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AFORESTRATION ON BARREN LANDS AND RESTORING BIODIVERSITY THROUGH NGO: A CASE STUDY

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ABSTRACT:Human needs are unending. Whether city or village, whether city dwellers or Aadivasis generally the natural resources are exploited for the needs. Due to this the natural resources are overexploited and may go for extinction. Trees are the easy targets and are useful to mankind for various purposes. Trees are cut for fuel, furniture, food, fodder, or medicines. Trees are also cut to get the clear land for construction or for agriculture and the end result is deforestation.

We can see the barren lands, hills, hillocks all around us and this results in a great loss to human. The trees are the great friends of human race. They act as the air purifiers, produce Oxygen, reduce Carbon dioxide, help in water recycling, supply food to entire animal kingdom, are resource for many medicines and have many more benefits.

In the deforestation process there is always a danger for extinction not only to plants but many other animal sps dependent on them. Thus from all angels for our own benefits it is necessary to preserve the forests and the biodiversity associated.

Hariyali an NGO based in Thane is making such efforts for conservation of the biodiversity on such barren hillocks for last 15 years. Till now more than 100 hectors of land in pieces has been brought under plantation and 620 hectors further is awaited for plantation. More than 45 species of saplings are sown, grown and taken care of till date. With this many sps, of butterflies, birds and many other animals are returning in these areas. The entire activity is done with the people's participation.

Keywords: Aforestration, tree plantation, biodiversity, conservation, NGO

INTRODUCTION

Environment protection and conservation are the words used very often by all of us. We practice these words while discussing the matters with friends, teaching / learning in schools and colleges, read in news papers and most of the time keeps quite latter, not knowing about what action can be taken.

It is always spoken about the reduction in forest land due to encroachment, reduction in rainfall due to reduction of forest, washing off soil from hill tops because they have become barren. We also know that the diversity of plants is reducing and the animals dependent on them are also reducing. Many of the plant sps are becoming endangered. Many of these plant sps have a great importance in our life as they are required in medicines, used as food, timer etc. Hence loosing these plant sps. will not be good for the future of mankind. The protection of the diversity of plants is very essential.

Case Study:

Hariyali is the registered NGO working in this field for last 15 years. Hariyali has undertaken many programmes to conserve the diversity of plants. For this Hariyali has well planned programmes throughout the year [1], [2].

1. **Selection of sites**: Hariyali has selected the areas in and around Thane. The areas selected include the hills around Thane, but in addition to it the areas around societies, near municipal water pipelines are also selected. The organization first started the work about 15 years back in yeoor hills which are at outskirts of Thane, just the backside of Sanjay Gandhi National Park. The work in this area continued for about 4 to 5 years. Simultaneously the other areas were undertaken for plantation like IIT Mumbai backyards, Vihar lake area, Bhandup water piplines, Mulund, Dindeshwar hills, Balkum Majiwada near Municipal water pipelines, Munda hills, Sonale Phata pipelines, kokanipada, Kalher, Kasheli, Gundavali, Chikhloli dam and now Bhavale. All these selected sites are at the distance of 10 to 20 km from Thane city in all directions [4].

The total area covered till date under plantation is about 100 hectors while further 600 hectors is to be undertaken. In the areas selected the work done is in collaboration with forest department and Municipal Corporation.

1. **Seed Collection**: For plantation at selected areas the seeds are collected from various localities, like Kokanipada, Yeoor hills, Maharashtra Nature Park, Thane city. The appeal is made to School/College children, citizens from Thane to collect the seeds from different localities where they visit. The people also collect seeds from the fruits which they eat and after drying seeds are given in Hariyali office. Even if the seeds are collected in large number still with extensive activities of Hariyali collected seeds are very less. Hence seeds are also purchased from Aadivasi's. Collecting different sps. of seeds prevents monoculture. It also helps in maintaining diversity of plants. Similarly collecting seeds from different sites help in getting the plants with different genotypes. This further promotes the healthy progeny.
2. **Packing and Distribution of Seeds**: This is a mega event many volunteers come together in Bhagavati Vidyalaya (one of the activity center of Hariyali) and pack the seeds in small brown paper packets. In the year 2010 & 2011 about 2 tons of seeds each were packed. This year around 30 sps. of seeds were collected by volunteers. In last 5 to 6 years more than 1 crore of seeds are distributed in mega events like 'Jay Vithal Abhiyan' or 'Mahabijaropan' and are distributed among Varkaries, Sai bhakta's, trekkers, bird watches, who sow them on the way when they go to Aalandi or Shirdi or go for trecks in nearby forests. In the year 2010 the sowing of seeds was undertaken on either side of National highway No. 3 from Thane till Dhule at the stretch of 350 km. certain times we also tried sowing seeds through mud balls.
3. **Nursery**: The collected seeds are also sown in Hariyali nursery to grow saplings. The seeds are sown in polytheline / milk bags and the saplings are grown for at

least one to two years before planting.

4. **Plantation**: Before the rain starts the pits are made ready. The soil is sundried. It is mixed with fertilizer and used to fill up the pits when saplings are planted. The pits are made in parallel lines with around 10 to 15 feet distance between the two. The saplings grown in nursery or purchased or the ones which people have grown in their houses are transported to plantation site and planted [5], [6]. Care is taken those saplings of various sps. are planted to avoid monoculture.

5. **Post Plantation Care**: After the rainy season the plants are watered from the storage of water created, The area near the saplings is deweeded. In many more ways the care of saplings is taken regular surveys are made to observe the growth and well being of saplings.

6. **Participation**: All this work is done with the help of volunteers from various sectors mainly including the student community, corporate sector, senior citizens, rotary, inner wheel clubs and many citizens in and around Thane. The work is done on sustainable basis. Hariyali thus has created a platform for those who wish to work for nature conservation. Every year around 3000 to 4000 volunteers of 60 + organizations put in their efforts in conservation sites.

For conservation of Biodiversity awareness in public is absolutely essential, rather the first step of action. For getting such a big support many environment awareness programmes are undertaken including lectures, workshops, symposia, trecks etc. In these programmes conservation of biodiversity topic is discussed most of the time. Even on the site when the saplings are planted volunteers are informed the names of which plants are getting planted. Hence people are aware of which plants they are planting. Such knowledge further help in conservation because the people take care of the plants around there houses too, unnecessary cutting of plants is avoided, even in common talks among friends the plants are discussed, which further spreads the awareness. Many people after acquiring knowledge about plants go for simple home medicines like eating Tulsi leaves, or lemon grass using Aloe vera etc. For increasing awareness about medicinal plants we also conductthe exhibitions of them. Hariyali has nurtured about about 185 sps. of medicinal plants, and maintained them with entireinformation which is displaced at the time of exhibition. While taking post care after plantation the growth rate, survival rates of the plants are measured/counted. And during all these programmes we have eminent Botanists, Zoologists and Environmentalists with us. This makes it easier to have scientific data as well as it helps in bringing awareness among the common people.

As these are the activities in denuded forest land before plantation we also do the survey of existing sps. and the predominant sps. existing in these areas are saag, palash, kuda, shalmali, temburni and shivan. Till date we have planted more the 50 + sps. of plants. (Table 1) [11] Out of the plants planted the Neem, Karanj, Kanchan, Bahava, Bhenda, Shivan, Bitti, Gulmohar, Khair, Kateri Bhabhul, Vilayati Chinch, Nirgudi and Sagargota are showing excellent surval and growth (more than 50 % saplings survived) while kadam, Aapta, Pangara are showing the surval rate poor which is less than 25 % Remaining have the surval rate between 25 % to 50 % [4].

When we do the plantation activity we involve the local population and local school children of the area. They are involved in the activity from day one that is digging the pits. For them special awareness programmes are conducted. This makes them interested in taking care of planted saplings against cattle grazing, forest fire, unnecessary damage, cutting trees etc. This automatically helps in conservation. Conservation of plant diversity in this fashion has also helped in bringing back the animals in the areas of plantation. We could notice the pug marks of Leopard in the Yeoor area where we had undertaken the activity of tree plantation and water conservation about 15 years back. The big phython, monkey family, deer groups are also noted in that area. Near the water pipelines, where tree plantation activity was undertaken and in Bhavale more than 45 sps. of birds (Table 2) [7], [8] are noted equal number of butterflies are also seen in this area [9]. But still the noting of butterflies, dragonflies, damselflies, ants is to be undertaken.

The case study of Hariyali thus reveals a fact that with proper planning if we take up a programme of aforestation it can be made successful with public participation and the biodiversity can be restored back [3], [10].

Benefits:

1. Barren hillocks getting converted into thick forests.
2. Restoration of the diversity of plants.
3. Restoration of the habitats for the forest animals.
4. Restoration of the animal diversity.
5. Engaging the human resources in conservation act.
6. Utilization of the youth energy in beneficial activity.
7. Bringing awareness about environment conservation in socity.
8. Reduction of pollution in environment.
9. Conservation of natural resources.
10. Protection of environment.

Predominent Species of Existing Wood Stock

1	Saag (Teak)	*Tectona grandis*
2	Palash	*Butea monosperma*
3	Kuda	*Holerrhena antidysentrica*
4	Shalmali (Sawar)	*Bombasa ceiba*
5	Tembhurni	*Diospyros montana*
6	Shivan	*Gmelina arborea*

Note Seasonal plant species are not included in either of the lists

TABLE 1: Species of Trees Planted with Indicative Rate of Survival

Sr. No	Name of Species Planted / Sown:		Method of Plantation	Indicative rate of survival as of August 2011
	Local	Botanical	Saplings / Seeds	
1	Adulasa	Adathoda zeylanica	Saplings	Good
2	Amba (Mangoe)	Mangifera indica	Saplings & Seeds	Good
3	Amla	Phyllanthus emblica	Saplings	Good
4	Apata	Bauhinia tomentosa	Saplings & Seeds	Poor
5	Ashok	Saraka ashoka		
6	Bahava	Cassia fistula	Saplings & Seeds	Excellent
7	Bakam	Melia azaderach	Saplings	Good
8	Bamboo	Bambusa vulgaris	Saplings & Seeds	Good
9	Beheda	Terminalia belerica	Saplings & Seeds	Good
10	Bhendi	Thespesia populnea	Saplings & Seeds	Excellent
11	Bitti	Thevetia peruviana	Saplings	Excellent
12	Chinch	Tamarindus indica	Saplings & Seeds	Good
13	Giripushpa	Gliricidia sepium		
14	Giripushpa	Gliricidia sepium	Saplings	Good
15	Gulmohor	Delonix regia	Saplings & Seeds	Excellent
16	Jamun	Syzigium cumini	Saplings & Seeds	Good
17	Kadam	Anthocephalus cadamba	Saplings	Poor
18	Kanchan	Bauhinia vareigata	Saplings & Seeds	Excellent
19	Karanj	Pongamia pinnata	Saplings & Seeds	Excellent
20	Karath	Feronia elephantum		
21	Kateri Babhul	Acacia arabica	Saplings	Excellent
22	Khair	Acacia catechu	Saplings & Seeds	Excellent
23	Khaya	Khaya senegalensis	Saplings	Good
24	Maha	Madhuca indica	Saplings	Good
25	Miscellaneous		Saplings & Seeds	Good
26	Neem	Azadirachta indica	Seeds	Excellent
27	Nirgudi	Vitex negundo	Saplings	Excellent
28	Palash	Butea monosperma		
29	Pangara	Erythrina indica	Saplings	Poor
30	Peet Gulmohor	Peltoppphorum pteocarpum	Saplings & Seeds	Good
31	Pimpal	Ficus religiosa	Saplings	Good
32	Raintree	Pithecolobium saman	Saplings	Good
33	Ratan Gunj	Adenanthera pavonia	Saplings	Good
33	Ritha	Sapindus trifoliatus	Saplings	Good
34	Rui	Calotropis gigantica		
35	Sag (Teak)	Tectona grandis	Saplings	Good
36	Sagargota	Caesalpinia bonducella	Seeds	Excellent
37	Shirish	Albizzia lebek		
38	Shivan	Gmelina arborea	Saplings	Excellent
39	Sitafal	Annona squamosa	Saplings	To be ascertained
40	Subhabul	Leuca leucasifolia		
41	Tamhan	Lagerstomia flosreginae		
42	Ukshi	Calicoptris floribunda		
43	Umbar	Ficus glomerata	Saplings	Good
44	Vad	Ficus benghalensis	Saplings	Good
45	Vilayati Chinch	Pithecolobium dulce	Saplings & Seeds	Excellent

Key to Matrix for Survival: Excellent = 50% +; Good = 25 to 50%; and Poor = Less than 25%

TABLE 2List of Birds Spotted at the Bhavale Site

Sr. No	Name of the Birds
1	Amphibians Bull Frogs in lake
2	Ashian Palm Swift
3	Ashy Prinia
4	Ashy Prinia
5	Barn Swallow
6	Baya weaver
7	Black Drongo
8	Black kite
9	Black Kites
10	Black shouldered Kite
11	Cattle Egrate (Flying)
12	Common Kestral
13	Common Myna
14	Common Myna
15	Common Tailorbird
16	Dusky Crag Martin
17	Dusky Crag Martin
18	Green Bee Eater
19	House Crows
20	House Sparrow
21	Indian Robin
22	Indian Robin
23	Indian Roller
24	Jungle Babblers
25	Jungle Bush Quail
26	Jungle Prinia
27	Large Billed Crow
28	Laughing Dove
29	Little Carmorant (Flying across)
30	Long tailed Shrike
31	Long tailed Shrike
32	Magpai Robin
33	Palm Swifts
34	Peacocks
35	Plain flowerpecker
36	Plain Prinia
37	Purple Sunbird
38	Red Rumped Swallow (basking on wire early morning)
39	Red Vented Bulbul
40	Red Whiskerd Bulbul
41	Rosy Starling
42	Scaly breasted Munia
43	Short Toed Snake Eagle
44	White throated King fisher
45	White Throated Kingfisher
46	Wiretailed Swallow

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