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ANNUAL REPORT 2004

FOREWORD

The year 2004 has been different for two reasons. In addition to the usual business of executing projects involving technology dissemination and exploring nascent technology of relevance to rural areas, we have (a) experimented with new technology dissemination models for creating income generation options in rural areas and (b) demonstrated technology in states of India where it had no prior experience or exposure.

Exploration of nascent technologies has been possible because of the core grant of DST, a grant that was not linked very rigidly to project deliverables. TIDE has, over the years developed expertise in designing wood or loose biomass burning stoves for a number of rural industry applications. However designing energy efficient jaggery making stoves continued to remain a challenge because of the vast variety in jaggery making devices and techniques. We have therefore through the core grant experimented with new designs for jaggery making pans instead of stoves and it is expected that in the coming year we would be able to offer fuel efficiency in jaggery making operations. We have also collected data on the new design of a low capacity brick kiln (about 12,000) bricks per batch) developed by Prof K S Jagadish of Gramavidya. The good wishes of Prof Lokras and Prof Jagadish, have enabled TIDE to offer well engineered energy efficient stoves and kilns and have contributed to TIDE's image of an organization that can deliver technology to disadvantaged sections of society. We gratefully acknowledge their contribution in the emergence of TIDE as a competent technology dissemination organization.

We have also tested the technology of bioreactors for production of biogas from a variety of solid biomass like urban solid waste, leaf litter, coffee waste in a number of projects. This technology developed by Dr. Chanakya, of Centre for Sustainable Technologies, IISc has exposed us to situations where the technology was challenged because of factors not related to technology and we realized that even if the technology is ready for field-testing the reverse might not necessarily be true.

The year 2004 also saw the end of TIDE's most successful project to date on 'Dissemination of energy efficient biomass combustion technology in non formal industries in Karnataka and Kerala'. This 5-year project supported by India Canada Environment Facility (ICEF) demonstrated a technology dissemination model for making stoves and dryers available to rural industries through entrepreneur networks. The project and the entrepreneur networks created by it have disseminated 4181 energy efficient devices in Karnataka, 826 in Kerala and 122 in Tamil

Nadu in an unsubsidized mode. Responsibility is a natural consequence of success. We are aware that we have a set of robust technologies and a sustainable technology diffusion model and we must exploit this knowledge and reach out to a far larger audience.

We are also aware that thus far success in technology diffusion when measured in number of devices sold has largely been confined to the rural industry that can afford to pay for the technology. We at TIDE are experimenting with technology transfer models where women self help groups are recipients of new technology and are able to generate income through projects funded by ICEF and ETC. These are challenging projects and the experiences would go a long way into the emergence of TIDE as a technology dissemination organization sensitive to the needs of the disadvantaged sections of society. ICEF and ETC have been supporting TIDE for about 5 years now and we are aware that we must live up to the faith that they have reposed in us over the years.

TIDE has been able to venture into new states in India both through projects and at the invitation of like-minded NGOs. We have demonstrated fuel-efficient stoves for silk reeling, yarn dyeing and bleaching in textile clusters in Tamil Nadu, Andhra Pradesh and Chattisgarh. We have also demonstrated a pottery kiln and a brick kiln in Madhya Pradesh and fuel-efficient ayurvedic medicine preparation stoves in Uttaranchal. These experiences have showed us that technology dissemination goes far beyond development of a good acceptable technology. An understanding of the lifestyle and needs of the society that is the recipient of the technology is vital for the development of an appropriate technology dissemination plan. We now realize that what is technologically superior is not necessarily accepted. The need to compromise on technology specifications and product quality in the interest of acceptability and low cost is an important lesson that we have learnt in the past few years.

An emerging area in TIDE is the work done by the water-harvesting group. After being tentative for the past years about the nature of expertise that we should develop in the area of water harvesting, we have identified water quality and quantity issues in peri urban areas as our attention. An ongoing project of DST should bring this activity into sharper focus.

We at TIDE realize that we have the capacity and the know how to disseminate technology far beyond our current efforts. But in order to do so we have to strengthen our limited financial and human resources. While the competency and the commitment of TIDE staff are not in doubt, we know that they should not be stretched beyond a point. The Council of Management and staff of TIDE clearly have a job on their hands and they have the determination to address it.

Svati Bhogle

WASTE MANAGEMENT AND EFFLUENT TREATMENT

Bioreactors for Organic Fraction of Municipal Solid Waste at Siruguppa

(Supported by Infrastructure Development Corporation (Karnataka) Ltd., (iDeCK))

TIDE, in technical collaboration with Centre for Sustainable Technologies (formerly ASTRA), Indian Institute of Science, Bangalore, has been involved in the dissemination of bioreactors for various applications. In 2003, Infrastructure Development Corporation (Karnataka) Ltd., (iDeCK), Bangalore, and TIDE entered into an agreement to set up a bio-methanation unit for processing of organic fraction of Municipal Solid Waste (MSW) at Siruguppa town, Bellary district, Karnataka.

The objectives of the Project are:

1. To demonstrate the new technology of bio-methanation for the processing of Urban Municipal Solid Waste (technology developed at Centre for Sustainable Technologies (CST), Indian Institute of Science, Bangalore)

2. To set up 3 modules of 60 cum. volume bioreactor, which are designed to handle 1.5 tons of Municipal Solid Waste

3. To study the techno-economic performance of the technology

Before the setting up of the bioreactor, a field survey and physical analysis of MSW in Siruguppa was carried out by TIDE. The bioreactor construction commenced in March 2003 and the plant was commissioned in September 2003. The bioreactor system has been operational since September 2003 and 7.5 - 10.0 cu.m of biogas per day is being generated.

Door-to-door waste collection in Siruguppa

TIDE initiated door-to-door collection system in two wards of Siruguppa town, thus demonstrating the possibility of setting up the source segregation system. TIDE implemented activities to create awareness among the public about the waste segregation and collection system. TIDE has also ensured that the organic waste from the hotels and hostel in Siruguppa would be collected directly in the tractor carrying the vegetable market waste to the site.

Biogas production: In the initial stages of operation, as the organic waste collection was deficient it was fed in equal proportions to three modules. Since February 2004, the waste was fed to one module, instead of distributing it among three modules. This has enabled the assessment of the performance of the system at full load. TIDE carried out a series of experiments to evaluate and assess the possible use of biogas generated from the bioreactor, so that an optimum system for gas use could be evolved. Experiments were conducted for the utilization of biogas for-

a. Lighting using biogas lamps

b. Generation of power using a 1.5 kW power generator set

c. Cooking

Compost production: One module of the bioreactor is being fed with about 300 to 400 kg of waste every day. About 60 tons of organic waste has been processed in the bioreactor so far.

Samples of the compost have been analyzed and the findings are provided below.

Component	Value (%)	Typical range (%)
Organic matter	29.20	-
Organic Carbon	16.94	-
Nitrogen (N)	1.48	-
Phosphorus (P_2O_5)	0.68	-
Potassium (K_2O)	0.92	-
C / N Ratio	11.4	10 to 12

The Project has been extended for 6 months from September 2004 to February 2005 in order to assess the feasibility of the entrepreneur mode for operation and maintenance of the bioreactor, with benefits accruing from the sale of biogas and compost.

Demonstration of Leaf Litter Based Bioreactor

(Supported by Biomass Energy for Rural India Project)

Biomass Energy for Rural India (BERI) is a joint project of many funding partners (UNDP/GEF, ICEF, MNES, and GoK) to demonstrate the potential of biomass energy for meeting the energy needs of villages in 25 select villages in Tumkur district. One of the biomass energy technologies identified for demonstration in this project is the bioreactor technology developed by Centre for Sustainable Technologies, Indian Institute of Science, Bangalore to generate biogas and compost from leaf litter.

The project objectives are:

1.To construct two biogas plants (expected capacity 6 cum. and 8 cum.) in locations identified by the BERI project

2.To commission these plants and train local people identified by the project in operation and maintenance of the plants

3.To monitor gas yield for 60 days

Leaflitter-based Bioreactor at __village

Ajjenahalli and Obenahalli, two villages of Koratagere Taluk, Tumkur District, Karnataka, were identified for setting up of the 8 cum. and 6 cum. bioreactors respectively. BIRD-K, a unit of BAIF was identified as the partner agency for community mobilization in the Project.

Construction of the bioreactors commenced during December 2003 in both the villages, and local masons were employed in the construction. The construction was completed in March 2004 and the bioreactor was initially loaded with an acclimatized bacterial bed of biomass to initiate the rapid decomposition process in the bioreactor. This bacterial bed was prepared outside the bioreactor with cow dung and biomass, in the ratio of 1:4. The feeding of the leafy biomass to the bioreactor started immediately after the commissioning of the bioreactor and combustible gas generation was observed in both the bioreactors

.**Problems encountered and overcome up to the commissioning stage:**

a. Non availability of local skilled masons:

The civil works were completed using local masons. During the leak test, conducted during pre-commissioning, it was observed that the inlet and the outlet portions of the bioreactor had defective joints, owing to which the bioreactor failed the leak test. Masonry help was taken from Bangalore, and the fortification and rectification of the inlet and outlets was carried out.

b. Low anaerobic bacterial load in startup manure:

As the project team did not anticipate the series of leaks, the startup manure was prepared at the same time as the leak test. The delay caused a reduction in anaerobic bacterial concentration in the cow dung. Therefore, gas production from the bioreactor which normally starts in the first week after commissioning did not start, but took about a month.

c. Availability of water for the leak test:

As a consequence of poor quality of construction, the leak test had to be done three times. Each leak test required 17,000 litres of water at Ajjenahalli and 14,000 litres of water at Obenahalli. It was difficult to obtain this quantity of water in the villages each time despite paying for the same. The reasons were:

- The leak tests were done in summer and there was a general shortage of water
- Severe power shortage for pumping of water
- Water had to be purchased from private bore well owners and transported in tankers to the village. (only two tankers were available in the vicinity of the villages)

Contribution of leaf litter from the households started in April 2004 and went on in an uninterrupted manner for a week. Pressure of gas in the bioreactor was not sufficient for gas to travel in the gas distribution network. Also, since the feed rate to the bioreactor was not in accordance with the start up sequence, full capacity gas production had not yet started. Therefore, the supply of biogas was made in small gasbags and the project started supplying limited amounts of gas to households in gasbags. This was discontinued owing to the following reasons:

1.The gasbag required constant pressure / weight on it, or it was necessary to roll the gasbag as the gas quantity reduced after consumption

2.The gas bag occupied a lot of space in the kitchen

3.Repeated problems with maintenance of gas bags

4.BERI project stated their concern for safety in this manner of gas distribution

Accordingly, a weight distribution system was fabricated with calculated weight for the required pressure for cooking. Also, the nozzle diameter of the jet in the stove located in the farthest houses was increased so that the losses due to flow in pipe would be compensated.

After the initial period of full capacity gas generation, TIDE project team handed over the plant management responsibility to the operator.

Bioreactors for Clean Coffee Effluent

(Supported by Coffee Board, Ministry of Commerce, Govt of India)

During 2001-02, TIDE had been a part of the Project ‘ Bioreactors for Clean Coffee Effluent’ acting as a Project Execution Agency and collaborating with Centre for Sustainable Technologies, (formerly Centre for ASTRA), IISc, Bangalore. The technology of biomethanation has been demonstrated for coffee effluent in 13 locations in different geographical regions of Karnataka and Kerala from the year 2000 and demonstrated for its ability to reduce the organic load of the effluents and recover biogas. The biogas has been used for running diesel engines with up to 70 % diesel replacement.

The Coffee Board has been concerned about preservation of the environment and preventing damage thereto, and has been desirous of adopting available and experimental technology to effectively treat coffee pulping effluents. TIDE has set up four such treatment plants for the Coffee Board's two Research Stations at Balehonnur and Chettalli, and two Coffee Demonstration Farms at Sakleshpur and Mudigere in Karnataka. Coffee Board, in its continued support to the dissemination of the bioreactors for the treatment of the effluents generated during the

field processing of the coffee fruits' wash water and pulp water, asked TIDE to set up the bioreactors at its representative offices at Regional Coffee Research Station at Thandigudi, and Coffee Demonstration Farm, Yercaud in Tamil Nadu.

Coffee effluent being fed into bioreactor at Yercaud

The plants have been constructed and commissioned for operation during this year's pulping season. TIDE was also asked to set up the accessory units' recycling tank with pumping system for pulp water reuse, bifurcation channels for separating the pulp water from wash water, aerobic tank for post bioreactor effluent treatment and screw conveyor system for coffee skin separation.

The bioreactor at CDF, Yercaud was inaugurated by Mr. EVKS Elangovan, Minister of State for Commerce and Industry, Government of India on 12th December 2004. Mrs. Lakshmi Venkatachalam, Chairperson, Coffee Board presided over the inaugural function

Integrated Solid Waste Management - Chikmagalur and Raichur

(Supported by Centre for Sustainable Technologies -Indo-Norwegian Environment Program)

As a sequel to the project to set up bioreactors for organic fraction of Municipal Solid Waste (MSW), TIDE has partnered with the Centre for Sustainable Technologies (CST), Indian Institute of Science, Bangalore in the demonstration of waste processing systems for urban solid waste.

Directorate of Municipal Administration (DMA), Government of Karnataka, and Indo-Norwegian Environment Program (INEP), Karnataka have initiated the demonstration of Integrated Solid Waste Management system, which would be in compliance with the Municipal Solid Waste (Management and Handling) Rules 2000, as notified by the Ministry of Environment and Forests, Government of India. The demonstration includes activities of source segregation, primary collection, secondary storage, transportation of waste, processing, and secured disposal of MSW, together with institutional strengthening, management information system, private sector participation, NGO participation, Community Based Organizations and community involvement.

CST is providing the technical support for concept extension of bioreactors to process segregated solid waste to biogas, and compost under field conditions. Two towns - Chikmagalur and Raichur - have been selected for the demonstration.

The one-year project that commenced in April 2004 has the following objectives:

a. Extension of concept of bioreactors for resource recovery through biogas and compost generated by the processing of USW

b. Redesign and demonstrate the construction, operation and performance of the bioreactors for processing USW with pilot plants

c. Support the implementing agency to evolve a total processing system for USW

The responsibilities of TIDE, as the partnering organization with CST, are:

a. Function in the role of a technology dissemination partner to CST

b. Responsible for construction, start up, operations, demonstration and training for USW based bioreactors and compost plants (1 tpd each)

c. Assistance to CST in the daily monitoring of performance of the demo plants

d. Provide technical specifications for subsequent construction of bioreactors and compost plants for the tendering processes to the DMA nominee

e. Provide technical assistance to DMA nominee for construction, start up, operation of the plants in the post project period in required

Organic municipal waste being fed into bioreactor during commissioning

TIDE has conducted the survey of the processing and landfill site, identified by City Municipal Corporation, Chikmagalur. Designs, based on the topographical survey, have been developed for both bioreactor and heap composting system. New, innovative designs for vault to enable easy removal of digested waste from the bioreactor have been developed. Construction of the bioreactor commenced in Chikmagalur during October 2004 with earthwork excavation. All the civil works have been completed. The pre-commissioning tests of bioreactor having been completed, the startup sequence and commissioning was undertaken during December 2004.

ENERGY AND ENVIRONMENT CONSERVATION

Capacity Building for existing networks of NGOs / CBOs and SHGs for environment linked income generation activities

(Supported by India Canada Environment Facility, New Delhi)

The project is being implemented in the three states of Karnataka, Kerala and Madhya Pradesh. In Karnataka, Chikmagalur and its surrounding districts of Hassan and Tumkur were identified as the areas of operation of the project. Kasargod district in Kerala and Chindwara district in Madhya Pradesh was identified as the project areas. Vikasana in Tarikere, Chikmagalur district, Prachodana in Hassan district, BIRDS, Abhivruddi and Jnana Jyothi Trust in Tumkur districts and EIRA in Chindwara were identified as the project partners. In Kerala, Kudumbashree, Poverty Alleviation Mission of the Government of Kerala, provided assistance.

Karnataka:

Awareness Campaigns: The objective of the Awareness Campaigns was to inform members of Self Help Groups about environment friendly technologies available that could be recommended for income generation. Posters, pamphlets, a short film and working models were developed by the project for these campaigns. A short film in Kannada was shown on the Sarala stove to highlight its advantages to the household and also its potential as a means for women to earn an income. 50 SHGs and 500 women were targeted in these campaigns. In order to measure the impact of the campaign, questionnaires were designed and administered to a sample of the women attending. A base level questionnaire was administered before the campaign, to know the level of awareness about technologies, the needs of the women and their ability to take up income generating activities. After each campaign, questionnaires were administered to find out the impact of the awareness campaign.

Income generating activities: Based on interactions with the NGOs and from the information in the base level questionnaires, it was decided to introduce the Sarala stove as an income generating activity in all the identified districts. Training sessions in stove construction were held for 104 women identified by the NGOs. This was followed by promotion campaigns in the form of mobile exhibitions in which the trainees took part. 585 orders were obtained during the campaigns. An incentive scheme for SHGs and the NGO was also announced. Some hurdles like agricultural activities, inauspicious months, festivals etc, hampered the stove construction activity, and so far, 89 stoves have been constructed. Field staff has been appointed in each NGOs area to provide market support for the trained women. Efforts are on to put up a demo unit for bore well recharge in Kadur taluk, and train a person in this, so that it can be an income generating activity.

Mobile display for promoting household cooking stoves in Karnataka

Madhya Pradesh:

Chhindwara district is situated in Satpura hill range in Madhya Pradesh. It is a tribal district largely covered with sparse forests. The main occupation of the residents is agriculture and collection of minor forest produce.

TIDE, in association with EIRA, undertook the following activities to promote income generating activities among the members of SHGs formed by EIRA -

- Oil seed collection activities
- Creating awareness about issues and technologies related to Water and Energy
- Providing training in installation of Sarala household cooking stoves and Water heating stoves

Oil Seed collection activities: A baseline survey was conducted by EIRA to know about the quantities of oil seeds and the areas where large quantities of oil seeds are available. From the survey report provided by EIRA in various clusters of Chhindwara, large quantities and varieties of non-edible oil seeds such as Mahua (Gully), Karanj, Chandra Jyoti (Jatropha), Jagni (Niger) and Castor were available. Initially, TIDE undertook the activity of collecting Mahua oil seed through the SHG members to show that this activity can generate substantial income to the individuals. Based on the experience gained in this activity, TIDE plans to set up a small oil-expelling unit at a suitable location in Chhindwara district.

The procedure for collecting the oil seeds were defined and implemented. SHG members were trained in identifying and collecting good quality oil seeds and grading them accordingly. The oil seed collection activity was initiated in May 2004 for a period of 5 days with members collecting about 500 Kgs of Mahua seed. The members could not collect the Mahua seed at the price fixed by TIDE and the market price of the seeds was more when compared to the price mentioned in the baseline survey conducted by EIRA. The profits earned by selling the procured seeds at Chhindwara market were enough to cover the cost of procuring and transportation of the seeds. The SHG members were unable to collect the oil seeds in bulk, because the local traders would approach the villagers at their doorsteps and were involved in trading oil seeds with other articles and food stuffs (barter system). The project could not continue trading in oil seeds, since the price of oil seeds showed an increasing trend. At this level of price fluctuations, the setting up of small oil expelling unit was not feasible and hence the activity of seed collection was discontinued.

Water and Energy: One of the major objectives of the project is to create awareness among members of NGOs/ CBOs/ SHGs about water related such as rain water harvesting, recharge of bore wells and ground water, building improved farm ponds, etc. In relation to energy, the objective is to create awareness about the availability of improved rural energy technologies. In addition, SHG members were exposed to information about the improvement in health conditions by adopting the improved technologies in cooking practices. TIDE conducted 10 awareness campaigns in various parts of Chhindwara, about 100 people had participated in each awareness campaign. In the awareness campaigns, information related to improved technologies, advantages derived from adopting those technologies in comparison to conventional technologies was shared with individuals. During the awareness campaigns, feedback from the participants were collected and assessed with the information collected by the same individuals prior to the awareness campaign.

Training in installation of Sarala household cooking stoves and water heating stoves: The objective of providing training in installation of Sarala household cooking stoves is to create enterprises for the trainees through the construction of smokeless stoves. TIDE has installed demonstration units to

assess the performance of the stove in Chhindwara. The stoves were well accepted and interest was shown by the individuals to adopt the improved stoves. TIDE has provided training to 5 individuals in installing Sarala household cooking stoves and during training, the individuals were trained in troubleshooting, materials arrangement and maintenance of the stoves. TIDE has also provided training in constructing water-heating stoves in Chhindwara.

Energy efficient water heating stove in Chindwara

TIDE has supported the individuals in promoting the household cooking stoves by meeting the potential adopters at their doorsteps and explaining about the improved household cooking stoves. Advertisements were also published in local newspapers to generate demand for the Sarala household cooking stoves.

The stoves are currently promoted purely on commercial mode and no subsidy is being provided by any agency. The poor villagers in Chhindwara found it difficult to pay Rs. 150/- for installing improved household cooking stoves. Under this project, about 30 Sarala household cooking stoves and 4 Water heating stoves have been constructed during the year.

Cashew processing centre

Kerala: Based on the suggestions from scientists at the Central Plantation Crops Research Institute (CPCRI), Kasargod and officials of the Kudumbashree programme, household processing of cashew as an income generating option for rural women was explored. It was found that KasargodDistrict would be a suitable project location as significant quantities of good quality cashew is grown here. A group of ten women belonging to Kudumbashrees SHGs were identified and trained in processing cashew. The group has applied for a loan from the bank under the Kudumbashrees scheme, as the requirement for working capital is high. Nearly 2 tonnes of cashew has been procured and is being processed. The processed cashew has been sold in the local markets. The activity has been profitable for the group so far.

Another activity recommended by the CPCRI is the vermicomposting of coconut leaves. Three groups were identified in Kasargod district to produce vermicompost from coconut leaves using the special strain of earthworms developed by CPCRI. Compost is being collected by the groups and is being used by the farmers in their own fields.

One group of women is using a biomass-fired drier to produce vanilla flavoured sweet chips out of coconut. Another group of women, is drying fish in a biomass fired dryer. The group dries coconut to produce copra during the season when fish is not available. Marketing support for these two groups is being worked out.

Technical training in household stove construction and pilot training in charcoal making from waste biomass

(Supported by ETC, Netherlands)

Charcoal from loose biomass: Mandya district was identified for training and subsequent income generation in this activity. Initially, women were trained in producing charcoal from bagasse, which was to be procured from jaggery making units after improved stoves were provided to these units. However, this did not work out. Therefore, another region in the same district was identified wherein lantana was available in large quantities. Six trainees, who are members of the Sri Sharadambha Swasahaya Sangha, Kabbali, Mandya taluk were identified, and were asked to harvest about 2 tons of lantana (for which they would be paid after the charcoal was made and sold) to demonstrate their willingness to be trained. Training in producing charcoal from lantana has been completed.

Lantana being processed to produce charcoal in Mandya Dist., Karnataka

Training of Trainers in stove construction is a part of the ETC project. Consultants have been appointed to prepare a manual for training trainers. The content for the training programme has been finalized. The content of the manual is under preparation.

Promoting Fish Drying Using Efficient Biomass Fired Dryers

(Supported under Small Grants Program of UNDP-GEF)

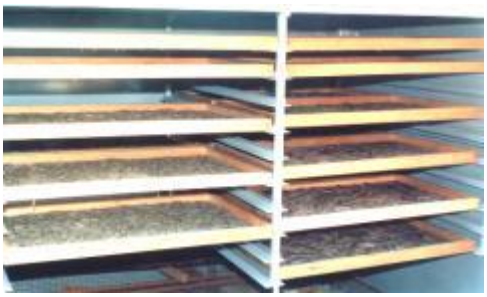
This project has focused on the severely stressed (socially and economically) fishing community and has developed biomass based drying as an income generation option because the activity was familiar, environment friendly and used local resources. The project also extended its scope to drying and marketing of other locally available produce like coconuts to ensure income generation during periods of lean fishing activity.

Past experience of TIDE in energy and livelihood projects has led to the realization that initiating CBOs into income generation requires an understanding of community institutions, renewable energy / rural processing and markets. It also requires an understanding of the adverse lifestyle circumstances of impoverished societies and an innovative, humane approach to energy service delivery. This project added to TIDE's competence in addressing these wider problems

The project 'Promoting fish drying using efficient biomass fired dryers' has been operational since March 2003. It has introduced biomass-fired dryers to 4 community-based organizations (CBOs) of women for drying fish and prawns harvested from the sea or from backwaters. The project has developed drying protocols for select varieties of fish, facilitated training of the CBOs in the use of biomass dryers, developed appropriate packaging of dried products and

assisted the CBOs in finding markets. It is also assisting newer groups in processing loan applications for purchase of dryers. It has also understood the need for sustained income for the CBOs during the lean fishing season and introduced drying of horticultural produce like coconuts in the same dryers to augment incomes. Consumers have accepted that fish dried in biomass dryers is hygienic and of good quality and are willing to pay a higher price for the same.

Fish being dried in energy efficient dryer



Activities of the project have resulted in the CBOs earning profits of about Rs 85,000 during the year. The women have been empowered with skills required to manage their enterprise and ensure sustenance and growth. An innovative renewable energy technology has been utilized to create livelihoods and generate income. The CBOs are able to handle all aspects of the enterprise including purchase of raw material, operation & maintenance of the dryer and marketing of the dried products. The weight of material dried is about two tons and a turnover of about Rs 3.5 lakhs has been achieved during the past six months of operation. A profit of about Rs 85,000 has also been generated. The number of people currently affected by the project is 45 women and their families.

The project has constructed dryers and trained 4 CBOs in drying select varieties of fish and prawns. One more dryer has been constructed outside the scope of the project. TIDE is receiving inquiries for replication from NGOs, CBOs and government departments in other regions. The project has received wide publicity in the press and among government departments. The dried products have been exhibited and sold in various trade fairs including the India International Trade Fair, New Delhi.

The project has introduced a sustainable and replicable model for the commercial exploitation of a renewable energy technology by a socially and economically disadvantaged section of society. The technology transfer model evolved as a result of this project could be replicated for the introduction of other livelihood linked renewable energy technologies.

The project introduces an innovative, environment friendly, low cost and hygienic process of drying fish to a community that is socially and economically extremely backward. It would enable them to earn higher incomes as hygienically dried fish commands a higher price. It takes renewable energy technology to remote areas where power supply is either erratic or absent and where biomass resources are available but unutilized. It creates value for loose biomass that is the only reliable source of energy for drying fish in the monsoon period.

Women who have used the drier in the past months have stated that they feel empowered because they offer quality assurance, (very rare in rurally processed foods) and their product is considered superior in the market. The project would thus aim to empower the disadvantaged fishing community using innovative and appropriate technology

The project has developed technical and managerial skills in community based organizations thus empowering them. It has introduced them to product diversification by drying and marketing horticultural produce as well. It has sensitized CBOs to productive uses of renewable energy and demonstrated that renewable energy has the potential to improve the productivity and profitability of rural industry.

Diffusion of efficient biomass utilization technologies in non-formal industries in Karnataka and Kerala

(Supported by India Canada Environment Facility, New Delhi)

This project that aimed at dissemination of improved biomass fuel combustion devices on a commercial mode has formally ended on 31st March 2004. 21 teams of entrepreneurs are currently involved in the dissemination of these devices in seven Indian states. These entrepreneurs, during the past three years (since setting up independent enterprises) have installed about 4600 devices with sales value of about Rs. 3.1 crores. The devices under the project have resulted in biofuel savings of about 90000 MTs (about 1.6 lakh tons of CO2 emissions) with the savings increasing by the year due to entrepreneurial activities.

Improved stove for Ayurvedic medicine preparation in Haridwar

The technical team of developing/adapting with consumers willing success in the originally Kerala has encouraged This project has demonstrated that improved combustion devices for rural applications can be promoted through commercial modes without dependence on subsidies or grants. the project has been instrumental in devices that can be delivered to select markets to pay for adopting the devices. The project's conceived project area of Karnataka and initiatives in the states of Tamilnadu, Andhra Pradesh, Madhya Pradesh, Chattisgarh and Uttaranchal. In each of these states, interventions were undertaken in a few clusters to promote improved devices through commercially operating entrepreneurs. In Uttaranchal, interventions were carried out in collaboration with The Energy and Resources Institute (TERI), with this institutional linkage being effective in demonstrating improved devices for select applications. The project has developed similar linkages in various regions with a number of Non-Governmental organizations, Governmental departments and self-help groups.

The achievement of the project in terms of the number of devices constructed in the project area is indicated in the table below. During 2003-2004, About 30 devices have been installed in Uttaranchal by entrepreneurs whose activities are being coordinated by TERI.

Under the project, since 1999, 5515 energy efficient devices have been constructed in user locations. These devices have cumulatively conserved about 1,10,000 MTs of biomass fuels and

about 2 lakh tons of GHG emissions. Currently, entrepreneurs developed under the project are installing the improved devices on a commercial mode. Annually, about 1100 devices are being installed in various states leading to immense environmental benefits.

The achievements of the project have been noted by a few institutions. The project has been awarded the Kerala state energy conservation certificate for the year 2002 for its interventions in various clusters in Kerala. The project has also received the Citizen Base Investment by Ashoka: Innovators for the Public, for the innovative approach to generate resources from local communities.

The project has developed the capacity of TIDE in relation to technology identification, assessment, adaptation, productization and promotion. TIDE has also been exposed to the finer nuances of enterprise development and rural marketing. Opportunities exist to promote improved devices that are based on tested technological concepts in other Indian states.

Assessment of potential for GHG emission reductions in textile processing units in Tamilnadu

(Supported by the British High Commission, New Delhi)

TIDE has been granted a project to undertake a survey to assess the potential for reduction in GHG emissions from the textile processing sector in Tamilnadu. This survey project is being implemented in the districts of Erode, Coimbatore, Karur, Dindigul, Madurai and Virudhunagar in Tamilnadu. Textile processing units that undertake bleaching, dyeing and calendaring are being surveyed to assess existing levels of energy efficiency and the potential for efficiency improvement. The survey would be completed by April 2005.

Other energy-related initiatives during the year

Attempts were made during the year to develop linkages with a number of institutions in the country that were involved / were interested in the promotion of environment friendly technologies. These initiatives include:

a. Promotion of efficient wood-burning devices in Chittoor District, Andhra Pradesh, in collaboration with Foundation for Ecological Security (FES, Anand, Gujarat State): A number of hotels, canteens, schools, hostels, Kalyana Mantaps etc in Chittoor District depend upon biomass fuel for their thermal energy needs. Most of the existing devices are energy

inefficient and consume significant quantities of fuel, mainly firewood. FES has established self-help groups in the region with one of the activities being the generation of income through the development of common lands and wastelands. Towards reducing the demand for firewood, FES and TIDE collaborated to promote improved combustion devices in a few of the demand centres. Improved cooking stoves for hotels have been demonstrated in a few regions of the district with the devices resulting in biomass savings of up to 60%. A significant improvement in the working environment is also seen. FES and TIDE are currently involved in developing programs for promoting improved devices in other regions of the district as well as in other states (FES project areas) in the country.

Improved cookstoves in a hotel near Madanapalle

b. Promotion of efficient pottery kilns in Orrcha cluster, Madhya Pradesh in collaboration with Development Alternatives (New Delhi): Orrcha is one of the largest pottery clusters in the country with a large number of potter families engaged in the production of pottery ware. Pottery is currently produced in energy inefficient pottery kilns leading to higher consumption of biomass fuel. Development Alternatives and TIDE collaborated to demonstrate the improved pottery kiln in a few locations in this cluster. TIDE has promoted the improved pottery kiln developed by Grama Vidya.. The improved kiln has been able to reduce biomass fuel consumption by about 25% along with a significant reduction in the breakage.

c. Promotion of improved biomass fuel combustion devices for sericulture applications in Andhra Pradesh and Karnataka: TIDE had implemented a project to promote improved charaka ovens and cottage ovens for silk reeling in Karnataka and Andhra Pradesh. TIDE has also developed and promoted improved stoves for silk dyeing in Pochampalli cluster of Andhra Pradesh and Kanchipuram of Tamil Nadu. During the interventions, TIDE had developed linkages with the Departments of Sericulture in the states of Karnataka, Andhra Pradesh and Tamil Nadu. Towards consolidating these linkages and promoting improved devices on a larger scale, attempts were made to develop technology promotion programs with the departments in each of the states. The Department of Sericulture, Karnataka has recognized one of the entrepreneurs developed by TIDE to construct improved silk reeling devices under the Governmental program. In Andhra Pradesh, the scope of the intervention has been widened by the inclusion of the Andhra Pradesh State Council for Science and Technology to provide local support.

d. Partnerships with various organizations as part of the Partners forum, SERI 2000, Swiss Agency for Development and Cooperation: The project to promote improved charaka ovens was implemented with the support of SERI 2000 of the Swiss Agency for Development and Cooperation. Subsequent to the implementation of the project, TIDE has become a core member of the partners forum..

Activities carried out under the core grant

TIDE has been the recipient of the core grant of the Science and Society Division of the Department of Science and Technology, Govt. of India for about 5 years now. During this period, TIDE has used the core grant to identify the S & T related needs of the rural community and demonstrate select technologies to rural communities. Depending on the response, TIDE then looks for specific project funding to disseminate the technology.

In the past year TIDE has maintained its focus on new technology for rural areas and looked at innovations in rainwater harvesting and interventions to address problems relating to water quality. In rural process industries TIDE has focused on developing a new fuel-efficient design of a brick kiln and improving the fuel efficiency of jaggery making. The bagasse thus conserved can then be diverted for other productive uses. Prof. K S Jagadish and Prof S S Lokras, retired faculty of IISc have been helping TIDE in these efforts. TIDE has also demonstrated and collected field data for the emerging technology of biogas from leaf litter and non-dung based biomass.

Testing of improved brick kiln:

The improved brick kiln has been developed to make good quality conventional bricks with reduced quantity of fuel. Bricks are made in the informal sector in conventional clamp kilns. The capacity of these conventional clamps is about 40,000 bricks per batch. This means that the working capital required by a small brick maker is high. To address the problem Prof Jagadish of Gramavidya developed a fuel efficient brick kiln with a capacity of 12,000 bricks per batch.

Salient features of the improved brick kiln are:

1. The kiln is a permanent structure of height 20 ft, width 12 ft and length 10 ft. It is made from bricks, cement, soil and sand i.e. conventional construction materials. The wall thickness is 1.5 ft. to circumvent problems associated with thermal expansion. For the same reason the entire kiln is clamped or tied with 2" L-angle. 10 openings, each of 2" diameter are made on the walls at the bottom of the kiln for uniform air entry into the kiln while firing.

2. As the capacity of the kiln is only 12,000 bricks per batch, loading and unloading of the kiln is easy. The batch time including loading, firing and unloading is 4 days. The firing time is just 36 - 40 hours. In spite of the small batch size the capacity of the kiln is 7.2 lakh bricks per year. The firing time in conventional clamps is 6-7 days. The loading and unloading time is also very high and it is estimated that 4.8 lakh bricks can be fired in a clamp kiln per annum. Also, in conventional kilns, about 2000 bricks in the outermost layer remain unburnt whereas in the improved kiln, all the bricks are burnt to the required extent.

3. The kiln is an updraft kiln for good firing of bricks. Bricks are stacked in four levels one above the other. Initially the fuel is fed at the bottom and fuel feeding is continued until the fuel stacked at the second level gets ignited. When the fuel loaded in the second level is ignited, the fuel feeding port at the lowest level is closed leaving only a 2" hole in each

chamber. The entire brick burning operation can continue without further supervision and can be completed in 36-40 hours. To minimize thermal expansion, metallic bands are tied around the kiln thereby avoiding collapse of the kiln. A significant feature of the kiln is that it requires about 0.27 kgs of fuel per brick as compared to 0.33 kgs of fuel per brick in conventional kilns.

Jaggery making

TIDE has in the past tried several designs of improved jaggery making stoves. Although the stoves had performed satisfactorily, the response from the jaggery making units was not very enthusiastic- reasons could be high cost of the new stoves, change in method of operations etc. The intervention experimented by TIDE this time was to effect minimal changes in the stove design but to increase the surface area of the jaggery pan. It therefore tested a pan with about 2000 small fins (4 mm dia and 40 mm height) welded onto the lower surface. This increased the surface area of the pan by about 37%. (original surface area 2.69 sq. ms, surface area with fins 3.695 sq. ms) The data collected so far shows that fuel saving of about 40% is possible and the processing time per batch has been reduced by 15 minutes. The response from the local unit has been very positive. The weight of jaggery processed per batch is also higher by about 5%. TIDE is also thinking of introducing a lining of insulation bricks to reduce heat loss to the ground and further save fuel.

Data collection from community bioreactor

The Centre for Sustainable Technologies (formerly ASTRA) has developed a technology to produce biogas from non-dung based biomass like leaf litter, agro residues, high BOD organic wastes. TIDE wanted to study the gas production potential and its usage by a rural community in order to assess the replication of the technology. TIDE therefore initiated data collection at a village site where small bioreactors were installed.

Fluorosis mitigation through technical intervention and community participation in Karnataka

Dental flourosis

Throughout many parts of the world, high concentrations of fluoride occurring naturally in groundwater have caused widespread fluorosis - a serious bone disease - among local populations. Fluorosis is caused in humans and animals due to intake of excess amount of fluoride in drinking water. It leads to mottled teeth, dental carries, stiffened brittle bones and joints, metabolic disorders and even paralysis in advanced stages. The disease is incurable. Nearly 25 million people in about 160 districts of 19 states in India are affected by fluorosis. About 65 million people including six million children are at risk from presence of high fluoride. The fluoride content allowable in drinking water as per WHO Standards is 1.5 ppm and the existing fluoride content of water in some places has reached to about 30 mg/l.

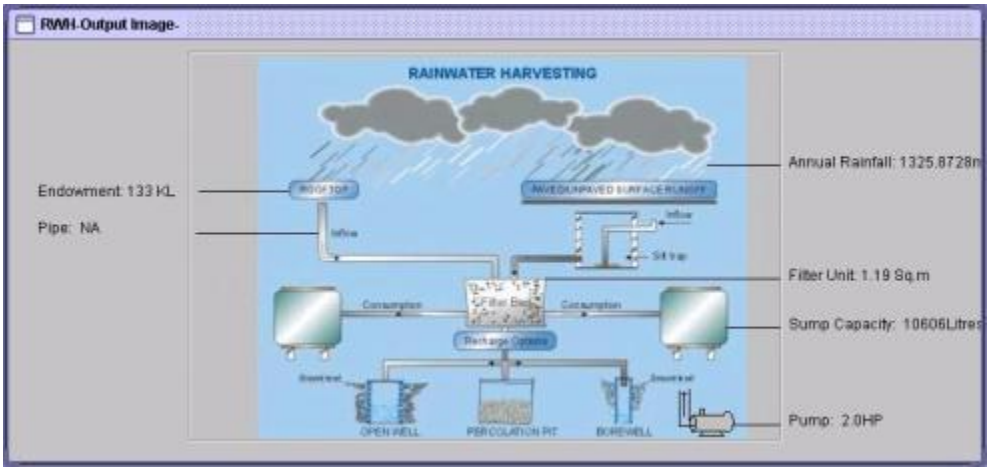
TIDE initiated through the core grant a small effort at understanding and possibly addressing this problem. Data collected from the Public Health and Engineering Department and

Department of Mines and Geology shows that in Karnataka about 6000 villages are affected by fluorosis. Devalganagapur village, Afzalpur taluk, Gulbarga district has highest fluoride content of 12.1 mg/l. Kanakpura and Magadi were among the highest fluoride affected taluks in Bangalore district with 101 and 143 habitants affected respectively. Data also indicated that Kodihalli, Sathnur, Kabbal of Kanankpura taluk and Tagachkuppe, Agalkote, Hullikatte of Magadi taluk were having fluoride above the permissible limit.

A preliminary investigation was done and water samples from Kodihalli, Sathnur and Kabbal of Kanakpura taluk were collected and analyzed for fluoride. The results showed that fluoride content in the water sample collected from Kabbal was 2.1 mg/l higher than the permissible 1.5 ppm. The water collected from Kabbal has been passed through AA filter. The filtered water showed reduced fluoride content of 0.4 mg/l.

These efforts would continue in TIDE through the newly sanctioned DST project on 'Fluorosis mitigation through technical intervention and community participation in Karnataka'.

Rainwater Harvesting Software



Rainwater harvesting software developed by TIDE for performing basic calculations for Rainwater Harvesting System (RWH) automatically. The RWH software focuses only on Rooftop Rainwater Harvesting. The software will help in understanding the rainwater endowment, harvestable amount of water for individual houses, industries, institutions etc. It will consider average annual rainfall data of the district. The software will automatically calculate harvestable amount of water on various roof types such as flat, sloping roof etc. Further, it will compute the area required for filter dimensions, volume of filter, design of the sump capacity, pump capacity for pumping the water from the sump. The software has facility to attach site drawing to show the various components of the rainwater harvesting system. It has an option for maintaining client details, which would help to follow up with the clients about the status, and performance of the system. The help menu is provided in the software to know definitions of various terminology used in the software.

Production Of Char And Pelleting Using Low Cost Biomass

(Supported by Science and Society division, Department of Science and Technology, Govt of India)

Charcoal is the solid residue obtained when biomass is "carbonized" or "pyrolysed" under controlled conditions in the absence of air. Charcoal is conventionally produced from dried wood by loading wood in a pit and burning it in limited air. This project does not propose to modify the conventional process but to adapt a recently developed small-scale process and make it more versatile. The project would also address efficient utilization of charcoal.

Volatiles being used to heat water in Charcoal-based kiln

TIDE has analyzed the charcoal samples produced by this method and assessed that while the charcoal produced was of acceptable quality there were considerable scope for further improvement. Efforts could be made to further improve its calorific value (beyond the current levels of 4700-4900 kcals/ kg) and reduce volatile content by better control of combustion and heat transfer. Scope exists to increase the yield of charcoal thereby enhancing the economics of the operation and making it sustainable for women's groups.

The objectives of the project are

- To develop environmental friendly and energy efficient techniques of small scale charcoal making from waste bio-mass/wood
- To develop, test and demonstrate the technology of making solid charcoal pellets
- To install demonstration units for charcoal pellet making in user locations
- To develop beehive briquettes from charcoal for rural cooking.
- To develop and demonstrate a gasifier using char pellet or charcoal as fuel.

RAINWATER HARVESTING

Rainwater Harvesting System In Mysore

(Supported by Karnataka Urban Infrastructure Development and Finance Corporation)

The implementation of rainwater harvesting system project in Mysore is funded by Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC), Government of Karnataka (under the ADB assistance) for water conservation measures. The project is designed and executed by Technology Informatics Design Endeavour

(TIDE), Bangalore. The project locations comprise Mysore City Corporation building (rooftop rainwater harvesting) and Cheluvamba, Shivaji, and Puthli parks in Mysore (surface run-off water harvesting).

Water collection sump at Mysore City Corporation Building

The rainwater incident on the rooftop of the **Mysore City Corporation building** is collected through the rainwater down take pipes and led to the filter unit through inspection chambers. The collected water is filtered by a state of the art filtration unit and then stored in the newly constructed underground rainwater sump of capacity 70,000 litres. Overflow from the sump, if it occurs during heavy continuous showers, flows to the recharge pit for recharge of groundwater aquifer. The rainwater collected in sump is utilized by pumping to the overhead tanks for the non-potable purposes. A separate drinking water system with the water purification system is provided for the potable uses of the MCC Staff. The source of water for this use is the Corporation supply. The total quantity of water that can be harvested from this system is calculated at about 1280 kiloliters per year (assuming an average annual rainfall of 870 mm). The present water requirement is 15 kiloliters per day (3750 KL/year, assuming for 250 days water requirement). The harvested water would suffice for the non-potable water requirements for a period of about 3 months.

The rainwater harvesting system at **Cheluvamba Park** includes providing recharge and storage facilities, aiming at the concept of achieving zero run-off from the park area. The park is located near Akashvani in the Ontikoppal area. The rainwater incident on the area of the park (24280-sq.mts. or 6 acre) is directed to suitable recharge and storage points in the park area. Since, the slope available in the park is gentle and towards southern and western side, the run-off water is channelised through the dispersion and contour channels to the recharge pits, mainly to increase the availability of soil moisture, to recharge the groundwater aquifers, and the overflow from these recharge structures is diverted to and stored in the withdrawal wells through a filtration unit. The selections of the location of all the recharge pits and wells have been based on the topographical and geophysical data. . The selections of locations of the contour trenches are based on topographic survey data. Two wells are of 6-ft diameter and 18 ft deep and other two shallow wells are 6-ft diameter and 9 ft has been provided. These wells are lined using concrete rings. In all, twelve recharge pits are constructed in the main park. An effort has also been made to demonstrate the various components of rainwater harvesting system. At the storage and recharge structures, appropriate filtering systems have been provided to keep the quality of water good for recharging as well as other utilities. Suitably designed pumps are provided to lift water from the storage structures to a overhead tank and an arrangement has been made for watering the nursery plants in the park along with the park management team. Provision has been made for diverting rainwater from adjacent road to the wells through the filter.

The **Rose Garden** is situated to the south of the main Park. The total area of the garden is 8094 sq mts or 2 acres. The rainwater harvesting system at the Rose garden includes providing of dispersion trenches along the fence which leads the runoff water to a filtering unit and then to the withdrawal well of 16 KL capacity. Provision has been made for runoff water from the roads along the park so that it diverts the runoff water to the withdrawal well through a filter unit. Four recharge pits are constructed to recharge the groundwater water.

The rainwater harvesting system at **Puthli Park** includes providing recharge and storage facilities. This park is located near the highway circle. The rainwater incident on the area of the park (1 acre 28 guntas or 6932 sq mts) is directed to suitable recharge and storage points in the park area. Quantity of water that can be harvested from the park area is 1206 KL per year. The park has an undulating terrain. The center of the park is elevated and slopes on all the sides of the park. The run-off will be high due to high relief. The total park area is divided into 4 zones. The run-off water is channeled through the dispersion and a contour channel and stored in the withdrawal well in the zone. A dispersion channel runs from the zone 1 to zone 4 to the withdrawal well in the zone 4. The capacity of the withdrawal well is 16 cu mts. Since the Park area is small, provision has been made for the collection of corporation supplied water in the withdrawal well so that the sprinkler facility set up in the Project could be used throughout the year. Four recharge pits have been constructed which are in the zones 2 and 3. All the recharge pits have leading channels, which leads the water to the recharge pits from different parts of the park. Selection of the location of the well was based on the topographical and geophysical data. The well is lined using the concrete rings of 6ft diameter. The recharge pits are constructed in the park area mainly to increase the availability of soil moisture, to recharge the groundwater aquifers, and to demonstrate the various components of rainwater harvesting system. The selection of location of the contour trench is based on topographic survey data, and recharge pits are based on geophysical information. At the storage and recharge structure, suitable filter is provided to keep the quality of water good for recharging purposes.

Shivaji Park is situated in the Narahsimha Raju (N.R.) Mohalla area. The objective of rainwater harvesting system at Shivaji Park includes providing recharge and storage facilities. The rainwater incident on the area of the park (4 acre 27 guntas or 16460 sq mts) is directed to suitable recharge and storage points in the park area. The total quantity of rainwater that can be harvested from the park area is 2864 KL per year. The park has a gentle slope and is towards the southeastern side. The total park area is divided into 6 zones. The surface run-off water is channeled to withdrawal well of capacity 16 cu mts located in the zone 2 through the dispersion channels and filter unit. There are eight recharge pits in the park, which have been designed to help in increasing the soil moisture in the park and to recharge the groundwater aquifer. Selection of the location of the wells is based on the topographical and geophysical data. The well is lined using the concrete rings of 6ft diameter. A water pipe line is provided from the well to the sprinkler points for watering the park area. The selection of location of the dispersion trench is based on topographic survey data, and recharge pits are based on geophysical information. At the storage and recharge structure, suitable filter is provided to keep the quality of water good for recharging purposes.

Rainwater harvesting projects designed / executed during the year

1. Adarsh Apartments, JP Nagar, Bangalore.

Rain barrel with online filter at Adarsh Apartments

The apartment is located in J P Nagar and the total area is around 1 acre. There are 6 blocks (A to F) in the apartment. Block F was selected for the rooftop rainwater harvesting of the project.

The harvested rainwater recharges the bore well located near the block. The total roof area of the block is around 1225 sq mts. The endowment for the harvesting of rainwater is 1188 Kl per year. Quantity of rainwater harvestable per year is around 950 KL per year. There are 4 down takes of diameter 90 mm on the outer side of the building. Two of the down takes at the right side of the block were selected. Rainwater barrels were installed below the down take pipes. The overflow from the barrels was connected to the abandoned bore well. The overflow from the bore well is led to the sump, which is being used for non-potable purposes. Intake test was conducted in order to estimate the intake capacity of the bore well. Water was fed to the bore well at a constant rate and the rate of decay of water was monitored at different intervals. The expected yield of the bore well was calculated.

2. Indo Australian Farm, Hoskote, Bangalore

Hydro-geologic and geophysical studies were carried out in order to identify the sub-surface geological earth layers and structures (soil, weathered, depth to the bedrock) and water bearing aquifers.

1. Hydro-geological Studies: A correct understanding of Hydrogeology of an area is of prime importance in designing the water harvesting structures and successful implementation of any artificial recharge scheme. This involves the study of topographic features, geology of the area, soil type, inventory of existing ground water structures in and around the area and the rainfall pattern in the area.

2. Geophysical Studies: The main purpose of applying geophysical methods for the location of appropriate site for artificial recharge studies is mostly to help and assess the unknown sub-surface hydro-geological conditions economically, adequately and unambiguously. Mostly it is employed to narrow down the target zone, pinpoint the probable site for artificial recharge structure and its design and also for selection of water harvesting structures. Based on the Hydro-geological and Geo-physical surveys, the thickness of the potential unsaturated zone for recharge should be worked out to take up construction of recharge structures.

3. Topographical survey: The topographic survey has been carried out using total station method (electronic) mainly to understand the topographic levels in the farmland. The survey information will help in knowing the surface run-off flow directions in the study area.

Location of all the existing buildings, unmetalled roads, water bodies, bore well, Geophysical survey locations points, large trees of different types, electric poles with power line, light poles etc. have been shown on the maps. The various types of ornamental plants and flowering plants are grown in the farm. The highest point is 901.009 m from the above mean sea level on northern-western part (near the old water tank and quarters) and lowest 895.806 m, on southern

side. The benchmark has been established near the entrance to the farm. The general slope is from northwest to southeast in the farmland. The contours have been drawn at 0.5-m interval**.**

3. ISRO's New ISAC Campus, Marathahalli, Bangalore

The study area lies in the eastern part of Bangalore near the Doddanekundi / Marathahalli village, Bangalore south taluk. The total campus area is about 110 acres. There are no perennial surface water bodies in the vicinity. The total area under investigation is considered about 60 acres. The study area is about 25-km southeast of Bangalore City. The LRDE housing society is situated to the north of the campus, and eastern boundary is marked by outer ring road.. HAL staff quarters are located to the west and Marathahalli village is located to the south of the campus. The area lies on the survey of India toposheet of 57 H/9 and situated between Latitude 120 55to 130 00 N & Longitude 770 40 to 770 45 E.

Following types of investigations have been adopted:

1. Hydro-geological survey has been conducted, in which all the relevant data such as topographic features, geological details, hydrological conditions, and existing bore well details have been collected.
2. Geo-physical survey (Electrical resistivity survey) has been adopted to know the subsurface conditions in the area.
3. Integrating all the results of the above survey, sub-surface geological section has been delineated and feasible locations for construction of water harvesting structures were suggested.
4. Drawdown and recovery test for understanding the optimum yield and suitable pump capacity for the bore wells
5. Groundwater potential zones have been identified and locations for drilling new bore well were indicated.
6. Percolation tests were conducted in order to assess the rate of infiltration in the project area.

4. John Fowler Pvt Ltd., Bommasandra Industrial area, Bangalore

Hydro geological and geo-physical survey mainly aims to:

- To understand the sub-surface geology / nature of subsurface layers at the site.
- To locate suitable / feasible sites for construction of water harvesting structures.
- Drawdown and recovery test were carried out for understanding the optimum yield and suitable pump capacity for the bore wells.
- Water quality studies in knowing the groundwater quality for various usages.

The area is lies in southern part of Bangalore near the Chandapur village, Anekal taluk, Bangalore urban district. The total area under investigation is about 6 acres and is identified by the plot no. 6/6 of Bomasandra Industrial area (Phase 1 &2). The study area is about 23km south of Bangalore and located 1 km off on Bangalore Hosur road National Highway No.7. The details of the study have helped them for recharging of the bore wells located in the factory premises. The water quality studies shows that groundwater is characterized by high nitrate and high hardness. An effort has been made for recharging the groundwater through artificial recharging techniques.

Rooftop rainwater harvesting has been introduced in the factory premises and harvested water is being used for non-potable applications.

5. ITC Infotech Park, Pulakeshinagar, Bangalore

It is located in Pulakeshinagar, near Bangalore east railway station. The total built-up area of the factory is 14 acres and the area of paved and unpaved surfaces is 22 acres. Quantity of water that can be harvested from the rooftop is around 49,960 Kl per year. Quantity of water that can be harvested from the paved and unpaved surfaces is around 17,446 Kl per year. More emphasis is given to the recharge of the groundwater by means of the recharge of the existing bore wells. In this context, the existing water level in all the bore wells were measured and optimum recharge structures were suggested. A mini water body proposed in the factory leads to the storage of the water to the maximum extent and also aids in percolation of water to the groundwater aquifer. The method of rooftop rainwater harvesting is demonstrated in the Power section by means of rainwater barrel method. Barrels are installed below the down take pipes and the collected rainwater is used for gardening, thus saving the water bills. Recharge wells have been constructed for collecting the rainwater and recharging the groundwater aquifers.

6. Utopia Builders, Behind ITC Factory, NH-7, Bangalore

UTOPIA is a residential township situated 26 km from the heart of Bangalore City and 2.6km off NH7, connecting Bangalore and Hyderabad. The area is developing into a virtual residential complex under various phases. The 50-acre residential township is well insulated from future developments in the area by a village each to the East and West, a natural lake to the South and a road to the North, which connects UTOPIA township to Bangalore City through the City Bus Service.
The scope of the work included:

Hydro geological, geo-physical survey, and pumping test were conducted mainly;

- To understand the sub-surface geology / nature of subsurface layers at the site.
- To locate suitable / feasible sites for construction of water harvesting structures.
- To locate potential ground water points for drilling bore wells.

Based on the Hydro-geological and Geo-physical surveys the sites for drilling new bore wells were suggested. Accordingly, Five successive bore wells were drilled and yield of the bore wells varies from 1500 LPH to 3500 LPH. The percolation pits in the storm water drain were suggested and later these structures have been constructed.

7. L M Glassfibres, Hoskote Industrial Area, Bangalore

Hydro geological studies were carried out to study the geology of the area, soil type, weathered and depth to the bedrock and water bearing formations. An inventory of existing bore wells in and around the area and the rainfall pattern has been studied.

8. Hindustan Aeronautics Limited (HAL) Overhaul Division, Vimananagar, Bangalore

The total area of the Overhaul division is 6.09 acres. Potential for rainwater harvesting by means of rooftop rainwater harvesting and harvesting from the paved and unpaved area is around 4829

Kl per year. The study part comprises of designing of rooftop rainwater harvesting system for the hangars, All-out hangar and KIRAN MK Hangar. Management of the rainwater in the paved and unpaved areas by means of recharging structures; artificial recharge of the bore wells is suggested for augmenting the groundwater resources. Recharge wells have been proposed near the drain situated near the boundary of the overhaul division.

URBAN PLANNING

Preparation Of Urban Land Use Maps

This project is being carried out for Spatial Data Pvt. Limited Bangalore. The urban land use maps of seven CMCs (Byatarayanpura, Yelhanka, Pattangere, Mahadevapura, Dasarhalli, Bommanahalli, and Krishnarajapuram) areas of Bangalore city is being prepared adopting digital interpretation techniques in conjunction with collateral data such as city guide maps and ground truth information. The urban land use maps are prepared using IRS 1C pan data for the year 1996, 2000 and 2004 and limited field data. The field photos were also taken for the different categories of land use. The different classes such as roads, railway lines, residential, commercial, residential + commercial, industrial, open space, water bodies, parks, agriculture land, plantations, quarries, playground. The residential area has been further classified sparse, medium, and dense depending up on the density of buildings. The area of various land use classes has been calculated.

Yelahanka CMC

Using GIS software, the extraction of data on roads and its length per square km has been studied. The shrinkage of open space over the 8 years has been computed. Finally, the superimposing of current ward boundaries over urban land use maps and preparation of ward level maps. The change in the different wards is also studied and which will helps in understanding the development activities in different wards in a CMC limits. The final vector information is in the .shp format.

The softwares that are being used are ARC/INFO, Arc/view, Spatial Analyst for GIS, ERDAS for image processing, AutoCAD and Microstation for drafting and MS Office for documentation.

Local responsible city governance through action planning techniques, Mangalore

(Supported by National Foundation for India, New Delhi)

This project is a continuation to the Phase 1 and Phase 2 implemented during April 2000 to December 2002. The objectives of the project are to develop ward plans in Tota, Bengare, Dongarakeri wards, promote civic consciousness among children through nature clubs in schools and test the concepts of community radio for generating discussions on ward issues. Following are the activities carried out in Mangalore,

In Tota, Bengare, small group meetings have been carried out and list of issues prepared. Samparka sabhas have been continued to bring the Corporator, Citizens and Officials to address issues of local concern. Samparka sabhas provided a conducive atmosphere between the Corporator and Citizens, it is evident that the Corporator increased his visits to Tota- Bengare and carried out works based on the priority list. Learning from our last year's experience of 'Malaria Watch Walk', the Bengare Vidyarthi Sangha organized Malaria awareness programme this year. The project facilitated a good understanding between the School teacher, School Development Management Committee and the Community. The members of the School Nature Club were involved in awareness programme on health & hygiene of the ward and bringing it to the notice of the Corporator.

In Dongarakeri, the project facilitated the formation of 16 Parisarasaktha Kria Vedikes (PKVs, Environment Action Forums) in association with Mangaluru Nagara Parisarasaktha Okkuta (MNPO). PKVs have taken responsibility to address the locality issues by involving in the door to door collection of solid waste. Monthly meetings (in different parts of the ward) with the Corporator have been initiated. Corporator has been actively addressing concerns of citizens in the monthly meeting. The PKVs generated concerns on drains by 'Save Alake Thodu Jatha. The Corporator addressed the artificial floods by desilting before and during the monsoon. This further facilitated organizing a ward level discussion (before the monsoon), a city level discussion (after the monsoon) and raised issues of coordination of different sections within Mangalore City Corporation and other state agencies.

Environment Education has been a specific activity targeting selected schools in Tota - Bengare, Dongarakeri, Bendur and Vamanjur wards. The objective of this effort is to promote nature clubs in schools, provide orientation to teachers and create awareness to children on ward environment. We organized a one-day outing for school teachers in Summer to Gurupur. A two-day orientation was organized for 15 school teachers along with 30 nature club students. The project organized 'Know your ward' quiz and 'Know your ward environment' activity. The Corporators in Four wards were happy that school children and parents contacted them for information and felt these activities must be continued.

Our involvement with NGO Forum, Mangalore continued as a member of the Adhoc committee.

Urban Governance, Civil Society and Local Economic Development, Udupi Phase 2

(Supported by National Foundation for India, New Delhi)

This project is continued as a part of Phase 2 during August 2001 - February 2004, extended till December 2004. The objectives of the extended project has been to develop ward plan through consultations in Vadabhandeswara ward, initiate discussions on Coastal Regulation Zone (CRZ) in the Kola and Malpe wards; linking these to the municipality and following up the NGO Network process at city level.

At ward level, the Councilor took note of the list of issues as prepared through the consultation with the citizens' associations (through our facilitation) and carried out works in Vadabhandeshwara ward. The Councilor also raised the issue of Coastal Regulation Zone (CRZ) in the Council, for which the Deputy Conservator of Forests (DCF) in charge of the CRZ was asked to make a presentation in the Council. The Council has also written to the State Government to take immediate action to reduce confusion amongst general public.

The project motivated the local associations in Kola and Malpe wards to create awareness on CRZ issues to the citizens. This activity has been carried out with the experience of Vadabhandeshwara ward.

The project's work with Udupi Nagarika Chintana Vedike continued to bring regularity in monthly meetings. Manipal Institute of Management (MIM), Manipal, one of the members, collaborated with Vedike to organize a national conference on 'Infrastructure Development and Quality of Life' in Manipal. Udupi Nagarika Chintana Vedike has initiated a process to formalize by preparing objective, rules, regulations and currently obtaining feedback from the members. The subcommittee on solid waste (of Udupi Nagarika Chintana Vedike) is pursued with University of Agricultural Sciences, Bhrammavar and a load of waste from Krishna Mutt is being test 'composted'. The Vedike expects to get a result, by which Krishna Mutt would be motivated to address their waste management issue.

The project continued interacting with nine women Councilors in Udupi. The project has prepared ward maps, ward information booklet and testing issue documentation formats with the involvement of women councilors. The project has also initiated interaction with neighboring towns of Saligrama wherein the project demonstrated preparation of map in one ward, conducted three learning meetings for Councillors and compilation & publication of information for service providers booklet in association with Udupi City Municipality.

The project has organized an orientation for teachers and school children on Environment Education. About 29 teachers participated in the programme, The project organized 'Know your ward' quiz and 'Know your ward environment' activity and 'face to face' interaction with the Municipality.

TIDE at a glance

	2002-03	2003-04	2004-05
Number of projects	21	23	21
Number of sponsors	19	22	25
Project Expenditure (Rs. Lakhs)	119.74	122.39	104.38
Secretariat expenditure as % of project expenditure	4.2%	4.0%	5.2%
No. of Core Staff	42	39	31
No. of Consultants	6	5	6

Device	No. of devices constructed					
	1999-00	2000 - 01	2001 - 02	2002 – 03	2003-04	Total
Karnataka						
Areca Cooking	126	253	314	517	499	1709
Jaggery making	4	4	0	0	0	8
Silk reeling systems*	0	8	501	683	637	1829
Tobacco curing	15	0	0	0	0	15
Drying systems	36	34	27	124	98	319
Cooking/heating systems	10	36	23	47	86	202
Lime/pottery kilns	0	2	13	16	0	31
Brick kilns	0	0	1	1	0	2
Other stoves/driers	0	0	0	4	62	66
Total Karnataka	191	337	879	1392	1382	4181
Kerala						
Rubber band stoves	30	9	5	2	2	48
Cardamom drier	3	1	3	3	2	12
Stoves for hotels	3	35	19	13	7	77
Ayurvedic units Stoves	70	133	90	205	89	587
Areca cooking	9	0	0	2	0	11
Coconut driers	0	23	24	11	12	70
Rubber smoking units	0	1	2	0	0	3
Brick kilns	0	0	0	0	0	0
Other stoves and driers	4	4	2	5	3	18
Total Kerala	119	206	145	241	115	826
Tamilnadu						
Textile/silk dyeing stoves					122	122
Andhra Pradesh						
Pochampalli stoves					14	14
Silk reeling stoves					367	367
Chattisgarh						
Silk dyeing stoves					5	5
Total TN, AP, C'garh					508	508
Total Project	**310**	**543**	**1024**	**1633**	**2005**	**5515**