

Role of BAIF in Environmental protection and Sustainable Development

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BAIF Development Research Foundation, formerly known as the Bharatiya Agro-Industries Foundation (BAIF), is a non-government organisation registered under the Bombay Public Trust Act 1950 and established in 1967. Although the mission of BAIF is to create gainful self-employment for the rural poor through the application of appropriate technology for improving the productivity of rural resources such as land, livestock water, vegetation using the idle manpower, sustainable use of these resources and protection of environment are the important consideration while implementing these development projects.

Target Groups

Four important groups identified by BAIF are the farmers, educated people involved in non-farming activities, children and industrial establishments. Since motivation for active involvement of these groups was essential, the following strategies were adopted based on the field experiences.

The majority of the farmers living in rural areas are poor and therefore income generation is a motivational factor for them. For educated people who have assured sources of income, awareness about the need for protecting the environment is adequate. Children can be motivated through emotional and sentimental lessons. Industrial establishments with honourable intentions and commitment for the society can be persuaded by demonstrating the feasibility of protecting the environment at a reasonable cost. Keeping these principles in view, BAIF has undertaken different activities.

The programme of afforestation and environmental protection include research, development and training in the states of Maharashtra, Gujarat, Karnataka, Rajasthan, Uttar Pradesh, Uttaranchal, Bihar, Madhya Pradesh, Andhra Pradesh, West Bengal, Orissa and Jharkhand

Research Projects

1. Introduction of Hawaiian Giant Subabul

In 1976 for the first time, BAIF introduced Hawaiian type *Leucaena* in India. Earlier, the indigenous subabul was of dwarf, bushy type with low fodder yield. BAIF developed the cultivation practices of Hawaiian Giant *Leucaena* and initiated the promotion of this tree throughout the country, for fodder and fuelwood production, particularly on wastelands in dry areas. So far, 100 tons of good quality seeds have been dispatched from BAIF to various institutions and farmers and today subabul is one of the most popular fodder species promoted in the Social Forestry Programme.

2. Germplasm Collection and Evaluation of Important Multipurpose Tree Species

With a view to conserve the germplasm, collect superior strains from other regions and evaluate their performances for popularising superior varieties, an arboretum has been established at Urulikanchan near Pune, by planting superior strains of more than 100 different species collected from Asia, Australia and Africa. Superior strains have already been identified in many species for establishing seed orchards. This technique will help in improving biomass production of tree plantations 3 - 4 times old.

Selection of Multipurpose Tree Species for different Agroclimatic Conditions

28 different multipurpose tree species have been tested under three agroclimatic conditions of Gujarat, and Karnataka and outstanding tree species for different regions have been identified. This helps in popularising ideal tree species in different regions.

3. Cost benefit analysis of different Tree species

Farmers are keen to know the economics and profitability of tree species before establishing tree plantations on their lands. However, this information is often not available with the research organisations and development departments in the country. Realising this drawback, BAIF carried out the cost benefit analysis of the important tree species such as neem, melia, eucalyptus, portia, teak, custard apple, ber, sesbania, drumstick, etc. and developed posters on the economics of different tree species. This has helped in motivating many farmers to take up tree planting.

4. Other Scientific Studies

The present studies include the evaluation of various germplasm received from Oxford Forestry Institute and other international forestry organisations to study the vegetative propagation of important fruit species and explore the potentials of petro crops on wastelands, etc.

5. Development of Wastelands

BAIF has established 10 research and demonstration centres under different agroclimatic conditions in the states of Maharashtra, Gujarat and Karnataka. These centres have been established on degraded wastelands where various techniques have been developed to establish different tree species using low cost technology. Some of the important activities developed for establishing forestry on wastelands are selection of hardy species for drought-prone areas, saline soils, run off water harvest using low cost fencing, development of biofertilizers using rhizobium and mycorrhizae for different tree species, promotion of fast growing green manure species to build up the soil fertility and introduction of organic mulching to conserve the soil moisture, etc. BAIF has also demonstrated the application of these techniques on its campuses in other areas.

To demonstrate the feasibility of establishing fuelwood plantation on wastelands, BAIF has set up energy plantations over 800 ha on different campuses in Gujarat, Maharashtra and Karnataka.

6. Promotion of Agroforestry

Realising the potential of agroforestry to improve the environment, BAIF has developed different agroforestry systems suitable for local conditions. This is further supported by organising decentralised nurseries so that the interested farmers can procure the seedlings and establish tree plantations on field bunds without additional pressure on foodgrain production.

7. Kisan Nurseries

Non-availability of good quality seedlings is a serious bottleneck while popularising social forestry. Realising this drawback, BAIF has been promoting kisan nurseries and school nurseries since 1985. So far, 120 lakh seedlings have been raised in the states of Gujarat, Maharashtra and Karnataka.

8. Establishment of Greenbelt Around Industrial Units

Many industrial units have acquired sizeable area around their establishments and most of it lies idle due to lack of interest and technology. Realising the potential of this unutilised land, BAIF initiated a programme of developing greenbelts around the industrial units by persuading industries to support this programme. Looking to the feasibility and success of this programme, many industries have now approached BAIF for establishing tree plantation around their units. The hallmarks of this programme are low cost technology, economic viability and replicability.

Utilisation of Treated Effluent for Afforestation

While undertaking afforestation around the industrial area, BAIF also initiated the programme of irrigating treated effluent to grow trees both at IPCL, Nagothane and NOCIL, Thane. As a result of this programme, NOCIL has completely stopped discharging the effluent to the Thane creek since one year.

These programmes are serving as excellent demonstrations for other industries and BAIF is currently approaching other industries to take up afforestation programmes around their units. To promote afforestation in industrial areas, BAIF has been organising meetings and film shows and the response is encouraging.

9. Involvement of School Children in Environmental Protection

With the financial support from NWDB, BAIF initiated the programme of raising seedlings and afforestation through 25 secondary schools in Pune district since 1987. About 20000 seedlings were raised by the children in each school which were subsequently distributed to them for planting in their backyards and fields. Children were also provided with useful literature in the form of story books and enlightened

about the role of afforestation in environmental protection through documentary films.

Under the National Environmental Protection Campaign, BAIF organised essay writing competitions for children during the year 1986-87, 1987-88. About 500 schools from ten districts in Maharashtra participated in this competition and more than 100,000 students wrote essays on different topics related to environmental protection. All the participating schools were awarded useful literature on afforestation and prizes were given for the two best essays in every class of each school. This has created significant awareness among the students and many of the schools have initiated afforestation and environmental protection programmes since then.

10. Regional Resource Agency for National Environmental Awareness Campaign 1989

BAIF has been nominated as the Regional Resource Agency for the National Environmental Awareness Campaign by the Ministry of Environment and Forests, Government of India. This has provided an opportunity for BAIF to develop useful literature and distribute to different NGOs in the states of Maharashtra, Madhya Pradesh and Goa for creating environmental awareness in their regions.

11. Seminars and Workshops

BAIF has organised the following workshops and invited large number of delegates from research institutes, government departments, non-government organisations and farmer groups. Such workshops have served as platforms for exchanging ideas which in turn have helped in popularising forestry at the grass-root level. The summary and recommendations of these workshops were printed and distributed to the organisations involved in promoting social forestry throughout the country. Proceedings of three of these workshops have also been published and distributed among research and development organisations in the country.

12. Extension and Training

Several district level agroforestry training programmes have been organized. State level training programmes have also been organized. BAIF has also conducted special training programmes for field technicians on various important topics such as raising of nurseries, production of multipurpose tree species, cultivation of nitrogen fixing tree species developed on wastelands and promotion of agroforestry. Atleast 3-4 training programmes have been organised every year which have been attended by 25-30 participants from different non-government organisations. The programmes have helped a large number of NGOs to develop their technical skills over the last five years.

13. Publications and Films

To support our training and extension programmes and popularise the technology at the grass-root level, BAIF has brought out the following publications -

1. Greening of Wastelands
2. Agroforestry : Selected Readings
3. Handbook of Wastelands Development
4. Rural Development and Social Forestry : Lessons from China
5. Mother Nature
6. Bio-Energy : the Dependable source for the future
7. Let Us Protect Our Environment
8. Appu and his Pet Puppy
9. Niru and her Baby Mango Tree

These include technical and pictorial publications for scientists, field technicians and children. BAIF has produced the following documentary films and video cassettes to support training and motivation of the rural people and field technicians in social forestry -

1. Varadan (The Boon)
2. Utthan (The Dawn)
3. Golden Earth
4. Industrial Greenbelt: A War on Urban Pollution
5. Gokak goes Green

These films have been made available to various organisations interested in promoting social forestry through training and extension.

14. Social Forestry Network of NGOs

With an objective of providing information and technical services to the NGOs involved in social forestry, BAIF has already set up an informal Social Forestry Network. As an initiative in this direction, BAIF has been sending useful literature and films to interested agencies.

15. Radio Programmes on Environmental Protection

With a view to capture a wider audience, BAIF has completed two radio serials during the year 1991. The first serial targeted for the farmers, covered the success stories of cultivating different tree species. The other serial aimed at educating children on environmental protection. The programme with the title 'Nate Nisargashi' was broadcast over 13 weekly episodes and several hundred students who had replied correctly to the questions asked at the end of each programme were awarded colourful books on environmental protection. BAIF has presently undertaken the evaluation of different media mainly audio visuals and print media for creating environmental awareness and promoting afforestation in rural areas.

Impact

- * There has been tremendous response from farmers to take up cultivation of subabul on private lands and public lands. It has been observed that livestock owners prefer to establish subabul and other fodder trees on field bunds and borders to meet shortfall of fodder. There has been a good demand for superior quality subabul seeds particularly from the farmers of Andhra Pradesh who have been taking up the cultivation for supplying wood to paper mills. BAIF has been popularising the cultivation of leucaena in marginal and wastelands through agroforestry extension and production and distribution of about 10 tons of leucaena (K₈) seeds annually.
- * Afforestation on degraded wastelands has converted barren denuded lands into productive lands ensuring sustainable income to the small and marginal farmers.
- * The effort to encourage school nurseries and essay writing competitions created significant awareness among the students and many of the schools initiated afforestation and environmental protection programmes.
- * Several industrial greenbelts developed by BAIF have not only helped in changing the micro climate but have also been attracting visitors for recreation. At Ghansoli adjoining Thane-Belapur industrial belt, about 5 km from New Mumbai, the plantation sponsored by NOCIL has been attracting atleast 2000 visitors during weekends. Looking to the favourable change in the micro climate, the local villagers have been extending full cooperation and are helping BAIF to protect the plantations effectively.
- * The demonstrations established by IPCL at Nagothane to cultivate various fruit trees as part of green cover development, using treated effluents has motivated farmers in the locality to take up similar plantations on private lands. Looking to their enthusiasm, IPCL has been extending timely support and technical guidance.
- * The industrial plantation at Gokak Mills spread over 120 ha has been another significant site for nature lovers. Once totally barren land, now it has a lush green cover of neem, subabul and several precious species. The plantation has been attracting a wide range of wildlife and motivating various organizations to take up similar work on their wastelands.

Innovative Models for Poverty Alleviation

1. Dairy Husbandry for Sustainable Livelihood

Promotion of dairy husbandry through upgradation of low productive non-descript cattle was given priority as most of the villagers owned a few cattle and the programme ensured techno-economic viability and prosperity for small farmers. Cattle development which was already initiated by the Government of India in early 50's was not popular due to lack of awareness and poor technical skills.

BAIF conceived an innovative programme to provide breeding and technical advisory services at the doorsteps of the poor farmers, using frozen semen of superior sires. Unemployed local youth were trained to undertake livestock breeding, pregnancy diagnosis, disease prevention vaccinations, primary health care, forage production, feeding and other technical aspects of livestock development in rural areas, assigning 12-15 villages for each Para Vet. While conserving the elite native breeds, uneconomical cows were bred with international dairy breeds. Door to door service not only helped the farmers to avail of timely services but also to develop confidence in technology adoption. As a result, the programme recorded a high conception rate of 55% (compared to 15-20% in the earlier programme) and the newly bred cattle could come into milk production, at the age of 3 years and produce over 2500 kg milk/lactation (as compared to the yield of 200-300 kg by the non-descript cows). As such cows were priced at Rs 15,000-20,000, farmers took good care by stall-feeding. This resulted in a three-fold increase in farmyard manure production and reduced grazing pressure on community lands. Dairy husbandry has also ensured nutritional security, through easy supply of milk and enhanced agricultural production.

Initially, BAIF started six centres in 1972 with the support of the Sugar Cooperatives in Maharashtra. Seeing the impact of this programme, the Planning Commission of India recommended wider replication under the Integrated Rural Development Programme in 1979. Presently, BAIF is operating 1400 cattle breeding centres in 12 states providing gainful self-employment to over 2.25 million rural families. Among them, at least over 7-8 lakh families maintaining 2-3 high yielding cows are able to earn about Rs 15,000-18,000 per annum. The milk produced under this programme is worth Rs 1650 crores per annum.

Apart from these centres which are managed directly, BAIF has trained over 800 unemployed youth to operate Livestock Development Centres independently, as a means of gainful self employment while providing reliable services to farmers pursuing dairy husbandry as a dependable source of livelihood. This scheme, having potential to provide self-employment for over one lakh youth, is being promoted in different parts of the country.

It has been observed that with the introduction of cross breeding programme, farmers adopted stall feeding and reduced the size of their herd. Such programmes have directly helped in establishing successful afforestation and silvipasture on community wastelands and degraded forests.

2. Silvipasture Development on Wastelands

To enhance the profitability of dairy husbandry through economic feeding, BAIF developed a programme of forage production on degraded lands, without competing with food production. As most of the traditional fodder crops grown in India demanded good quality land and assured supply of water, BAIF evaluated a wide range of non-traditional hardy, drought tolerant shrubs and herbs which can be cultivated on wastelands. In this process, BAIF promoted the cultivation of Salvador type *Leucaena* (Subabul) introduced from Hawaii, which has become popular throughout India as a tree crop for fodder, fuel and pulp wood. BAIF has

also bred and evaluated various cereals suitable for fodder production on arid and wastelands. Superior quality seeds and technical guidance are being provided to farmers for cultivation of different fodder crops.

Livestock is the main source of livelihood for the small and poor farmers in arid and hilly regions and traditionally, 10-20% of the land in every village is maintained as community pasture to facilitate fodder supply for these farmers. However, over the years, these common lands have been heavily denuded and over-exploited, resulting in loss of grass cover and severe fodder scarcity. To reverse this trend by inducing a sense of responsibility among the villagers and through introduction of appropriate soil and water conservation practices, BAIF promoted silvipasture development on community pasture lands in 70 villages located in semi-arid regions of Rajasthan, covering 3000 ha. The strategy was to involve different sections of the village community right from project planning, incorporate watershed development as an integral part of silvipasture development, introduce hardy protein-rich shrubs and trees apart from native grass and leguminous herbs, introduce stall-feeding, livestock breed improvement and equi-distribution of fodder and other outputs, as decided by the village pasture development committee represented by all sections of the society. This programme not only enhanced the forage production by 6-8 tons/ha and green cover on the barren pasture lands but also reduced soil erosion, raised the ground water table, improved the bio-diversity and micro-climate. The Government of Rajasthan is now actively considering expansion of this activity in the entire state.

3. Water Resources Development

Water is not only critical for survival but also for ensuring food security and sustainable livelihood for the rural population. However, in India, only about 30-35% of the total rain water is utilised, while the rest is wasted, resulting in floods, soil erosion and siltation of river beds and reservoirs. It is generally the poor farmers who own poor quality land and are deprived of water even for drinking. Although, a massive watershed development programme has been launched in the country on top priority, the poor need further support of technology and resources to make best use of the water conserved through this programme. With this background, BAIF has taken several innovative projects to club water resource development with ravine land development and conservation of village common lands, sustaining the interest of small farmers.

In Moosanagar cluster in Kanpur (Rural) district of Uttar Pradesh, farmers were motivated to develop the ravine lands through gully plugging, creation of percolation tanks, contour bunding and establishment of grass and shrub species on ravine lands, owned by the Government and community. This could reduce soil erosion on the adjoining agricultural fields owned by the farmers. The rain water collected in percolation tanks facilitated the re-charging of ground water and the local farmers took advantage of the increased ground water table by drilling tube wells in small groups to increase their cropping intensity by 100%. Through this project, they have learnt the need for protecting the community lands for enhancing the productivity on their farms.

In Hassan district of Karnataka, a network of farm ponds scattered in the fields facilitated the storage of rain water for 6-8 months in the year and supported the farmers to establish fruit plantations or cultivate vegetable crops while controlling soil erosion and run-off of rain water from the field. The water accumulated in these ponds could also re-charge the ground water thereby reviving the rivulets and bore wells which were earlier defunct due to lowering of water table. This programme could help the farmers to increase the cropping intensity by 25-30% as well as the yields by 30-40%. Looking to the enthusiasm of the farmers and impact of the programme, the model has been adopted by Government of Karnataka for wider replication under the World Bank aided watershed development programme since 2002. The watershed development programme covering 2.20 million ha in 600 villages has benefitted over 70,000 families.

4. Tribal Rehabilitation through Agri-Horti-Forestry

Tribals who represent over 10% of the Indian population are significantly backward mainly due to their displacement from forests rich in natural resources. Deprived of the traditional means of livelihood, they have taken up shifting cultivation on degraded forest lands and migration to urban areas in search of wages. Not assured of food security and employment, they have become addicted to alcohol and other vices. Children who accompany their parents to the cities are also deprived of education and health care. Although a large number of voluntary organisations and Government agencies are involved in tribal rehabilitation, there has not been any significant breakthrough in rehabilitation of this vulnerable community. Therefore, BAIF decided to initiate an eco-friendly sustainable development project by rehabilitating the tribals on degraded forest lands. The lands being inferior, infertile and deprived of irrigation facilities, BAIF developed a strategy to establish fruit orchards which can ensure food security as well as generate substantial income from newly established fruit orchards.

The programme was initiated by taking the participating families into confidence and involving them right from the stage of planning. As women are the major work force, it was decided to ensure their active participation in the programme by reducing their drudgery, ensuring health care, promoting functional literacy and providing skill-oriented training. Based on the traditional knowledge of the tribals and technical feasibility, an agroforestry programme was conceived to establish fruit trees as main crops, fodder, fuel and medicinal herbs on fields, bunds and borders while intensifying the cultivation of traditional agricultural crops in the inter-space. Various improved agricultural practices were introduced to conserve soil and moisture, improve soil fertility and Integrated Pest Management was undertaken to protect the crops. As the fruit orchard has a gestation of 4-5 years, various intermediary sources of income were developed through promotion of fruit and forestry nurseries, group vegetable cultivation, sericulture, mushroom production, vermicomposting and off-farm activities like establishment of flour mills, consumer stores, production of housing materials and promotion of various services. The programme was supported with water resources development activities to ensure critical water supply for nurturing the fruit plantations, particularly during the initial stage. Depending on the agro-climatic conditions and preference, fruit crops like mango, cashew, custard apple, ber, guava and citrus were cultivated by the tribals on about 0.4 ha land which

generated a net annual surplus of Rs 25,000-30,000. With intensive land management, the crop yields in the inter-space were higher by 30-80% as compared to the yield during the earlier period. With assured income and food security, the tribal families stopped migration. They started sending their children to schools. They initiated additional income generation activities and post production and marketing activities as well. Vasundhara Cooperative Society, a tribal cooperative with its brand name 'Vrindavan', had a turn over of Rs 2.25 crores during the year 2003-2004. This unique programme, popularly known as *wadi* not only provided food security and year-round employment to 0.12 million tribal families spread over Gujarat, Maharashtra, Karnataka, Rajasthan and Uttar Pradesh, but also ensured year-round supply of water and improved environment. The programme could address the twin problems of poverty and environmental degradation. It has evolved as a replicable model for conservation of bio-diversity while enhancing rural prosperity.

5. Cluster Development Approach for Assured Livelihood

Although dairy husbandry and cattle development, watershed development and tree-based farming had the potential to alleviate poverty of small farmers, these models in isolation could not benefit all the small farmers and landless families who have very limited access to natural resources. Hence, BAIF developed a new strategy of promoting a multi-disciplinary programme incorporating livestock husbandry, agricultural production, tree-based farming, water resources management, empowerment of women and micro-enterprises, particularly to enable the small farmers and landless to take part in 2-3 activities based on their skills, resources and opportunities. For implementing this programme, BAIF has developed a cluster development model of selecting 15-20 villages and organising the poor and backward families into self help groups of men and women. These groups formed on basis of their socio-economic homogeneity, identify the problems of each member and come up with a programme for each family. The components of this programme include various income generation activities, health care, education and development of good moral values. Village level Planning Committees, represented by all the self help groups are formed to organise forward and backward linkages, establish linkages with financial institutions and market outlets and take up various community development initiatives. Such people's organisations are helpful in sustaining the programme beyond the project period. In a cluster based development programme initiated by BAIF covering 250 villages, among 35000 poor families who participated in the programme, over 85% families were able to come out of poverty in the project period of 7 years. BAIF has now adopted this approach as a strategy for providing sustainable livelihood in different parts of the country.

As India hosts about 30% of the world's poor, providing sustainable livelihood to the rural poor is a major challenge. Thus, the innovative approaches developed over the last three decades have greater acceptance and wider replicability not only in India but also in other developing countries in Asia and Africa.