2.8 Environment Management Initiative: A unique low-cost model in Andaman and Nicobar Islands

In July 2005, the Dr. B.R. Ambedkar Institute of Technology launched an environment management initiative in Port Blair, Andaman and Nicobar, with the aim to promote environmental conservation and awareness through implementation of rainwater harvesting, effluent treatment and paper recycling. As a result of this initiative, nearly half of the institute campus' water requirement is being met through rainwater harvesting. Simultaneously, the paper recycling plant set up under the initiative produces 500 file folders every semester; and the solid waste management component has helped reduce waste.

Rationale

This environment management initiative was implemented inside a residential educational campus, comprising buildings and living quarters. The campus faced a severe waste management problem, an issue that is felt universally across urban settlements, negatively affecting the environment and consequently, public health. The waste management problem was further complicated by the fact that waste segregation was not practised by the students and other residents of the campus, as a result of which organic recyclable waste was being mixed with inorganic toxic waste. In any case, the waste was not collected regularly. The absence of waste segregation and waste collection by students in a systematic manner resulted in piling up of waste and growth of harmful bacteria, which posed a health risk to all campus residents.

The environment management initiative was introduced in response to this scenario. It focussed on implementation of different waste management techniques, including recycling of paper, effluent treatment and rainwater harvesting within the campus.

Image 1: Solid waste management system

Objectives

The overall objective of the initiative was to demonstrate sustainable environmental practices and solve the various waste and water management problems of the institute. The aim was to set up a rainwater harvesting plant that could meet 50% of the campus' water requirements; an effluent treatment plant (ETP) that could make 50,000 litres of water available for horticulture and other activities; a solid waste management plant to covert biodegradable solid waste into organic manure; and a recycling plant to produce paper and jute material for 500 file folders every semester.

Key Stakeholders

Dr. B.R. Ambedkar Institute of Technology, which operates under the Department of Higher Education, implemented the initiative. The Department of Science and Technology, Andaman and Nicobar, and the Andaman

Figure 1: Key stakeholders

- **Dr. B.R. Ambedkar Institute of Technology**
  - Implementation agency
- **Department of Science and Technology, & Andaman Public Works Department**
  - Techological support
- **The World Bank**
  - Financial support
- **Students and staff members of the institute**
  - Operation and monitoring of the project

Public Works Department provided the technological support for implementation, while the World Bank provided financial support to the initiative. Students and staff members of the institute provided operating and monitoring support.

Implementation Strategy

The Andaman and Nicobar administration, along with members of the Institute, implemented this initiative for efficient waste management at the Dr. B.R. Ambedkar Institute of Technology which is spread over 16.8 hectares. Keeping in mind the adversities of the region, the project was designed and successfully implemented utilising the available natural resources. The main components of the project were biodegradable solid waste management, rainwater harvesting, effluent treatment and recycling of paper waste. Each of the components is discussed in detail below.

Solid Waste Management System

The system for waste management was implemented to manage solid and liquid waste produced within the campus and to reduce their negative effects on human health. Under this system, waste is segregated at source and put into multi-coloured bins – green bins are used for compostable waste and blue ones are used for non-compostable waste. Yellow bins are meant for disposing rubber items, while grey bins are for the disposal of industrial waste such as automobile filters.

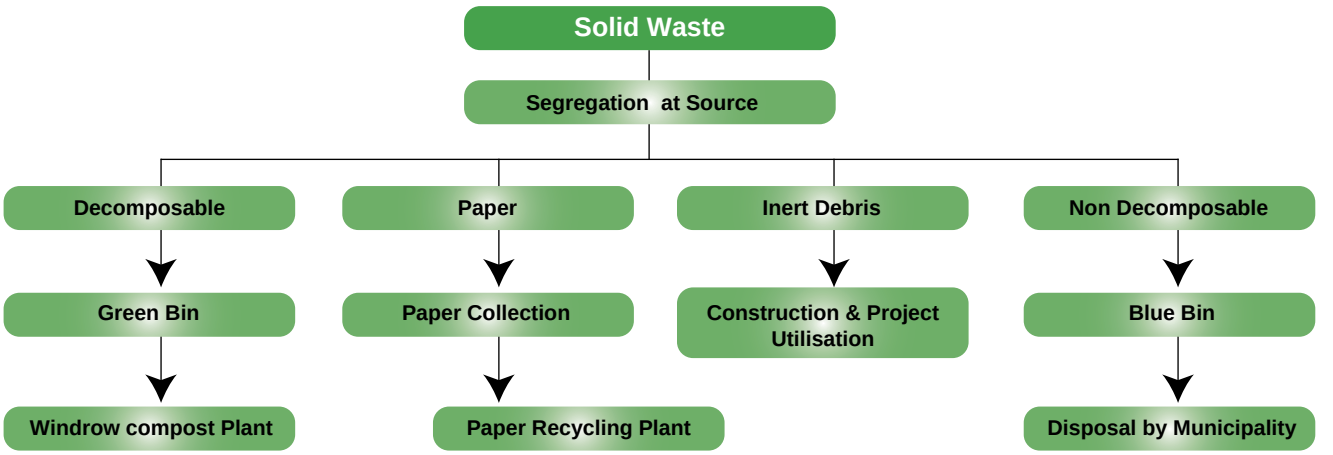
The quantity of waste produced is then studied and the part of it that is organic waste is managed by a technique known as windrow composting. This technique is used to produce compost by piling organic matter such as animal manure or crop residues in long rows (windrows). The method is used to produce large amounts of compost. The rows are rotated to improve oxygen content, mix or remove moisture, and redistribute the manure. Partially transparent green fibre roofing is used during the rainy season to prevent the entry of water into the composting ground.

Effluent Treatment Plant (ETP)

The liquid waste produced from domestic units (kitchens, bathrooms and laboratories, including the waste from water closets) is treated in the ETP, which was set up in 2003. Most of the water comes as liquid waste containing sullage and soil waste, which needs to be disposed off and treated. The ETP consists of a screen, collection well, grit chamber, anaerobic digestion chamber, aeration tank, clarifier, and sludge drying beds. It is able to treat all kinds of liquid waste.

Image 2: Manure composition

Figure 2: Solid waste management system



Source: Dr. B.R. Ambedkar Institute of Technology

Rainwater Harvesting System

The management and distribution of water in the campus was a source of concern, especially due to the absence of community participation in water management and a water harvesting system. This necessitated the need for rainwater harvesting to recharge the groundwater. In order to ensure adequate supply of clean water, a rainwater reservoir was constructed at the institute. This reservoir collects the surface run-off in bore wells. The water is then treated using pressure filters and chlorine contact basins, and the treated water is used for gardening, fire fighting etc.

Recycling of waste paper

The institute also set up a paper recycling plant. The large amount of paper waste created by the institute is recycled in this plant to make folders and other necessary materials. The process of paper recycling involves mixing used waste paper with water and chemicals to make it soft. It is chopped down into finer pulp or slurry, which is then strained through a screen to remove plastic and other impurities. The pulp is spread on large sheets using rollers and left to dry. Once the paper dries, it is cut into different shapes as needed and given a finishing touch. Recycling of paper reduces air pollution, contributes to the conservation of trees and lowers waste disposal at landfill sites.

Image 3: Recycled Paper

Resources Utilised

The contribution of students at the institute was crucial in the planning and implementation of the initiative. They took the responsibility of monitoring and operating the different plants/units deployed in the campus as part of the Initiative.

Table 1: One time cost of setting up different plants

Plant type	Cost (in Rs)
Effluent treatment plant	70 lakh
Paper recycling plant	5 lakh
Rain Water Harvesting	15 lakh (2 members)

The units operate by using available natural resources, such as rainwater or waste items like used paper, effluents and biodegradable waste.

Impact

Sustainable waste management processes, clean environment: This environmental initiative in Andaman and Nicobar has demonstrated effective and sustainable waste disposal practices to the community. It has shown that even remote and disadvantaged areas have the potential to develop sustainable environmental options. The biodegradable waste management system established under this initiative has created a clean and hygienic living environment inside the campus. The initiative is encouraging people to adopt such practices and improve their surroundings.

Recycling of solid and liquid waste to generate useful by-products: After the launch of this initiative, almost 50% of the campus' water requirement is being met through rainwater harvesting; 50,000 litres of water is available for fire fighting and horticulture activities through processed ETP discharge; the paper recycling plant helps produce 500 file folders every semester; and the solid waste management project has improved the environment by reducing waste. Thus, the initiative is introducing students and others to the idea of environmental conservation and encouraging them to develop streamlined waste management and environmental practices for better living.

Key Challenges

Community participation is a core component in implementation of an initiative such as this. Interactions with the administration and officials at the institute revealed constant challenges in convincing the community about the various environmental practices. During the initial phase, people were disinterested and reluctant to participate in the waste management system. They did not readily participate in the segregation of waste into solid and liquid and ensure disposal into different bins. However, there was a gradual increase in awareness and an acknowledgement of the need for the project. The

Image 4: Paper recycling plant

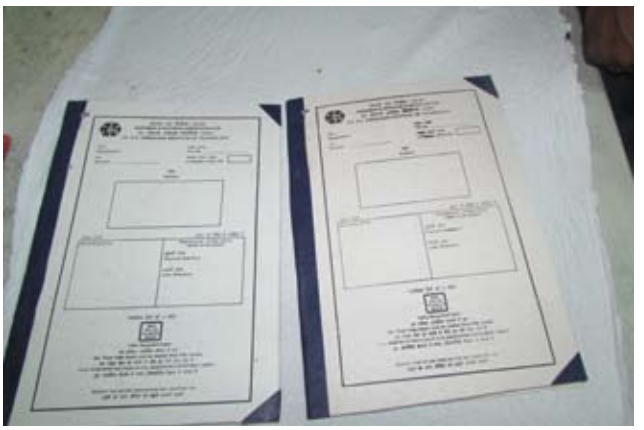


Image 5: File foldes made from recycled paper

Table 2: Percentage of waste generated

Type of waste generated	Percentage
Organic waste	64.90
Paper waste	15.46
Plastic waste	11.01
E-Waste	2.00
Other waste	6.63

Source: Dr. B.R. Ambedkar Institute of Technology

Table 3: Quantity of effluent obtained

Parameters	Effluent quantity
Ph value	6.4
Suspended solids	40mg/1
Dissolved solids	9mg/1
B.O.D	2.5mg/1
Total residual chlorine	Less than 0.1ppm

Source: Dr. B.R. Ambedkar Institute of Technology

growing contribution of the students and staff members helped establish a strong foundation for the project and enhanced the environmental and economic viability of the initiative to enable the achievement of almost all its targets.

Replicability and Sustainability

The utilisation of natural resources like rainwater and waste materials like paper, effluent and solid and liquid waste, and the leveraging of the existing network of local human resources (students and staff members of the campus) make this a highly sustainable initiative. Neither did the development and implementation require continuous external support, nor did it burden the community with any additional responsibility.

The initiative tapped into the existing human and financial resources and did not require high investment or technology. These factors make it an environmentally and economically viable and sustainable initiative. It also carries social relevance as it involved creating awareness among students, the younger generation, to be more

Table 4: Quality of effluent to be disposed

Parameters	Effluent disposed into inland surface water (IS:2490)	Effluents disposed into marine coastal area (IS:2490)
Ph value	5.5 to 9	5.5 to 9
Suspended solids	100mg/l	100mg/l
Dissolved solids	2100mg/l	2100mg/l
B.O.D	30mg/l	100mg/l
Total residual chlorine	1mg/l	1mg/l

Source: Dr. B.R. Ambedkar Institute of Technology

sensitive toward the environment and contribute to the community's well-being.

This initiative is highly replicable. Its strength lies in the adoption of sustainable practices, coupled with adequate community participation for achieving best results. Successful implementation of this environmental initiative in an area like Andaman and Nicobar, which has a fragile ecosystem, difficult topography and limited infrastructure, should serve as an example for other states.

Conclusion

The uniqueness of this initiative lies in the simple yet effective and efficient solution it offers to alter waste management and environmental practices. Recognising the importance of the community in ensuring sustainability, this environment management initiative has been put completely under the charge of the community, especially students and the younger generation, making it an exemplary practice.

Fact Sheet

Theme	Environment
Nodal Implementing Agency	Dr. B.R. Ambedkar Institute of Technology, Department of Higher Education, Andaman and Nicobar Administration
Geographical Coverage	Within the campus of Dr B.R. Ambedkar Institute of Technology, which is spread across 16.8 hectares
Target Groups	Students and staff members of the institute
Years of Implementation	2005 - Present

The Karnataka Forest Department has initiated India's first end-to-end online system for tracking forest produce by managing transit of produce as user departments have access to all the data on a single, simplified dashboard that can track the high volume of transactions.