

## **Greenbelt for Environmental Protection around the Industries: A Success Story at Nocil**

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Industries do pollute the environment. Nevertheless industrial growth has been receiving tremendous boost all over the world. Over 60-75% of the pollution in the world is related to industrial production and consumption of fossil fuel and the developed countries have the major share in it. The present global model of development for prosperity is directly linked to industrial growth and hence even the developing countries have to initiate industrial development for their progress, although most of them are lagging far behind the others.

Today environmental awareness in India is building up gradually, with great inspiration from the West. There is nothing wrong in borrowing ideas from the Western countries but it is necessary to remember that western countries are still the major contributors to environmental pollution. Their crying concern for the promotion of appropriate technology which they have now developed, should not be a marketing gimmick to escape the industrial threat emerging from the developing countries. With the technologies earlier borrowed from the developed countries, the developing countries like India, Taiwan, China, Korea, Malaysia are now able to compete with the West, because of cheap labour and low cost of resources.

If these production activities have to be changed to suit the new environment friendly technologies, at a heavy investment and payment of royalty there will be a setback both in terms of profitability and technological advancement. This would certainly delay the process of industrialization and export marketing in the developing countries. Royalty and patent rights of the new technologies are likely to take away the cream of profitability. Thus it is necessary for the world leaders to negotiate with the technology centres to provide environment friendly technologies to poor nations either free or at a nominal cost to protect the environment on this planet. While the politics of environment will be a major issue for debate during this decade, there is no excuse for our industries to neglect their responsibilities and recklessly pollute our environment.

Although the global warming and depletion of ozone layer are the long term ill-effects of environmental pollution at the global level, people around the industries are presently suffering in many ways. The most serious concern is the health hazard of different kinds. Our industrial surroundings are smoky, filthy and unfit for living. There is probably no control over highly poisonous gases, effluents and solid wastes discharged by the industries. Such pollution affect the health of the people working in the factories as well as in the surroundings while contributing to the global warming. Thus the priority is to prevent such pollution, before pumping money on modern technologies. How can we expect these factories to protect the world who cannot protect their own workers? The casual negligent attitude of the people and inability of the government to enforce the laws, encourage the industries to continue their operations without caring to reduce the pollution. In the

absence of necessary control by the government it is necessary for the common public and voluntary agencies to take initiative to prevent such pollution. This can be done by creating environmental awareness among various groups of people.

In a polluting industry it is not the staff and workers, but the management who is primarily responsible for the pollution, because pollution control involves installation of equipment and heavy investment. The role of the staff is only marginal, when they are careless in treating the pollutants properly. Thus a majority of the staff do not contribute to the pollution but become the victims. They continue to work silently in the polluted atmosphere as they are either unaware of the hazards or helpless to quit the job. Hence with proper awareness among the factory workers and senior officers, pressure can be built up to reduce the pollution. A time may come for the workers union to bargain for a better environment and pollution free atmosphere. This can be done through environmental education. There are many good examples where industries have shown great concern for their surroundings and to keep the pollution at the lowest level. If there is a will there are many ways to find suitable solutions for keeping the environment clean. One such example is provided by the National Organic Chemicals Industries Ltd. (NOCIL) at the Thane-Belapur industrial area near Vashi, in New Bombay.

NOCIL accepted to establish tree plantation over 200 hectares as their commitment, with their forthcoming industrial expansion. However the company did not own any vacant land either around the factory or elsewhere. Hence they approached the Government of Maharashtra to permit them to take up reforestation on the degraded forest lands spread in vast stretches along the Thane-Belapur Industrial belt at Ghansoli village behind the NOCIL factory. Although the Forest Protection Act of Government of India did not permit either transfer or leasing of forest lands to others, taking advantage of the guideline of June 1990 to involve local people in forest protection, the Government of Maharashtra permitted NOCIL to take up tree plantation without any claim on the land ownership as well as the produce generated from the trees. The government also advised NOCIL to involve the local people in planting of different tree species adaptable to the local conditions.

NOCIL approached BAIF Development Research Foundation (BAIF), a voluntary agency involved in afforestation and rural development to prepare a plan for greenbelt development for implementation. Thus the project was started in 1990 with a tripartite agreement between the Government of Maharashtra, NOCIL and BAIF. It was planned to reforest 50 hectares in the first year. BAIF prepared a comprehensive plan in consultation with the Forest Department and the Bombay Natural History Society (BNHS), which included the strategy for land development, soil and water conservation, run-off water harvest, and selection of tree species which are not only well suited to local soil conditions but also attract wildlife while providing a green cover to absorb maximum volume of carbon dioxide.

Although this site receives an annual rainfall of 2500 mm, plantations suffer due to stunted growth and high mortality during the long dry spell of 5-6 months. Hence it was planned to irrigate the plantation with well treated effluent from the petrochemical complex of NOCIL. The effluent which contained diammonium

phosphate was analysed to ensure its safety for plants as well as the soil micro organisms. It was a difficult task to conserve the rainwater, because of undulating topography, steep slopes and heavily eroded shallow soils. Hence staggered trenches of 2 m long were dug in a zig-zag way along the contour to reduce the velocity of run off water and to facilitate soil and water conservation.

Saplings of 35-40 different tree species raised in poly pots were planted at both the ends of the staggered trenches to ensure moisture availability. Seeds of fast growing leguminous species such as *Sesbania sesban*, *Gliricidia sepium*, *Derris indica* and *Leucaena leucocephala* were sown on the mounds formed along the lower part of the trenches and agave and vetiver suckers were also planted to improve soil and water conservation, while intensifying the vegetal cover. The tree species selected for planting were teak, Shivan (*Gmelina arborea*), Shishum (*Dalbergia sissoo*), Shiris (*Albizia lebbek*), White shiris (*Albizia procera*), Banyan (*Ficus benghalensis*), Peepal (*Ficus religiosa*), Amala (*Emblica officinalis*), Tamarind (*Tamarindus indica*), Jambulena (*Syzygium cumini*), Guava (*Psidium guaveyava*), Neem (*Azadirachta indica*), *Casuarina equisetifolia*, Pongamia (*Derris indica*), Jackfruit (*Artocarpus heterophyllus*), Bamboo (*Dendrocalamus strictus*), Cashew (*Anacardium occidentale*), Mango (*Mangifera indica*), Bengali babul (*Acacia auriculiformis*), Khair (*Acacia catechu*), Kashid (*Cassia siamea*), Silk cotton (*Bombax ceiba*), Coral tree (*Erythrina variegata*) and many other fruit and flowering species to attract birds and wild life. Water tanks were constructed at an altitude of 80 m at four points to pump the treated effluent and this was distributed through gravitational flow to irrigate the plantation in the summer. Additional 55 hectares were reforested during the second year.

This piece of land located at an altitude of 90-300 m, does not receive irrigation. Nevertheless, over 80 percent of the saplings have survived. The growth rate of this plantation is slower than the earlier plantation because of non-availability of irrigation. But these saplings did not show any signs of wilting in summer because of adequate moisture storage in the soil through the staggered trenches. To improve the moisture supply, further gully plugging was carried out to develop two percolation tanks which could retain water for three months after the end of the rainy season. All loose stones were collected and used to plug the gullies to facilitate better soil and moisture conservation and to improve the grass growth.

Apart from the plantation on the forest area, an arboratum was established in a plot adjoining the factory and over 700 different tree and shrub species were planted in different sections. These plants are classified on the basis of their growth habits and uses. This provided an excellent opportunity for the visitors to learn about the growth habit of different plants and their uses. Pet birds and aquatic lives have also been maintained at the arboratum. So far over 450,000 plants have been established in this project and the trees have grown to a height of 4.0 metres where effluent containing nutrients have been used for irrigation. These trees have grown thick and healthy. Trees like cashew have started bearing fruits at the age of two years itself. The tree canopy of this tree cover provides a significantly cool and humid micro-climate, ideal for regeneration of local species and to attract wild life, for enriching the biodiversity.

In a recent follow up study undertaken by the BNHS, it was reported that there was ample evidence from the foot prints and droppings, that wild life like panther, wild boar and hynae were visiting the newly afforested hill areas. A few carcasses of stray cattle were also found in the plantation to confirm the presence of big cats. The population of rabbits and snakes also increased significantly. Out of 39 bird species spotted in the plantation, 16 were new migrants and a few of them were from Siberia. Some of the important avifauna found on the site are redwented bulbul, wren warbler, rufous backed shrike, little brown dove, green bee eater, red tailed finch lark, paddy bird, Indian roller, cormarent, tailor bird, crow pheasant, dabchick, cattle egret, house swallow, little large egret, marh harrier, black winged stilt, little ringed plover, gray wagtail and green sandpiper. In addition to these, some of the migratory birds found in the plantation were honey buzzard, blue rock thrush, sand piper (Siberia), yellow headed wagtail (Siberia) and white wagtail (Siberia).

Looking at this excellent tree growth and change in the environment, the local people who were coming to cut the bushes for fuel till now, stopped hacking the trees. They are encouraged to cut and carry the grass grown in between the trees for fodder. Grass cutting is a regular activity necessary to protect the plantation from fire. In certain patches where cutting of grass in the entire area is difficult, strip cutting is being followed to reduce chances of fire hazard. Two percolation tank with 5 metre deep water, natural waterfall, well planned tracks for walking, thickly grown trees and a wide range of wild animals have been attracting a large number of visitors from Bombay and adjoining areas. Over 400-500 people visit the site every weekend. Initially, it was difficult to persuade the visitors to maintain discipline. But now the changed environment is motivating them to prevent abusing the nature. Sign boards warning about the hazards of wildlife discourage them to take stray walks.

The managers and staff working at NOCIL are also highly motivated after experiencing this change. They have been coming up with various suggestions. In one of the discussions, a chemical engineer came up with a suggestion to modify the present process in one of their plants so that a trace of heavy metal present in the effluent can be completely avoided to ensure further safety. The environmental division has started using the entire effluent for growing trees and lawns in their factory premises and as a result, NOCIL has completely stopped the discharge of effluent into Thane creek. With improved garden, the cleanliness of the premise has improved significantly and everyone working in the factory has started realising the benefits of a clean environment. No doubt the management took the initiative but the contribution of the staff was spontaneous and wholehearted because it was for their benefit. Looking to the green patch of Ghansoli hills, many industries have shown interest to take up similar afforestation activities in the region. BAIF has undertaken the assignment of greenbelt development for Nuclear Power Corporations, Indian Petrochemicals, Indian Aluminium Company, Gokak Mills and many other industries on a turnkey basis. It does not take a long time to spread the success stories.