

Case Study

Community-Based Agricultural Biodiversity Conservation Programme

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Executive Summary

The Green Revolution of the 1970s was hailed for its impact on increasing food production in India. However, in order to do this, the traditional links between food, technology, ecology and culture had to be changed. New high-yield seeds, the hallmark of the Green Revolution, led to accelerated loss of genetic diversity. Uniformity in crop cultivation was accompanied by intensive use of chemicals, particularly pesticides. In a similar way, the introduction of water intensive crops drained the ground water, significantly raising the amount of water required for irrigation and depleting natural resources. Along with this, indigenous knowledge and ways of doing agriculture were relegated to the background, transforming agriculture into a subsidiary activity and farmers into mere 'facilitators' of agricultural processes.

Against this background, the GREEN (Genetic Resource Ecology Energy and Nutrition) Foundation (GREEN hereafter) started the 'community-based agricultural biodiversity conservation programme' towards enabling sustainable agriculture for the purpose of food security among small and marginal farmers in two villages of Thalli in 1996. Initial activities revolved around conservation of seeds with an effort at awareness generation of the concept of conservation of agro-biodiversity and a seed-mapping exercise. The focus was on making the farming community, particularly women in it, aware of the fact that they were the main custodians of their genetic heritage. Today, the programme has expanded to include sustainable agriculture practices like organic farming, use of bio-pesticides, bio-fertilisers, and soil improvement.

Till date, the programme has impacted nearly 4000 farmers spread across 65 villages in Karnataka. 14 community seed banks together house more than 350 varieties of seeds while the gene bank contains over 420 seed varieties.

Methodology

GREEN has successfully innovated, experimented, improvised upon and up-scaled an approach that has been proving path-breaking in introducing sustainable agricultural practices in many parts of the country. Starting its work from two villages in 1994, GREEN today works in approximately 120 villages of Karnataka. Its expanding operations for over a decade and half give good reasons to assume sustainability of the approach adopted and the vast impact it has had on the lives of farmers in the state. Moreover, the impact of the programme is substantially tangible to facilitate documentation even though the indirect impact of the programme has been as significant as the direct one.

In order to analyse the programme impact and verify good practice, existing documentation on the programme was studied. Based on this, a set of unique features and benefits was identified. The OneWorld team conducted interviews with the Executive Director and Documentation Officer at GREEN, based in Bengaluru, to better understand the functioning and confirm the perceived benefits of the programme. Actual functioning of the programme on ground was observed by visiting two community seed banks- in the villages of Terubidi and Kulmedoddi- in Maralawadi **hobli** of Kanakapura *taluka* in Ramanagar district of Karnataka. A focus group discussion was organised with 8 farmers in order to assess the impact of the initiative over years. Any remaining gaps in understanding were then filled by an interview with the Programme Coordinator- Kanakapura region.

The farmers as well as the programme implementers at GREEN were forthcoming with their views. Since the two major stakeholders of the programme- the implementing institution and the beneficiaries- were interviewed thoroughly, it can be safely assumed that biases in information are at the minimum. The research team's unfamiliarity with Kannada restricted direct interaction with farmers. However, ability of some of the community resource persons to speak in Hindi and/or English helped overcome the language barrier.

Background

The highly productive mechanical methods of farming that have had an overarching influence in the developed world and that came to India with the Green Revolution of the 1960s are being questioned today. India has been facing persistent food insecurity and inflation in the price of food items, even more so recently, despite exemplary economic growth. Along with this, the degenerating condition of the farming communities, evident in the high suicide rate among farmers in the country, has drawn the attention of civil society towards the gravity of the situation. In policy circles, the blame has consistently been placed on low productivity in agriculture. However, as the country's experience has shown, the emphasis on genetically engineered, high yield seeds and the pervasive use of chemical fertilisers and pesticides has done little to enhance poor people's access to food. Simultaneously, the implications of the uniform high yield variety seeds are devastating to food supply- these seeds do not have an inbred resistance to pests or climatic variations, they encourage monoculture crops and destroy crop diversity that is crucial for ensuring future productive harvests. As significantly, it has relegated farmer-science to the background, alienating them from their own vast wealth of indigenous knowledge evolved over centuries of experiential learning. Farmers have, therefore, been reduced to being mere 'facilitators' of agricultural practices for producing high returns yielding cash crops like cotton. It is only very recently that the Central and various State Governments are attempting to lessen the use of chemicals in farming processes- this is

reflected in the 'organic farming missions' introduced by many states. However, the governments' focus lacks any serious engagement with the role of the farming communities in organic farming practices, providing it with adequate rights and forums for grievance redressal.

Policies and their implications for farmers' rights

While the Green Revolution took away farmers' control over their own resources by making them dependent on the market, existing policy regime on seeds, plants and farmers' rights seems to further undermine farmers' rights to food sovereignty and to consolidate the hold of the multinational companies.

The Protection of Plant Variety and Farmers' Rights Act (PPVFRA) 2001 was a result of India's obligation under the Trade Related Intellectual Property Rights (TRIPs) agreement; the Act makes it mandatory for all parties to have some form of intellectual property protection for their plant varieties. Even though the Act recognises farmers as breeders, it is clearly loaded in favour of corporate plant breeders as it grants the right to sell branded seeds only to breeders and not the farmers. Moreover, it is difficult to assess farmers' seed varieties against prescribed standards of distinctiveness, uniformity and stability. Both the National Seeds Policy of 2002 and the Seeds Bill of 2004 sought to encourage private sector investment in seed production. The policy makers clearly exhibited a favouring attitude towards technology and high cost solutions.

Market forces influence not only seed production but the entire domain of agriculture. The agriculture departments' extension workers are trained to promote mainly high external input agriculture with hybrid seeds and chemicals rather than low external input-based sustainable agriculture with traditional seeds and organic inputs. Both the National Horticulture Mission (NHM) and the National Food Security Mission (NFSM) have a thrust on technology as a means of enhancing production. While the former talks of a holistic approach covering production, post production and post harvest management, processing and marketing, it nevertheless has the promotion of research and development (R&D) technologies as a major strategy. The NFSM aims to increase the production of rice, wheat and pulses in the country and makes no mention of coarse grains or minor millets that are the preferred diet for rural populace. Traditionally consumed food crops such as *ragi*, *sajje* and *navane* are not included in the Public Distribution System of the country.

GREEN Foundation's intervention

It is against this backdrop that the work of the GREEN Foundation, started more than a decade and half ago, comes across as pioneering in recognising the need for conservation of agro-

biodiversity while building self-reliance and livelihood security for the communities involved. The 'community-based agricultural biodiversity conservation programme' started with a focus on maintaining diversity in seed varieties. The concept of on-farm conservation through community seed banks was based on ecological, economic, cultural, political and gender-based analysis of the issue. The community seed bank is a system in the process of community agriculture, which encompasses village level facilities where traditional varieties are safeguarded. Through this system, farmers have played a key role in the creation, maintenance and promotion of crop genetic diversity. The programme has moved beyond community seed banks today and looks at sustainable agriculture holistically. The vision expanded to include use of bio-pesticides, bio-fertilisers, soil improvement and organic farming. This led to the introduction of vermicomposting, kitchen gardens and various other innovations.

The programme was initiated by Dr. Vanaja Ramaprasad in 1996 with five women farmers, a handful of seeds in Dharampuri district of Tamil Nadu. With dedication to the cause of conservation of biodiversity and improvement in the livelihoods of marginal and subsistence farmers, its activities are currently spread across different districts and agro-climatic zones of Karnataka. Its work currently expands over 65 villages across Karnataka. The programme is implemented in 60 villages in Kanakapura *taluka*, which is where the major portion of programme implementation is focused, and 3 villages in the newly-formed Northern Karnataka Network. Till date, approximately 4,000 farmers have benefited from various innovative initiatives within the programme. The crux of GREEN's work lies in the community seed banks. Accordingly, there are 9 seed banks in Kanakapura and 14 in total across Karnataka. Apart from these, a gene pool is maintained that houses nearly 420 varieties of seeds.

Objective

The primary objective of the Green Foundation's community-based agricultural biodiversity programme is to strengthen the capacity of farming communities in Karnataka to conserve, utilise and benefit from their genetic resources through appropriate technical support, institutional mechanisms and policy interventions.

Programme Design

Based on the philosophy that 'farmers are the best scientists', the agro-biodiversity conservation programme of GREEN includes activities like seed-mapping, seed *yatras* and seed fairs, exposure visits, setting up seed banks, capacity building and training, seed and crop improvement, kitchen gardens, community gardens and vermicompost production, income generation programmes (like handicrafts), organic farming certification, field farmers' school

programmes, and organisation of farmers into a federation named *Janadhanya*. All of these activities revolve around enhancing the participation of the farming community.

Key Stakeholders

Currently, there are three main stakeholders of the programme.

Green Foundation

Having started its work in the domain of agro-biodiversity conservation more than a decade and half ago, GREEN is the facilitator of the entire programme till today. However, its degree of involvement has reduced with the growing expertise of the farmers. It maintains a Field Manager in each region of its operation. Currently, it works with 8 Field Managers. They organise participatory exercises and activities such seed mapping, seed fairs and seed *yatras* as well as training programmes to build capacities of the farmers. Each of these Field Managers has practiced farming and other agriculture-related activities for substantial periods of time and, therefore, has primary knowledge of farming techniques.

Farming community members

Since the crux of the entire programme is to enhance community's participation in agricultural conservation, farmers are inherently involved in all its activities.

- The indigenous knowledge of the farmers is used for identifying traditional seeds. The more enterprising farmers work on the multiplication of seeds and seed banks are formed after due consultation with them.
- Women's Self Help Groups (SHGs) form the Seed Bank Management Committees are completely responsible for the sorting and labelling of seeds, maintenance of seed stocks, and maintenance of records of seeds borrowed from and returned to the bank.
- Under the Societies Act, the farmers are now organised into an independent federation named *Janadhanya*. The federation is a governing body involved in providing seed and food security to the community. It collects and sells local varieties of seeds to farmers outside the region and in some cases, grains as well. It has provided an avenue to farmers to earn extra income by selling their surplus seeds at an approximate rate of INR 12 per kilogram.
- Women farmers are given particular attention under the programme. It is aptly believed that while women are equally, and even more, competent than men in agriculture-related knowledge and practices, their work is hardly recognised. Therefore, community women have been involved in income generating programmes like handicrafts in order to enhance their position within the community.

- In some villages like Terubidi, the community members now shoulder 25 per cent of the financial costs involved in the maintenance of seed banks.

Funding bodies

The agro-biodiversity conservation programme in Karnataka is currently funded by two bodies.

- i. The Government of Karnataka, under its 'Organic Farming Mission' of 2007, has made an annual financial commitment of INR 4 lakh to support GREEN's work in the state.
- ii. The Netherlands-based international development organisation Hivos provides for the major part of programme costs. Hivos works on issues related to financial services and enterprise development, sustainable production, human rights and democratisation, gender, women and development, and ICT and media.

It has been GREEN's operational strategy to work with various partner organisations in the field in order to spread their ideas and approach. Partner organisations in the past have included Keystone, Agramee, Anthra, Satvik, and Mitra.

Work Flow

The very nature of the activities under the agro-biodiversity conservation programme is such that they provide a holistically sustainable agriculture system. Working of the salient components of the programme is as follows.

Seed-related activities

Seed mapping

A Participatory Rural Appraisal (PRA) technique is adopted to map seeds in order to quantify the genetic diversity available with the community. The process involves the entire community, particularly the senior members, and enables them to determine the diversity that has been lost and that which can be retained. Seed mapping is followed by collection of available varieties and their distribution among farmers for further multiplication and utilisation. Varieties that have been lost in a particular area are procured from another area with similar climatic conditions and distributed among farmers.

Intensive discussions and dialogue among community members are involved in the process of seed mapping. This is crucial since it helps the farmers to identify for themselves the ill-effects of mono-cropping, loss of diversity and conversion to high yielding varieties. Discussions are non-threatening and have proven to be the most effective strategy for encouraging farmers to

convert to multi-cropping and traditional agricultural practices. This provides a substantially high probability to their staying with the practice.

Seed yatras and seed fairs

These are mainly activities for promoting awareness among villagers about the effects of globalisation and the way it has impacted the agricultural sector.

Seed *yatras* are events where farmers, staff of organisations, and animators carry out a procession through several villages of bullock carts colourfully decorated with ear-heads of different crops and vegetables grown from traditional seeds. It encourages interaction among villagers, helps in building links among farmers from different villages and motivates a general public interest in the concept of sustainable agriculture.

Held immediately after the harvest season, a seed fair brings diverse farming communities together to understand the need to conserve agro-biodiversity. It provides opportunities to farmers to demonstrate seed storage techniques, nutrient management, pest and disease control, and crop diversity of their farms.

Community seed banks

Community seed banks are an important strategy for maintaining genetic diversity in crop and plant species. The location of the seed bank is decided as such to cater to nearby four to five villages or more in case the villages are small. All seed banks facilitated by GREEN are operated through the existing SHGs in villages.

The first step in setting up a seed bank is to identify the people who will run it. For this, two representatives of each SHG working in the region are invited to a meeting in the village where the seed bank is to be established. After learning about the work involved in setting up and maintaining a seed bank, a discussion follows where the community decides which group would be most suitable for running it. Once seeds are collected through the seed *yatras* and seed fairs, the members of the chosen SHG start storing indigenous varieties of seeds in a place identified as suitable for setting up the seed bank. SHG members are responsible for (a) proper storage of seeds, (b) lending seeds to those who require them, (c) maintaining a record of seeds lent out



Figure 1: Community seed bank in Terubidi, Kanakapura
Source: OneWorld Foundation India, 2011

and returned, (d) ensuring that the seeds returned adhere to prescribed standards of quality, (e) maintaining records of seeds that are in demand, and (f) promoting the use of local varieties of seeds.

Exposure visits

Exposure visits are organised to enable cross-learning between farmers from different regions. It is based on the logic that when farmers interact with one another, it creates an enhanced understanding, awareness and knowledge about agricultural processes at work in other areas. Hands-on training in these processes is also made available. The exposure visits have helped recognise different expertises of farmers since their experience no longer remains localised.

Sustainable agriculture practices

Capacity building and training

It is important to keep farmers abreast with latest technical advances and agricultural practices since they are the custodians and managers of the local agricultural biodiversity. For this purpose, strong capacity building avenues are provided for training the farmers. The training has covered topics like seed treatment, germination test, bio-intensive gardens, vermicompost, bio-pesticides, seed storage and more. Regular meetings among farmers and the fortnightly Field Farmers School Programme (FFSP) also ensure participatory learning.

Development of bio-pesticides

Bio-pesticides are pest management tools that are based on beneficial microorganisms, nematodes or other safe, biologically-based active ingredients. Bio-pesticides help control insects, diseases and weeds, and ensure human and environmental safety. Examples of bio-pesticides include bitter leaves and formulations that emit bad odour to drive away pests; vermin-wash spray that works both as a pesticide and a fertiliser; chilli-garlic spray, wood ash powder and neem leaf extract are other popular pesticides.

Kitchen gardens

Kitchen gardens are rich in genetic diversity and translate into dietary variety and high nutrition for households though out the year. Kitchen gardens provide three key benefits. Firstly, many households have been growing vegetables like brinjals, gourds, beans and some medicinal plants as well. Most of the produce is for their subsistence, bringing down the financial costs for procuring vegetables from the market. Secondly, kitchen gardens are an effective way to maintain seed stocks of basic vegetables and pulses. Lastly, maintenance of

kitchen gardens is mainly the prerogative of women. They have helped bring women's work in the household to the forefront.

Community gardens and vermicompost

Community gardens are maintained for the multiplication of rare and exotic vegetable varieties in the area and to generate income by marketing the seeds and vegetables. They also help landless farmers to benefit from the initiative since the produce is shared with them.

GREEN has also helped to start vermicomposting in all the villages under the programme. The compost is used to replenish the soil nutrients and promote bio-fertilisers. The vermicompost utilises agricultural remnants, provides organic manure for the fields, and eliminates the need for external inputs in terms of fertilisers like urea.

Income generation programmes

Agricultural activities are in a flurry during the sowing and harvest season. During other seasons, the farmers have ample time to spare. The income generation programmes include making artefacts and household products using farm materials like grass reeds, banana barks, jute and bamboo; making plant-based medicines, and other value-added products like papads, chutneys, pickles, millet mix, rice products, sweets and savouries using organically-grown crops.

These predominantly women-centric activities are increasingly witnessing participation of men. Hence, they are also serving to loosen the rigid social divisions between men and women in the villages.

Financial Resources

The programme is currently funded by Hivos, a Netherlands-based international development organisation, and the Government of Karnataka.

Impact

GREEN's agro-biodiversity conservation programme has been in operation for nearly a decade and half and has expanded from two villages in Tamil Nadu to nearly 65 villages across North and South Karnataka. The programme has impacted nearly 4,000 farmers in direct and indirect ways.



Sustainable level of yields

The conventional way of practicing farming relies on mono-cropping, depletes soil nutrients, and high yield variety seeds do not have an inherent immunity against pests, diseases and they are incapable handling erratic changes in climatic conditions. While this method produces high yields with the help of genetically engineered seeds and chemicals, chances of crop failures are equally high in it.

When traditional seeds and indigenous farming methods were employed on such soil in Kanakapura, yields in the initial two were substantially low than what the farmers were used to. Once the soil has habituated itself to organic methods, yields have now increased and are at par with, and in some cases have exceeded, earlier levels. Since the seeds are locally adapted and multi-cropping is practiced, chances of the failure of entire crop are substantially low.

Cost effectiveness

Mechanised farming techniques rely on external inputs like high yielding seed varieties and chemical fertilisers and pesticides. These are developed by multinational corporations (MNCs) and have ensured farmers' dependence on the market. On the other hand, use of local seed varieties, organic manures like vermicompost and indigenously-developed pesticides has minimised dependence on the market, thereby bringing down the financial costs involved in farming. For instance, a 50 kg bag of Urea costs approximately INR 350 and a farmer requires 7 to 8 bags per hectare for one season. Against this, vermicompost and other organic manures like cow pat pit manure, cow horn manure, horn silica medicine and such like utilise agricultural and animal waste. The cost involved, therefore, is negligible.

Conversion to multi-cropping has reduced the financial burden on many farmers. Some of them used to take loans to buy seed for their entire lands. But they now need less seeds since, on a portion of their land, they sow seeds of different varieties collected from the seed bank.

Use of water and management of soil nutrition

Chemical fertilisers and pesticides make the soil dry and significantly increase the amount of water required for irrigation. In dry land areas like Kanakapura, availability of water resources is as it is a challenge for agriculture. With the use of organic manures, the soil retains its moisture for longer. In Kanakapura, farmers have reported a decline of 35 to 40 per cent in the amount of water required for irrigating the fields now.

Organic farming prevents many of the problems associated with intensive farming systems. These problems include compaction, erosion, salinisation and soil degradation. Organic manures and mulches are applied to the soil even before the crop is sown, leading to a process

known as 'mineralisation'- literally the mixing of minerals in the soil. Mineralized organic matter, which is not present in synthetic fertilisers, is one of the essential ingredients required physically and chemically to hold water on land.

Organic farming also uses crop rotations, undersowing and mixed cropping to provide the soil with near-continuous cover. This is essential for maintaining the nutrients of the soil. By contrast, under conventional farming methods soil is often left uncovered for extended periods prior to sowing, and again after the harvest, leaving essential organic matter fully exposed to erosion by rain, wind and sunlight.

Increase in the number of traditional seeds revived

Currently, GREEN's gene pool in Kanakapura houses approximately 420 varieties of seeds. The 9 community seed banks within the *taluka* collectively house 160 varieties of paddy, 86 varieties of *ragi* and 60 varieties of vegetables. Strong networks have been established among the seed banks. In case a particular seed bank runs out of a particular variety of seeds, it can easily be borrowed from another seed bank or from the gene pool, in the last instance.

Impact on state agricultural policies

The Karnataka state government rolled out its Organic Farming Mission in 2009 to protect, promote and strengthen agro-diversity and farmers knowledge systems within the state. GREEN's work in this domain has been recognized as path-breaking by the government. GREEN was also invited for several rounds of consultations prior to the rolling out of the mission.

The indirect impact of the programme has been as crucial as the tangible one.

Increased awareness

There has been a marked difference in the way farmers now approach their farming practices. During the FGDs, farmers unanimously voiced in favour of sustainable agriculture techniques. They are aware that use of traditional seeds and methods can give them better seed and food security, result in better health due to reduced or no use of chemical inputs, result in less expenditure on food and inputs for agriculture, provide an alternative to migration, increase soil fertility, and provide adequate fodder for the cattle.

Making women the decision makers

The role and participation of women in agro-biodiversity conservation is crucial to the philosophy of the programme. Traditionally, women have been the seed savers of the community. There has been a revival of this role with GREEN's programme. Women are

engaged in the programme through the SHGs and this has empowered them to lead the programme itself in running of the seed banks.

More public visibility of their work has empowered the women in the decision-making processes with regard to cropping patterns. Women are actively involved in decisions about seeds to save, grow and multiply. There are visible changes in gender relation within the community. Even as health providers of the family, women have made a difference. The setting up of kitchen gardens in their backyards has resulted in nutritious food for their families.

Challenges in Implementation

The concept and practice of reviving traditional seeds and agricultural practices faced major initial challenges. To begin with, farmers had to be taken through an 'unlearning' process. Years of modern agricultural techniques had taken away their agency to make decisions, choose for themselves, and their entrepreneurial tendencies. This stood in the way of their recognising themselves as the custodians of genetic heritage. It was difficult to make them aware that they had lost traditional seeds and that local varieties grown in the traditional way can yield results as good as the high yielding varieties.

The erosion of genetic matter in the region and state per se had been so extensive that, as per the GREEN team, gene banks all across the world had to be contacted in order to source seeds. As pioneers of this approach, GREEN had no precedent to follow and had to constantly innovate on need basis. Opposition and scepticism from the scientific community constantly worked to undermine GREEN's approach and initiatives. However, with commitment and persistence, the programme survived these initial challenges and gradually expanded its spread.

On the side of the farmers, the major challenge to the programme is the absence of a streamlined, uncomplicated and reliable marketing mechanism. Fluctuation in the prices of grains and prevalence of mediators often undermines the income of the farmers from their produce. However, a start has now been made in this direction. An independent farmers' federation- *Janadhanya*- provides a platform for collection and sale of local varieties of seeds and grains. If the mechanism is made to function properly, farmers would not need to approach middlemen for selling their produce.

Conclusion

The agro-biodiversity programme has been operational for a long period, starting from 1996, and has innovated along the way to deal with any emergent challenges. GREEN was the

pioneer of this approach in the country. Its impact has been duly recognised by government bodies at various levels. The idea of seed banking in Nepal and Bangladesh owes much to GREEN's work.

The initiative is clearly a best practice in the domain of securing livelihoods for the farming communities. Its approach is innovative and impact tangible and measurable. Its steady expansion in the state of Karnataka, and many other parts of the country through its partner organisations, suggests its institutional and financial sustainability. In terms of institutional sustainability, GREEN has set up Village Development Committees and *Janadhanya* to serve as nodal facilitators of this approach once GREEN withdraws its direct involvement in these villages. At the individual village level, Community Resource Persons (CRPs) are being trained to serve as contact points for farmers in the future.

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Appendix A – Interview Questionnaire

GREEN FOUNDATION (GF)

Background

1. When and where did GREEN start working in the field of agro-biodiversity conservation?
2. Did it start as a new programme or as the extension of an existing one? What were the motivations for the same?
3. Was there a pilot project for this programme? If yes, please provide details- purpose, duration, location, finances involved, sources of funding, results, follow-up interventions.
4. What have been and are the current worksites for programme implementation? What are the criteria for choosing these sites?
5. Which activities are involved in the agro-biodiversity conservation programme?
6. What is the current policy stand and involvement of the Government of Karnataka on agro-biodiversity conservation?
 - a. Has GREEN's work on agro-biodiversity conservation been able to affect any changes in Government of Karnataka's policies regarding the same?
7. Please provide details of your organizational structure? How many staff members (headquarters and field) are involved in the programme and what are their exact roles?

Stakeholders

8. The three main stakeholders of the programme are the GF, farmers and funding agencies. Please elaborate on each of their roles in the programme.
9. Are there any partnerships with the formal sector viz. the plant breeding research institutes, or any other organizations?

Community Seed Banks

10. What is the organizational structure of the community seed banks?
11. Please explain the step-by-step process of community seed bank operations.
12. How is the use of traditional seeds beneficial over that of hybrid seeds?
13. How are traditional seeds identified and obtained? What are the criteria for deciding which seeds are to be conserved?
14. What is the shelf life of conserved seeds? How is the stock of seed species maintained?
15. What are the parameters for ensuring the specified quality of seeds in the bank? How are these parameters decided upon?

16. Do all kinds of seeds respond similarly to GREEN's techniques for their conservation? If not, what are the techniques employed for conserving non-orthodox seeds (viz. *in vitro*, cryopreservation)?
17. What incentives are provided to the farmers to put seeds in the seed bank? Are farmers required to pay any membership fee?

Sustainable agricultural techniques

18. Please provide details on GREEN's involvement in the following:
 - a. Kitchen/home gardens
 - b. Organic farming
 - c. Land development activities

Participatory Guarantee System

19. What is the existing system for organic certification by external agencies?
20. How is the PGS an improvement over this existing system?
21. Please provide a work flow of the PGS.
22. What is the organizational structure of the PGS? How are farmer representatives appointed?
23. PGS also involves marketing directly from the producer to the consumer. How is this done?
 - a. What have been the benefits of this direct marketing approach?
24. Does PGS have the same credibility as the existing system? Is it recognized only within the particular community networks?
25. Are there any costs involved for the farmers in this process- membership fee etc.?

Community participation

26. The participation of women in agro-biodiversity conservation is critical to GREEN's work. What are the arenas in which women's work has been leveraged by GREEN?
 - a. Considering social restriction, how is women's participation ensured in agricultural activities?
27. What were the motivations behind the formation of Janadhanya?
 - a. What is the organizational structure of Janadhanya?
 - b. According to our research, Janadhanya is involved in various activities. Please provide details for each of the following:
 - i. Institution-building
 - ii. Provision of training and mentorship
 - iii. Business development services

- c. What is the kind of training provided to the farmers with regard to Janadhanya's operations?

Monitoring mechanism

28. According to our research, GREEN has developed a systematic method to 'map' the seeds and track the results of crops. Please provide details regarding the design and functionalities of this method.
29. What are the parameters for evaluating the performance- from germination to harvest- of each seed variety? How were these parameters decided upon?

Impact

30. Please provide annual data on the following, 1996 onwards:
 - a. Number of villages
 - b. Number of farmers involved
 - c. Number of seed banks
 - d. Number of samples, number of varieties, number of species conserved
 - e. Break up of these seed varieties in terms of medicinal plants, endangered species etc
 - f. Inputs required under the hybrid seed cultivation system and GREEN's conservation programme- fertilizers and pesticides, productivity, financial.
 - g. Outputs delivered under the two methods
31. How has been the performance of conserved seeds *vis a vis* hybrid seeds in terms of inputs of fertilizers and pesticides, soil and water conservation etc? Please provide data on these.
32. How would GREEN ensure that its interventions sustain themselves after the organization pulls out of a particular work location- institutionally, technically as well as financially?

Financial inputs

33. How is the agro-biodiversity conservation programme funded?
34. What are the major heads of expenditure? Please provide an approximate break-down of costs per head.
35. Is there a revenue-generating aspect of the programme (from seed banks, vermicomposting etc)?

Challenges

36. A common conflict in seed conservation programmes has been found to be that between varietal conservation (a large variety of traditional seeds should be conserved, particularly

the endangered ones) and socio-economic needs of the farmers (the seeds that give most financial returns are not endangered; preserving other seeds as well takes away resources from investment in the more popular ones). Did this pose a challenge in GREEN's programme? If yes, how was it overcome?

37. Another significant hurdle in community-based programmes with marginalized populations is the lack of awareness and entrepreneurship among members to experiment with newer methods. What were the methods adopted by GREEN to overcome this challenge?

