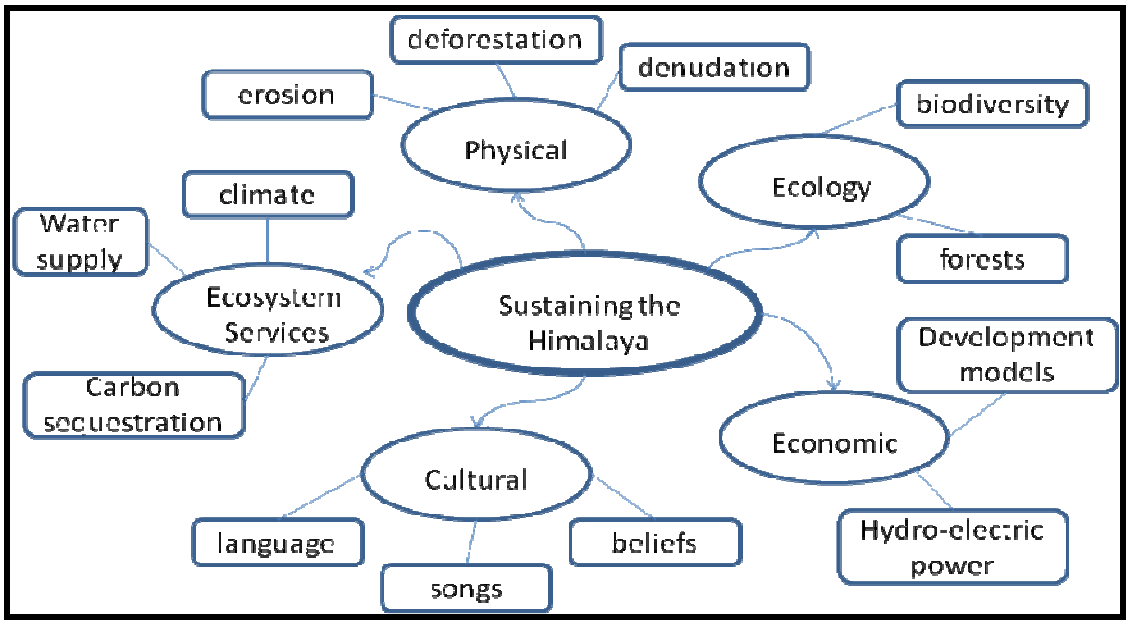
b) *Irresponsible forest use*

Irresponsible use of the forest can result in forest degradation. Examples of irresponsible forest use include cutting down too many trees, planting non-native species and collecting too much fodder. This enhances soil erosion, flooding, landslides and the loss of resources upon which livelihoods and communities depend. It is therefore important to encourage sustainable and responsible forest management.

c) Dos and don'ts of ecotourism:

Do	Don't
Keep to the path	Pick wild flowers or plants
Respect wildlife	Disturb wildlife
Take your litter home	Trample vegetation
Leave property as you find it	Damage trees
Take special care on rural roads	

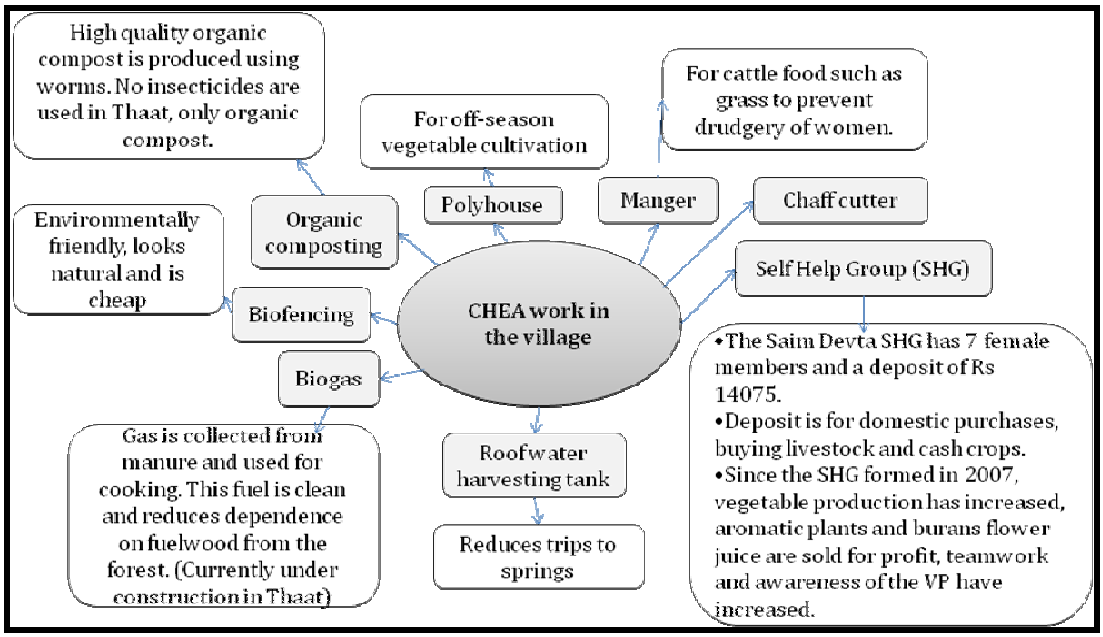
d) ***What do we understand by 'sustaining the Himalaya'?*- A group discussion**



Take the path downhill on the left (East) side of the shop to the village Ratura.

2. CHEA WORK IN RATURA VILLAGE

CHEA (Central Himalayan Environmental Association) works with local communities to strengthen van panchayat management. CHEA helps VPs to take up enterprises that contribute to their economic sustainability.



Traditional village life and architecture can be seen in Ratura village. Challenges which face the village are due to recent depopulation as people move away because of lack of healthcare, education, and other facilities. Recently there has been less snow in winter, less rain, and more degradation of the surroundings.
However, many positive changes have been made in order to conserve village life and to provide money-making opportunities for villagers. These can be seen around the village.

Crops grown in the Ratura village:

- Madira , pears, cabbages, chillies, French beans, coriander, apricot, pumpkin, maize, cacti, nettles (eaten to ease pain, sprains), ugal vegetable, rajama (a pulse dried on roofs), turmeric (spice, for colour and cosmetics), cucumber, rice.

- Organic Agriculture – See Appendix A.

Follow the same path back out to the road and see on the way:

3. **BUFFALO AND COMPOST.** Leaf litter/pine needles ares collected from the forest, traditionally by women. They are used for livestock food and bedding. Bedding is mixed with manure and used as compost. Addition of worms to this compost speeds up its formation. This is an important source of carbon (humus) for the soils in mountain farms and leads to production of the crop without any other input such as fertilizers. Small fires are lit by the buffalo to repel flies and mosquitoes. Buffalo can be seen eating fodder from a manger and using it as bedding at location 3.

4. **BIOFENCING.** Surrounds paths to keep out animals, an environmentally friendly and cheap form of fencing.

5. **FLOUR MILL**. Wheat is ground here to produce flour that can be used to make roti.

Walk East along the road, away from Almora, and in about 100m take the path off to the right as the road swings round the corner.

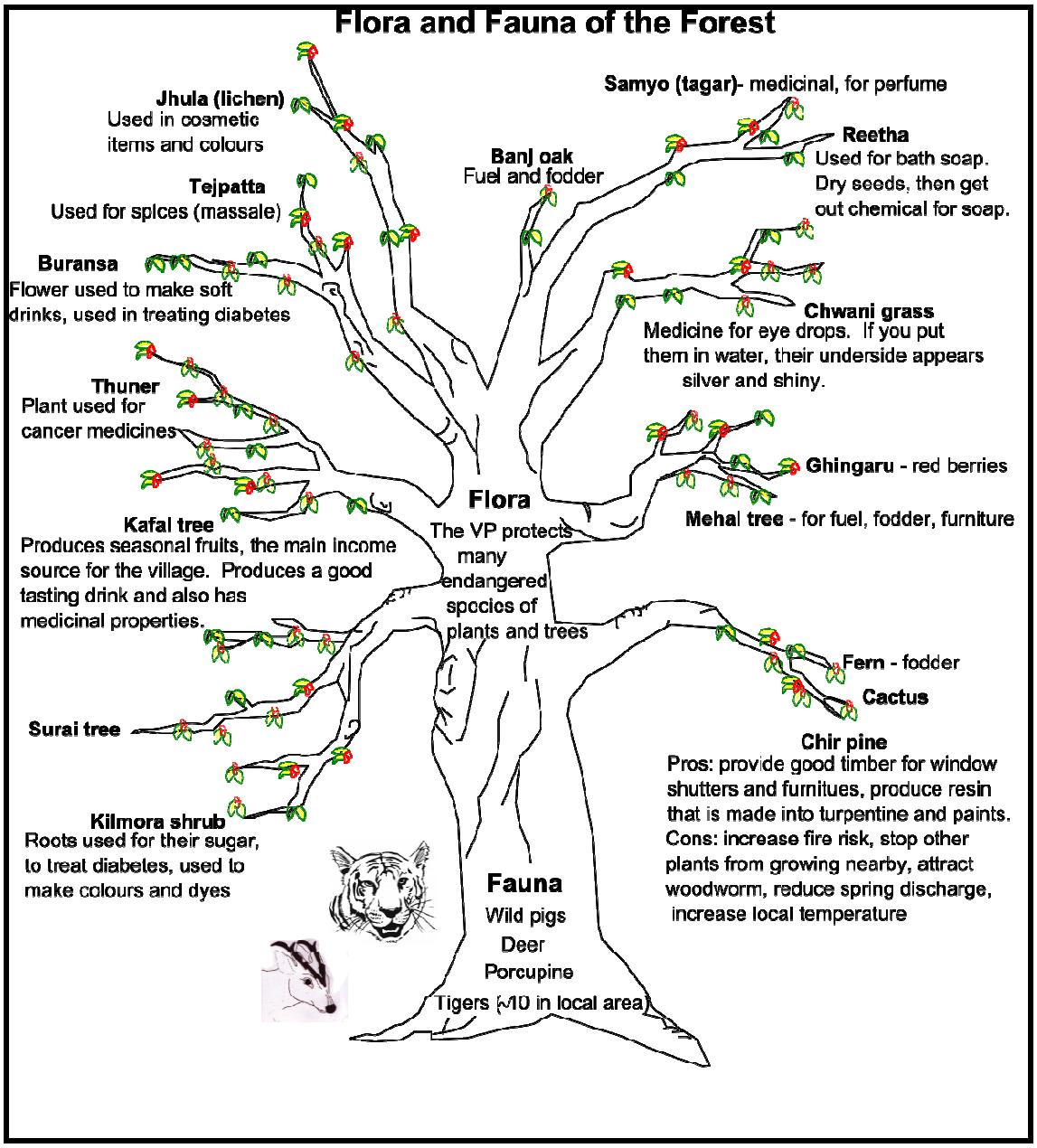
6. **NAPIER GRASS** is a type of fodder. One of the main uses of the forest of the VP is fodder collection. Fodder is generally used for feeding cattle. Higher quality fodder means less need to be collected and also ensures better health of livestock. CHEA encourages the collection of fodder grasses and leaves in a sustainable manner from

the forest closest to the village in order to save time and prevent degradation of the whole forest.

Take a dirt track off the main concrete path to:

7. **SAIM DEVTA TEMPLE**. Many trees here, as people conserve the forest as sacred to please the gods.

8. **FOREST OF THE VP.** During the visit you will see many important species:



Conservation practices: Planting of new trees and building walls to keep animals out.

What are forests are used for?

There is a strong link between forests and livelihoods. In addition to the extraction of timber and fuel wood, the forests provide a range of non-timber forest products (NTFPs):

- Timber: used to build houses, furniture, window shutters.

- Fuel wood: Fuel is collected from the forests throughout the year and burned to provide heat mainly in the winter season. Excessive loping of branches from trees causes degradation of the forest. Collection of dead branches from the forest floor close to the village is encouraged. The calorific value of oak as a fuel is much higher than that of pine. The Forestry Commission of India (FCI) estimates that every year, removal of fuel wood from forests and plantations is in excess of what they are capable of producing on a sustained basis.

- Collecting leaf litter (*parsa*) for animal bedding, fodder for the animals to eat and biomass for preparing compost.

- Collecting wild fruit and flowers

- Lichen collection - for cosmetics, colours (sold at Rs 15 / kg)

- Collection processing and marketing of medicinal and aromatic plants. Ashota is in partnership with companies which buy the medicinal plants grown here. Medicinal and aromatic plants have potential to educate communities about sustainable harvesting and increase income.

- Carbon sequestration – see Location 17 and Appendix C.

- Ecosystem services – See Appendix D.

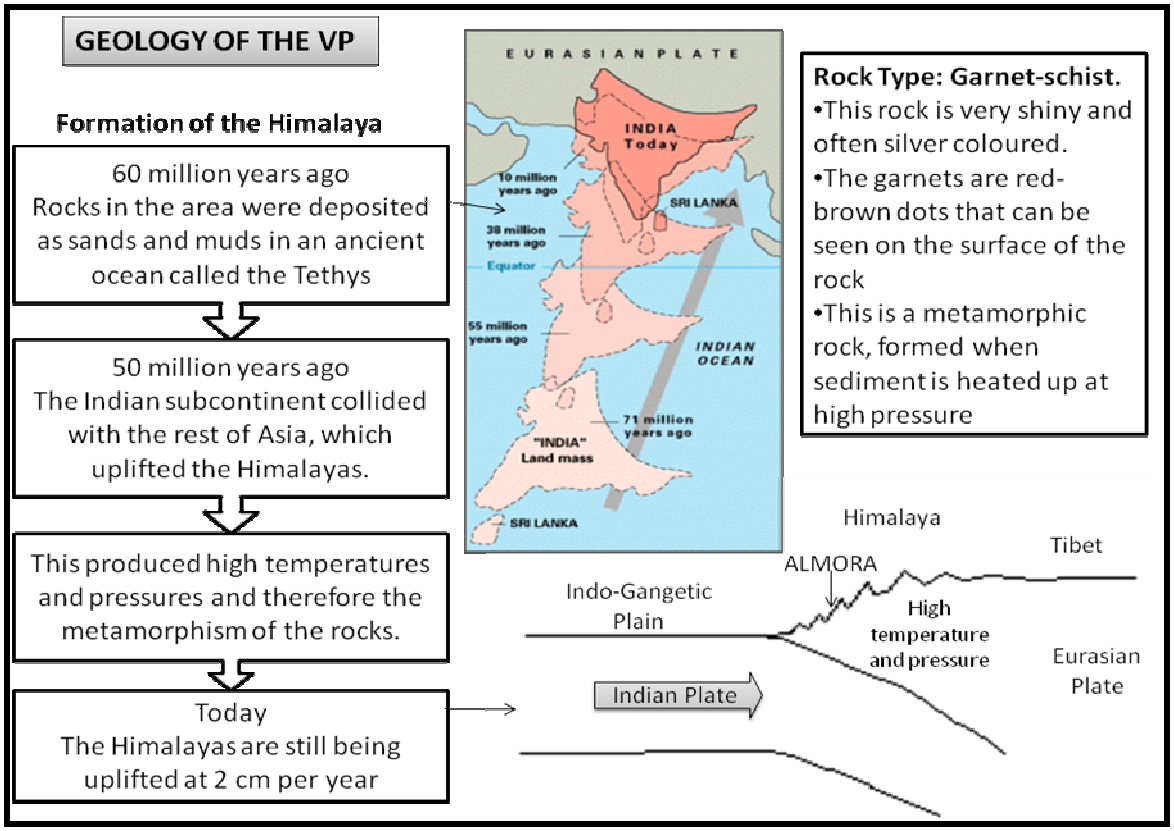
Leave the cement track and head downhill on the dirt track

9. BIOGAS – being built below the track to the right

10. LUNCH in village

11. SPRING in brick enclosure used for drinking water. Built in 1844.

12. **ROCK OUTCROP**. Rocks are used for building purposes and also inform on the area's geological history.



13. **RICE PLANTATION**

14. **MANGER.** This home has a newly built manger. Lemon pickle also produced here to help digestion and ease stomach pains. Manger can hold fodder which the animals then eat.

15. **THORNY KUZA PLANT** for fodder and making baskets.

Follow the less good path uphill where the path forks. Continue upwards to a barbed wire fence, which should be carefully crossed to enter the plantations.

16. **PLANTATIONS OF FODDER GRASS AND TREES.** The plantation is protected by stone, wire and bio-fencing to stop wild animals trampling the young plants. Napier grass for fodder, and trees such as oak are planted and micro-reservoir pits are dug. Positive changes seen are increased water supply to village and more fodder.

17. WATER CONSERVATION PRACTICES

Effective water management can be achieved by reviving age old traditions of micro reservoirs (*Khal)* and contour (*Khanti)* which have been dug into the hillside in Thaat.

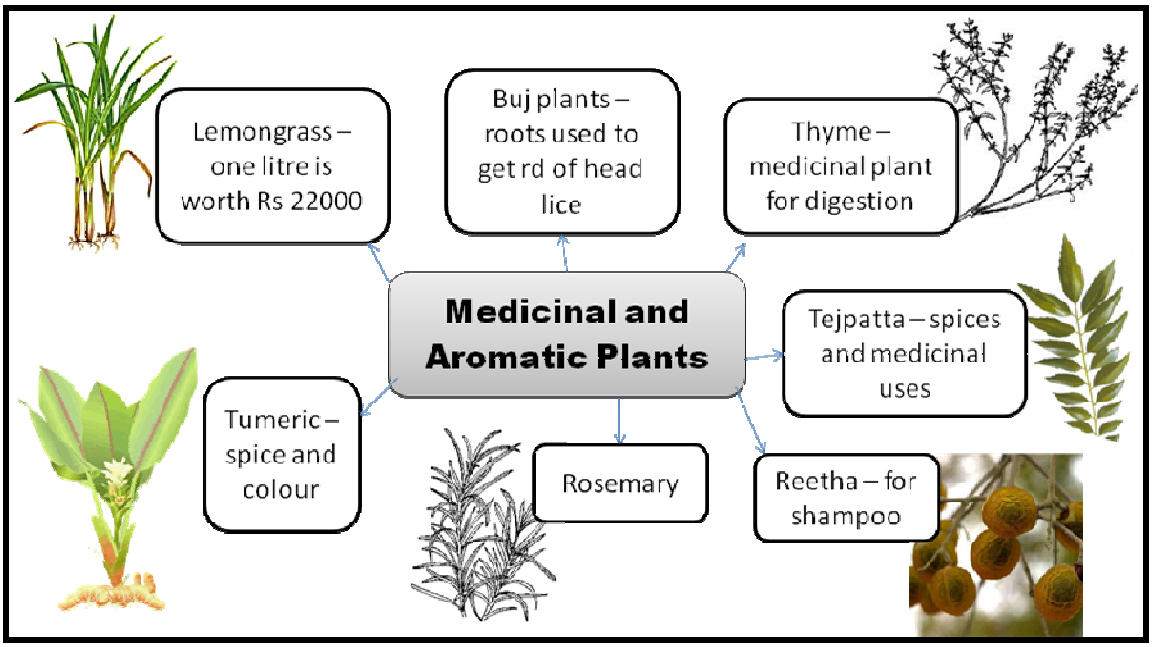
- Microreservoirs are pits dug into the group on hillsides which trap rainwater from overland flow during rainfall. This prevents soil erosion and the loss of the water by rivers. Micro reservoirs are present on the many of the hillsides in Thaat VP and fill with water during rainfall. The water seeps slowly into the soil and therefore helps to increase and regulate stream discharge.
- Contours are troughs dug into the hillside which also prevent overland flow and trap water during rainfall. They may also be used for new plants; 4 in each contour. Lemongrass has recently been planted in contours in Thaat. Increased vegetation cover helps to hold the soil in place so it will not be washed away by rainfall.

For further information, see Appendix E on water resources.

Cross a stone wall on a path, which winds up the hill to the medicinal plantation.

18. PLANTATIONS OF MEDICINAL AND AROMATIC PLANTS

Plantations specializing in aromatic and medicinal plants. Plants can be sold, generating income for the villagers. This also increases local knowledge of the uses of these plants.



Continue uphill and go left to cross another stone wall onto a small path.

CARBON SEQUESTRATION.

As the trees grow they take in CO_2 from the atmosphere. This is carbon sequestration.

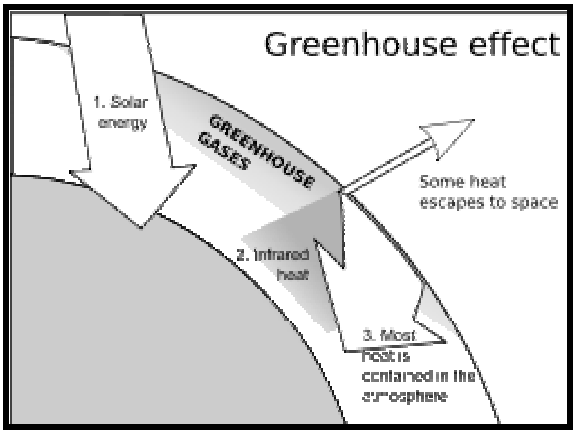
Measuring carbon sequestration

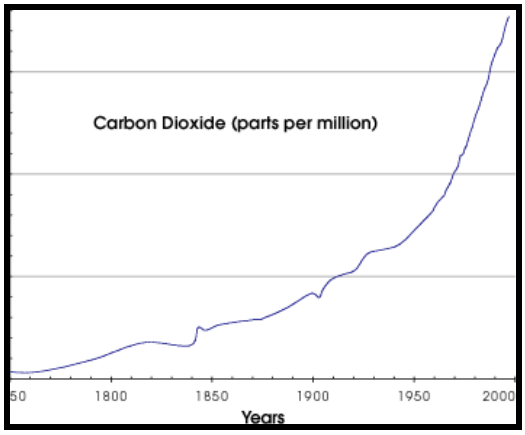
Measuring the amount of carbon sequestered by the forests would be an important step in claiming carbon credits and so money for the locals.

Trained local communities can measure effectively the changing carbon stock in their forests using standard forest inventory methods:

1. Map out areas of different types of forest using GPS
2. Within each type of forest mark out plots of 5.62 metre diameter. There are 12 plots in Ashota VP, the trees measured being marked with yellow bands.
3. Measure amount of carbon in each plot from the diameter and number of trees within it.
4. Repeat the measurements one year later to find the net change in carbon
5. This is the amount of carbon sequestered in the plot in a year. This can be scaled up to the whole forest.

The world has warmed by about 0.6 °C during the past century. Greenhouse gases in the atmosphere trap energy from the sun; this is called the "greenhouse effect". Greenhouse gases come from burning fossil fuels and deforestation.





Warming in India will mean more intense flooding through enhanced monsoon rainfall and glacier melt, and an increased spread of malaria. Species will shift to higher altitudes, and some species will become extinct.

Deforestation currently accounts for 18-25% greenhouse gas emissions. Community managed forests can reduce these emissions, as trees act as carbon sinks. Managed forests sequester more carbon than unmanaged forests.

Communities can also reduce their CO_2 production by switching to fuels other than wood, protecting forests from fires and sustainable practises. Biogas, micro-hydro and solar power can all be used instead of firewood. Biogas plants convert manure to gas, micro-hydro plants are placed in streams to convert the water energy to electricity, and solar panels capture the power of the sun. They have the added advantage not producing toxic smoke, as burning firewood does. A disadvantage is that they have high initial costs.

At the junction of paths, take the one downhill to reach a few buildings by the road

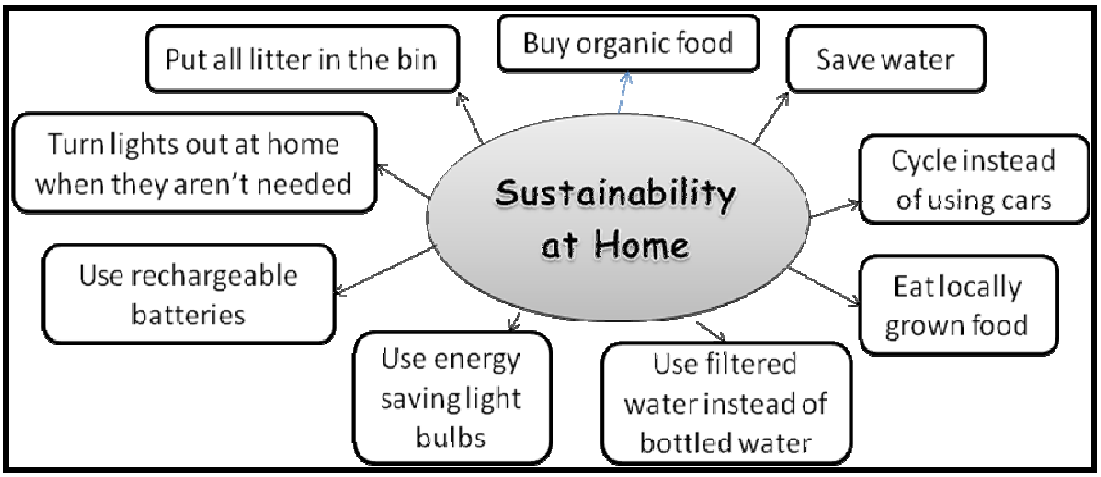
19. BLOCK OFFICES - government offices to manage the development of the local area

Continue across the road and down the path. Follow the road across the stream, and then take the path uphill.

20. HOSPITAL - This is the local hospital for Lamgara.

21. BRIEFING POINT AT THE END OF THE DAY

Sustainable practices can be extended to everyday life and not just whilst in the forests! For example:



Everyone should be encouraged to carry out these sustainable practices at home and also to educate friends and family about them.

APPENDIX

A. Organic Agriculture

The Organic Agriculture (OA) program began in 1998 as part of a World Bank assisted scheme called the Diversified Agriculture Support Program (DASP). The objective of OA development is to increase sustainability in agriculture productivity and increase profitability. The provision of livelihood options for farmers is one solution to the migration of the able bodied youth from the mountains in search of employment.

Crops promoted include millets, amaranths, buckwheat, spices, mustard, maize, spices like gingers, chillies and turmeric which do not need high nitrogenous fertilisers.

Outcomes of OA schemes include an increased market price of organic products, improved soil fertility, improved health due to improved food quality and an overall increase in employment.

B. Flora and Fauna

Flora

Banj oak – It is ideal for producing fodder and parts of the tree are valued for its medicinal qualities. Banj oak helps soil formation and replenishes land fertility, maintains the health of the mountain streams and stabilises local climate and prevents soil erosion. Bank oak is the most common broadleaf tree in the mid altitude Himalayas. It is an evergreen oak, and it is now endangered. The reasons for its decline include the population explosion, global warming, deforestation and aggressive pruning of the oaks for use as cattle feed and firewood by the local people. Regeneration rates are slow as stresses cause the oak to produce fewer acorns and the oak is a slow grower so takes decades to grow into a tall tree. Some oaks here are up to 200 years old.

Chir Pine – It was planted on a large scale by the British for its economic importance in the paint industry – a large number of people were employed collecting its resin. The resin yields an essential oil called turpentine. Chir pine doesn't allow other plants to grow nearby as it layers the ground with dried needles. The dried needles are sometimes collected by locals to use as bedding for their livestock. The pine's roots spread a long way and lead to the drying up of surrounding water springs causing acute water shortages.

Deodar (Himalayan cedar) – Worshipped as a divine tree. It's a very good building material because of its rot resistant character and fine grain. Deodar forests were exploited by the British, especially during world wars as it was considered ideal for

railway sleepers. Today its oil is used in perfumes, soaps and disinfectants. The inner wood is aromatic and used to make incense and essential oils which repel insects and can be used as an antifungal.

Rhododendron – Uttarakhand's state tree. The red flowers (blooming in spring) of the Buransh rhododendron can be used to make a soft drink which has great medicinal and herbal value. It is beneficial in improving the blood circulation and treating heart diseases.

Kaphal - The tree yields a fruit which is one of the tastiest wild fruits of the sub-Himalayan region. This fruit tree carries a lot of commercial importance and every year its fruits worth thousands of rupees are sold in different towns. Fruit is eaten fresh and is also processed into sweets, jam, juice and wine. The bark of kaphal is said to possess many medicinal properties - useful in disorders relating to vata and kapha, fever, asthma, urinary discharges, piles, bronchitis, throat complaints, tumours, anaemia, chronic dysentery and ulcers. The oil from the flowers is a tonic, useful in earache, diarrhoea and paralysis.

Fauna

Tigers – There are 10-12 tigers in Ashota VP. They eat deer, porcupine and wild pigs. Jim Corbett became famous for hunting man-eating tigers, though few tigers are man-eaters today.

Barking dear (muntjac) - The oldest known deer, appearing 15-35 million years ago. They feed on fruits, shoots, seeds, birds' eggs as well as small animals and even carrion. They give calls similar to barking when they sense predators.

Porcupine - Rodents with a coat of sharp spines, or quills, that defend or camouflages them from predators. The common porcupine is an herbivore. It eats leaves, herbs, twigs and green plants like skunk cabbage and clover and in the winter it may eat bark.

Pheasant – The Himalayan Monal is the state bird of Uttarakhand. The population of this species in most of its range is threatened due to poaching and other anthropogenic factors. The male monal has been under heavy hunting pressure for its crest feather, which was used for ornamental hats of Himachal men, until 1982 when legal hunting was banned in the state.

C. Carbon Sequestration, Global Warming and Kyoto

Global warming

Uptake of carbon from the atmosphere occurs during photosynthesis (where CO_2 is converted into carbohydrate and releases oxygen).

The earth naturally release carbon dioxide, however the recent sharp rise in CO_2 due to human activity is unique. It is difficult to know how the climate will respond, and the effects are potentially devastating for human civilisation.

Kyoto Protocol

The Kyoto Protocol is a legally binding international agreement that commits industrialised countries to reducing their emissions of six greenhouse gases (GHGs). Projects set up to reduce carbon can receive money for the amount of carbon dioxide saved.

Currently aforestation and reforestation can gain carbon credits, but stopping deforestation is not rewarded. Avoiding deforestation and stopping forests degrading is an important strategy in reducing CO_2 emissions. A project has been set up, "Think global, act local", which aims to bring local sustainable forest management projects under the Kyoto Protocol.

How community managed forestry can reduce global warming

Forests sequester 20 to 100 times more carbon per unit area than croplands. Community forestry sequesters 2-3 tonnes of carbon per hectare per year, providing valuable ecosystem services at local, regional and global levels. Currently, communities aren't rewarded for protecting their forests and sequestering carbon but this may change in future.

D. Ecosystem Services

Ecosystem services are uses of the environment which may be useful to humans. These include climate regulation (by humidity rise from forests), carbon sequestration, water supply, erosion control, food production, raw materials and culture.

Ecosystem services are always in flow, regardless of human presence. Uttarakhand is connected to the Gangetic Plain via rivers and the downstream flow of ecosystem services. This has played a major role in the rise of culture and currently supports 500 million people.

Ecological and economic values are both difficult to assign. The total annual value of the ecosystem services of Uttarakhand is estimated to be 2.4 billion US$. Payment for the measurable ESs from community-managed forests may in future be an economic motivation for environmental management in Uttarakhand. This has been recognised by the Government of India and the Planning Commission's Mid Term Assessment.

E. Water Resources

Forests affect the quantity and quality of water flow through a region. Forest vegetation acts as a sponge, soaking up and storing rainwater and releasing it later on. This reduces the impact of downstream floods and droughts. This sponging effect is due to aboveground and belowground litter, pores, tunnels and slits created by dead roots and soil fauna.

The forest's sponging effect depends on tree type. Banj oak forests have thick undergrowth that absorbs lots of rainwater. Chir pine forest floor is thinly covered by pine needles and absorbs little water and increases the risk of erosion and flooding. Human intervention in the form of micro reservoirs and contours can also help to regulate the water supply.

Torrential rainfall causes the loss of important topsoil each year. The landscape of Uttarakhand is highly susceptible to landslides and erosion. This causes the rivers to transport very high quantities of sediment. Vegetation cover shelters soil from the rain and roots hold soil in place. Clean rivers are important for the generation of hydroelectric power and use of water downstream in the Gangetic Plain to produce some of the most productive grasslands in the world. Silty water is also bad for fish in rivers and lakes.

The presence of forest cover in the Himalaya contributes significantly to the productivity of crops grown in the Gangetic plains by providing humid conditions. Vapour is sourced from evapotranspiration from vegetation.

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Map Localities

1. BRIEFING POINT

   Walk down the path into Ratura Village
2. CHEA WORK IN RATURA VILLAGE

   Walk back along the same path and on the way see:
3. BUFFALO AND COMPOST

   Walk east along the road, away from Almora, and in about 100m take the path off to the right as the road swings round the corner.
4. BIOFENCING
5. FLOUR MILL
6. NAPIER GRASS
7. SAIM DEVTA TEMPLE
8. FORESTS
9. BIOGAS
10. LUNCH
11. SPRING
12. ROCK OUTCROP
13. RICE PLANTATION
14. MANGER
15. THORNY KUZA PLANT

    Follow the less good path uphill where the path forks. Continue upwards to a barbed wire fence, which should be carefully crossed to enter the plantations.
16. PLANTATIONS OF FODDER GRASS AND TREES
17. WATER CONSERVATION PRACTICES

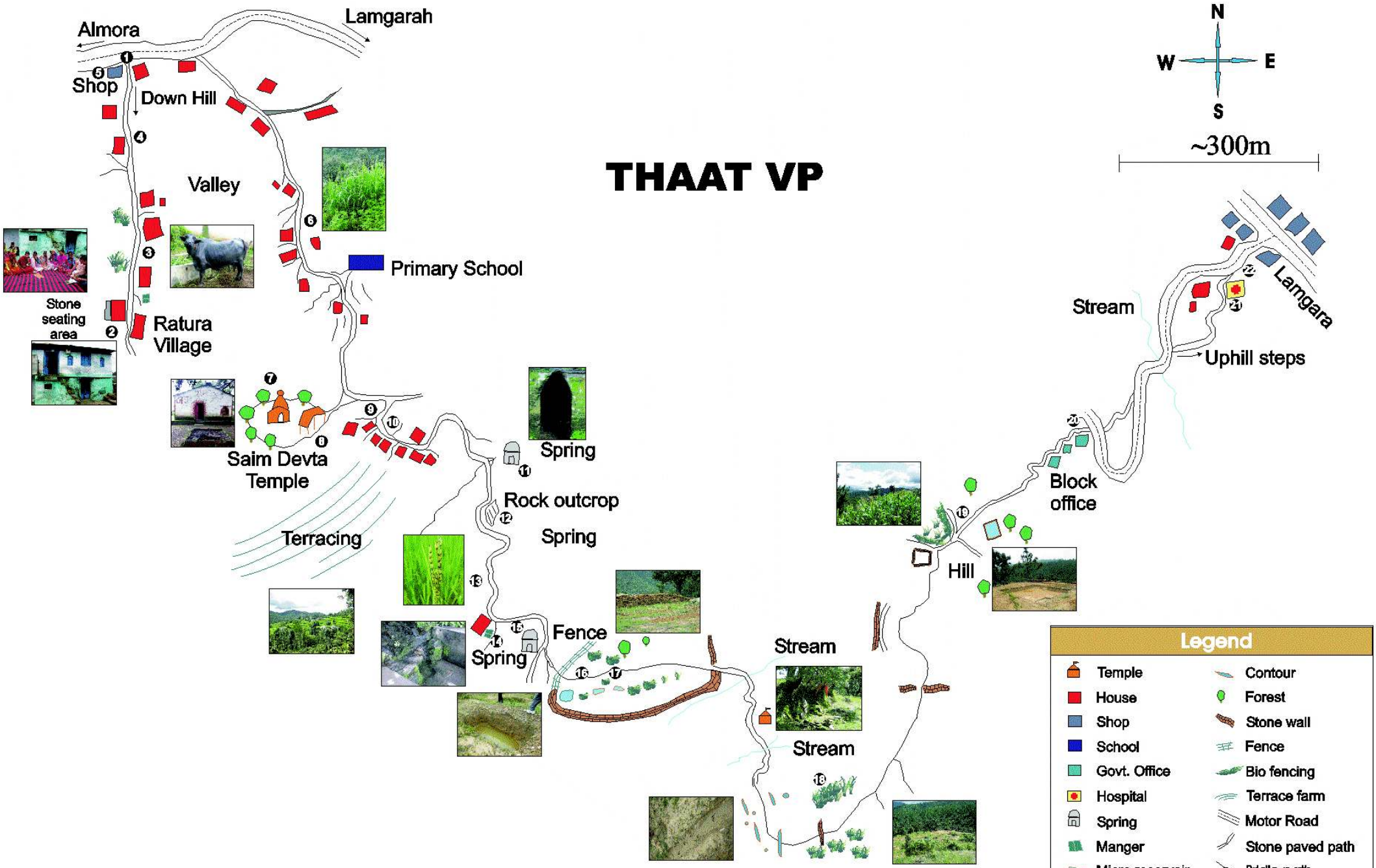
    Cross a stone wall on a path, which winds up the hill to the medicinal plantation.
18. PLANTATION OF AROMATIC AND MEDICINAL PLANTS

    Continue uphill and go left to cross another stone wall on a small path. Continue along this path.
19. CARBON SEQUESTRATION.

    At the junction of paths, take the one downhill to reach a few buildings by the road.
20. THE BLOCK OFFICES.

    Continue across the road and down the path. Follow the road across the stream, and then take the path uphill.
21. HOSPITAL
22. BRIEFING POINT AT THE END OF THE DAY

THAAT VP


Almora
Lamgarah
Shop
Down Hill
Valley
Primary School
Stone seating area
Ratura Village
Saim Devta Temple
Terracing
Spring
Rock outcrop
Spring
Fence
Spring
Stream
Stream
Hill
Block office
Stream
Uphill steps
Lamgara
N
W
E
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~300m
Legend
Temple
House
Shop
School
Govt. Office
Hospital
Spring
Manger
Micro reservoir
Contour
Forest
Stone wall
Fence
Bio fencing
Terrace farm
Motor Road
Stone paved path
Bridle path