

Gandhivan

A project on wasteland development by
Gram Bharati Samiti



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Printed by: Tanisha Offset Press
Published by: Gram Bharati Samiti

First edition: November 1994
Second edition: June 1999
Third edition: January 2008

Gandhivan



'A model for halting desertification in Semi-Arid Rajasthan'

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Executive Summary

Gandhivan, a project initiated by Indian Non Government Organization Gram Bharati Samiti, is a model of environmental wasteland management for semi-arid areas of Rajasthan. Over the past sixteen years, Gandhivan has been transformed from moving sheet sand into a vegetated and agriculturally productive area. Gandhivan benefits the local village people both directly, through fuel and fodder agreements and indirectly, as a hub for education and social activities.



Before and after
***Left**: Before re-vegetation works*
***Right**: Today, species utilized for fuel fodder, shade, timber and fruits*

Introduction

Gandhivan is a project site initiated and supported by Indian Non Government Organisation, *Gram Bharati Samiti* (*'GBS'*). GBS is Hindi for "Society for Rural Development". The organization was founded in 1983 and was registered in 1984 under the *Rajasthan Societies Registration Act 1958*. The organization is accredited under the "United Nations Conference on Desertification" process and has received special consultative status with the "United Nations Economic and Social Council". GBS is registered for Income Tax exemption under the *Income Tax Act 1961* of India.

The mission of GBS is to establish a society based on the values of humanity, democracy and ecological balance. To serve the deprived, down trodden and distressed, including, women, tribal communities, the handicapped, those affected with leprosy and people living with HIV/AIDS. They serve without discrimination by caste, race, religion or gender. GBS strive towards this vision by involving all stakeholders in grassroots programs.



GBS helps those most vulnerable in society

Background

Location

Gandhivan is a twenty-five hectare rehabilitated wasteland located fifty kilometers northeast of Jaipur city in district Jaipur of Rajasthan, India. The site runs parallel to the Aravalli hill range.



Location: Jaipur District, Rajasthan, India.

Geography

Area: Rajasthan is the largest state in India and constitutes 10.41% of its total land area[1]. District Jaipur amounts to 3.25% of Rajasthan[2].

Rainfall: Rajasthan has a normal rainfall of 57.51cm per year[3], while district Jaipur has a slightly lower rainfall of 56.38

[1] Aggarwal et al, 2006.
[2] DEC, 2005.

cm[4]. District Jaipur is defined as a semi-arid area[5] and the rainfall here is unpredictable, where, during in monsoon season, heavy rains erode topsoil.

***Temperature*:** In 2005-2006 district Jaipur had an average maximum temperature of 44.7°C and minimum of 3.65°C[6].

Soils: The soils of district Jaipur include, non calcil brown soils, alluvial soils of recent origin and yellowish brown soils[7].

The Aravali Hills: The Aravali hills slice Rajasthan in a northeast direction. Of the Rajasthan state 9.5% constitutes forest area. Of this, approximately half is located on the Aravali hills. The surrounding population depends on the forests for fuel, fodder, timber and various non-timber forest products[8]. The National forest policy states that forest *cover* should exceed 33% however; Rajasthan's forest cover is less than 5%[9]. District Jaipur fairs slightly better as 11.75% is defined as forest cover.



li hill
ge

Over the last two decades the section of Aravali hills adjoining Gandhivan has been completely denuded and is subject to constant grazing by local village herds. Furthermore, the fast

[3] Ibid.
[4] Ibid.
[5] Chouhan & Joshi, 1993.
[6] DEC, 2005.
[7] Chouhan & Joshi, 1993.
[8] Aggarwal et al 2006.
[9] Ibid.

flowing water running off the hills in monsoon season has caused severe gulling in the flanking area, as a consequence there is significant loss of topsoil. In some cases this has lead to the formation of shifting dunes. In addition, the reduced forest cover has contributed to a marked reduction in rainfall over the past ten years.



Liquid Gold: erratic rainfall and decreased groundwater recharge puts increased pressure on villagers

As a consequence of this history, the area of Gandhivan, like 10% of district Jaipur is defined as "culturable wasteland". Dr K.N. Joshi[10] defines "culturable wasteland" as "all lands, which are cultivable, but at present lying waste due to numerous limitations". The area qualifies as degraded forest lands which have been formed by anthropogenic activities.

[10] 2004, p5.

Demography

***Population*:** In 2001, at last census, India had a population of 1.02 billion, and population density of 325[11]. 57 million people live in Rajasthan with a lower than average population density of 165[12]. In contrast, Jaipur had a population of 5.2 million and the highest population density in Rajasthan of 471. 72.2% of India's population is located in rural areas. The rural population across Rajasthan consists of 76.7%. By contrast, Jaipur's rural population is 51%.[13] The overall population growth rate of Rajasthan over the period from 1991 to 2001 was 28.41. In Jaipur the rate was 35.06.

***Mortality*:** Life expectancy across India is 63.9 for males and 66.9 for females. However in Rajasthan male and female life expectancy is very similar at 62.2 for male and 62.8 for female[14]. Infant mortality is also higher in Rajasthan. Across India the mortality rate per 1000 is 58, whereas in Rajasthan it is 68[15].

Women in Rajasthan have a significantly lower life expectancy than the average Indian woman



***Sexual disparity*:** The sex ratio of India is 933 females to every 1000 males. In Rajasthan the average is 921, and in district Jaipur the rate is 897[16]. India's literacy rate is 76% for

[11] DEC 2006.
[12] DEC,2006.
[13] DEC, 2006.
[14] DEC, 2007.
[15] Ibid.
[16] DEC, 2005.

males and 54% for females. Rajasthan's men and women have a literacy rate of 76 and 44 respectfully. Jaipur has a higher than national average literacy rate of 83% and 56%[17].

Slum areas: In Rajasthan 2% of the population live in slum areas. By contrast, 15 % of the people who live in the Jaipur district are living in slums.

Healthcare and disabilities: In Rajasthan there is one doctor per 10,437 people (2004-5)[18]. Over all Rajasthan, 2.5% of the population is affected by a disability, in Jaipur a higher proportion of the population is classified as disabled, 2.6%[19].

Castes

The three villages in the area surrounding Gandhivan comprise mainly of scheduled castes, scheduled tribes and other backward classes. In Kela Ka Bas, the vast majority of the population belongs to the scheduled caste of *Raigers*. In Todaladi the two main groups are the scheduled tribe of *Meena* and the *Gurajar's*, which belong to 'other backward classes'. Similarly in Madhogarh the *Gurajar* are the majority.

Across Rajasthan, 17% of the population belongs to scheduled castes; while in Jaipur 15% of the people belong to scheduled castes. Across Rajasthan, 12% belong to scheduled tribes while in Jaipur it is only 8%[20].

Local Income

The community immediately surrounding Gandhivan has reported a significant decrease in natural forest over the last twenty years. The community has grown concerned over the lack

[17] Ibid.
[18] Ibid.
[19] Ibid.
[20] DEC, 2005.

of common pasturelands and the deteriorated condition of the surrounding lands. As a consequence, they believe they may soon be unable to continue animal husbandry, which has been the traditional occupation of the area. As an illustration, cattle population in the state of Rajasthan is 49 million, which almost exceeds the state's human population.

Local villagers with their livestock



In 1991 when the area of Gandhivan was allotted to GBS, the local villagers were experiencing a decreased economic condition. Due to a drop in demand, cottage and small village industries had recently diminished, driving the changing rural-urban demographic shift in the area. Local village industry now includes embroidery, stone cutting and polishing, carpet making, shoe making, carpentry and marble.



***Sari making**: local village women complete intricate sari embroidery*

Gem cutting





The finished product: cut and polished gems

Water and electricity

Water: In 1991, there was no access to safe drinking water within two and a half kilometers of Gandhivan. Similarly, there was no access to electricity within five kilometers of the site. In addition, the ground water resources were severely depleted and consequently irrigation was not an option for local farmers.

***Electricity*:** In 2007 98.3% of the villages in Rajasthan had access to electricity.

Objectives of Gandhivan Project

The objectives of the Gandhivan project were as follows:

- To stablise the sand dunes
- To restore ecological balance to the heavily degraded area
- Improve the quality of life of the surrounding communities by supplying fuel and fodder.
- Support the government in its pursuits to improve the quality of village life.
- Cultivate local indigenous plant species to prevent extinction and ensure the traditional knowledge of their medicinal properties is retained.
- To create a platform for capacity building with the local villagers.
- Encourage the uptake of sustainable farming practices in the surrounding areas.
- To create a readily replicable model to benefit the surrounding areas.



Humble beginnings: a dream of something beautiful

Activities

The following activities were conducted to achieve project objectives:

i. Through formal and informal meetings, GBS raises awareness on environmental issues within the immediate area. Four times a year open forums are conducted on the consequences of deforestation and the specific impact on daily life.

ii. Training of community women and youth in propagation and vegetation care.

iii. Annually, through consultation with the community, nursery planning occurs. First, the number and type of species are selected. Then, the seeds are purchased and prepared. When the seedlings are approximately four months old, they are transplanted around Gandhivan.

iv. Stabilising sand dunes to check the march of desertification. Gandhivan was created as a model to be replicated in surrounding areas and vulnerable areas of the Aravali.

v. Plugging the gullies to conserve the moisture and reduce erosion.

vi. Regenerate the indigenous plant species to be utilized for medicinal purposes such as for teeth and stomach ailments.

vii. Prioritising vegetation species for fuel and fodder

viii. Erecting check dams to harvest rain water

Outcomes

Soil and water conservation

Initial works at Gandhivan reflected the priorities for the area. The first step was the installation of a bore well, which overcame drinking water scarcity. The project was funded by a venture initiated by the GBS executive members. This bore well was just over thirty-three metres deep.

Then, under the instruction of the Botany Department from Rajasthan University, three hundred small mud bunds were constructed within the numerous gullies located on site. These bunds where then covered in mulch and vegetation to stablise them. Since installation, soil erosion has significantly reduced in the area and the soil structure has also improved. Throughout Gandhivan's history additional mud bunds have been created and at January 2008 there were sixty-two gully plugs at Gandhivan



Lush growth now dominates where Erosion once reined

Next, a small check dam was constructed to harvest rainwater and to further reduce water erosion on site. As a consequence of the check dam and gully plugs, the groundwater level in the nearby villages of Madhogarh, Todaldi and Kela Ka Bas were recharged by up to ten metres. Furthermore local villagers' herding animals utilize the dam as a water source.



Gandhivan check dam



Villagers with livestock drinking from dam



Worker re-filling watering can at tank

Subsequently, a further two bore wells have been drilled and submersible pumps where attached to utilize ground water resources. Finally, large tanks were constructed to store groundwater to water the plants.

Vegetation

Before commencing re-vegetation, GBS consulted the local community on needs and uses of the land. From these meetings it was discovered that fuel and fodder were a community priority and this need was the chief reason for environmental degradation in the immediate area. Consequently, a large proportion of species located at Gandhivan are utilized for these purposes

Species chosen in consultation with local villagers



The afforestation work was carried out under technical guidance of dendrologists, officials from the Rajasthan forest department, private environmental institutions and senior community members.



Planting at Gandhivan

In June every year nursery work is attended to. This involves seed propagation, replanting, fertilizing and pest prevention. Through consultation with the community, organic substitutes of herbs, ashes and leaves are used in preference to chemical pesticides as chemical pesticides have a negative impact on the environment.



Nursery works

To date, 88,190 plants are established at Gandhivan. These plants are watered regularly, and weeding and fertilizing occurs twice a year. The survival rate of these plants is over seventy percent.



Weeding

Plant species located at Gandhivan

Canopy cover	Delonix regia Azadirachta indica Polyalthia longifolia Albizia lebbek Cassia fistula Ficus religiosa Melia azadirachta Pithecellobium dulce
Fragrant, Medicinal and Ornamentals	Michelia champaca Callistemon lanceolatus Bauhinia purpurea Nerium indicum Nyctanthes arbor-tristis
Fruits	Punica granatum Citrus aurantifolia Emblica officinalis Zizyphus jujuba Psidium guajava Tamarindus indica
Timber	Dalbergia sissoo Dendrocalamus strictus Acacia nilotica
Fuel and Fodder	Leucaena leucocephala Acacia catechu Ailanthus excelsa Prosopis cineraria

Community involvement

Community participation has been an integral element of the Gandhivan project. As highlighted in the objectives, the aim of Gandhivan is to promote community. Consequently, local villagers have been involved in Gandhivan from the beginning. In the initial stages, the local rural women, handicapped and leprosy patients who were rehabilititated at Gandhivan carried out most of the laborious activities. Subsequently, many villagers including the youth have provided labour to Gandhivan and GBS's other projects.



Local village women building check dam near Gandhivan

Through consultation with villagers, a cooperation agreement was formed between GBS and the women for fuel and fodder. Five local villages each have a wood lot at Gandhivan. The women from each respective village weed and water their trees. In return, they take twigs and branches for fuel in their homes and fodder for their livestock. Through this initiative, deforestation on the adjacent hills has decreased dramatically and the women can now allocate time elsewhere. **Over six thousand families** benefit each year from the scheme.



Local village women carrying fuel and fodder from Gandhivan

Gandhivan has also provided employment opportunities for local village people. GBS employs four core staff year round to manage all Gandhivan's administration. In addition, during the one month of nursery activities, GBS employs a further ten village women. For these women Gandhivan provides not only a source of income and education, but also an improvement in social status.



Agreement

Left: village woman weeding. Right: woman with fodder



Enriching flora and fauna

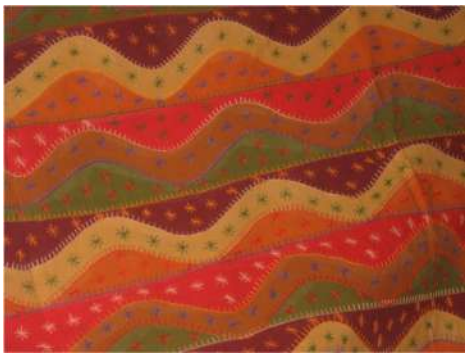


GBS's activities at Gandhivan have had a number of benefits for the flora and fauna. First, GBS re-introduced a wide range of plant species significantly increasing the diversity of flora present at the site. Second, the constant presence of water has meant that local village herds utilize the water source, while animals such as the squirrels have made Gandhivan their home. Similarly, rare bird species are now returning to the site.

Consequently the increase in biodiversity at the site strengthens the surrounding area against negative environmental impacts such as droughts and desertification.

Social Benefits

Vocational training



Locally made carpet

In 1994 GBS conducted an initial survey of the surrounding villages of Madhogarh, Todaldi and Kela Ka Bas about the status of women and their role in family life. Based on those results, GBS conducted vocational training for the women whom they found most distressed. This training was held in the community hall at Gandhivan. Over the period from 1994 to 1998 over three hundred women attended vocational training in various trades, such as

carpet making, durry, hand weaving, stitching and producing MCR tiles. Of these women, two hundred acquired financial assistance from the "Industrial Development Bank of India" to start a small business independently. The loans were repaid through facilitation by GBS and the businesses are now completely self-sufficient.

Similarly, in 1994 over four hundred people who suffered from leprosy or a disability and previously engaged in beggary on the streets where provided with vocational training at Gandhivan.



***Improved social status**: women who earn an income benefit from an improved status within the community and their family.*

Health and well being

Gandhivan is located six kilometers from the nearest medical facility. As a consequence, twice a year GBS organises for a medical practitioner to visit Gandhivan and provide medical services to the local village people free of charge. To date, over seven thousand people have received medical services from these visits.

Social hub

GBS also organizes a variety of social functions to be held at Gandhivan. These involve national events like Independence Day, Republic Day and festivals like *Deewali* and *Holi*. In addition, youth camps, meetings and workshops on contemporary issues are also held there.



Meeting with village people

Annually in October, the nine-day *Navratra* celebrations are held. Children from surrounding villages regardless of caste participate in the final day celebration and feast. Traditionally, only children from upper castes participate; however, GBS specifically invites lower caste children for them to experience the main stream.

Youth Camp at Gandhivan



In addition, there are ceremonies every year on 1st December in honor of World AIDS Day. On this day, villagers attend education sessions on the transmission of the disease and the community makes a commitment to prevent the further spread of the disease. A five-day youth camp is also held at Gandhivan every summer where the program includes education on the environment, HIV/AIDS and women's empowerment issues.



Youth participating in an environment camp and providing labour to build check dam



Community sharing their concerns on famine and drought in a seminar at Gandhivan



New Life: *from left*

- *Umrao Salodia the then divisional commissoner of Jaipur planting Embilica officinales*
- *Kusum Jain joint secretary GBS*
- *Bhawani Shanker Kusum Secretary GBS*

These social functions demonstrate, that Gandhivan allows the local people to move beyond basic survival and prejudice to offer a platform for social cohesion, tolerance and acceptance in traditionally segmented village communities.



Power Walk, *from right:*

- *Mr Chandi Prasad Bhatt a senior environmentalist and recipient of maysaynay award*
- *GS Bapna an eminent lawyer*
- *Mainekchand Bohara a Gandhivan*
- *Dr SN subbarao, a senior Gandhivan training youth thoughout India*
- *RC Jain, a laywer*
- *Master Ram Sharam Amtyamuprashi, an eminent socialist leader*
- *Bhawani Shanker Kusum*

Farming practices

During the initial campaign of afforestation in the area, villagers were encouraged to take saplings back to their properties. Over 150,000 indigenous saplings were distributed amongst the farmers, which they planted on the boundaries of their fields (mosaic planting). These farmers experienced improved nutrition or income from the consequent fruits supplied by the trees. They also utilize the trees for fuel and fodder. Environmental benefits include an improved microclimate, and a decrease in soil erosion.



Lemon Tree bearing fruit



View from Gandhivan of Mosaic planting on nearby farming properties

Cost Effectiveness

Over the past sixteen years, less than ten million INR have been allocated to Gandhivan. Funds were sourced from GBS members, Government of India- Ministry of Environment and Forests, Ford India Ltd and private donations to the organization.

Cost breakdown

Expense	INR
Approx annual expenses	Total- 580,000
- salaries	- 340,000
- seeds	- 30,000
- manure	- 50,000
- utilities (electricity and water)	- 60,000
- transportation	
- tools and equipment	- 50,000
- Misc	- 20,000
	- 30,000
Total expenditure over 16 years	**9,280,000 (US$ 233,600)**

Achievements

The GBS team has been highly effective in attaining Gandhivan's initial objectives.

i. The dunes have successfully been stabilised within the re-vegetation zone and are no longer dominated by sheet sand.



The sand dunes are now stabilised

ii. The introduction of vegetation and water to the area has significantly improved the ecological diversity. This is evidenced through the return of a number of bird and fauna species.

Bird at Gandhivan



iii. Significant groundwater recharge has taken place.

iv. Gandhivan has improved the lives of the surrounding communities. Through the fuel and fodder agreements, women have a reduced collection time for these products.

v. The local species suggested by the villagers are growing well and are utilized by these communities for medicinal purposes.



Medicinal plantation

vi. Gandhivan has become a part of the community structure and is used as a social and education hub.



Social Hub

Left: celebrations

Right: disadvantaged children receiving food



vii. The introduction of water to the local area has increased agricultural production. Furthermore, GBS has also assisted local people in re-vegetating their own properties to bring the owners additional benefits.



Pomegranate fruit

Increased nutrition or a cash crop

viii. The Gandhivan model has the *potential* to be replicated in the surrounding area.

Local Villagers enjoying Gandhivan



Sustainability

The sustainability of initiatives at Gandhivan is evident from:

i. The villagers' continual involvement and ownership of the project. They were engaged from the beginning and they chose the direction of the project.

ii. Their significant voluntary labour demonstrates the value they personally give Gandhivan.

iii. The fields of fruit plants are converted into cash crops, the income from which is utilized in further project implementation.

Sustainable Future

Planting at Gandhivan





Cash Crops

Orchard at Gandhivan

The Future

Gandhivan has been an exercise in social improvement and is a vehicle for community unity. Looking to the future, GBS wishes to replicate the program in the nearby villages of Mehangi, Gudha Hasuka, Raisar, Devitala, Chainpura and so on.



***Bright future**: GBS moving towards replication*

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