# IWMI-TATA Water Policy Research Program

# Phase II: 2006-2011

## Annual Report

### Jan – Dec 2011

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# PREFACE

The second phase of the ITP has been given no cost extension upto March 2012. The works covered during 2011 primarily included the following: completion of the ongoing projects in different regions, extension of the TNDRIP capacity building program to another 100 villages (1000 farmers) and initiate the MI capacity building programs with GGRC, Vadodara, policy interface with Government departments using the key results from the completed studies and working with SRTT partners in the north east regions on programs of mutual interest.

In terms of research studies, ITP completed the studies initiated during 2010 which included: SRI adoption in Tamilnadu and Kerala, impact of rural power supply in selected states, river basin performance in Andhra Pradesh, climate change impacts in Godavari, Krishna and Cauvery basins, irrigation subsidies in canal irrigation, performance of Krishi Mahotsav in Gujarat, weather based crop insurance in Andhra Pradesh, impact of MGNREGS in Tamilnadu, financial performance of irrigation sector in India, water harvesting and agrarian economy in Gujarat and impact of tank conversion into percolation ponds in Karnataka.

New studies were also initiated during 2011 which include the adoption of system of rice intensification in 11 states of India, meta analysis of tank irrigation systems in India and emerging issues and developments aspects of water users associations in Maharashtra. The farmer level MI studies in Uttaranchal state which were initiated during 2009 were also monitored for their sustainability.

Strong partnership was established with NEI of the Trust in Nagaland and Mizoram where ITP engineer is working closely with SRTT partners. Dissemination and public awareness of the ITP program outcome were done through four workshops and three capacity building programs benefitting the researchers, farmers and extensions officials. The key messages from the studies were used to develop capacity building programs to the researchers particularly in the methods of data analysis for policy prescriptions. Climate studies took a lead among the studies where there is a growing interest from the stakeholders including Government departments particularly to focus on adaptation strategies where external funding was also generated. As a performance indicator, the TNDRIP capacity building program was awarded the Rotary Water Award of the year and a water calculator to the extension officials and farmers were introduced.

ITP Annual Report 2011 thus provides the results of the research studies completed, ongoing programs, fellowships, new models developed for implementation, capacity building programs and policy interface initiated during 2011. The lessons learned will be helpful in framing the future course of action.

**K. Palanisami**
**Director, ITP**

# I. INTRODUCTION

This annual report covers the activities undertaken under the IWMI Tata program during the year 2011. During this period, the 7th and 8th SC meetings were held in Mumbai on 28 April 2011 and 04 Oct 2011, respectively. A no cost extension of ITP for the period July 2011 to March 2012 was decided during the SC meeting.

During the first half of 2011, focus has been on consolidation earlier studies and during the second half of 2011 synthesis of the studies was carried out. A few new studies were undertaken during the year that was multi location policy related studies.

Some of the major achievements during this period include:

1. **Research:** New multi state studies were initiated and the details are provided in the following sections in the report.

2. **Partner Links:** ITP's research and capacity building in the NE was undertaken. TNDRiP has been successfully implemented in the project districts. GGRC capacity building program was initiated in Narmada district. Government of Tamilnadu officials visited GGRC.

3. **Publication:** Based on ITP research, 2 books were published. Details of the publications are provided in the report.

4. **Policy:** A Policy Brief was released in Karnataka and Policy Discussion and interface took place in Andhra Pradesh. An Implementation Model for Micro-irrigation was developed at the behest of the GoTN and same has been submitted. The details are provided in the relevant session of this report.

The annual report is organized as follows - Section II provides updates on the research initiatives; Section III on partner network and links; Section IV summarizes work published and conferences and seminars attended by staff; Section V covers new program initiatives; Section VI covers external funded research followed by Section VII on ITP outreach initiatives. Section VIII gives details of ITP visitors and Section IX is about staff movements, followed by Section X - the conclusion.

## II. RESEARCH INITIATIVES

Most of the studies that were ongoing in 2010 were completed in 2011 and the study outcome of these studies is given below. Ongoing and new research studies that were initiated in 2011 and are currently ongoing are also mentioned below. Fellowship studies awarded and their status is detailed out in this section.

### a) Completed Studies

1. **Impact Evaluation of "Drip Irrigation Capacity Building and Management Initiative for Maximizing Productivity and Income" (TNDRiP Project) In Coimbatore District -** Dr. C. Karthikeyan

TNDRIP initiative was conceived and implemented with the support of IWMI-TATA water policy program jointly with the Water Technology Centre (WTC) of the Tamil Nadu Agricultural University (TNAU) and Jain Irrigation Systems Limited (JISL) for the benefit of the drip farmers of Coimbatore (including Tirupur) and Erode districts of Tamil Nadu state. IWMI has proposed to conduct the impact evaluation of the project. The overall objective is to study the impact of the drip capacity building program on technology adoption, water use efficiency and income by farm size, gender groups and crops.

'Before-After' type of research design is adopted for the evaluation. The samples were drawn from 16 villages (64 % of the project villages) for the evaluation study. Few cases were identified to highlight the various dimensions of impact of the TNDRIP.

Qualitative impact assessment indicators such as change in awareness about maintenance practices, knowledge gain, attitude, adoption and information sharing by trainees regarding TNDRiP practices, perceived benefits due to adoption, were included for the study.

The top three benefits that were perceived and ranked by the adopters were the reduction in the duration of irrigation, improved dripper discharge and achievement of uniform distribution of water in the field. A majority of the trainees (70%) had shared the information about the drip maintenance practices to their family members (52.38%) followed by other fellow farmers (52.38%).

The strength of TNDRIP project was the fact that it was implemented jointly by three agricultural research institutions with the support of well experienced resource persons in the subject of drip irrigation. Poor after care customer service offered by the drip irrigation dealers to maintain the drip system discouraged farmers' adoption behaviour which is a weakness. It is an opportunity that the trained farmers would serve as trainers to train other fellow farmers in their locale. Lack of conviction of the farmers to adopt venturi unit in the drip system for acid treatment purpose (instead of fertigation tank) remains a challenge for promoting the acid treatment practice among the farmers of Coimbatore.

**2. Conversion of Irrigation Tanks into Percolation Ponds in Karnataka**

**MG Chandrakanth and Akshta Nayak**

Tanks in several regions in semi arid areas are being used as percolation ponds due to prolonged low storage. Intensification of wells in the tank command contributed to this development. A study was taken up to examine the contribution of percolation tank in recharging groundwater in Kolar district of eastern dry zone of Karnataka. The sample included 70 farmers from 5 percolation tank situations and 30 farmers from 2 irrigation tank situations. Using appropriate methodology, the results indicated that the wells located in percolation tank situation were amply benefited from groundwater recharge from the tanks. The proportion of well failure was lower in percolation tank situation (11.6%) than irrigation tank situation (22%). The average yield of bore wells in percolation tank situation was higher by 40 percent (1481 Gallons per hour) than the irrigation tank situation (1060 GPH). The cost per acre inch of groundwater was Rs 281 in percolation tank which was 15 percent lower compared with the cost per acre inch of water in irrigation tank situation (Rs 329). The physical access to groundwater increased by 40 percent, while the economic access increased by 15 percent. This is a *prima facie* indicator of the implicit savings in cost of water due to percolation tanks. The net return per farm in percolation tank situation was Rs. 72410, which was higher than that in irrigation tank situation (Rs. 65300) by 11 percent made possible due to higher water availability in bore wells due to percolation tanks. The net return per acre inch of groundwater was Rs. 725 in percolation tanks which was higher than that under irrigation tanks (Rs. 650) by 11 percent. The net return per rupee of irrigation cost in percolation tank situation was Rs. 52, which was higher than that of irrigation tank situation (Rs. 46) by 13 percent. The results of the study apparently indicate that percolation tanks were more useful in recharging the ground water and that conversion of irrigation tank to percolation tank is economically worthwhile. Farmers are yet to reap the full benefit of percolation tanks, since their realization is around 10 percent, even though the economic access to groundwater due to percolation tanks increased by 15 percent.

**3. Impact of Rural Power Supply on Village Economy in Gujarat, Madhya Pradesh, Rajasthan, Punjab, Karnataka, Kerala, and Tamil Nadu -** Tushaar Shah and K. Palanisami

**Project Outline/Details**

The objective of the study is to understand the impact of power sector reforms on agricultural and rural development. Rural power supply environment – which captures the price-quality-supply characteristics of electricity supplied to agriculture and non- agricultural rural users-varies considerably across Indian states. High quality rural power supply environment—such as in a state like Gujarat-- promotes agricultural growth as well as rural non- farm sector growth besides improving the quality of rural life. In contrast poor power supply environment impedes agricultural growth; increases customer cost of equipment maintenance, disrupts cottage industries and results in deterioration in quality of life.

The study will be carried out in Gujarat, Madhya Pradesh, Rajasthan, Punjab, Karnataka and Tamil Nadu. A group of two (2) students will be assigned to each state. All groups will use a common research framework and survey questionnaire to undertake the study. Both the students opting for a state must know the local language. The study in each state will involve a formal structured survey as

well as Focus Group Discussions. Students will analyze their data and submit complete reports to IWMI mentors. They will also be expected to present their studies in an open workshop that IWMI will organize.

The study will involve a formal structure survey as well as Focus Group Discussions. Students will analyze their data and submit complete report

**a. Study of rural power supply under Uttar Gujarat - Mehul Srivastava and Uchit Maulesh Desai**

**Major Findings:**

For domestic sector the power supply environment has improved post Jyotigram Yojana and as a result many villagers have adapted to livelihood opportunities in village itself. In case of agriculture the average number of hours farmers gets the electricity was 8 which were mostly sufficient except in winter season. The farmers were satisfied with the functioning of UGVCL. There was a huge waitlist for getting new connections. Tatkal Scheme was afforded by only economically well off farmers. The farmers were ignorant about MIS which should be undertaken by UGVCL and subsidies for same should be increased.

**Recommendations:**

Providing technical guidance to the farmers on efficient usage of pump and water. Introduction of awareness campaigns that will make villagers understand the importance of efficient use of electricity. Replacing inefficient pumps by proper ISI certified pumps. To implement various steps to recharge ground water level.

***b.*** **Study of rural power supply scenario in Madhya Pradesh - Amresh Sinha, *V*aibhav Gupta**

**Major findings:**

The rural power supply in MP is faced by frequent power interruptions. The average power supply in villages ranges from 10-12 hours per day. Since feeder separation has not been done, voltage fluctuation is a major problem during winter season which is also the peak agricultural season. DISCOMs can improve their performance by focusing on joint optimization between technical variables (feeder separation; improved transformers; better metering) and social system variables—such as organizational culture, employee motivation, etc especially, agricultural consumers. They form the most politically sensitive market segment and appropriate research needs to be done before formulating any strategy for them. Some of the schemes like Franchisee Scheme and OYT scheme been run by the company are worthy of appreciation and need to be recognized at the national level.

**Conclusions and Recommendations:**

Power supply situation is very bad in MP and steps need to be taken to improve it. Power is directly linked to agriculture productivity, ground water level and migration level in the village. Consumers nearer to the substation and the transformer get better power supply compared to those at the tail end. DISCOM acts as a major source of reform which can drastically change the rural power supply situation. Unbundling has not been able to provide the desired impact in Madhya Pradesh. Still

bureaucratic way of doing things continues. Projects like feeder separation are growing at a very slow pace and require strict monitoring by the state and central government. Political climate plays a major role in the power supply with parties protecting their vote bank at the cost of the company. Attitude of employee should change from owners to service providers. New schemes and technology should be adopted by the company according to the area and consumer mix

**c. Assessing the quality and quantity of rural power supply in villages of Punjab - Rachna Rajput and Pushpendra Saharan.**

**Findings:**

The rural power supply in Punjab faces problem of power interruptions primarily in summer and monsoon season. Farmers complained of frequent cuts during the peak paddy season. The spread of area to which PSPCL supplies electricity is very large and there is need to establish more power grids. The present grids are overloaded and thus more interruptions. The domestic interruptions increase during the peak season. Farmers and PSPCL both have their own limitations to achieve high quality of power supply. Due to the free power supply to farmers PSPCL is running into deep losses of Rs.2996 crores. HVDS (High value distribution system) has reduced the distribution losses to a great extent. Installation of Pillar boxes is another reform to reduce the theft of electricity; however it is too premature to comment on the effectiveness of the reform.

**Key Learning:**

The need of the hour for Punjab state power corporation limited is to set up more grids to under load the present grid stations and bring more consumer orientation among the employees of PSCPL.

**d. Study of rural power supply in Rajasthan– Gaurav Jain and Roma swami**

**Major findings and Conclusion:**

The outcomes of key rural electrification schemes like FRP (Feeder Renovation Programme), RGGVY, etc have improved the rural power scenario to a greater extent. Also, it helped the distribution company to bring down its distribution losses but on the cost of huge capex on power distribution. The usual stated power supply is 5 hours, 3-phase and 11 hours, single phase. The major problems that rural consumers face include: interruption in power supply, delay in release of agriculture connections, cost in acquiring farm connections, issues related with the faulty energy meters According to some employees the expenditure far outweighs the benefits achieved from loss reduction. As a result of which, utility is saddled with huge borrowings which is deterring its performance. Information Technology implementation and Bachat Lamp Yojna (BLY) are the promising steps taken by the Discom to improve overall efficiency.

**Recommendations:**

The utility should work keeping in view long term scenario and emphasis should be given to adherence of policies and monitoring of reforms. The utility should perform to achieve financial stability for better service. Diversion of funds meant for capex to fund working capital requirement of Discom, tariff hike, additional fund should be allocated to meet interest expenses and change in consumer mix with more supply to industrial users will enhance revenue and bottom line. There is urgent need to recruit field staff. Consumer awareness programs for educating consumers about efficient use of power would save electricity and hence improve supply conditions.

**e. Rural power supply environment Kerala – Asha Eapen & T.P. Remiya**

**Findings:**

As there is no separation of feeders uninterrupted 24 hours power supply is available to both domestic and agriculture consumer segments. Kerala has not observed load shedding for the past 4 years. The tariff rate fixed for domestic consumer segment is the lowest in the country. On an average the available power supply to farmers and households was found to be 23 hours through the survey. Power interruptions were found to be frequent during monsoon. As most of the agriculture connections were taken long years back 15% of the surveyed farmers faced problems in getting an immediate connection. More than 95% of the total sample population was happy with the services of KSEB. New initiative like model sections promise the consumer more to get from KSEB.

**Conclusion:**

Although there are problems like power shortage in peak seasons, revenue gap and issues of restructuring KSEB has achieved satisfactory level of performance in the case of consumer satisfaction. The power interruptions and power fluctuations reduced considerably over five years. The ease of getting power connection has improved over five years across all the segments. It is expected that KSEB will continue its performance in the near future as well.

F. **Discoms and rural electricity market: A study of Tamil Nadu D. Periyar Ramasamy and S. Govindaraj**

**Conclusion:**

Power sector is an ever expanding sector both generation and distribution, there is a need to develop the infrastructure. Purchase the power from the private firms in the reasonable price (Ensure the state quota) and also we have to change the people mind set to use the electricity in the peak hours.

In Technological concept automatic reader, smart grid concept (which control the power at the household level), Information Technology, Data base management and GPS will be used for consumer services.

In High Transmission services Electronic meters are fixed. It helps to interpret the flow of electricity in order to check the power theft. Maintenance also be the load management mechanism. Projection of requirement, the connection should given to the consumer

**3. River basin performance in Andhra Pradesh using total factor productivity analysis (3 decades)**
K. Palanisami and C. R. Ranganathan

The performance of the river basins are studied using various indicators such as area irrigated, area cultivated, water use efficiency, income per unit of water etc., However, it is difficult to genalize the performance owing to variety of other issues such as irrigated vs. rainfed aera, agriculture vs. Other benefits (such as livestock), inputs used, labour supply etc., Hence a holistic approach taking into

account all inputs and outputs is necessary. In the proposed study, both a Törnqvist-Theil index (growth accounting framework) and a non-parametric Malmquist index (DEA approach) to measure agricultural TFP growth was used for the 40 river basins in Andhra Pradesh.

Average technical efficiency of all the basins is only 66% implying that only 66% of the maximum possible outputs have been produced by the basins using the current level of inputs. The first three ranks of the efficiencies are occupied by other basins, viz., Manneru (0.879), Upputeru (0.837) and Kandeleru (0.827) and Godavari and Krishna with respective efficiencies of 0.574 and 0.725 occupy 32nd and 15th ranks while the third largest basin Pennar with an efficiency of 0.823 has rank 4.

In all the basins there was a decline in growth of agricultural output during the first two decades, viz., 1979-80 to 1988-89 and it had picked in the last decade (1999-2000). Krishna basin has the highest growth rate (6.57%) followed by Godavari (5.875%) during this period. These two basins show highest annual growth rates in gross irrigated area. Growth rate of labour stabilized around 1.5% in all the basins. Fertilizer consumption showed annual growth rate of around 5% in all the basins during the three decades. Similar trend existed in terms of the other two inputs, viz., tractors and pump sets except at Pennar basin where there is a decline in the growth rate of these inputs during the last decade.

All the river basins have TFP change greater than 1 indicating progress in agricultural productivity in all the basins. Godavari, Krishna and Pennar basins have TFP changes 1.211, 1.152 and 1.169 respectively contributed by both technical efficiency change and technical change. Out of the 40 river basins, 14 river basins have technical efficiency change less than 1 indicating decline in TFP growth and the figures for Godavari, Krishna and Pennar basins are respectively 1.029, 1.027 and 0.999. In the case of technical change, all the 40 river basins have changes greater than 1 implying that there is shift in production frontier over years. This shows the effectiveness of use of modern technology in agriculture in Andhra Pradesh.

Regarding the agricultural output growth, the contribution is mainly from total factor productivity and the contribution from inputs is negative during the first decade (1979-80 to 88-89) in all basins (except Pennar) and during the third decade (1999-00 to 2008-09) whereas during the second decade (1989-90 to 98-99) the contribution is from inputs only. Overall, in Godavari basin agricultural growth is due to TFP growth whereas contribution from inputs is negative. In the remaining basins, inputs have about 101% to 103% of contribution to agricultural growth and TFP contribution is negative but negligible. In general, within the TFP, technical change contributed more than technical efficiency change.

Looking at the future options for increasing the agricultural output in the river basins, it is important to focus on improving the TFP growth compared to increasing the quantities of physical inputs. As revealed in the study, although all the basins have shifted towards frontier, about 35% of them still need to be improved in efficiency of the input use. This can be achieved through intensified agricultural extension programs in using the modern agriculture and irrigation technologies. Specifically converging of the different agricultural development programs and strengthening the capacity building programs at the village level which will include crop management programs like SRI, water management programs like alternate wetting and drying for paddy and micro irrigation for horticultural crops.

**4. Regulatory Experiences of Water Resources in Andhra Pradesh: An Insight on Implementation of AP Water, Land and Trees Act (2002) in Andhra Pradesh**

MV Rama Chandrudu

The precarious situation of water resources, particularly groundwater in Andhra Pradesh demands urgent attention by policy makers and practitioners. The need for conserving water resources and promoting regulated use of groundwater/ surface water is undeniable in the state. Based on this need, Government of Andhra Pradesh introduced APWALTA (2002), which intends to promote conservation and regulated use of water resources, land and trees. This study was intended to make an objective assessment of experiences related to execution of this Act on the ground. The methodology of study is largely based on field visits; literature review and interviews with key players in the execution of APWALTA (2002) in the state.

The comparative analysis of APWALTA (2002) with other policies/ acts helped to understand the broad contours of the act itself. However, a detailed analysis of various provisions of the APWALTA (2002) was conducted to understand the nature of the Act. The APWALTA (2002) is very comprehensive in its approach, which goes beyond the Model Bill (1996) which was proposed by GoI. The institutional arrangements of this act combine the "developmental agenda" and "regulatory functions". The execution of the Act is largely based on "convergence platforms" that work under the supervision of Mandal Revenue Officer.

The APWALTA (2002) has mainly focused on water resources, land and tree cover. There are 23 provisions of the act to promote conservation and regulated use of these resources. A systematic assessment of each provision is made, based on the interviews, field visits, literature review and studying related records at different levels. It is found that APWALTA (2002) was more effectively implemented in some of these 23 provisions such as registration of bore wells in rural areas; inventory of rigs; controlling bore wells in urban areas, controlling sand mining. Related to several other provisions such as tree felling, protection of surface water bodies, APWALTA (2002) was not able to make any dent.

The study also made an assessment of achievements, challenges and gaps in implementing APWALTA (2002). Improved consciousness on the importance of regulated use of natural resources (with a focus on groundwater); single window clearance, use of groundwater data for declaring the status of each zone – were some of the achievements of the Act. It was also observed that APWALTA (2002) was able to improvise the rules and made amendments to simplify the process of executing the Act. Insurance of Bore wells is an important example of this process. This section also identified a long list of gaps in the execution of this Act. Discontinued efforts by administration at all levels and stopping the monitoring are two important gaps at this point of time. Operationally there were several gaps in the procedures of the Act. This section broadly concludes that several provisions of APWALTA (2002) were not implemented and there was no possibility of implementing them also, given the complex procedures of the act. One of the important gaps is absence of data bases to prove or disprove the effective implementation of the Act itself. An effort was made to identify lessons from alternative experiences of groundwater management/ regulated use of groundwater in the state.

These lessons were found to be relevant for ensuring conservation and regulation of local resources, mainly groundwater.

Based on the above analysis, an inventory of factors that facilitate promoting conservation and regulated use of natural resources was proposed, in Section 5 of the report. It is argued that in a spectrum of regulatory arrangements, State and Individuals stand on two extremes. Other actors such as markets, independent regulatory authorities, collectives of communities fall in between these two poles. The proposed that design of regulatory arrangement has to give space to all of these actors and create necessary ambiance for collective action. These facilitating factors were -- explicit & long term commitment from state; dedicated teams at independent regulatory authority; proactive nature of regulatory instruments; regular monitoring; strong role for local institutions; incentives for regulated use of groundwater; legal sanction to local decisions; focus on benefits to farmers; creation of enabling support systems and so on. It is obvious that current provisions of APWALTA (2002) do not have any of these enabling and facilitating factors, which made it an ineffective regulatory instrument.

**5. Are We Over-estimating Irrigation Subsidies in Multipurpose Water Resources Projects in India? -Methodological Issues and Evidence.**
**K. Palanisami, R.P.S.Malik and Kadiri Mohan**

Irrigation subsidies have become a highly contentious issue over years and alternative approaches and conventions have been evolved in measuring the magnitude of these subsidies. Given the fact that the capital cost is a sunk cost, this paper uses the O&M cost of the project and the gross receipts in computing irrigation subsidies. Further, the paper makes an improvement to the subsidy estimation methods by adjusting the O&M cost of the projects to multiple benefits of the irrigation projects using Separable Cost Remaining Benefit (SCRB) method in three major multipurpose irrigation projects in Andhra Pradesh State, India. The results indicate that currently irrigation subsidies are over-estimated. For example, the estimated average irrigation subsidy in Nagarjunasagar Project (NRSP) Right Bank canal based on currently practiced methods, works out to Rs 428 per ha whereas using the SCRB approach it is Rs 111 per ha. The irrigation subsidy for NRSP is thus being currently over-estimated to the tune of almost 286 percent. Similar is the case with the other two projects studied though the magnitude of subsidy over-estimation could differ. The results thus demonstrate how through use of appropriate accounting methodologies, more informed and transparent estimates of irrigation subsidy can be derived. The inference from this paper is that reliable information about subsidies actually going to the irrigation sector could help in framing better pricing policies for irrigation water and in promoting more efficiently use of irrigation water and use of subsidies. The outcome from the study will also be useful in fine-tuning the subsidy related discussions in the 12$^{th}$ Five Year Plan documents.

**6. Impact of climate change on agriculture: Godavari Basin, Andhra Pradesh.**
**K.Palanisami, C.R.Ranganathan, K.Krishna Reddy and Nagothu Udaya Sekhar**

**Assessment of Vulnerability to climate change**

Out of the 10 districts, Adilabad district occupies rank 1 in terms of overall vulnerability followed by Medak. West Godavari district is least vulnerable.

The results of the Ricardin model indicated that among the climate variables, South West Monsoon and North East season temperatures and rainfall seem to have significant effect on crop net revenues. The effects are non-linear. Temperature contributes more for the reduction in net income of the crops (41%) compared to precipitation (31%). The impacts are not uniform across the districts.

The Just and Pope production function results had indicated that for first climate change scenario, i.e. an increase of 1.93$^{o}$C in temperature and 13.6% increase in precipitation, the expected loss in rice yield during Kharif season, varies from 1.9% to 9.4%. The variability in yield is around 13% for all the districts. The second climate change scenario produces greater percentage of losses and variability in yield. The percentage loss varies from 22.9% to 38.3% and crop yields. Thus it can be concluded that climate change induces not only loss in yield but also greater variability in yield of rice.

The percentage of loss in maize yield under first climate scenario is small in all the districts and. for the scenario 4.1$^{o}$C/17.8%, the percentage loss seems to decrease. However there is slight increase in variability in yield. Thus we can conclude that climate change may not have considerable impact on maize yield..In summary, climate change will have very serious effect on groundnut, moderate effect on rice and negligible effect on maize. Further, stronger climate change will induce higher variability in yield in all the crops. The optimization model has projected that the climate change impact in the long term basis is projected to reduce the rice production in the project area by 25-30%. The key message is that water is the key constraint in rice production in the long run and land put under current fallow due to water scarcity will be a key issue to be dealt with. Implementation of various rice water and labour saving technologies will minimize the reduction in rice production between 20 to 25% under the medium term and long term basis. Further, farmers not investing in wells for supplemental irrigation purposes are currently incurring a loss of Rs 12108/ha compared to farmers who own the wells. Further, the results of the crop insurance analysis indicated that farmers grasp the weather indexed insurance product only partially.

It could be concluded that climate change impacts could be inevitable; however, the magnitude of these impacts on crop production could be minimized through the adoption of various management practices.

**Recommendations**

Using the results of the analysis done in the basin on various aspects, it is important to focus on those districts with comparatively high level of vulnerability with appropriate interventions. As the ultimate impact of the climate change will be on the production level of crops and their variability, it is important to address this issue on priority basis. The following interventions are considered important to augment the crop production in the basin:

- Introduction of system of rice intensification, alternate wetting and drying irrigation, machine transplanting of rice seedling and adoption of water management technologies such as irrigating at recommended depth will minimize the possible reduction in crop production due

to climate change. Hence, simply implementing the water management technologies will address the rice production constraints without making any structural interventions such as construction of new storage structures. Already field level studies in the project area had shown that water saving technologies will have a higher rate of return in rice production systems. The key question is how and what scale, these technologies should be introduced and what kind of institutional and capacity building mechanisms are needed to achieve this. The following suggestions are considered important:

- Water management technologies should be piloted in selected locations of the project and based on the success of these technologies, the upscaling mechanisms should be initiated.

- A cluster approach (covering a group of villages in a location) will be more useful in up-scaling the water management technologies and farmers will be free to interact and follow up with the relevant technologies.

- Labour saving technologies such as machine transplanting has proved to increase the rice area and production in all the climate scenarios. Hence given the future labour scarcity in rice production, machine transplanting package should be organized at village level through the involvement of local community. A custom hiring unit can be established in the cluster of villages and farmers can easily forecast their requirement for paddy seedlings and planting in a given time schedule.

- The existing Government programs with the Agriculture Department of the Government of Andhra Pradesh should include the water management technologies in their program.

- Adequate capacity building programs in technology upscaling and mainstreaming should be established. The expertise with the agricultural university research stations should be explored for strengthening the capacity building programs.

- Choice experiments offer an approach for evaluating insurance product design on the short term, the importance of framing information such as forecasts, and evaluating price elasticity of insurance. Providing information on insurance products may be as effective as subsidising premia. Government will also have to play an active role in regulating the type of information provided to farmers regarding rainfall and irrigation forecasts. For the first time in 2011 authorities in Andhra Pradesh will provide irrigation forecasts. Our results suggest that irrigation forecasts by authorities would have a large impact on weather indexed insurance for irrigated crops, perhaps to the extent of making an insurance market unviable in certain time periods when system irrigation is likely, although not guaranteed.

**7. Tank ecology and multiple uses of water in villages of Western Orissa: Technology choices, economics, institutions and livelihoods.**

**M. Dinesh Kumar, Ranjan Panda, Niranjan Vedantam, Nitin Bassi, Sacchidananda Mukherjee**

Analysis of five wetlands in western Orissa shows that that there are five major uses of water from the wetland. They are domestic water use; livestock water use; water use for irrigation; water use for fish production; and swimming, which is a recreational use. The economic value of the multiple use benefits created by the direct use of water from the tank was estimated by several methods, viz., hedonic pricing method, market analysis and public pricing method. The total economic value (TEV) of various uses ranged from Rs. 2.95lac in a normal year in Gadloisingh tank to Rs. 21.61lac in the case of Rugudipali tank in a normal year. Interestingly, the incremental return from the use of water per unit area of irrigated crop in the wetland over upland was found to be higher during drought years for three tanks, indicating the greater value the tank water has for the farmers in such years. Nevertheless, at the aggregate level, the incremental return from the use of tank water was found to be lower in four out of the five tanks, indicating the distress it causes on poor tank irrigators. Irrigated agriculture using tank water produces the highest value in economic terms in all the tanks.

Water allocation from the tanks for agriculture during normal rainfall years is less than that of drought years in three out of the five tanks, in spite of having more water available during such years. In the remaining two tanks, where the volumetric water use is more during normal years, it was made possible through winter irrigation. The extremely low water demand for paddy grown during the kharif season, the inability to expand the command of the tank, and the restriction on water withdrawal during winter season imposed by the Panchayat, which leases out the tank to contractors for fish production, are the reasons for this. Because of this restricted water allocation, the economic value of the benefits realized from the use of tank water is quite low during normal years. Irrigated agriculture is in direct conflict with fishery production.

Water productivity analysis shows that all the winter crops except potato have higher water productivity as compared to kharif paddy, during normal as well as drought years. Also, the same crop, grown in the wetland, yields higher water productivity during normal years as compared to drought years. A conceptual model developed for analyzing the gross tank product from direct uses of water from the tank for different water availability scenarios (Diagram 1). Subsequently, we have also derived the mathematical formulations for simulating the economic value of various benefits derived from the tank under various water allocation scenarios, with various physical and socio-economic constraints induced as constraints and boundary conditions.

Application of this model for the current situation in the tanks shows that there are no significant trade-offs between maximizing the economic value of water in agriculture production, and meeting water needs for other existing uses of the tanks. Consequently, there is a sufficient scope for improving economic value of tank water used for irrigated agriculture, without compromising on the basic needs and fisheries. Three major options for this are: 1] reallocating water used for growing kharif paddy to winter crops during the drought years as the water required for paddy is very high during these years; 2] using some more water from the tank for production of crops that are high valued, and that which give high economic returns per unit volume of water during the winter season, in normal rainfall years; and 3] increasing the utilization potential of the tank water in kharif season itself by taking it to areas outside the command through new conveyance systems. The crops that can be grown during winter are: brinjal, tomato, potato, onion, mustard and some curry leaves such as fenugreek and coriander.

But to affect the enforcement of these rules, strong institutional intervention would be required. Water reallocation is the biggest challenge. First, there should be sufficient infrastructure for expanding the command area of the tank during normal rainfall years. Second: there is a need for an institutional mechanism to ensure that sufficient water from the tank is earmarked for winter crop production. This can be done without compromising on fish production which needs the presence of minimum quantity of water for longer time periods. This should be supported by good scientific and technical knowledge of growing horticultural crops, and raising fish. Periodic water quality testing is required for ensuring good quality water for domestic uses, and fisheries. It is to be kept in mind that keeping a lot of water in the tank, without allowing it to be used for crop production, for fisheries does not result in increased fish yield.

The institutional arrangement suggested for tank management comprises administrative set up, rules and regulations, water right, and mechanisms for generating finance for tank management, which ensure local institutional capacity for management of these tanks as multiple use systems for rural livelihood enhancement.

There is a great scope for further research to deepen the understanding of tanks in the region. The future research can concentrate on mapping out actual area irrigated by tanks in typical rainfall years, valuation of the ecological services offered by the tanks, and undertaking the analysis at the level of sub-basins. Remote sensing and GIS would be the best tool for mapping out the area irrigated.

**8. Evaluation of Agricultural Extension on Farmers through Krishi Mahotsav in Gujarat: A Preliminary Assessment**

Study Team: Sonal Bhatt; Neela Oza,Bansari Mukesh Bhatt, Alka Palrecha, Sivani Mishra, Paresh Rawal, M.S. Patel, Rakesh Shah, Itishree Pattnaik/GIDR

The major conclusions that can be drawn for the study covering 25 districts are like:

1. Awareness about KM was found to be fairly high, which indicates a positive response to the programme.
2. Participation of beneficiaries in planning (during Gram Sabha) and preparation for the visit of the Krishi Rath was found to be low, for which, further efforts are required.
3. Awareness about new practices in agriculture and allied activities was found to be high, but it is difficult to ascribe this to KM alone.
4. Adoption of new practices was found to be low; however, this could be expected to increase in the long run.
5. Major changes are required in its timing, design, implementation and management of KM; as well as motivation of personnel involved with it. Only then, will the time, effort and expense incurred on the KM would generate a considerable impact on the target group and the efforts and benefits of KM would match each other.
6 There is a need to look into the questions of follow up and synergic linkages with the larger extension systems other than Krishi Mahotsva. Essentially, the programme may contribute

towards revitalizing the larger systems with which farmers keep connected on a regular basis. This issue of course, needs further probing as it was not part of the present enquiry.

Finally, the requirement for information services is increasingly becoming more nuanced and location/farm specific. This is particularly so in the wake of the increased climatic vulnerability, food insecurity and resource-use sustainability. It is therefore, high time the future models of extension services are better equipped with more nuanced rather than focusing on the messages/recommendations that are general in nature. While Krishi Mahotsav could perform the latter task, it should keep reminding us that the more complex tasks are yet to be addressed with care and long term commitments.

**9. Adoption of SRI in different farm sizes and irrigation sources**

**K. Palanisami and K. Karunakaran**

The study on the SRI adoption level under different irrigation sources and farm size categories in Tamil Nadu State, India was undertaken during 2009 under Phase I. In order to study the sustainability of SRI adoption, the details on paddy cultivation, adoption and coverage of SRI method of paddy cultivation from 500 SRI and 100 Non SRI farmers were contacted from ten districts for 7 seasons from 2007-08 and 2008-09 to collect the data by recall basis in Phase I.

In continuation of the Phase I the study, in order to study the sustainability of the adoption of SRI method in Tamil Nadu, data were collected from further four paddy seasons (all three seasons in 2009-10 and 2010-11 *Kuruva*i season) from the selected 500 SRI and 100 non SRI farms during 2010 as Phase II study. Analysis were made with available data set from the two phases for estimating the adoption level using different components of the SRI during 2009 -10 and *kuruvai* 2010-11 under the different irrigation sources; and farm size.

In 2009-10, SRI method of paddy occupied about 85 % in *Kuruvai*, 71 % in *samba* and 80 % in summer seasons. Small and large farmers allocated comparatively more area to SRI due to availability of assured irrigation supplies. Hence for marginal farmers, going for higher area under SRI might be a problem due to resource constraints. Only 15% of the SRI farms were under surface irrigation, 49% in ground water and 36% under conjunctive use of surface and groundwater. The average farm size under surface, groundwater and conjunctive irrigations was 2.00 ha, 2.70 ha and 3.4 ha, respectively.

The paddy area coverage had declined in all irrigation sources, but the area under SRI has increased among more the number of farms indicating the gradual expansion of SRI area in Tamil Nadu. SRI area had increased to 1.7 ha and 2.1 ha in 2009 from 1.5 and 1.7 ha covered during 2008 for Kuruvai and samba seasons, respectively. In total, from 566 SRI sample, farmers were increased 786 ha, 801 ha and 253 ha cultivated paddy by SRI method in kuruvai, samba and summer seasons during 2009-10 compared to 517 ha, 599 ha and 168 ha over 2008-09. This indicated a clears evidence of annual increase in total SRI area by 52, 34 and 51 per cent in 2009-10 over 2008-09.

The intensity of SRI adoption was studied by comparing the share of SRI area to the total paddy area by each farmers, under all the three seasons for 2009-10. Farms who allocating more than 75 per cent of total paddy area to SRI method in a particular season has increased to 66, 64 and 77 per cent in 2009 from 43, 50 and 49 per cent of total paddy area under SRI in 2008. It is clearly evident that among 566 SRI farms, farmers gradually expand the share of SRI method of paddy cultivation in all the season over last three years.

SRI adoption status in 2009-10 in comparison with 2008-09 is revealed that more half of the farms increased the SRI area and one fifth reduced area under SRI. Five per cent of SRI farms dropped the SRI cultivation however, which has compensated by 12 per cent of farmers became new adopters of SRI in 2009-10.

Among the adoption of different core components, 44 per cent of SRI farms used recommended seed rate in SRI. Age of the seedling, modified mat nursery method and single seedling technologies were only followed by one third of SRI farms in 2009-10 this showed marginal increased in adoption status of these core components compared to 2008-09. Cono weeding is an important core component which largely influenced the rice productivity in SRI, which was followed by one fourth of the farmers.

In kuruvai 2008-09, SRI farms realized 9.78 per cent of additional yield over conventional method, but in 2009, SRI farms realized about 15 per cent higher yield (5.23 t/ha) over conventional method (4.56 t/ha). However, in samba, same level of 11 Per cent additional yield was realized in 2009 as like 2008.

Adopting single seedling or age of seedling reported comparatively higher yield. Among combination of any two components, single seedling with square planting or single seedling with cono weeding reported the highest additional yield of 1 t/ha combination of all the core components yield around 1.5 t/ha hence single component resulting 10-12 per cent additional yield 2-3 components gives more than 20 per cent additional yield while following all the core components had increase the paddy yield to 30 per cent over conventional method in all the situation the maximum yield was ranging from 7-9 t/ha indicating further scope for increasing complete adoption of all the core components at right time.

In samba 2009 adopting single component resulted additional yield of 6 q/ha, combination of two gives 6.5 q/ha three or all the four core components resulting 9 q/ha addition yield over conventional method However the maximum yield was ranging 6.5-8 t/ha in samba of the SRI farms at the maximum 20 Per cent additional yield while adopting all components, 12 Per cent in any two components additional yield was recorded in samba 2009.

About 12 per cent of the Kuruvai and samba SRI farmers in 2009-10 transformed the concept of SRI cultivation at the extent possible through machine transplanter. They largely used the six rows- four

wheels drive machine transplanter which have calibration for adjusting the between plant spacing and number of seedling. However, the single seed ling and 14 days old seedling was not maintained by the transplantor hire operators. The core components were readjusted with planting 18 days old 2 -3 seedlings at 30x 25 cm spacing in place of SRI cultivating area. An average the farmers recorded 6-9 q/ha of additional yield which is closely with SRI average yield realized in last year. This would solved the labour problem and time management with in the season.

**10. Weather Based Crop Insurance and Farmers' Willingness to Pay for Paddy crop in Godavari, Krishna and Cauvery Basins, India**

**K.Krishna Reddy and K.Palanisami**

Agriculture is prone to various risks due to production, weather, technological and market uncertainties. Losses arising out of these risks have to be mostly borne by farmers. A majority of the Indian farmers are small scale, and often find it difficult to adjust to uncertainties, especially the risks from extreme weather events and change in climate. Sixty five per cent of Indian agriculture is heavily dependent on natural factors, particularly rainfall. Rainfall variations account for more than 50% of variability in crop yields and a high degree of correlation exists between the rainfall and agricultural production. Crop insurance is one mechanism that has been popular amongst Indian farmers, but they are not interested in paying the premium, and are not satisfied with the payment mechanisms and hence the program is not successful as expected. Nonetheless, the government of India has initiated weather based crop insurance scheme (WBCIS) on pilot basis to provide insurance protection against risks and losses in crop yield resulting from adverse weather indices for selected rainfed crops

Farmers' under Godavari, Krishna and Cauvery river basins cultivate rice as the major principal crop and is highly influenced to the climate changes. In this context, study was designed to answer the questions like, what are the constraints in adapting the crop insurance, what are the perceptions of farmers on climate change, and what amount of money farmers willing to pay in WBCIS for paddy?

Choice experiments and Double bounded dichotomous models were used for the study. The choice experiment was designed for Manjeera sub-basin of Godavari river, Andhra Pradesh. Double bounded dichotomous choice model was used for the Krishna and Cauvery basins.

In choice experiment, farmers choose adaptation measures such as increasing well depth or adopt water saving measures on farm, there is a greater likelihood that insurance will not be used, as per expectations. The type of irrigation (Tank irrigation, borewell, and lift irrigation) with the forecast details has no significant effect on the choice of weather based crop insurance. The forecasts of more rainfall and irrigation months lead to a higher probability that no insurance is chosen.

Most of the farmers under the crop insurance and weather based insurance scheme are loanee farmers, which left less scope for the non-loanee farmers. The farmers' willingness to pay for WBCIS is about 3 to 4.7 % of sum insured in Krishna and Cauvery river basin. Among the major factors affecting farmers WTP is age and awareness about the compensation framework.

Hence, it is important to create more awareness to the farmers on the insurance schemes in order to ensure his financial security in the event of heavy loss due to unmanageable adverse weather events such as floods, droughts etc. In addition, the number of studies have to be increased to bring out the more sustainable insurance products.

**11. Drivers of the Success of the Canal Irrigation Systems, Tamilnadu**

**K.Palanisami and Soundarajan**

The success of the irrigation system depends on characteristics of water supply, system management, methods of water utilization and final outcome of the water use. In this study, possible drivers of the success of the canal irrigation systems are identified and the system performances are measured. Three case studies, viz. Parambikulam Aliyar Project (PAP), Lower Bhavani Project(LBP) and Tambraparani Project (TP) are analysed to identity the drivers or factors behind the successful operation of the irrigation systems, using the long term data. The identified drivers are critically evaluated on how they are affecting the success of the canal irrigation system. The identified main drivers influencing the success of the irrigation system are water availability per unit area; level of water demand met by canal supply, rainfall pattern and groundwater supply; usage of water saving technologies; cropping pattern changes; water allocation pattern; participation of water user association and usage of improved technologies for cultivation and water management. The performance of the irrigation systems are based on percentage of the target area irrigated, water productivity of major crops and average profit per unit area and per unit water used. Among the canal irrigation systems in Tamilnadu, two irrigation systems viz. PAP and LBP are performing better as compared to others. Hence, the best performing irrigation systems are considered as bench-mark systems and other irrigation systems are compared with the bench-mark.

When analyzing the performance measures, PAP and LBP are performing better compared to TP. Important drivers identified are: canal water supply, ground water supplementation, water allocation pattern, cropping pattern, water saving technologies and functioning of water user association which are playing major role in the successful operation and water distribution. Groundwater supplementation along with canal water supply, if both can able to meet the water demand, the performance will improve. Cropping pattern depends on water availability and reliability. Water allocation pattern and physical infrastructure of the water distribution system also influence the overall successful operation of the system. Use of water saving technologies and effective functioning of water user association are influenced by farmers knowledge, awareness, financial status and government policies. Further analysis with more number of systems will strengthen the grouping of drivers of success of canal irrigation.

## 12. Grass Roots Dynamics of MGNREGS Implementation in Tamil Nadu

**M. Chandrasekaran**

The pattern of implementation of MGNREGP in Tamil Nadu indicates some interesting features, such as considerable participation of SCs and STs accounting for 29.17 per cent with 30.86 per cent of the person days created availed by the group. The women accounted for 76.75 per cent of the person days created. This implies the overall benefit going to the weaker sections of the society. The larger participation by the women also indicates them getting empowered in financial terms. Most of the works were completed between four and 12 months which indicated a focused approach to plan works in small scale and at manageable level given the constraints in availability of supervisory staff. However, in larger works which are not many, the shortage of supervisory staff was felt. Perhaps the need to provide jobs within 15 days put pressure on the authorities to plan works to absorb the labour in supply leading to supervisory problems. Some flexibility in waiting period may thus be needed. Labour constituting 100 per cent of the total estimate and the expenditure implies the state taking the advantage of the open ended nature of the conditions in the project design such as not more than 40 per cent of the fund is allocated for the costs of material components of the project (inclusive of the wages for the semi-skilled & skilled labor) and 60 per cent or more of the fund allotted is to be expended towards wages of the unskilled labor, besides, total finances being shared by the central and state government in 90-10 ratio; the material cost divided in 75-25 ratio. This had led to all earth work done, the durability of which will be much lesser thus weakening provision on asset creation. The authorities at different levels including the Panchayat Presidents also shared the same concern. Therefore asset creation is one area that needs to be looked into at the least in-terms of making the structures fairly durable besides making use of a specific share of the total allocation at the Panchayat level for permanent asset creation. The authorities otherwise followed all the provisions in the Act.

One of the ELR features states that the compensation package should provide a decent standard of living even as it helps to maintain wage and price stability while hiring out the bottom in the labour market. However, the increase in the wage rates by 100 per cent at the minimum for the female labourers and by 100 per cent at the maximum for male labourers indicates a disturbing trend of pushing up of wages, particularly in the case of male labourers. The villagers also indicated difficulties in the availability of labour during the agricultural seasons.

The quality of whatever works taken-up was reported and seen as good. There are not many problems for work seekers as the officials are scouting for labourers to meet targets.

The work selection process of the works approved by the resolutions of the Gram Sabha being forwarded to the Block level authorities for preparation of estimates and execution and the responsibility of the maintenance of all the work related records and processes by the Panchayat office are the indications of the empowerment of the Panchayat Raj institutions and local people.

But for the difficulties expressed in the overseeing of works as these are executed, the supervision arrangements are perfect with the Panchayat Presidents taking keen interest beside the ward members and the Block level Engineers and Administration officials. The dialogue with the Engineers and officials revealed that they are well aware of all the works executed and their quality in a relative sense, even while the sample works were rated as good. The composition of the monitoring group with representation for SC community people, women SHGs and NREGS workers and the social auditing being done have brought in a lot of credibility to the whole process. The rights awareness among the people was obvious and brought out through instances of the people complaining to higher officials on specific clauses, being enquired upon by them for clarification or resolution or follow-up action.

People expressed usefulness to the level between 70 and 100 per cent of the irrigation related works on the basis of nature of work done either to increase or maintain storage capacity or potential to recharge wells in the area, besides digging Small ponds for storing water to serve animals' needs.

The Panchayat office was maintaining all the specified records and updating these regularly to meet reporting requirements to the Blocks and there-upon to the district authorities. The NGO involvement was absent, however it was not felt as a lacuna since the works are taken-up as per recommendations of the Gram Sabha and local people are involved in execution under the supervision of the Makkal Nala Panialar who again is a local person and the People representatives and the Monitoring group drawn from local population.

**13. Adoption of SRI in Kerala State: Potential and constraints**

**S.Shanamugsundaram**

A study on the SRI adoption in Kerala was taken up covering 3 years viz., 2008- 09, 2009-10, 2010-2011 and Viruppu(April-May to Sep-Oct) Mundakan(Sep-Oct to Dec- Jan) and Punja (Dec-Jan to March- April) season. The samples covered 200 SRI farmers and 40 Non SRI farmers.

- The average area under Paddy was 1.70 ha . Out of the average Paddy area, average area under SRI was 88 percent , 89 per cent and 90 per cent under Viruppu season,79 per cent , 84 per cent and 88 per cent under Mundakan season and 82 per cent , 70 per cent and 82 per cent under Punja season.
- Comparing the three year data 37 per cent of farmers in Viruppu season and about 87 per cent of farmers in Punja season were disadopters of SRI in their farms. Further about 6 per cent farmers in Viruppu season, 15.50 per cent in Mundakan season and 1.50 per cent of farmers increased their area under SRI in Mundakan season.
- Under full adopter category more than three fourth of the respondents adopted single seedling planting , use of mat nursery, planting 8-12 days old seedling and square planting. Partial adopters adopt Organic and Inorganic fertilizer application
- Reduction in the seed rate was not adopted by 36.50 per cent of the farmers.

- An yield increase of 8.57 per cent during Viruppu season 8.90 per cent during Mundakan season and 5.49 per cent during Punja season was noticed by adoption of SRI.
- Among the crop season maximum yield was recorded in Mundakan season with 5.24 t/ha over conventional with 8.49 per cent yield increase.
- Farmers face several constraints for not adopting all the SRI components. Constraints such as Lack of trained labours in single seedling planting and use of marker, Time consuming for transplanting, Crop stand not visible in the initial stage, Problem of timely labour availability, Square planting with rope not able to attain, Intermittant wetting and drying in fragemented holding is difficult, First Season not suitable, Use of cono weeding laborious, Cono weeder not of good quality and lasts 1-2 season, Weeding cost is more, Frequency(10 days interval) of weeding not adopted perfectly due to timely labour availability and Discouragement from fellow farmers were faced by more than 50 per cent of the farmers.

The following are the recommended strategies;

- Farmer-Farmer Extension and Farmer Field Schools to be promoted
- Incentives for speciality rices like navara to be given
- Mechanisation to be promoted especially for planting and weeding operations
- Control of water by providing drainage channels around and between the field plots should be made compulsorily regulating the flow of water.
- SRI tools like Markers and Cono weeder with technical back up to be provided
- Awareness Campaign by delineating the areas suitable for SRI to be initiated
- Involvement of Self help groups in SRI activity

**14. Financial performance of India's irrigation sector: A macro level analysis**

**A. Narayanamoorthy**

India's irrigation sector, one of the largest in the world in terms of number of large dams and irrigated area, has been facing a number of different problems, especially since mid-1980s. Low and fast declining financial recovery is one among the important problems of the irrigation sector. Since adequate financial recovery is needed to manage and sustain the vast irrigation network, many changes have been introduced in pricing as well as in other areas of irrigation sector over the last two decades. A few states have initiated bold reforms in the irrigation sector to improve its overall performance. Some states have revised the water rates expecting to improve the financial recovery. A few states have transferred the management of the systems to water users group by enacting an Act to improve the financial recovery. Why is the financial recovery of the irrigation sector poor in India? Can the revision of water rates alone help to increase the revenue and recovery rate? Is the level of financial recovery same across different states and periods? Is there any relationship between revision of water rates and financial recovery? Is it correct to say that the increased operation and maintenance expenditures are the main reason for poor recovery? Since there are no detailed studies covering these issues utilising temporal and spatial data of MMI projects in recent years, an attempt is made in this study to probe these issues covering national and State level data from 1974-75 to 2006-07.

The study shows that despite substantial increase in area under canal irrigation over the years, there has been a consistent decline in the financial recovery of MMI projects in India. The financial recovery (percentage of gross receipts to working expenses) of MMI projects was close to 100 percent during mid-seventies, but it reduced to about 15 percent in 2006-07 at all India level. While the recovery rate is generally low across all the States, the agriculturally less developed States have performed relatively better than the agriculturally developed States. The financial recovery of Maharashtra and Gujarat has improved appreciably since 2000-01 because of all-round reforms introduced to improve the performance of irrigation sector. The study found no relationship between the agricultural development (reflected through canal irrigated area and value of crop out) and the financial recovery across the States. Fast increase in working expenses, low and unrevised water rates, less realisation of revenue to assessment and not initiating required policy and institutional reforms together have contributed to the drastic decline in financial recovery in irrigation sector. However, the recent experience of Maharashtra State, which made turnaround in financial recovery since 2001-02, suggests that the financial recovery of the irrigation sector can be increased, if economic and institutional reforms are packaged and sequenced appropriately along with upward revision of water rates.

15. **Spatial Patterns of Decentralized Water Harvesting and its Impact on the Agrarian Economy of Saurashtra**

**Shilp Verma and Alka Palrecha**

Saurashtra has been witness to a unique mass-movement for decentralized water harvesting and groundwater recharge. However, despite widespread evidence from village case studies enumerating the positive impacts of check dams on agrarian economy, decentralized water harvesting has been called chaotic and often criticized for its failure to account for negative downstream impacts. It has been argued in river basins where much of the dependable flows have already been committed to medium and major irrigation dams downstream, indiscriminate water harvesting would cannibalize government-built dams and would only lead to redistribution of finite water resources within the basin without adding much net social value at the river basin scale. This concern is heightened by the fact that several of the government-built dams are also critical drinking water sources for important and growing urban centers. Further, it has been argued that the basaltic nature of Saurashtra's hydrogeology imposes serious limitations on the storage capacity of its aquifers. If the limited aquifer capacity rejects recharge after a point and the remainder of the water remains collected on the surface in small reservoirs, much of it is likely to quickly evaporate in the arid conditions.

Despite these critiques, in early 2000s, a Government of Gujarat commissioned independent evaluation of check dams in Gujarat recommended that "the rainwater harvesting efforts initiated with the people's participation and support from SPPWCP should be re-launched and implemented on a larger scale". This prompted the government to facilitative the construction of thousands more check dams and by 2010, close to 50,000 check dams and numerous other water harvesting structures

have been constructed in the seven districts of Saurashtra alone. Together these check dams created new water storage capacity of more than 20,000 million cubic feet contributing roughly 60-65% to the growth in total storage capacity in Saurashtra since 2001.

This study was initiated with the dual objective of compiling a first-of-its-kind comprehensive database of decentralized water harvesting in Saurashtra and to understand its macro-level impacts on the agrarian economy of Saurashtra. The study has compiled taluka level time series data on: (a) numbers and capacities of check dams constructed under various government programs from the early 1990s to now; (b) rainfall data from more than 300 rainfall stations for the same time period; and (c) data on irrigation from public irrigation systems in Saurashtra. In addition, the study has compiled data on gross and net area irrigated by source for each taluka with the objective of correlating water harvesting with agrarian stability and growth. We now propose to conduct a consultation with key government officials, irrigation engineers, researchers, NGO leaders and selected experts to share this database, present preliminary analysis and generate a discussion on ideas and hypotheses for further analysis.

## b) Ongoing Studies

**1) Adoption of SRI in AP, Maharashtra, Karnataka, Gujarat, Rajasthan, Orissa, West Bengal, Assam, Chhattisgarh, UP and MP States of India- K. Palanisami**

**The Problem:** Several states in India have taken efforts to promote the SRI to the farmers by providing the incentives. However, several studies have reported the varying levels of SRI performance in the field. The key question is how the farmers are responding to SRI over years. If there are dis-adopters, what are the major constraints. Since SRI is still considered in policy circle as one of the improved practices, it is the right time to make the quick study on their performance and identify the drivers of adoption/disadoption. Hence this study is focused to address the key aspects of SRI in selected states where SRI is practiced.

**Scope of the study:** Evaluate the SRIin different irrigation typologies in different states involving scientists from the local universities. Study the adoption levels, SRI components and the factors influencing them.

**Specific Tasks:**

a. Conduct a farmer level survey from different land/irrigation typologies where SRI is practiced using the prestested questionnaire.
b. Conduct of a qucik survey of implementing agencies/ staff.
c. Data entry in excel sheet

**Methodology:** The study will cover about 200 farmhouseholds and 15- 20 extension officials/NGOs in each state. The households will be selected randomly using the list of SRI

farmers from the implementing department. Irrigation sources and farm size groups will be included in the sample selection. The secondary data will refer the key details relating to each state. The survey will use crop seasons of 2010 as the base year for comprison. The farmers will be post-stratified as small/medium and large during the analysis. Implementing agency survey: Extension officials = 5; scientists= 5; NGOs=5; other if any =5

**Deliverables:** Data sheet in excel along with the original questionnaire. Map showing the location of the sample farmers ( district and villages)

**Duration:** 3 months

**Results:** Received Data sheets, data analysis is in process

**2. Assessing the success, failure and potential Water Users Associations (WUAs) in Maharashtra.**
**Seema Kulkarni, Society for Promoting Participative Ecosystem Management (SOPPECOM)**

**Objectives and Scope of the Study:** One of the key objectives of the study is to do a situational analysis of the various WUAs formed under the Maharashtra Management of Irrigation systems by Farmers Act (MMISFA) 2005. Such an analysis would map the successes, failures and also the potential for change.

**The situational analysis report would be useful in the following ways**

- To use this information and analysis for collective thinking towards alternatives
- To use this analysis to lobby for change with the WRD through the network partners

**The scope of the study** is limited to the state of Maharashtra and it would cover a representative sample of WUAs registered under the newly formed MMISFA 2005 from Major and Medium Irrigation projects. It would not cover lift irrigation societies.

**This assessment would cover the following broad areas**

- Governance of WUA which would include its formation, formal registration, joint inspection, formal handing over and how participatory have the processes been, audits and financial dealings, meetings and information to members, women's participation etc
- Technical dimensions: Measuring devices, whether water is measured and records are kept regularly
- Allocations: Water allocations and entitlements tail end and other equity issues, how is the demand for water over years.
- Pricing and cash and kind contributions (part of reform process): How farmers charge and how the WUA is charged by the ID
- Water rotations and cropping patterns over the last few years to understand the frequency intervals
- Physical system- maintenance, its present condition

**Duration:** 01 October 2011 to 30 November 2011

**3. A meta-analysis of tank irrigation systems in India- Dr. V. Ratna Reddy (Livelihoods and Natural Resource Management Institute, Hyderabad)**

The deliverables include:
a) Draft report showing the synthesis of the results of the tank studies for different regions
b) List of recommendations for tank rehabilitation for eastern, northern, western and southern Indian tanks
c) Policy suggestions showing how to upscale the recommendations at different levels (farmer, community and government)
d) Data sheet in excel with the key findings if applicable

**Duration:** November 2011 to December 2011

**4. Investments, Financial Flows and Financing Options for Irrigation Water, India R.P.S.Malik**

**The Purpose**

Addressing investment and financing issues in water sector is a complex undertaking. Investments in development and management of water resources are made by a number of players – different Ministries/Departments of Federal and Provincial governments, private sector, farmers, NGOs and many other stakeholders. The finances for these investments also come from a variety of sources- government's own budgetary resources, user contributions , borrowings from both domestic and foreign multilateral and bilateral institutions, from private savings, private sector, other stakeholders etc. Some of these investments are in the nature of expenditure on works/equipment etc, some are in the form of subsidies intended to encourage complementary investments by other stakeholders and/or in making irrigation services affordable for the farmers to use. A part of the subsidy could also be given to meet governments objective of achieving such objectives as food self- sufficiency and in keeping the prices of crop output at an affordable level.

Since perceptions about the utility of data collection, resources available for data collection and data collection capabilities of different countries differ, different countries are at different stages of data collection and reporting on investments going in to the water sector. Even those countries, where a relatively good data base exists on some of these issues, have not attempted to collate available data from different sources and purposes and provide a more comprehensive assessment of investments going in to this sector. Quite often the investment data reported refers to the public investments and that too made only by the Ministry/Department of the government responsible directly for the development of irrigation. No estimates of private sector investments, which could sometimes be as large as the public investment, going in to water sector are available. Water sector investments being made indirectly ( e.g. through such programs as MGNREGA program in India) are not counted towards water investments. Similarly subsidized or free diesel engines provided under different programs of the government are not counted towards water investments. Quite often water sector

investments are loaded on to and packaged as a component of multi sector investment portfolios. Investment data from projects funded by multilateral funding organizations have similar problems. Accounting for this component separately is often not attempted. The generally reported data on water sector investments by a country could thus differ vary widely from the actual investments going in to sector. As a result a comprehensive information base on investments going in to development and management of water/irrigation sector is lacking in most of the countries.

Realizing the need to improve our understanding of the magnitude and nature of investments going in to the water sector and understand how these investments have been changing over time, the present study aims to take a closer look at the quality and nature of data availability in the water sector investments, ascertain the sources of investment funds, and identify current and emerging challenges in the financing of the water sector. Based on a consistent and comparable data set the study will attempt to analyze the pattern of trends in investment, composition of investment, and sources of funds for different water activities and study how these have been changing over time. The study would also attempt at an identification of data gaps on these issues and suggest what institutional interventions and level of efforts may be required to build and maintain a consistent and comparable data set on these issues

**What are irrigation investments?**

Irrigation investments are investments made by different stakeholders- both public and private- in constructing, managing, governing, maintaining, rehabilitating, modernizing, up grading, expanding and operating irrigation water systems of different sizes and based either on surface or groundwater sources.

These investments also include investments made in groundwater pumping and water conserving and water efficient technologies. These investments also include expenditure incurred directly in provisioning of electricity in rural areas for irrigation pumping. To the extent such investments can be identified and measured, irrigation investments also include indirect investments – such investments include investments which though made primarily for a purpose other than that intended to contribute to irrigation but end up contributing significantly to development of water sector. Examples of such investment include public works program, employment generation programs with a major focus on water security.

**Irrigation investments will however exclude**

Expenditure made on research and development in identifying appropriate irrigation development and management technologies. Establishment costs of government bureaucracy (except that relating directly to maintenance of works etc). Expenditure incurred on providing training to farmers and their capacity building, study tours, etc. Expenses on command area development. On farm water works undertaken by farmers (such as building water conveyance channels, land leveling etc). Flood control, drainage and anti -sea erosion projects. Displacement and rehabilitation cost of project affected people. Any externality (positive or negative) associated with development of projects

**What are the sources of finance for irrigation sector investments?**

The key stakeholders in the irrigation sector investment portfolio are many though their roles and relative contributions may vary. The important stakeholders are: government ministries and departments (both at the federal and provincial levels) directly responsible for the development, management, operation and maintenance of irrigation/water resources; other related government departments which though not directly responsible for irrigation water provisioning but run some programs which have a bearing on water sector such as Departments of Rural Development, Ministry of Power etc, NGOs, financial institutions, private individuals such as farmers themselves, communities and farmers groups (such as WUAs), donors and bilateral and multilateral lending institutions.

**How to account for Irrigation Investments in a Multipurpose Project**

Quite often irrigation constitutes just one component of a multipurpose project which in addition also serves a few other purposes. All investments made in such multipurpose projects cannot therefore be attributed fully to irrigation. While methods are available for allocating total project investments in to its different components, at this stage it is proposed not to go into this allocation. For the investments made in multipurpose projects with irrigation as an important constituent we propose to attribute the entire cost of such projects towards irrigation. This may to some extent overestimate irrigation investments but we will at a later stage go in to this question of allocation of total investment in to its constituents.

**c) Fellowship Research**

Two fellowships to the study the Agricultural Water Management and Sustainable Livelihood Issues in the North East states and one fellowship on Water Supply systems in Nagaland One of the study reports has been submitted and we are expecting the report from the 2nd study to be submitted by July end.

A new fellowship has been awarded in 2011 to TNAU students. Details are given below.

**FELLOWSHIP – 1**

**Topic:** Study on Domestic Water Supply systems in Nagaland – Challenges and Potential for up-scaling **- Avizo Richa**

The study looks into the water availability and constraints in obtaining water across the rural and urban parts of Nagaland, for domestic as well as industrial purpose. The author has identified that while water shortage is experienced in the rural as well as the urban areas, the rural area face shortage due lack of infrastructures and in urban areas, physical scarcity and poor water quality are pressing issues.

The report has been submitted by the fellow, and comments to improve the report have been sent from ITP.

**FELLOWSHIP – 2**

**Topic:** Agricultural Water Management for Sustainable Livelihood Improvement: A Case Study in North Sikkim District – **Kalpana & Proloy Deb**

The research study was carried out under the guidance of Dr. Bharat Sharma, Principal Researcher and Head, IWMI Delhi office. The study has been completed and report submitted. While the complete report is available, the summary and conclusions from the report is provided below.

**Study Findings:-**

1. The average annual rainfall is found out to be more than 3300 mm which ultimately gives an image that the water resources in Sikkim is 2.86 BCM and in spite of having such a huge source of water due to the unawareness of water management the state sometimes falls in a condition of water scarcity in the winter months. So the management of water is very necessary at Dzongu.

2. On an open survey the number of agriculturist at Dzongu was found out to be 81 % of the total population at the project villages. They use to rare the various domestic animals and hence they need huge volume of water. But during the winter months they face many problems due to the scarcity and non availability of water. To mitigate this problem the state government and some people of each village has made some water tanks but they made for the temporary storage rather than the permanent storage for the supply of water so the people doesn't get enough water to irrigate their fields. These tanks have to be re build after proper estimation and proper designing such that the required water can be supplied during their peak rate.

3. The water available at the seasonal sources are so huge amount that the water use to flow over the pathways leading to the destruction of them so that excess water can be stored in huge tanks for the further use. This may be due to the lack of knowledge or the negligence of the state government that the place is not on the verge of development. IWMI has started this project in order to develop the situation and for providing the water to the farms in the dry season also such that the farmers can grow more in order to increase production.

4. The farmers should grow the off-season vegetables like Tomatoes, Capsicum etc. since by growing these crops more money can be earned from since there will be a demand in the market of those crops and by the adventure of the ICAR and the implementation of NAIP projects many low cost poly-houses has been implemented and hence the farmers are benefitted.

5. Some of the tanks had turned into nonfunctional ones because of the lack of management of those tanks. So it's better to manage the older tanks rather than constructing the new ones if it's cheaper.

6. The farmers use to keep the land fallow after harvesting of paddy/ maize since the farmers generally practice Rain fed Agriculture.

7. The farmers of Dzongu in the project site use to go for the traditional way of agriculture and by the advent of the ICAR through NAIP project they have learned the advanced agriculture.

## FELLOWSHIP – 3

**Topic:** Design of filtration unit for Greywater in Urban environment – Ms. Archana Jayaraman, Anand Kumar V, Rajagopal E, Soundarya R A

**Project goal and objectives**

**Goal:**
To treat the greywater produced from household units using a suitable filtration system.

**Objectives:**
1.To promote reuse of wastewater
2.Find suitable filter material which is cost effective and technically feasible
3.Find alternatives for large scale wastewater treatment.

**Outputs:** Final Project report on design, installation of the filtration System; Economic and environmental issues
**Duration:** ***from*** *15 December 2011* ***to*** 30 January 2012

### d) Interns

Jennifer Shen from Tufts University, USA visited IWMI, Hyderabad for her M.S thesis work and worked on the farm level date from Krishna basin focusing on farm level efficiencies in crop production.

## III. PARTNER NETWORK AND LINKS

### 1. Work in the Northeast regions

Work in the North East region with SRTT partners is already on with ITP engineer stationed in Nagaland. Details of the various activities undertaken and the progress is detailed out in later sections of the report.

### 2. The TNDRIP program 2nd phase:

The TNDRIP has successfully completed the 1st phase target of 100 villages and 1000 farmers and moved into the 2nd phase of the program to cover another 100 villages and 1000 farmers. The details of the farmers' response are given under outreach programs.

### 3. The GGRC drip capacity building program in Gujarat:

This program was initiated during this phase. During the ITP 2nd phase extension period till March 2012, 40 villages and 400 farmers in Narmada district of Gujarat will be completed. The talukas covered are : Nandod, dediapada, Sagbara amd Tilakwada. The advisory committee consisting of the following persons was also formed:

**Members:**

- Dr S.Raman, Advisor to GGRC Ltd
- Dr K.Palanisami, Director, IWMI-Tata, Hyderabad
- Dr.R.G.Patil, Research Scientist, Navsari Agrl University
- Mr. Arun Viramgama, Asst. General Manager, Netafim irrigation India Pvt. Ltd
- Mr. P.P. Donga, Sr. Manager, GGRC, Ltd. Member secretary.

### 4. Uttarakhand Micro-irrigation system for small holders

The performance of the MI systems in the farmers field was studied consecutively for the third season. The performance is satisfactory as all the farmers realized the water saving and income increase. The details are given in the later sections of this report.

## IV. PUBLICATION, CONFERENCE AND SEMINARS

### i] ITP Publications

Six books are in the pipe line. Three were completed during the period ending Dec 2011.

| | Book | Status |
|---|---|---|

| Sl. no | Activity |
|---|---|
| 1 | Follow up and monitoring of 3 sites of gravity based MIS in Nagaland.<br>A 12 month contract to be signed with partner NGO |
| 2 | Another 3 sites in Nagaland for better understanding on the suitability of the models |
| 3 | Installation of 3 sites of gravity based MIS in Mizoram |
| 4 | Follow up and monitoring of 3 sites of gravity based MIS in Mizoram.<br>A 6 month contract to be signed with partner NGO for yr2011-12. |
| 5 | Installation of 3 sites of gravity based MIS in Arunachal Pradesh |
| 6 | Follow up and monitoring of 3 sites of gravity based MIS in Arunachal Pradesh.<br>A 6 month contract to be signed with partner NGO for yr2011-12. |
| 7 | Capacity building programme on need based issues on S&WC in Nagaland, Mizoram and Arunachal Pradesh |
| 8 | WATSAN programme supervision and reporting in Nagaland |
| 9 | Drafting technical papers as and when required by ITP and case studies based on the implemented pilot schemes in NE. |
| 10 | Hand holding, documenting and value addition in the NGO implemented engineering initiatives under SRTT NEI initiatives. |

| | | |
|---|---|---|
| 1. | Micro Irrigation –Economics and Outreach by K.Palanisami, S.Raman and Kadiri Mohan | Published |
| 2. | Climate change – Godavari basin by Nagothu Udaya Sekhar, A.K.Gosain and K.Palanisami | Published |
| 3. | Water Resource Atlas for Andhra Pradesh by ITP and | Published |

**ITP Reports with the following titles were prepared during 2011 -**

1) **Water Management Intervention: Impact on Small Landholder Livelihood IWMI Tata Program Experience (2001-2010)** - Vidya .R and K. Palanisami

2) **IWMI Tata Water Policy Research Program (ITP) - Policy Interface and Partnership Development** - K. Palanisami and Vidya Ramesh

**ii] Conferences/ Workshop Organized**

**a) Stakeholder workshop at WALAMTARI - 17/2/2011**

On 17th February 2011, the Stakeholder Workshop for ClimaWater was organized at WALAMTARI, Hyderabad from 9.00 am to 3.00 pm. The main purpose of the Stakeholder Meeting is to share the project progress and result with the stakeholders. The partner organizations presented research results obtained till date pertaining to the various components of the project and obtained feedback from the participants on ways to strengthen the project outputs.

Dr. Uday Shekar, the Project Coordinator from Bioforsk, Norway, Mr. Vinay Kumar from the Norwegian Embassy, New Delhi, Dr. Madar Samad, Director, South Asia Regional Office, IWMI, Hyderabad, Dr. Tirupataiah, Director General, WALAMTARI, Hyderabad, Dr. Palanisami, Director, IWMI-Tata Program and Dr. A.K. Gosain, Professor, Indian Institute of Technology, New Delhi were some of the dignitaries present at the workshop. Representatives from various government departments were present contributed actively to the discussions. Nearly 20 farmers from Medak district represented the farming community at the workshop and provided constructive inputs to the project.


The encouraging and constructive feedback was obtained from all the partners who agreed on the importance of such a project in the region and about future research activities to be taken up.

Picture: Prof. Gosain, Dr. Kota, Dr. Sekhar and Dr. Samad at Stakeholder workshop

**b) AQUACROP Workshop was organized from 14 – 18th February 2011 at MCRHRD, Jubilee hills, Hyderabad. ( in association with Irrigation Dept of AP and TN states and Bioforsk, Norway)**


The AquaCrop modeling workshop was held in Hyderabad, from 14th February to 18th February, 2011 as part of capacity building program to the stakeholders from irrigation & engineering departments, universities etc of Andhra Pradesh and Tamil Nadu states. Capacity development for farm management strategies to improve Crop-Water Productivity using AquaCrop was the focus of the workshop.

The team from Bioforsk, Norway, International Water Management Institute (IWMI, Hyd) and Water and Land Management Training and Research Institute (WALAMTARI) has participated in the inauguration of the workshop along with the facilitators from FAO. The workshop was inaugurated by Dr. Tirupataiah, Director General, WALAMTARI and explained about the need of crop and water modeling for the state government and research institutes. Altogether there were 17 participants in the workshop from Tamil Nadu Agricultural University, Coimbatore; IWMI, Hyderabad; Irrigation and CAD Department, Government of Andhra Pradesh; WALAMTARI, Hyderabad. The participants thanked FAO facilitators Dr. Dirk Raes and Ms Eline Vanuytrecht for training and requested for the follow up program to work with the model in their own study area. The facilitators assured their assistance to the participants and their availability during September 2011. Participants were glad in learning the model and expressed AquaCrop as a good user friendly crop model for farm level study.

Mr. Ole Reidar Bergum, First Secretary, The Royal Norwegian Embassy, New Delhi, Mr. Vivek Kumar, Senior advisor, Dr. A. K. Gosain, IIT Delhi attended the workshop during closing ceremony and issued certificates to the participants.

**c) Stakeholder workshop at TNAU Coimbatore – 21/02/2011**

ClimaRice II was a joint project initiated between Bioforsk (Norway), IWMI, TNAU and IPRC (Hawai). A Stakeholder workshop for the ClimaRice II was organised at TNAU, Coimbatore on 21st February 2011. State government departments officials, farmers, university representatives have taken part in the workshop. The main objectives of the project from the point of Hydrology, Socio-economics, climate scenarios and Gender were presented.

Farmers' interaction section was organized during the workshop. The validating technologies taken up in the project was discussed in the workshop. Group discussions were organized regarding the adaptation strategies, gender issues and policy decisions.


Farmer group discussion on Alternate adaptation strategies of Climate change

Discussion on Gender issues


Stakeholders meet at TNAU on 21-02-2011

**d) Report on 'FIELD DAY' programme on Paddy under Drip irrigation (a collaborative Research plot with IWMI & Bioforsk) organized at Chinnaganapur (v), Kulchararm (M), Medak Dist on 21st May.2011.**

The one day 'FIELD DAY' programme on "PADDY UNDER DRIP IRRIGATION" (a collaborative Research Plot with IWMI & Bio forks in the farmers field) was organized at Chinnaganapur village of Kulcharam mandal on 21st May,2011 in the field of Sri. Srinivas s/o Sri.Viswanatham.

About 80 participants', comprising Scientists from ARS, ANGRAU namely Dr.Ramchandrai, Principle Scientist & Head , Dr. Govardhan (Rice Agronomist), Sr. Scientist, Dr. Ramesh, (Scientist), Dr. Shankar, Sr.Scientist. ARS, ANGRAU, Narsapur. Dr. Krishnareddy, Scientist from IWMI, Patancheruvu.

Dr. Srinivas Reddy, Sr.scientist & Co-ordinator, DOT centre, Sangareddy, Dr. Vijayakumar, Sr.Scientist (Head ) ARS, ANGRAU,Basanthapur, Medak Dist & Mandal Agricultural officers, 15 'AADARSHA RYOTHULU' (Progressive Farmers) (Nominated by Government.of Andhra Pradesh and Agriculture Department, who will transfer the latest agricultural technologies to the farmers of their respective areas) from different mandals of medak dist and more than 50 farmers from the surrounding villages have participated in the said field day program.

All the participants who visited the plot were highly impressed by the performance of the paddy crop under drip. All the scientists have gone round the complete field and taken the tiller count and impressed with the higher tiller count/hill. The average effective tiller count/hill recorded is 42 in drip irrigated field and 28 in conventional flood irrigation. All have impressed with the crop performance under drip irrigation. The grains count per panicle is 197,180,161 grains/panicle respectively under drip irrigated paddy and 80, 70 grains/panicle respectively under flood irrigated (conventional) paddy field.

Further Mr.Viswanatham, farmer of the Research plot has shared his experiences and informed to the scientists and all the participants that he observed 1.) more no of tillers/hill under micro irrigation when compared to the conventional method which contributes to higher yields 2.) No pest and disease incidence is noticed .3). Since he followed the fertigation program in splits applying once in every 3 days as suggested by JISL, the fertiliser efficiency is very good and reduced in fertiliser qty when compared to the fertiliser application and its use efficiency under conventional method.
He informed that though the Rabi planting was very much delayed (planted during end of February) he is very much impressed with crop performance under Micro irrigation, and the crop performance is superior to early plated crops.

During the field visit Dr.Govardhan, Sr.Scientist & Rice Agronomist from ARS, ANGRAU has suggested on the spacing improvement, irrigation hours, fertiliser and herbicide doses. After the field visit, had a detailed discussion with the scientists present at site apart Dr.Soman , and have clarified the doubts raised by the farmers who have attended the programme. He has also emphasised on Micro irrigation in Paddy, Pulses etc and the importance of fertigation through drip for achieving higher crop yields.

While concluding the meeting the scientists have suggested us to organize such exposure visits of the famers inviting from other districts also.

**Paddy-drip irrigation field visit day**

**Farmers discussion at field visit day**

# అధిక దిగుబడులకే నూతన పద్ధతులు



సదస్సులో మాట్లాడుతున్న శాస్త్రవేత్త



హాజరైన రైతులు

**కొల్లూరం:** తక్కువ నీటితో అధిక దిగుబడుల సాధనకే నూతన పద్ధతులతో వరిసాగు విధానాన్ని ప్రవేశపెట్టినట్లు ఆచార్య ఎన్.జి. రంగా వ్యవసాయ విశ్వవిద్యాలయం పరిశోధన క్షేత్రం ఇన్‌ఛార్జి డా.రాజేంద్రప్రసాద్ అన్నారు. శనివారం చిన్నామనహూర్‌లో ఐడబ్లుఎంఐ, జైన్‌డ్రిప్ సంస్థల ఆధ్వర్యంలో బిందు పద్ధతిలో వరిసాగు విధానం పై జరిగిన అవగాహన సదస్సులో ఆయన ముఖ్య అతిథిగా పాల్గొన్నారు. రెండు సంస్థల ఆధ్వర్యంలో కొల్లూరం మండలం చిన్నామనహూర్‌లో తక్కువ ఖర్చు తక్కువ నీటితో వరి సాగు కార్యక్రమాన్ని చేపట్టారు. బిందు పద్ధతిలో సాగుచేసిన చేసిన వరి పంటను శనివారం ఎన్.జి. రంగా విశ్వవిద్యాలయం శాస్త్రవేత్తల బృందం సందర్శించారు. ఈ సందర్భంగా రైతులకు నూతన పద్ధతులలో వరి, చెరకు, కంది పంటల సాగుపై అవగాహన కల్పించారు. బిందు పద్ధతి వట్టివరి సాగు విధానం పై శాస్త్రవేత్త గోవర్ధన్ రైతులకు వివరించారు. ఈ కార్యక్రమంలో శాస్త్రవేత్తలు సోమన్, శ్రీనివాస్‌రెడ్డిప్రసాద్ బసంత ఫూర్ రిసెర్చ్ సెంటర్ ఇన్‌చార్జి డా.విజయకుమార్, డాట్ సెంటర్ శాస్త్రవేత్త శ్రీనివాస్ మండల వ్యవసాయ అధికారి ప్రవీణ్ మెడక్‌సిడిసిఐశ్మెన్ నరేందర్‌రెడ్డి, ఆదర్శ రైతులు అంజయ్య, శ్రీనివాస్, నారాయణ, కొండల్ రెడ్డి, వెంకటేశం, రైతులు సుభాష్‌రెడ్డి, సంఘమేశ్వర్, జగన్నాథం తదితరులు పాల్గొన్నారు.

## e) March 11: Global Subsidies Initiative (GSI) workshop at Planning department, secretariat, Govt of AP, Hyderabad

The workshop was based on the study conducted by ITP funded by International Institute for Sustainable Development (IISD), Switzerland. The key presentation highlighting the results of the AP irrigation subsidies was made by K.palanisami. dr Chris Charles, Manager , IISD presented the overall methodology in the calculation of the irrigation subsidies . Mr.S.P. Tucker Principal secretary, Planning Department, GOAP made suggestions on how to improve the measurement methodologies. Mr Sanjay Gupta, Spl secretary Planning Department , Dr Kota Thirupathiah, Director General, WALAMTARI, GOAP, Dr varadharajan, Regional Director, CGWB, GOI also participated in the discussions and indicated the GOAP' support in handling the data and related research studies. The key message issues from the IISD-ITP workshop is as follows:

**IISD report estimates value of irrigation subsidies at US$575 million per year from 2004 to 2008 in four South Indian States**

Indian governments in four southern states provided at leastUS$575 million per year from 2004 to 2008 in subsidies to major irrigation projects, according to a new study by the International Institute for Sustainable Development's Global Subsidies Initiative.

The study, prepared in collaboration with the International Water Management Institute (IWMI), uses a rigorous, transparent, and replicable methodology to provide the most comprehensive estimate of subsidies to irrigation in Tamil Nadu, Andhra Pradesh, Karnataka and Kerala.

The study assesses subsidies in Andhra Pradesh, where the government spent at least US$282 million per year in subsidies for major irrigation projects from 2004 – 2008. Energy subsidies in the form of free electricity to the irrigation sector were estimated at INR8 519.02 million (US$190.37 million) for 2008 and 2009. A per-hectare subsidy rate calculated for major irrigation projects in Andhra Pradesh was applied to similar projects in the three other southern states (Tamil Nadu, Karnataka and Kerala) to develop a regional estimate.

The study marks an important step towards improving transparency in India's agricultural subsidies. Obtaining information on irrigation subsidies is a challenge.Going forward, the report encourages water authorities to maintain better records and publicly provide information on water costs, revenues and subsidies.

Irrigation subsidies are a particularly important part of the country's agricultural policy, influencing water consumption, crop choices and growing patterns.
The report recommends a gradual reduction in government subsidies for irrigation projects. Increasing water charges marginally would provide higher levels of cost recovery for irrigation projects, and allow for more reinvestment of funds into maintaining irrigation systems. It would also signal to farmers that water is an increasingly scarce resource.

Any reform of India's irrigation subsidies should be careful not to endanger the highly precarious situation of India's poor farmers. Poor farmers may be better served by more direct forms of public support instead of subsidized water.

The report, *Measuring Irrigation Subsidies in Andhra Pradesh and Southern India: An application of the GSI Method for quantifying subsidies*,is part of a series of sector-specific studies that survey government subsidies by IISD's Global Subsidies Initiative (GSI), a Geneva-based program.

**(F) Field trip to Nagarjuna Sagar Project and interaction with the farmers -** 10-03-2011

As part of the IISD subsidy study launch meeting a field trip was organised on 10-03-2011 to one of the study project sites of the study i.e., Nagarjuna sagar project in Nalgonda District of Andhra Pradesh.

The team include 3 members include Chris Charles, Karryn Lang and Damon Vis Dunbar and two members from IWMI, Kadiri Mohan and K. Krishna Reddy.

**Media coverage**

సాగర్‌డ్యాం సందర్శించిన విదేశీయులు

హిల్‌కాలనీ, న్యూస్‌టుడే: నాగార్జునసాగర్ డ్యాను కెనడా దేశస్తులు గురువారం సందర్శించారు. కెనడాలోని ఐఐఎస్‌డీ సంస్థకు చెందిన ముగ్గురు నీటి రంగ నిపుణులు గురువారం సాగర్ డ్యాం గ్యాలరీలు, స్పిల్‌వేను పరిశీలించారు. వీరికి డ్యాం ఈఈ సలీం డ్యాం నీటివిడుదల, స్పిల్‌వే పనిచేయు విధానం, తదితర విషయాలను వివరించారు.



సాగర్ డ్యాం వద్ద కెనడా దేశస్తులు

1. Eenadu Telugu daily news paper Dt. 11-03-2011

సాగర్ డ్యాంను పరిశీలించిన కెనడా ఇంజినీర్లు

నాగార్జునసాగర్, న్యూస్‌టుడే : కెనడా దేశానికి చెందిన ఐదుగురు ఇంజినీర్లు గురువారం నాగార్జునసాగర్ ప్రాజెక్టును పరిశీలించారు. హైదరాబాద్‌కు చెందిన అంతర్జాతీయ నీటి యాజమాన్య సంస్థకు చెందిన శాస్త్రవేత్తలతో కలిసి వీరు ఇక్కడకు వచ్చారు. ప్రాజెక్టు అంతర్భాగంలోని గ్యాలరీలు, ప్రాజెక్టుకైన ఖర్చు, నీటియాజమాన్య పద్ధతులు, ప్రకృతి వనరులను ఉపయోగించుకునే తీరు తదితర అంశాలను పరిశీలించారు. ప్రాజెక్టు వల్ల ప్రజల జీవన విధానంలో వచ్చిన మార్పులను అడిగి తెలుసుకున్నారు. ప్రాజెక్టును ఆధునిక పరిజ్ఞానాన్ని జోడిస్తే ఇంకా ఎంత పటిష్టంగా ఉంటుందనే అంశంపై సమీక్షించారు. వీరి వెంట ప్రాజెక్టు ఈఈ సలీం తదితరులు ఉన్నారు.

విజయవిహార్‌ను తనిఖీ చేసిన టూరిజం హోటళ్ల జనరల్ మేనేజర్

ఆంధ్రప్రదేశ్ పర్యాటక అభివృద్ధి శాఖ హోటళ్ల జనరల్ మేనేజర్ నుమిత్ సింగ్ గురువారం నాగార్జునసాగర్‌లోని విజయవిహార్ అతిథి గృహాన్ని తనిఖీ చేశారు. సమాగమం, నంది పార్క్, విజయవిహార్ కాంప్లెక్సులలోని గదులను సందర్శించారు. స్విమ్మింగ్‌పూల్ రెస్టారెంటు, బార్, హోటల్ తదితర ప్రాంతాల పరిశుభ్రతపై ఆరా తీశారు. అనంతరం కొద్దిసేపు విశ్రాంతి తీసుకొని విజయవాడకు వెళ్లారు. ఆయన వెంట హోటల్ మేనేజర్ అశోక్ తదితరులున్నారు.



సాగర్ డ్యాంను పరిశీలిస్తున్న కెనడా ఇంజినీర్లు

వేతనం పెంచాలని ఉద్యోగుల మొర

దినసరి వేతనం పెంచాలని హోటల్‌లో పనిచేసే ఉద్యోగినులు జీఎంను కోరారు. చాలా కాలం నుంచి రోజుకు ₹70 కూలితో పనిచేస్తున్నామని, తోట పనిని కూడా తామే చేస్తున్నామని వివరించారు. ఈ మేరకు వివరాలను పంపించాలని హోటల్ మేనేజర్‌ను జీఎం కోరారు.

2. Sakshi Telugu Daily News paper Dt. 11.03-2011

**(g) Training on Azolla – Livestock feed and Biofertiliser for rice at RARS, LAM (4/8/2011)**

Dr. Lakshmanan and Geetha Lakshmi were invited to RARS, LAM to give training on Azolla and its importance as biofertiliser and livestock feed. Fifty participants have attended the training program from the scientific staff RARS, LAM; Farmers from the pilot villages; distributary canal president; Nilagiri foundation (NGO); KVK, Krishna district; agricultural officers, WALAMTARI and IWMI. Though azolla is recommended as a biofertiliser crop for the last two decades farmers are unable to upscale it due to the non availability of Mother inoculum and awareness about it benefits. Dr. Sankara Reddy, Associate Director of Research, RARS, LAM has pointed out that biofertilisers like Azolla will play key role in reduction of Methane gases and nitrous oxide in the environment.

Dr. Geetha Lakshmi has explained about the importance of the study in interdisciplinary mode due to the increase in temperatures from the last 4 decades. Considering the time series data she also mentioned that the temperatures have increased and there is a need to develop new varieties that can withstand high temperatures. The breeding community can play key role in this. Physiologists are also trying identifying the stress regulators and growth promoters at high temperatures. The agronomist can bring out the best management practices in adaptation to the climate changes.

Dr. Lakshmanan has presented about the azolla pit preparation and use of it to the livestock and paddy fields. Azolla is also used as animal feed as it has 25-35 % of the Protein on dry weight basis. The best season to cultivate azolla is July-December and cant with stand high temperatures. The TNAU 1 variety (cross of Indian and Chinese varieties) can with stand high temperatures (39-40 $^{o}$c), rich in omega fatty acids and high betacarotenoid. Azolla can be applied in rice fields after 10 days of transplantation (50 kg/acre). A demonstration was carried out at the azolla pit in RARS, Lam. The pit will be used as the mother inoculum for the entire years and supplied to the farmers. Dr. Gurava Reddy gave a detail translation in local language to farmers throughout the presentation.

Picture 2: ADR, Farmers, Scientists, NGO etc. at Azolla pit demonstration

అజొల్ల ఎరువులతో పంటలకు మేలు

మాట్లాడుతున్న లాం ఫాం ప్రాంతీయ వ్యవసాయ పరిశోధనా స్థానం ఏడీఆర్ శంకర్‌రెడ్డి. పక్కన కృష్ణారెడ్డి, గీతాలక్ష్మి, లక్ష్మణ్

కొరిటెపాడు (గుంటూరు), న్యూస్‌టైమ్: అజొల్ల ఎరువుల వాడకం వల్ల పంటలకు మేలు జరుగుతుందని లాం ఫాం ప్రాంతీయ వ్యవసాయ పరిశోధనా స్థానం ఏడీఆర్ శంకర్‌రెడ్డి చెప్పారు. లాం ఫాం ప్రాంతీయ పరిశోధనా కేంద్రంలో గురువారం వాతావరణ ఆధారిత వరిసాగులో జీవన అజొల్ల వాడకంపై అవగాహన సదస్సు జరిగింది. ఆయన మాట్లాడుతూ ఈ ఎరువులు వాడడం వల్ల అధిక ఉష్ణోగ్రత, వర్షాభావ పరిస్థితులను తట్టుకొని పంట ఎదుగుతుందని తెలిపారు. వరినాట్లువేసిన పదిరోజులకు ఈ ఎరువును వాడితే దైరు పెరుగుదలతోపాటు, దిగుబడి పెరుగుతుందని చెప్పారు. అంతర్జాతీయ నీటి యాజమాన్య సంస్థ శాస్త్రవేత్త కృష్ణారెడ్డి మాట్లాడుతూ అజొల్ల ఎరువు వాడకం వల్ల రైతు ఇతర రసాయనాలకు పెట్టే ఖర్చు తగ్గుతుందని వివరించారు. పంటలతోపాటు అజొల్ల ఇటీవల కాలంలో కోళ్ల, చేపల పెంపకంలో మిక్కిలి ఫలితాలు సాధిస్తోందన్నారు. తమిళనాడుకు చెందిన శాస్త్రవేత్తలు గీతాలక్ష్మి, లక్ష్మణ్ మాట్లాడుతూ ఈ ఎరువులో 25 నుంచి 35 శాతం ప్రొటీన్స్ ఉండడంతోపాటు, మినరల్స్, అమినోయాసిడ్స్ ఉండడం వల్ల కోళ్ల పెంపకంలో ఆశించిన ఫలితాలు వస్తున్నాయని తెలిపారు. అజొల్ల దాణా ఎద్దులు, మేకలు, పెంపుడు జంతువులకు ఆహారంగా ఉపయోగించవచ్చన్నారు. సదస్సులో లాం ఫాం శాస్త్రవేత్తలు వి.చెంగారెడ్డి, గురవారెడ్డి, సుబ్బిరామిరెడ్డి తదితర అధికారులు, రైతులు పాల్గొన్నారు.

**(h) Meetings attended at IWMI and WALAMTARI with the TNAU team on 03/08/2011**

1. Discussion on water measurement (RBC flumes), Azolla brochure, dissemination activities carrying out at TN and AP with Dr. Geetha Lakshmi and Lakshmanan.
2. Introduction with the group (10 people) from WALAMTARI, AO, Rajendranagar, AOs Biofertiliser Lab, Rajendranagar, and IWMI
3. Dr. Lakshmanan has given introduction about the CLIMARICE project to the Agricultural department members.
4. One of the objective is to develop a system/tool box to the adaptation practices through the project
5. Rice has a bad comment saying that it produces methane gas to the climate. To overcome the methane gas emissions azolla can be grown as the water fern dual crop in the paddy fields.
6. Azolla contains BGA (anabena) which fixes nitrogen and releases ammonium in to the water
7. Azolla @ 50 Kg per acre has to be used. It saves about 25 % of fertilizer application
8. Weed rate is coming down due to the Azolla in the paddy field
9. Azolla releases oxygen into water and reduces the methane gas emissions
10. Bottlenecks: cant with stand high temperature (so developed TNAU 1, which can withstand upto 40 C, lack of proper awareness (so localized with the women programs in TN and maintaining mother inoculum)
11. Adds up lot of biomass with nitrogen and phosphorous
12. If we continue for 3 years the fourth year azolla can be avoided due to the development of pores to the root level.

13. First season suggest for BGA and second season suggesting for Azolla
14. Apart from Biofertiliser it can be used more for the livestock
15. Proteins, Essential Amino acids, minerals, vitamins and carotenoids are high in the Azolla, which are very nutritious for the animal feed.
16. Also providing sustainable income to the women groups for culturing Azolla @ Rs 15/kg
17. Azolla has 7 varieties. Planning to try to 2-3 varieties and seen which one is giving more successful results

## (i) Village meetings, dissemination centers (LAM & BAPATLA)

Individual village meetings were conducted for the Climarice II farmers. All the farmers are invited to explain in brief about the Kharif 2011 action plan. Scientists, Lam, Bapatla have taken lead in conducting the meetings to the farmers in the cliamrice II four villages. Lam dissemination had conducted meetings on 7th and 25th of July 2011 at Jonnalagada and Rangareddi palem villages respectively. Bapatla dissemination has conducted the meetings on 22nd and 23rd July 2011 at Modukur and Doppalapudi villages. Farmers were requested to follow the instruction given by the researcher and scientists during the technology validation. It was also informed that all the operational dates, water levels, input details need to be submitted to the researchers for the validation of technologies.


Farmers meeting on direct seed sowings for kharif 2011 at Jonnalagadda village



Farmers meeting on drum seeded rice and machinery transplantation for Kharif 2011, Rangareddy palem village.

Farmers have interacted on the supply of drum seeder for the group and the machinery supply for transplantation. Farmers on drum seed validation request to provide the herbicide to control the weed in paddy fields due to the dry conditions and less water application. Machinery farmers

requested to provide support for his entire farm while he cannot practices two different practices in a single farm. In this regard farmers are requested to invest from their end for the rest of the farm.

(j) Dr. Palanisami Co-convened the side event: "Building Resilience to Tsunami Disaster in Asian Coastal Regions" . Convenors: Research Institute for Humanity and Nature and IWMI-TATA Water Policy Program Research Institute for Humanity and Nature (RIHN), Kyoto, Japan, 2011 World Water Week, August 22-27,Stockholm


**(k) BBM (CLIMAHYD) stakeholder's workshop was organized at Irrigation and Command Area Development, Government of AP, Hyderabad Sept 7, 2011.**

The workshop was initiated by a welcome address by WALAMTARI, followed by an introduction explaining the objectives of the CLIMHYD project. Here, the wish for enhanced cooperation between scientists in India and Norway was emphasized, which is the main focus of the research grant that funds this project. Dr. K. Palanisami, IWMI, gave a speech on irrigation, before Atle Harby, SINTEF explained the logics behind the BBM. The CLIMHYD project team also discussed and evaluated the workshop. The most striking impression was the eagerness the participants showed when they carried out the tasks in the group works, especially the first one. Also, it was seen as a good sign

**Stakeholder discussions**

that the participants discussed the issues freely between themselves seemingly without being inhibited by rank or level. All participants, including higher level management representatives, stayed throughout the entire workshop.

The workshop was evaluated both by the participants and the project team. A simple evaluation form was distributed to the participants at the end of the meeting. The form was filled in by 15 respondents. The respondents' experiences from similar workshops varied. Whereas one third of the participants attend such workshops more than once a year, 27 % (4 participants) had never attended such a workshop before[2].

**Field visit to Sri Ram Sagar Project - 29.08.2011**

Visit to Sri Ram Sagar Project for CLIMHYD project team field visit arrangements. During the visit interacted with Joint director of agriculture, District collector, Deputy Director Groundwater, Rural water supplies, APGENCO and Assistant director Fisheries.

## (L) Water Technology Centre, TNAU, Coimbatore, Launching of water calculator CD on 25.11.2011

As part of the Water Technology Centre, Tamil Nadu Agricultural University and IWMI-Tata Water Policy Program collaboration, an irrigation water calculator CD for farmers to assess the water requirement of crops, based on the location, crop geometry, different stages of crop growth, drip irrigation system operating time depending on the lateral spacing, dripper spacing and dripper discharge rate and different soil type was released on 25th November 2011 by Professor Dr. P. Murugesa Boopathi, Vice-Chancellor, Tamil Nadu Agricultural University, Coimbatore.

The water calculator was developed by Dr. S. Raman Water Management expert and IWMI-TATA program consultant who explained the operation of CD in both languages (Tamil and English) for different crops under different field conditions. He also demonstrated the use of the calculator to the farmers.

[2] It should be noted that the respondents may have interpreted the last alternative in question 1 to mean that they had not attended a BBM-workshop before.

The Vice-Chancellor pointed out that Tamil Nadu was one of the states where water was scarce. The ground water potential was already over exploited with the rising population and industrial usage. The availability of water for agriculture was expected to decrease from 85 per cent to 73 per cent by 2025. Hence, the development of water calculator CD will solve the problem of scarcity by applying exact quantity of water to the crops. He also emphasized that water budgeting may also be incorporated in the water calculator CD.

K.Palanisami, Director (IWMI-TATA water policy programme) and Dr.S.Chellamuthu, Director (Water technology centre, TNAU) spoke about the importance of knowledge enrichment of the farmers through water calculator in irrigation management. Farmers from Selvapuram. Periyanaickaypalayam and Karegoundenpalayam villages participated. The water calculator was distributed to the local farmers who are participating in the WTC,TNAU –IWMI-Tata collaborative program.

## (M) ITP Policy workshop "Tamil Nadu Water Resources Management: Priorities for the 12th Five Year Plan" TNAU, Dec 28, 2011

The Department of Agricultural Economics, CARDS, Tamil Nadu Agricultural University, Coimbatore in association with the IWMI –TATA Policy Programme, Hyderabad organized a Policy Session on "**Tamil Nadu Water Resources Management: Priorities for the 12th Five Year Plan"** on 28.12.2011. More than 150 eminent Agricultural Economists of national and international repute, well-known researchers, and senior academicians participated.


**Dr. S. Neelakandan, Dr. K. Palanisami & Dr.C.Ramasamy**

In the inaugural session, Dr.N.Ajjan, Director (CARDS) welcomed the gathering and narrated the nature of research studies taken up by the Department of Agricultural Economics, CARDS, TNAU, Coimbatore.

Dr. K. Palanisami, Director, IWMI in his thematic address briefed about the paradigm shift that had taken place in Agricultural Economics research over years which had grown from strength to strength from farm management studies at the initial stage to policy studies as on date and stressed the need for the policy studies related with water resources.

Dr. C. Ramasamy, former Vice-Chancellor and the currently the President of Indian Society of Agricultural Economics delivered the presidential address. In his speech, he explained in detail the water resource management research studies taken up in the University at global and national levels.

Dr. M. Chinnadurai, Professor and Head, Department of Agricultural Economics proposed vote of thanks.

K. Palanisami, Principal Researcher & Director, ITP, International Water Management Institute (IWMI) delivered his address on "Tamil Nadu Water Resources Management: Priorities for the 12th Five Year Plan". He cautioned that the existent Supply-Demand Gap of water was at 11,185 MCM. To meet the growing irrigation water demand, he outlined the need of supply side interventions like reaching the ultimate potential, investment - new and rehabilitation and watershed programs and demand side interventions like stabilizing the created potential, Water Management Technologies (and reuse of water. He pointed out that out of 812 MCM of the sewage generated more than 90 per cent could be reused with the technologies available. He also presented the parameters of area, research cost and spread of selected technologies like SRI, Drum seeding of rice, Water conservation in rice, Drip irrigation-Sugarcane and Banana. He shared his findings on Farmers' Participatory Action Research Program (FPARP) which concentrated on Micro Irrigation with Fertigation, Soil Health, and Promotion of Integrated Farming System, Water and land management technologies, Crop diversification and multiple uses of water. He concluded that 95 per cent of the technologies of the research stations were successful and Action Research Programmes were more effective in water savings with income increase upto 20-69 per cent. According to him effective water management reforms in rural power supply, Water management research and application by cluster approach, watershed programs as Community based models and integration of MNREGS with water storage structures were needed to be given a lift.

Prof. Dr. S. Neelakantan, Former Director, Madras Institute of Development Studies enlightened his views on "Land, Environment and Classical Economics". In his presentation he engaged with doomsday predictions, famine, triage and the population bomb and falsified everything in cut and clear manner. He optimistically noted that the last 200 years of world economic growth stand in stark contrast to the thousands of years before as the *aam admi* of this day enjoys goods which would be luxuries for Raja Raja Cholan. He argued that there could be *no* resources without human intervention. He showed that growing human population in free societies produce net increase in resource supplies.

The topic on "Profitability in Agriculture in India" was presented by Dr. A. Narayanamoorthy, NABARD Chair Professor and Head, Department of Economics and Rural Development, Alagappa University. In his address he accounted that inadequate credit supply, decline in productivity and imperfect market conditions were the major reasons for the continuing trend of distress and debt-trap in agriculture. He considered trends in all the major crops from 1975-76 to 2006-07 from the Cost of

Cultivation Scheme. He showed that only in the case of gram, farmers reaped profit followed by groundnut, paddy and wheat. He concluded that farmers were getting profit >30 per cent only a few times and in paddy and wheat, profit was not even 30 per cent. Erosin in profit margin arose either due to rise in Cost of Cultivation or fall in Value of Produce. He suggested price and non-price incentives as the need of the hour.

During the discussion, delegates discussed the various issues related to the topic and speakers have responded nicely to the points raised.

Dr. C. Ramasamy former Vice-Chancellor, TNAU gave concluding remarks of the technical sessions and thanked the speakers.

**Participants of the Policy Seminar December 28, 2011**

# V. ITP Outreach Activities

## 1. ITP working with SRTT Partners in Nagaland

ITP entered NE India in 2010-11 in partnership with NEI cell of SRTT with an objective of piloting water related activities on an action research mode so that can be replicated in the same line and strengthen the water plan of NEI working closely with the cell. Nagaland was selected for ITP's entry out of three states where SRTT has a presence.

Nagaland as a water abundant state of India faces huge water scarcity. Two major reasons behind it is accessibility to water sources and management of water by stakeholders. There are three major rivers Dikhu, Doyang and Dhansiri flowing through Nagaland. But till date the utilization of these river waters have not been done for either irrigation and drinking.

**Studies initiated in Nagaland**

**1. Tuensang District:**

The study on MI has been initiated in three plots of Longra village, situated in Tuensang district of Nagaland in the project getting implemented on orange cultivation. The study is facilitated by ECS (Eleutheros Christian Society), the partner NGO of NEI. The systems were installed in April'11. The total area is 6220 sqmtr covering 5 farmers as beneficiaries. These farmers have orange plantations of around one year old. The spacing is 5.5mX5.5m and it has primary inter crop as banana and new short duration secondary inter crops are being introduced for this season like tomato, chilly, beet etc. for assured return to farmers and the whole system is monitored during the ongoing dry season.

**Operational mechanism & ongoing activities:**

The control points for each plot have been formalized. Development council under church, Farmers' club and group consisting of all 13 SHGs of Longra village have authority to monitor and maintain the demo plots under guidance of ECS. Schedules prepared for monitoring the systems are shared with the NGO and the data are being captured on regular basis. The initial data from the three plots are given below.

**Table- Plot detail**

| Plot No | Crop | Area sown (sqmtr) | Type of MIS installed | Cost of MIS (Rs) | Remark |
|---|---|---|---|---|---|
| 1 | Orange intercropped with Banana & Chilly | 1920 | Pressure compensating drip | 46955 | Chilly did not germinate due to poor quality of seed |
| 2 | Orange intercropped with Banana & Chilly | 1800 | Pressure compensating drip | 49177 | Chilly did not germinate due to poor quality of seed |
| 3 | Orange intercropped with Banana & Chilly | 2700 | Pressure compensating drip | 53483 | Chilly did not germinate due to poor quality of seed |

**Capacity Building Program:**
Capacity building program are done for farmers to orient them on the basics of MIs and adopt the same for their irrigation requirement. On field trainings are done frequently and an in-house training was organized for the farmers before the dry season.

**Issues involved in the demo plots:**

1. Out of three plots, one plot has been washed away by the road construction under MNREGA creating an issue of shifting the system or reorientation of the system. After site verification it was decided that half plot will be taken as per original plan and another small plot will be taken under the same system after VC's approval. After finalization of plot there was a resolution in VC and as that has not been respected in its terms, that's why the matter will again be resolved within the purview of VC.
2. Banana and orange are at growing stage. Banana has grown more than orange. The secondary intercrop being chilly as of now is not germinating as expected. The reason put forward by NGO staff is poor quality seeds from the Govt. Department. Apart from this issue; it was felt that the systems need a renovation to fulfill the water requirement in near future. The installed system has discharge of 1 ltr per hour with a 30cm spacing to cater vegetables. For orange in grown up stage, the water requirement will increase and the same amount of water will be more than enough for vegetables. Thus to establish an equilibrium in the irrigation, more laterals of online drip has to be laid out with a separate sub-main to cater to the need. As NETAFIM, the installing agency has only this option and does not have online drip with more discharge, in fact they don't have the expertise and know how of manufacturing other models as told by NETAFIM regional head. Finally it has been decided that JAIN irrigation firm will be involved hereafter to do the renovation
3. The sites have been cleaned by the villagers and they are maintaining it sincerely. Only at night time fox is a threat. They are damaging the pipes.

**Impacts so far:**

- Realizing the perceived benefits of this gravity based low cost micro irrigation systems that reduce family labour and water application considerably the neighborhood farmers have already started placing demands for installation of the MI systems with the concerned NGOs/ participating farmers.
- NEI cell the prime-mover of SRTT funded development projects in the state has already started initiative and dialogue with both ITP and partner NGOs to expand the program in Tuensang district. Based on this, survey for more demo plots has been initiated. The detail is given under new demo plots.

**New Demo plots:**
In Tuensang district, few more plots for gravity based MI systems have been identified in the proposed vegetable clusters in the project head **Promoting Sustainable Livelihoods through Wadi and Establishing Market Linkages a**pproved by SRTT. Tanks will be constructed and connected to the natural water sources. This activity will be prioritized in the plots selected for demonstration of micro irrigation so that systems can be installed and irrigation would begin.

**Table: Total budget for Tuensang dist. Of Nagaland**

| Sl No. | Activity | No of units | Cost(INR) | Unit cost(INR) |
|---|---|---|---|---|
| ***Installations*** | | | | |
| 1 | Drumkit drip | 2 | 72452 | 36226 |
| 2 | On line drip | 4 | 144396 | 36099 |
| 3 | Fogger | 1 | 20518 | 20518 |
| | **Total** | **7** | ***237366*** | **33909** |

**2. Dimapur District:**

There is a project on **Promotion of irrigation and livestock for integrated and sustainable livelihoods** initiated under NEI cell in Dimapur district of Nagaland. ITP is monitoring the water component of the project in order to create a credible data base for impact assessment and planning to initiate the MI pilots.

Progress: Under irrigation component, nine number of irrigation wells have been constructed amidst monitoring of ITP and a diversion tank will be constructed by the end of this financial year. Field visits were made and the NGO personnel were given on field guidance. Few snaps of ring well and monitoring visit with SRTT team.


**Demo on MIs in Dimapur**

The NGO has selected beneficiaries of well in project villages for pilots on micro irrigation based on the criteria like

- Farmers have to allow installing the system and conduct the study on the field
- Agree to maintain the system
- Help in giving time to time information as part of the data collection process
- Be ready to attain training on the whole process of study.

Four plots of 2000sqmtr in two project villages have been identified to begin the study on MI in Dimapur district. Jain irrigation has been contacted for procurement of materials. These are basically drum kit model and will be used for promotion of vegetable cultivation in dry season. The study will begin this year (2011-12).

**Table: Total budget for Dimapur dist. Of Nagaland**

| Sl No. | Activity | No of units | Cost(INR) | Unit cost(INR) |
|---|---|---|---|---|
| ***Installations*** | | | | |
| 1 | Drumkit drip | 4 | 111572 | 27893 |
| | **Total** | **4** | ***111572*** | **27893** |

**Water and Sanitation (WATSAN) works in Nagaland:**
ITP was assigned to conduct the initial survey on WATSAN in three villages under Noksen block of Tuensang. This is the program initiated by Trust under the name Mission Swachh Jal. The survey was done and the results were shared with Trust. Apart from the survey, an on field training was conducted to measure the lean discharge of the sources for the water supply schemes. Now the villagers are maintaining the records of discharge on monthly basis.

**Report of survey done for the potential assessment of water sources in the cluster of Noksen/Longra/Letim villages in Tuensang district of Nagaland**

Probable water sources were identified for gravity based water supply to Noksen/Longra/Letim cluster and lean discharge were taken from 31.03.11 to 06.04.11. The village wise description is given below. As the partner NGO is in process of collecting base line data for the cluster, other information will be provided later and the final analysis is yet to be done. As Letim does not have water source for gravity based supply, it can be considered for total RWH and rest can be combination of two systems.

**Description of water sources for WATSAN in Nagaland**

a. Available sources

| Sl no | Description | Details on water sources **Village Name: Noksen, Block-Noksen, Dist-Tuensang** | | Details on water sources **Village Name: Longra, Block-Noksen, Dist-Tuensang** | |
|---|---|---|---|---|---|
| | | Source 1 | Source 1 | Source 2 | Source 2 |
| 1 | Name of source | Nabongyongbang-1 | Chanyak | Yemtiyong | Nabongyonbang-2 |
| 2 | Type of source (spring/river/dug wells/infiltration etc) | Spring | Spring | Spring | Spring |
| 3 | Location of source( village council/other village council/block/government departments) | Noksen Village Council | Longra Village Council | Yangpi Village Council | Noksen Village Council |
| 4 | Is the source is in use by others (vc/government/other vc) | Presently old system laid by PHED exists and water is reaching village in to 2000ltr tank and villagers distribute it 3times in a week | Presently old system laid by PHED exists and its in defunct state | No | Presently old system laid by PHED exists and water is reaching village in to 2000ltr tank and villagers distribute it 3times in a week |
| 5 | If yes, then purpose (drinking water/irrigation/power etc) | Drinking | Drinking | NA | Drinking |
| 6 | Is the source upstream/downstream in use? If yes, then purpose | No but tree cutting is common | No but tree cutting is common | No | No but tree cutting is common |
| 7 | Is any possibility of conflict over source? If yes, what kind of | No | No as village council is giving all assurance and its being used for more than 20 years by this village. | It has to be formally declared under Longra. Villagers are not willing to trap this source because of possible conflict | No |
| 8 | Distance of source from village (km) | 5 | 5 | 4.5 approximate | 4.8 |
| 9 | Vertical interval between source and village (m) | 32 (approx) | 35 (approx) | Not measured | 125 (approx) |
| 10 | Is community in agreement for the source | Yes | Yes | No | Yes |
| 11 | Lean discharge (ltr/min).<br>Date of measurement<br>Last two years discharge is recommended | 3.44<br>31.03.11 | 8.16<br>31.03.11 &06.04.11 | Not measured as community is not interested | 4.41<br>01.04.11 |
| 12 | Expected safe discharge (ltr/min) 60% in case of 1 year record 75% in case of 2 years or more record | 2.58 considering 75% as people are using it for more than 20 years | 6.12 considering 75% as people are using it for more than 20 years | NA | 3.30 considering 75% as people are using it for more than 20 years |
| 13 | Quality of water source | Good with iron content which, is rusting the pipes | Good - Slight iron content which, is rusting the pipes | Visible iron content, may be not useful for consumption | Good with iron content which, is rusting the pipes |
| 14 | Possibility of contamination | No | No | Yes | No |
| 15 | Does it dry out anytime | No as per villagers feedback | No as per villagers feed back | No as per villagers feed back | No as per villagers feedback |

**Farmers Training on Micro Irrigation Systems (Techniques, Utilities, Operation & Maintenance, Fertigation, Field Management & Agronomic Practices) conducted at Longra village, Block-Nokshen, Dt- Tuensang, Nagaland on 15.11.2011**

**Organized by:** IWMI-Tata Water policy research program (ITP)

**Facilitated by**: NEI cell, SRTT and partner NGO- ECS

**Technical facilitation**: Jain Irrigation, NE unit

**Purpose of the Training**: To familiarize the farmers on comparative advantages of MI systems and orient them on the operational mechanism and maintenance of the installed system.

**Backdrop of Training & Participants**: Introduction of gravity based pressure compensating MI (drip) systems is new to farmers of hilly regions of Nagaland. For the first time, the facilitating NGOs are also exposed to these systems and associated requirements of it. Hence it was imperative to organize training for the farmers as well NGO personnel to familiarize them with better package of practices and enhance their understanding on the gravity based MI systems.

**Proceeding of the training:**
Two- hour theory session was conducted where around forty farmers along with NGO personnel and ITP-Engineer were present. The Area manager from Jain Irrigation Ltd. facilitated the technical session supported by the Engineer-ITP and the whole training was translated to local dialect by the Program coordinator of ECS. After a brief self-introduction of the participants, the primary aim of the current action research on gravity based micro-irrigation systems sponsored by ITP was explained by the Engineer-ITP. It was clearly stated that in order to popularize these MI systems the participating farmers' role was crucial as they were expected to utilize the systems and follow the package of practices seriously so that results became evidential for others. ECS coordinator urged the farmers to cooperate in data collection and operate the systems with utmost care so that credible database can be created in order to influence policy makers for wide adoption of these systems for small farm-holders of hilly regions.

The Jain irrigation representative familiarized the participants on the evolution of drip irrigation systems and its advantages. He also narrated the science and basic principle of micro irrigation systems, why crops grow well under such systems vis-à-vis conventional flood irrigation, root development, wetting pattern and crop water requirements, etc. After this he spoke about the package of practices that are required to be followed especially in cash crops with special reference to orange, banana, vegetable crops etc in order to maximize the benefits from the MI systems and precision farming methods. Then he explained the need of fertigation (application of synthetic fertilizers along with water through the irrigation systems) and the easier ways to apply the same such as direct mixing of granules in the water tank itself or injecting the fertilizer mixture into main line of the MI system. There was a buzz on tissue culture banana and the topic was then discussed after the main training. Finally he described on operation and maintenance of the MI systems such as flushing of main as well sub-main pipe lines, periodic cleaning of filters, sprinkler nozzles, release air bubbles from the system, etc. Then the house was let for open discussion and interaction.


**Broad outcomes of the Training:**

- This served as an eye opener for farmers dealing with an irrigation system, which was beyond their imagination.
- Farmers could be exposed to better crop husbandry and operation of the MI systems
- Farmers and the NGO personnel could clarify queries on gravity based MI systems from the representative of MI agency
- Farmers were made to understand the necessity to operate the systems or apply water to the crops on the basis of crop water requirements and hence as per the irrigation schedule prepared

Apart from this, the display boards are kept at village level for awareness generation.

## 2. ITP and SRTT Partner Activities- Mizoram

Few visits were made by ITP to guide the partner NGOs in Mizoram basically CEP (Centre for Environment Protection) and RADP (Rural Agricultural Development Program) on water component and initiate some study on micro irrigation. The feasibility in Mizoram and the visit reports are shared below to assess the progress made in the state.

**Mizoram feasibility report**

Model followed in Rain water harvesting: The rain water harvesting tanks have been constructed with objectives of harvesting and storing rainwater in the days of abundance for use during the lean days.

These tanks are basically under the ground made up of concrete and have capacity to store around 10cum of water. It was presumed that rain water will be collected and manually transported to field of one hectare and seed bed down the tank.

**Fig-1 Tank on the top of demo plot**

**Issues with Rain Water Harvesting in hilly areas:**

Rainwater harvesting irrespective of the technology used, essentially means harvesting and storing rainwater in the days of abundance for use during the lean days. Storing of rainwater can be done in two ways i) in an artificial storage and ii) in the soil media as ground water. Rainwater harvesting systems in meeting local water demand should consider the a) hydrological regime of the region/ locality, b) the reliability of the supplies governed by the reliability of rainfall, c) the constraint imposed by local geological and geo-hydrological settings on recharge potential and; d) aggregate demand for water from various sectors within the local area.

One of the major constraints for water harvesting structures in these hilly regions is high seepage loss from storage tanks and inadequate provision for withstanding unexpected peak run off rate. Seepage losses are quite high as the soils are coarse textured and lower strata are made of fractured stones.
Considerations in planning: In the conditions where demo plots have been developed few factors should be taken in to account.

*Catchment area*- The rain water harvesting potential depends upon the catchment area of the structure. In case of Mizoram the avg. Annual rain fall is 2.5m and a catchment area of 1000sqmt can harvest up to 2000cum depending upon slope and co efficient of run off.

*Silt deposition*- High rainfall and higher catchment cause higher soil erosion and that should be trapped before it reaches tank in order to retain the original capacity of the tank.

*Other sources of water like perennial natural spring or high altitude streams*- always getting a good catchment area is difficult in hilly areas and that's why tapping natural springs works out to be a sustainable solutions as far as harvesting is concerned.

*Irrigation techniques*- After harvesting irrigation techniques become very important so as to save labour and ensure efficient use of water. The point is to ensure that the effort gone into harvesting water should not go in vain.

*Low cost and durable techniques*- It helps in replication of a model in terms of up scaling.
In terms of methods and topographic situations, water harvesting can broadly be divided into 3 categories; areas under low altitude (valley portions) b) areas under mid-altitude range and c) areas under high altitude (upland terraces). The strategies for water harvesting for all these typologies have to be different and even in similar altitude situation the types of WHSs are to be different in construction functionality depending upon the site conditions/ topography.

Below are the few options for water harvesting with respect to different field conditions and water application as life saving irrigation.

- Farm Ponds (Scattered or in series)
- Low cost micro rain water harvesting structures named as *Jalkund*
- Ferro cement tanks
- UV resistant plastic lined rain water harvesting tanks
- Field Bunding in terraces to contain water for rice
- Nalla Bunds (dug out-cum-embankment type earthen structure) across small streams
- Shallow depth ring wells
- Check Dams across drainage lines
- Masonry storage tanks
- Gravity based micro irrigation (Drip and Sprinkler)

**Fig-2 Jalkund**

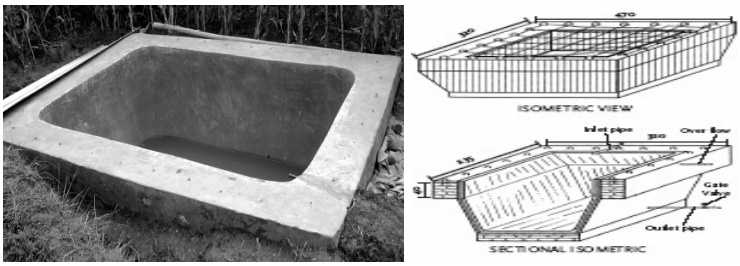



**Figure-3 Ferro cement tank**

**Figure-4 Field bunding in terraces**

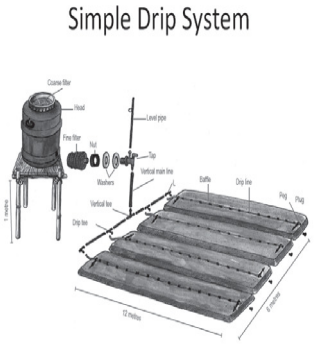



**Figure-5 Drip irrigation in use**

**Recommendations**

Taking in to account the topographical features of the demo plots best suitable options are recommended below for pilot

For water harvesting

- Farm pond with mud plastering or concrete plastering
- Ferro cement tank
- Jalkund - For application
- Water application precision systems like drip or sprinkler

The sample estimates are given below for reference and need to be customized according to conditions of Mizoram, which will be done in consultations with the partner NGOs. The rates considered are referred from the quoted rates in the approved proposal of CEP.

| Farm pond with cement plastering of capacity 10000ltrs | | | | |
|---|---|---|---|---|
| Particulars | Unit | Unit cost(INR) | Quantity | Total cost(INR) |
| Earthwork in excavation | cum | 80 | 10.00 | 800 |
| Cement | bags of 50kgs | 390 | 2.5 | 975 |
| Sand | cum | 1000 | 0.2 | 200 |
| Labour | No | 150 | 10 | 1500 |
| | | | | 3475 |
| Contgcy | 5% | | | 173.75 |
| Total | | | | 3648.75 |

| Ferro cement tank of capacity 10000ltrs | | | | | |
|---|---|---|---|---|---|
| Particulars | Unit | Unit cost(INR) | Quantity | Total cost(INR) | |
| Earthwork in excavation | Cum | 80 | 11.00 | 880 | |
| Cement | bags of 50kgs | 390 | 5.5 | 2145 | |
| Sand | Cum | 1000 | 0.56 | 560 | |
| Chicken mesh | Sqmt | 150 | 31 | 4650 | 13mm hexagonal mesh of 20 gauge |
| Labour | No | 150 | 20 | 3000 | |
| | | | | 11235 | |
| Contgcy | 5% | | | 561.75 | |
| Total | | | | 11796.75 | |

| Farm pond with LDPE of capacity 10000ltrs | | | | |
|---|---|---|---|---|
| Particulars | Unit | Unit cost(INR) | Quantity | Total cost(INR) |
| Earthwork in excavation | cum | 80 | 10.00 | 800 |
| Clay plastering | sqmtr | 5 | 10.00 | 50 |
| Cushioning with banana leaf | sqmtr | 3 | 4.00 | 12 |
| Lining with LDPE black agri film | sqmtr | 100 | 16.00 | 1600 |
| Pesticides/thaching | lumpsum | | | 400 |
| Labour | No | 150 | 15 | 2250 |
| | | | | 5112 |
| Contgcy | 5% | | | 255.6 |
| Total | | | | 5367.6 |

The drip and sprinkler irrigation cost around Rs.60/- and 40/-per sqr mtr of irrigated land and may vary according to local conditions in terms of availability in local market, accessibility to the installation area, demand in the locality and market fluctuation as per the inflation scenario.

**ITP-NEI coordination in Serchhip district in Mizoram**

NEI has initiated a project called ***"Enhancing livelihood through improved management practices on orange cultivation"*** in Serchhip district in Mizoram with the partner RADP (Rural Agricultural Development Programme). It covers three villages, Chhingchhip Village: 83 kms from State Capital, Aizawl (*through NH- 54*), Khawbel Village: 27 kms from Chhingchhip Village towards East. (*Total 110 kms from Aizawl*) and Buhkangkawn Village: 72 kms from State Capital, Aizawl (*through NH -54*)

The project has irrigation component with thirty beneficiaries. Out of all, there will be 3 demonstration plots. Tanks will be constructed of size 12'X6'X3' which will harvest around 6000ltrs of water. The water harvested will cater to orange fields having existing plants of around 5 years and more. This will help in stabilizing the fruiting phase of the orchards.

**Observations:**

**T**he plots are basically having very steep slope and scattered occurrence of rocky outcrops. Orange is grown with pineapple and banana mostly, as inter crop. Almost all plants are affected by diseases and insect attacks. To increase yield, proper management is essential and water will play an important role.

Out of three demo plots, in two plots there is existing tanks, done by farmer and another will be done through project and in third one in Chhingchhip, the demo tank has been initiated. Other tanks will be constructed subsequently.

On an average it will cater to 1Ha to 1.5Ha area. The NGO is planning to irrigate by connecting flexible pipes from the tanks. One/two persons would go around from plant to plant with the pipe in hand and irrigate. Mizoram Govt. issues pipes on subsidy to the needy farmers and that can be availed for the targeted beneficiaries, as told by the head of the organisation.

**Suggestions:**

- The tank size should be increased from 6000ltrs to at least 10,000ltrs. It should be dug out in locations keeping in view of gravity based irrigation to the whole plot.
- In future number of tanks per beneficiary may be increased to two to cater to at least one hectare area.
- As far as possible the tanks should be connected to natural springs by gravity. The tanks for which, its not possible should harvest maximum rain water by proper catchment area treatment. The simple thumb rule is to protect the existing bushes and trees and they in turn will conserve soil and water and act as protected catchment area for the tank.
- Proper irrigation techniques should be adopted for efficient and low cost irrigation.

**Plan/Activities:**

- In the present condition ITP will pilot three MIS in three demo plots to study the irrigation with an objective of arriving at a model for replication.
- Tanks will be connected to natural sources by HDPE and PVC pipes as per requirement
- If more tanks are required sintex tanks may be placed on raised platforms

- Drippers will be put in the plant inside the half moon terrace
- The critical irrigation will be required from November to April. So the installation will be done before that. Capacity building programmes will be conducted for farmers and based on their response the final model will be up scaled.
- Jain irrigation has been requested to provide materials and the NE in charge has visited the site with ITP and a preliminary survey has been done.

**Technical specifications:**

- Plants are on average 5.5mX5m spacing. 2 drippers of 8lph for each plant will be fixed.
- Systems will be pressure compensating and enabled with fertigation
- The cost will be around Rs.10/sqmtr after all kind of negotiations

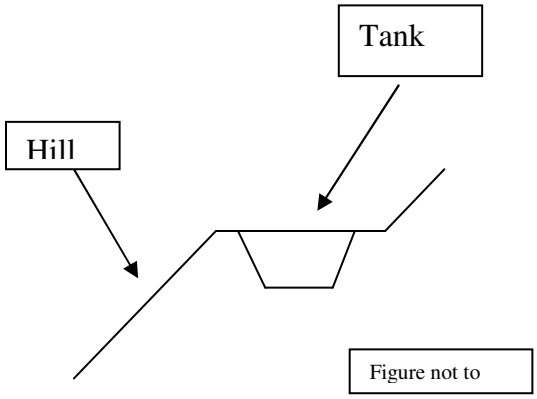
**Project location: Chhingchip under the Serchib district of Mizoram.**

**Observations:**

1. Tanks construction is going on and the NGO has followed the proposed dimension in tanks that we visited. As per last visit suggestion, farmers and NGO have selected sites that have connection to sustainable water sources to ensure irrigation in critical period. Mostly water will be collected during night time through pipes from the natural spring and will be used for irrigation during day.


**Suggestion:**

1. Locations of the tanks primarily have been governed by the principle of tapping the spring water and distributing in the fields. For this basic reason some of the tanks are located beside the water point and away from the orchards having greater density of orange plants. On the other hand, farmers are really interested by the fact that tanks can help in irrigation in dry periods and willing to go for more number of tanks. Thus it is suggested that number of tanks should be increased keeping a thumb rule in mind that one tank per half a hectare of land.
2. The tank size wherever possible should be increased to a capacity of 10,000ltrs of water
3. Tanks constructed are over the ground. Let it be below the ground and having a gradient on the upstream side with catchment area protected. Figure given below.




**Observation:**
The NGO has cancelled a demonstration plot under the SRTT project due to farmer's unwillingness to co operate. The same plot was selected for the MI pilot under ITP and was surveyed with Jain irrigation firm. As the plot will be changed, ITP also needs to drop the MI plan on the same plot.

**Plan:**
Let NEI and NGO come to an agreement on the new plot and then ITP would conduct a survey for pilot.

**Training:**
Training on agriculture and water was organized by NGO and around 40 participants attended from all the three clusters. Water conservation and irrigation were discussed. The NGO head explained in Mizo language the importance of water harvesting, irrigation and its techniques as suggested during ITP visits.

3. **Uttarakhand - Status of MIS Adoption under UTMI during 2011**

3rd season performance of MI systems in the hill regions of Uttarakhand:
Issues and Impact so far:

1. People have adopted the systems and trying to maintain it at their own cost. For example farmers in GVK project area are going to Vikash Nagar, a nearby township to get the spare materials. There is a demand in the vicinity for the same kind of systems. MVDA has gone ahead with OXFAM to provide 4 more systems to farmers.
2. The water sources selected (about 50%) in case of MVDA are the connections under the Govt. drinking water supply schemes, which the villagers objected and complained to the Deptt. Concerned. Subsequently the Govt. took a decision to disconnect the systems from the drinking water schemes. Now the systems will be shifted to new farmers having genuine water sources.
3. Beneficiaries found drip more useful than sprinkler in terms of less maintenance, good for vegetable irrigation and allows less weed growth
4. There is a time saving in irrigation compared to manual irrigation. Farmers can engage themselves in other works during the irrigation. Subsequently it adds to more income or better quality of life.
5. Indirectly it addresses to women drudgery with respect to time saving as in many cases women were involved for manual irrigation.

1. Name of Farmer: Mr. Abbal Singh Village: Chaillee Block: Bhilangana Facilitating NGO: MVDA


Abbal Singh has a connection from a canal run by Irrigation Department to irrigate his agricultural fields and he utilizes the water for micro irrigation installed for 5nali (1000sqmtr) of land.

Apr2011-Sep2011

| Sl. No. | Crop | Area sown (sq. mt.) | Total Production (kg.) | Market Price (Rs./ Kg.) | Gross Return to farmer (Rs.) | Productivity (Kg./ 100 sq.mt.) | Cost of MIS |
|---|---|---|---|---|---|---|---|
| 1 | Pea | 236 | 218 | 30 | 6540 | 92.37 | 20,160 |
| 2 | *Palak* (Spinach) | 170 | 39 | 12 | 468 | 23 | |
| 3 | Potato | 142 | 167 | 18 | 3006 | 117 | |
| 4 | Onion | 140 | 96 | 30 | 2880 | 68 | |
| 6 | Coriander | 400 | 13 | 100 | 1300 | 3.25 | |
| Total | | 1088 | | | 14194 | | |

**Oct2011-Mar2012 (results are awaited till harvesting)**

| Sl. No. | Crop | Area sown (sq. mt.) |
|---|---|---|
| 1 | Pea | 142 |
| 2 | *Palak* (Spinach) | 170 |
| 3 | $Potato | 236 |
| 4 | @Onion | 140 |
| 6 | Coriander | 200 |
| Total | | 888 |

2. Name of Farmer: Mr. Abtar Singh Negi Village: Doni Block: Bhilangana Facilitating NGO: MVDA

He is the head of the organization MVDA. The system is installed in the training centre at Dondi village.

Apr2011-Sep2011

| Sl. No. | Crop | Area sown (sq. mt.) | Total Production (kg.) | Market Price (Rs. / Kg.) | Gross Return to farmer (Rs.) | Productivity (Kg. / 100 sq.mt.) | Cost of MIS |
|---|---|---|---|---|---|---|---|
| 1 | Cabbage | 223 | 81 | 15 | 1215 | 36 | 21,000 |
| 2 | Pea | 123 | 79 | 30 | 2370 | 64 | |
| 3 | Onion | 200 | 95 | 30 | 2850 | 47.5 | |
| 4 | Garlic | 48 | 21 | 70 | 1470 | 43.75 | |
| Total | | 594 | | | 7905 | | |

Oct2011-Mar2012 (results are awaited till harvesting)

| Sl. No. | Crop | Area sown (sq. mt.) |
|---|---|---|
| 1 | Coriander | 170 |
| 2 | Pea | 50 |
| 3 | Onion | 280 |
| 4 | Garlic | 100 |
| Total | | 600 |

3. Name of Farmer: Mr. Dharmendra Singh Village: Koti Block: Bhilangana Facilitating NGO: MVDA

Dharmendra Singh, facilitated by MVDA (Mount Valley Development Association), an organisation working in the Ghansali area of Uttarakhand has its own view about the MI systems. He has a 2000ltrs of tank. The system is half damaged but farmer is utilizing pipes to irrigate the fields.

Apr2011-Sep2011

| Sl. No. | Crop | Area sown (sq. mt.) | Total Production (kg.) | Market Price (Rs. / Kg.) | Gross Return to farmer (Rs.) | Productivity (Kg. / 100 sq.mt.) | Cost of MIS |
|---|---|---|---|---|---|---|---|
| 1 | Pea | 443 | 115 | 30 | 3450 | 26 | 16,000 |
| 2 | *Rai* (Mustard) | 64 | 16 | 12 | 192 | 25 | |
| 3 | Cabbage | 28 | 15 | 15 | 225 | 53 | |
| 4 | *Palak* (Spinach) | 30 | 11 | 12 | 132 | 36 | |
| 5 | Onion | 39 | 10 | 30 | 300 | 25 | |
| 6 | Coriander | 36 | 4 | 100 | 400 | 11 | |
| | Onion | 200 | 17 | 30 | 510 | 8.5 | |
| Total | | 840 | | | 5209 | | |

Oct2011-Mar2012 (results are awaited till harvesting)

| Sl. No. | Crop | Area sown (sq. mt.) |
|---|---|---|
| 1 | Pea | 120 |
| 2 | *Rai* (Mustard) | 64 |
| 3 | *Palak* (Spinach) | 50 |
| 4 | Onion | 260 |
| 5 | Coriander | 50 |
| Total | | 544 |

4. Name of Farmer: Mr. Keshar Singh Village: Jaundana Block: Bhilangana
Facilitating NGO: MVDA

Keshar singh is working with Horticulture Department and is willingly accepted the micro irrigation systems. He has plans of introducing it to the Department so that it may be included in any Govt. Schemes. He had a water connection from Government, but unfortunately the supply was stopped and now system is not working properly. As the system is defunct, the pipes are developing leakages.

Apr2011-Sep2011

| Sl. No. | Crop | Area sown (sq. mt.) | Total Production (kg.) | Market Price (Rs. / Kg.) | Gross Return to farmer (Rs.) | Productivity (Kg. / 100 sq.mt.) | Cost of MIS |
|---|---|---|---|---|---|---|---|
| 1 | *Rai* (Mustard) | 50 | 32 | 12 | 384 | 64 | 31,300 |
| 2 | Pea | 88 | 19 | 30 | 570 | 21 | |
| 3 | Radish | 81 | 23 | 18 | 414 | 28 | |
| 4 | *Palak* (Spinach) | 160 | 27 | 12 | 324 | 17 | |
| 5 | Potato | 16 | 12 | 18 | 216 | 75 | |
| 6 | @Onion | 50 | 12 | 30 | 360 | 24 | |
| | Coriander | 400 | 13 | 100 | 1300 | 3.25 | |
| | | | | | | | |
| Total | | 845 | | | 3568 | | |

Oct2011-Mar2012 (results are awaited till harvesting)

| Sl. No. | Crop | Area sown (sq. mt.) |
|---|---|---|
| 1 | Pea | 188 |
| 2 | *Palak* (Spinach) | 160 |
| 3 | Potato | 120 |
| 4 | Onion | 100 |
| | Coriander | 100 |
| Total | | 668 |

5. Name of Farmer: Mr. Akhilesh Rawat Village: Dewat Block: Bhilangana Facilitating NGO: MVDA


Akhilesh has got all infrastructures and he is using the fields through micro irrigation installed by Netafim. But rodents have become big hassles and creating leakages in pipes.

Apr2011-Sep2011

| Sl. No. | Crop | Area sown (sq. mt.) | Total Production (kg.) | Market Price (Rs. / Kg.) | Gross Return to farmer (Rs.) | Productivity (Kg. / 100 sq.mt.) | Cost of MIS |
|---|---|---|---|---|---|---|---|
| 1 | Coriander | 400 | 13 | 100 | 1300 | 3.25 | 24,600 |
| 2 | Pea | 200 | 40 | 30 | 1200 | 20 | |
| 3 | Potato | 100 | 61 | 18 | 1098 | 61 | |
| 4 | *Palak* (Spinach) | 40 | 11 | 12 | 132 | 27.5 | |
| 5 | Onion | 130 | 23 | 30 | 690 | 17 | |
| | | | | | | | |
| Total | | 870 | | | 4420 | | |

Oct2011-Mar2012 (results are awaited till harvesting)

| Sl. No. | Crop | Area sown (sq. mt.) |
|---|---|---|
| 1 | Coriander | 200 |
| 2 | Pea | 200 |
| 3 | Potato | 150 |
| 4 | *Palak* (Spinach) | 70 |
| 5 | Onion | 130 |
| Total | | 750 |

6. Name of Farmer: Mr. Baijram ram Kothiyal Village: Painyan koti Block: Bhilangana
Facilitating NGO: MVDA

Bajiram is an old fellow and now alone in his house fighting with illness of old age. His son and his family went out of the village in the search of another job leaving alone the old father in the village. After struggling for some time he has shifted his base to his son's house. That's the reason now system is not in use and data has not been collected.
The system will be shifted to another farmer and will be monitored accordingly. Netafim, the installing agency has confirmed to do the reinstallation work.

7. Name of Farmer: Mr. Kamal singh Gussain Village: Jaundana Block: Bhilangana
Facilitating NGO: MVDA


Kamal Singh from Junana village had a water supply connection from Government meant for drinking water. As he started using drinking water in irrigation his fields, Govt. disconnected the supply which, resulted in system being not in use. That again caused pipe damage.

Apr2011-Sep2011

| Sl. No. | Crop | Area sown (sq. mt.) | Total Production (kg.) | Market Price (Rs. / Kg.) | Gross Return to farmer (Rs.) | Productivity (Kg. / 100 sq.mt.) | Cost of MIS |
|---|---|---|---|---|---|---|---|
| 1 | Pea | 110 | 30 | 30 | 900 | 27 | 26,800 |
| 2 | Coriander | 140 | 11 | 100 | 1100 | 7.8 | |
| 3 | Radish | 80 | 23 | 18 | 414 | 28.75 | |
| 4 | *Rai* (Mustard) | 144 | 12 | 12 | 144 | 6 | |
| 5 | *Palak* (Spinach) | 230 | 17 | 12 | 204 | 7.39 | |
| 6 | Onion | 117 | 54 | 30 | 1620 | 46 | |
| 7 | Potato | 400 | 201 | 18 | 3618 | 50.25 | |
| Total | | 1211 | | | 8000 | | |

Oct2011-Mar2012 (results are awaited till harvesting)

| Sl. No. | Crop | Area sown (sq. mt.) |
|---|---|---|
| 1 | Pea | 110 |
| 2 | Coriander | 140 |
| 4 | *Rai* (Mustard) | 100 |
| 5 | *Palak* (Spinach) | 130 |
| 6 | Onion | 117 |
| 7 | Potato | 400 |
| Total | | 997 |

8. Name of Farmer: Mr. Rikeswar Prasad Village: Andarthi Block: Bhilangana Facilitating


Riseswar is model farmer for MVDA as he has vermin compost, vermi wash, rain water harvesting tank, poly house and last but not the least beneficiary for drip and sprinkler. As he has a drinking water connection in his house, he used the RWH tank for micro irrigation. The tank capacity is 3000ltrs. But now due to pipes damage, he is suffering a lot in irrigation.

Apr2011-Sep2011

| Sl. No. | Crop | Area sown (sq. mt.) | Total Production (kg.) | Market Price (Rs. / Kg.) | Gross Return to farmer (Rs.) | Productivity (Kg. / 100 sq.mt.) | Cost of MIS |
|---|---|---|---|---|---|---|---|
| 1 | Palak (spinach) | 180 | 33 | 12 | 396 | 18 | 26,800 |
| 2 | Onion | 71 | 32 | 30 | 960 | 45 | |
| 3 | *Rai* (Mustard) | 44.5 | 11 | 12 | 132 | 24 | |
| 4 | Pea | 65 | 15 | 30 | 450 | 23 | |
| 5 | Coriander | 200 | 13 | 100 | 1300 | 6.5 | |
| Total | | 560.5 | | | 3238 | | |

Oct2011-Mar2012 (results are awaited till harvesting)

| Sl. No. | Crop | Area sown (sq. mt.) |
|---|---|---|
| 1 | Palak (spinach) | 80 |
| 2 | Onion | 71 |
| 3 | *Rai* (Mustard) | 44 |
| 4 | Pea | 65 |
| 5 | Coriander | 200 |
| Total | | 460 |

9. Name of Farmer: Mr. Hukum Singh Village: Mason Block: Jonpur Facilitating NGO: GVK

Hukum Singh, whose son Rajesh is working with GVK took the initiative after getting convinced by ITP team to install drip system in his fields. The objective was to develop it as a model for others and an NGO staff was the best option to showcase.

Apr2011-Sep2011

| Sl. No. | Crop | Area sown (sq. mt.) | Total Production (kg.) | Market Price (Rs./ Kg.) | Gross Return to farmer (Rs.) | Productivity (Kg./ 100 sq.mt.) | Cost of MIS |
|---|---|---|---|---|---|---|---|
| 1 | Pea | 263.25 | 262 | 25 | 6550 | 99.52 | 20142 |
| 2 | *Tomato* | 416.25 | 550 | 18 | 9900 | 132.13 | |
| 3 | Onion | 481.50 | 370 | 08 | 2960 | 76.84 | |
| Total | | 1161 | | | 19410 | | |

Oct2011-Mar2012 (results are awaited till harvesting)

| Sl. No. | Crop | Area sown (sq. mt.) |
|---|---|---|
| 1 | tomato | 250.25 |
| 2 | *patato* | 897.75 |
| Total | | 1148 |

10. Name of Farmer: Mr. Trapan Singh Village: Magdiya Block: Jonpur
Facilitating NGO: GVK

Trepan Singh is residing out of the village Magadia to look after the agriculture and is commited to its work. As a model farmer he was selected and the systems, drip and sprinkler were installed in his fileds. The fields have gentle slope and cut through terraces

Apr2011-Sep2011

| Sl. No. | Crop | Area sown (sq. mt.) | Total Production (kg.) | Market Price (Rs./ Kg.) | Gross Return to farmer (Rs.) | Productivity (Kg./ 100 sq.mt.) | Cost of MIS |
|---|---|---|---|---|---|---|---|
| 1 | Pea | 86.8 | 96 | 25 | 2400 | 110.59 | 17443 |
| 2 | Tomato | 207.49 | 248 | 18 | 4464 | 119.52 | |
| 4 | Onion | 94.35 | 112 | 08 | 896 | 118.7 | |
| 5 | Cabbage | 98 | 180 | 10 | 1800 | 183.67 | |
| Total | | 486.64 | | | 9560 | | |

Oct2011-Mar2012 (results are awaited till harvesting)

| Sl. No. | Crop | Area sown (sq. mt.) |
|---|---|---|
| 1 | Been | 86.8 |
| 2 | Nepeyer | 54.99 |
| 3 | Onion | 152.5 |
| 4 | Nepeyer | 94.35 |
| 5 | Been | 98 |
| Total | | 486.64 |

11. Name of Farmer: Mr. Gulab Singh Village: Mogi Block: Jonpur Facilitating NGO: GVK

Gulab Singh is an old man but committed to agriculture for his and family's livelihood. He has the expertise of optimal use of his fields

Apr2011-Sep2011

| Sl. No. | Crop | Area sown (sq. mt.) | Total Production (kg.) | Market Price (Rs./ Kg.) | Gross Return to farmer (Rs.) | Productivity (Kg./ 100 sq.mt.) | Cost of MIS |
|---|---|---|---|---|---|---|---|
| 1 | Pea | 125.5 | 145 | 25 | 3625 | 116 | 19530 |
| 2 | *Palak* | 178.5 | 70 | 10 | 700 | 39 | |
| 3 | Potato | 180 | 260 | 10 | 2600 | 144.44 | |
| 4 | Onion | 84.5 | 82 | 08 | 656 | 97 | |
| 5 | Corn | 115.2 | 210 | 12 | 2520 | 182.3 | |
| Total | | 683.7 | | | 10101 | | |

Oct2011-Mar2012 (results are awaited till harvesting)

| Sl. No. | Crop | Area sown (sq. mt.) |
|---|---|---|
| 1 | Onion | 304 |
| 2 | Palak | 180 |
| 3 | Wheat | 199.7 |
| Total | | 683.7 |

12. Name of Farmer: Mr. JagtRam Village: Kandi Block: Jonpur Facilitating NGO: GVK

Jagatram is one of the progressive farmers from the village Kandikhal. He got a concrete tank from State Govt. of capacity 45000ltr for drinking water and critical irrigation but was not able to use it properly, which eventually made him dependant on rainfall for agriculture. When GVK (Gharwal Vikas Kendra), the fecilitating agency for the IWMI-Tata policy research programme explained the MI systems, he readily agreed to it and installed the system in his fields. According to him not only it helped him and his family to grow wheat and vegetables through out the year but also it was less labour intensive and water consumption for irrigation reduced considerably

Apr2011-Sep2011

| Sl. No. | Crop | Area sown (sq. mt.) | Total Production (kg.) | Market Price (Rs./ Kg.) | Gross Return to farmer (Rs.) | Productivity (Kg./ 100 sq.mt.) | Cost of MIS |
|---|---|---|---|---|---|---|---|
| 1 | Onion | 145.5 | 192 | 08 | 1536 | 132 | 24108 |
| 2 | *Palak* (Spinach) | 51.6 | 57 | 12 | 684 | 110.5 | |
| 3 | Pea | 124.2 | 150 | 25 | 3750 | 120.8 | |
| 4 | Wheat | 320 | 170 | 14 | 2380 | 53 | |
| 6 | Parsley | 28 | 30 | 10 | 300 | 107 | |
| Total | | 669.3 | | | 8650 | | |

Oct2011-Mar2012 (results are awaited till harvesting)

| Sl. No. | Crop | Area sown (sq. mt.) |
|---|---|---|
| 1 | Onion | 145.5 |
| 2 | *Palak* | 51.6 |
| 3 | Wheat | 444.2 |

| | | |
|---|---|---|
| 6 | Parsley | 28 |
| Total | | 669.3 |

13. Name of Farmer: Meena Devi Village: Kandi Block: Jonpur Facilitating NGO: GVK

Four members from one of the women SHGs run by GVK jointly came forward to install the MI systems in their fields, on an average, 1nali (200sqft) each, for critical irrigation

Apr2011-Sep2011

| Sl. No. | Crop | Area sown (sq. mt.) | Total Production (kg.) | Market Price (Rs./ Kg.) | Gross Return to farmer (Rs.) | Productivity (Kg./ 100 sq.mt.) | Cost of MIS |
|---|---|---|---|---|---|---|---|
| 1 | Pea | 132 | 140 | 25 | 3500 | 106 | 22436 |
| 2 | Chillies | 215 | 200 | 10 | 2000 | 93 | |
| 3 | Chillies | 153.6 | 140 | 10 | 1400 | 91 | |
| 4 | Onion | 48.5 | 40 | 08 | 320 | 82.5 | |
| Total | | 549.1 | | | 7220 | | |

Oct2011-Mar2012 (results are awaited till harvesting)

| Sl. No. | Crop | Area sown (sq. mt.) |
|---|---|---|
| 1 | *Palak* | 132 |
| 2 | Onion | 215 |
| 3 | *Ginger* | 103.6 |
| 4 | Onion | 98.5 |
| Total | | 549.1 |

**4. TNDRIP covered 30 villages and 280 farmers during the reporting period.**

**Technology Dissemination in Tamil Nadu**

Planned to upscale the capacity building initiative of the drip farmers in a massive way through IWMI-TATA, WTC-TNAU project called TNDRIP Initiative has been implementing the low-cost drip irrigation program in Coimbatore, Erode and Tiruppur districts of Tamil Nadu.

**Differential Impact on Women's Workload**

The main crops grown in the surveyed area were sugarcane, banana, turmeric, millets and vegetables viz., tomato, chillies, brinjal and cucumber. On average, 186 hours of labor were required per season for vegetable production on an average plot of 0.127 hectares.

Within drip-irrigated vegetable production, women play a predominant role by contributing 67 percent of the total labor use (Table 1). In fact, with the exception of seed bed preparation and perhaps sowing, women were found to play the dominant role in all aspects of the production and marketing process. This suggests that drip-irrigation, at least as implemented in the study site, can have a major pro-women bias in generating opportunities for female labor force participation and the decision making also increased (Tables 2-4).

*Table 1- Gender division of labour in vegetable farming per season (area: 0.127ha).*

| Activities undertaken | Total hours used | |
|---|---|---|
| | Men | Women |
| Seedbed preparation | 10 | 4 |
| Sowing seed | 2 | 2 |
| Transplanting | - | 5 |
| Irrigating | 60 | 60 |
| Fertilizer application | 10 | 12 |
| Harvesting | - | 5 |
| Marketing | 10 | - |
| Weeding | - | 36 |
| Total hours | 62 | 124 |
| Proportional mean in % | 33 | 67 |

*Table 2 - Perception of women on the drip-irrigation technology*

| Statement | Agree | Neutral N = 131 | Disagree |
|---|---|---|---|
| Adoption of drip technology helps generate more income than other available livelihood options for women. | *111 (84)* | *10 (8)* | *10 (8)* |
| Credit or subsidy should be provided to new adopters. | *131 (100)* | *00* | *00* |
| Women are more involved than their male counterparts in vegetable production under the drip system | *98 (75)* | *27 (21)* | *6 (4)* |

| | | | |
|---|---|---|---|
| Adoption of the drip-irrigation technology has not increased women□s work burden | *88 (66.7)* | *27 (21)* | *16 (12)* |
| Drip irrigation technology brought changes in the daily vegetable intake | *(66.7) (33.3)* | *43 (33.3)* | *00* |

*Note:* Values in parenthesis are percentages

*Table 3 - Decision making by gender in percentage before drip adoption*

| **Decision variable before adoption** | **Jointly** | **Male** | **Female** |
|---|---|---|---|
| Decision on the purchase of drip | 9.9 | 80.1 | 10 |
| Decision on buying agricultural inputs and selling agricultural produce | 32.2 | 66 | 1.8 |
| Decision on household expenditures | 56.1 | 22.7 | 21.2 |
| Decision on purchase of assets | 49.8 | 34.1 | 16.1 |

*Table 4 - Decision making by gender in percentage after drip adoption*

| **Decision variable after adoption** | **Jointly** | **Male** | **Female** |
|---|---|---|---|
| Decision on operation and maintenance of drip kits | 36 | 17.4 | 46.6 |
| Decision on household expenditures | 10.6 | 9.6 | 79.8 |
| Decision on buying and selling agricultural inputs and produce | 66.5 | 21.5 | 12 |
| Decision on purchase of assets | 52 | 22 | 26 |

# VI. MEETINGS/WORKSHOPS ATTENDED AND CONTRIBUTIONS BY ITP STAFF

## i] Meetings attended

## Dr. K.Palanisami

Attended the International conference on "Water Partnerships Towards Meeting the Climate Challenge" organized by Centre of excellence for change, Govt. Of Tamilnadu, IAMWARM project, Jan 6-7, 2011. The paper "Water security- Towards New Paradigm"by Colin Chartres, Madar Samad and K. Palanisami was presented

Participated in the discussions on Tiruppur water privatization project with the GOTN officials in Chennai, January 7, 2011

Presented the policy report on "Water sector Interventions for Tamilnadu' prepared by ITP. Submitted the report to the Principal Secretary, Irrigation, Govt. of Tamilnadu, Jan 7, 2011

Delivered the special address and presented the paper "Technology transfer – lessons from the farmer participatory action research program" at the Indo-US Workshop scheduled during 4-6 March 2011 at MSSRF, Chennai. This workshop was organized by the Indo-US Science & Technology Forum

Presented the paper "Irrigation subsidy: use of GSI methodology for irrigation projects in Andhra Pradesh" organized by IISD, Switzerland and ITP. Hyderabad, March 11, 2011, Hyderabad

Presented the paper "Application of Quantification methods in the estimation of stabilization value of groundwater" at the training workshop on climate change and quantification methodologies, organized by NCAP (ICAR), New Delhi March 25, 2011

Presented the paper "Application of Economic Surplus methodology in watershed evaluation" at the policy workshop organized by ICRISAT, Hyderabad, April 6, 2011

Delivered the inaugural address at the Association of Economists of Tamilandu (AET) workshop on "Prepare, present, publish and prominence", held at PSG College of Arts and Science, Coimbatore. May 28, 2011.

Discussed with Dr R. Vijay Kumar,I.A.S., Principal Secretary Planning, Govt. of Tamilnadu in Chennai on the policy papers prepared by ITP. The SRI and MI adoption and spread were presented.
TN electricity study team also visited the TNEB office in Chennai and interacted with me. Dr Umasankar also provided necessary support for data collection. July 8

Discussed with Mr. Sandeep Saxena, I.A.S., Commissioner of Agriculture and Dr Arul Mozhi , Principal Secretary, I.A.S., Agricultural. Department on the implementation of the MI irrigation programs in the state. Visited the state planning commission for discussions. Visited the TN electricity office in the afternoon to get the details on the distribution systems July 11

Discussed with Mr. S. Senkottaiyan, Minister for Agriculture, Govt. of Tamilnadu on the ITP proposed model for implementing the MI in the state. The GGRC model was also discussed. July 12

Attended the 1st Advisory committee meeting of the ITP -GGRC MI capacity building program being implemented by GGRC, Vadodara. Mr Shyamal Tikadar, jt MD, Mr.P.P.Donga, Sr. Manager, GGRC, Dr Raman, Advisor, GGRC participated in the meeting. Guidelines relating to the implementation of the capacity building activities in selected villages were outlined. July 14

Presented the paper, " Adoption of Micro irrigation technologies among different states of India" to the participants of the SAARC training program on Techniques of Water Conservation and Rainwater Harvesting for Drought Management, organized by Central Research Institute for Dryland Agriculture (CRIDA), ICAR and SAARC Disaster Management Centre, Hyderabad, July 21, 2011

Attended the lecture "Hydrological Modelling of Godavari Basin". by A.K.Gosain, IIT Delhi, organized by WALAMTARI at CADA, Hyderabad. Shared the ongoing works in Godavari basin with the participants. July 22.

Attended the TNDRIP field visits and meetings in the selected villages around Coimbatore, Annur, and Erode districts. Aug 1-2

Attended the Dhan Foundation Tank Program Board Meeting at Madurai. Discussed with Mr. Vasimalai chairman of the Dhan foundation. Visited the tanks on MUS. Shared the views on the implementation of the institutional interventions on tank management using the Vayalagam as an example. Also discussed about the possibilities of organizing an ITP policy event in Sep 2011 along with the Dhan foundation symposium to be held during Sep 14-18 at Madurai. Aug 6:

Discussed with Dr K.Arulmozhi, Principal secretary, Agrl. Dept , Govt of Tamilnadu at Chennai on the Aug 16 & 17.

Presented the ITP water policy brief on " A Model for Micro Irrigation Scheme Implementation in Tamil Nadu (TANMIA)". The modalities of implementing it have been outlined. It looks like the TN Govt team will be planning a visit to Gujarat to see the implementation of the GGRC MI implementation model where ITP is now participating in the capacity building program of CCRC. The tentative date for the team visit is Sep 21, 2011.

Attended the Stockholm Water Symposium and presented the paper " What we learned from 2004 Indian Ocean Tsunami" Stockholm ,Aug 22, 2011

Attended the 8th SC meeting at SRTT, Mumbai on the Oct 4, 2011

Discussions and meeting with Jain irrigation (Jalgon, Aurangabad) on the Oct 5-6, 2011.

**Dr. Kadiri Mohan:**

Attended International Conference on "Water Partnerships Towards Meeting the Climate Challenge" at Hotel Taj Connemera in Chennai on Jan 06 and 07 2011 organized by UNICEF and Tamil Nadu Modernization and Water bodies restoration and management (IAMWAM) project.

**Mr. Kiran Jella**

Participated in the training workshop, "Aquacrop Modelling" Feb 13-18, Hyderabad

Presentation at WALAMTARI, on Hydrology Modeling part of the Climate Change Projects . July 11.

Attended ClimaWater Results Presentation Workshop by Prof A.K.Gossain at CADA Hyderabad. July **22**

Attended the Advance SWAT Workshop held at TNAU Coimbatore, Sept 16-19, 2011.

Jan 18-21: Participated in Geospatial World Forum – 2011, Made a presentation on "Farmers adaptation and regional land use changes in irrigation systems under fluctuating water supply in Krishna Basin"

March 11: Attended the Global Subsidies initiative (GSI) meeting organized by IWMI at Planning department, secretariat, Hyderabad (11/3/2011).

April 8: Presentation was given on watershed evaluation methodologies in capacity building program organised by Agroecosystem, ICRISAT (8/04/2011). Engineers and agricultural department officials participated in the program.

**Krishna Reddy**

CLIMAWATER annual review meet was organized from 14 – 18th February 2011.
15/2/2011- Internal review meet with the project partners
18/2/2011- Annual review meet
Attended CLIMARICE II annual review meet from 19-22 February 2011 at TNAU, Coimbatore
19 & 20th Feb. 2011 – Internal review meet with the project partners
22/2/2011- Annual review meet

Visited Norway for midterm review meeting from 5th – 15th June 2011.

Presentation on climate change projects (climawater and climarice II) at WALAMTARI for giving exposure to the state departments. July 11.

Attended guest lecture given by Prof.A.K.Gosain at I & CAD office. The presentation was given to the state government department engineers and principal secretary's of irrigation and projects. July 22

Farmers meeting at Rangareddipalem due to the onset of monsoon and cropping practices. A detailed plan for the climarice farmers was given. July 25

March 3 2011 - Given presentation at CRIDA on Vulnerability index of Godavari river basin on 3rd March 2011. The workshop highlighted on the quantification methods of climate change impacts. The workshop was organized under National Initiative on Climate Resilient Agriculture (*NICRA*) Program

**Rajat Kumarpati**

Visited Mizoram for monitoring the irrigation component and re visit of the sites selected for ITP pilot study. The partner organisation has cancelled a demonstration plot without informing NEI and that has caused major setback for the ITP pilots in Mizoram. Aug 2011

Visited Longra project area in Tuensang district of Nagaland with NEI team. Had a thorough discussion on future plan of ITP in Nagaland. The pahse-II proposal was again fine tuned in a meeting with partner organisation. Aug 2011.

Discussed with NABARD GM, Nagaland Dr. Saha on the study initiated by ITP on MI and expansion of the same in the region in partnership with NABARD. Sahred the views with SRTT Sep 11.

Visited Dimapur distrct of Nagaland to review the progress of Prodigals'Home work, the partner NGO in irrigation components and discussing with farmers on MI pilots planned to be done under ITP Sep 11.

## ii] ITP Contribution to /Journal Articles

### Peer reviewed journals:

Palanisami,K., C.R.Ranganathan and C.Umetsu.(2011). Groundwater Over-exploitation and efficiency in crop production: Application of data envelopment analysis. **Journal of Applied Operational Research**. 3(1).

Suresh Kumar,D and K.Palanisami (2011). Can Drip Irrigation Technology be Socially Beneficial? : Evidence from Southern India, **Water Policy,** 13: 571—587.

Palanisami, K, Kadiri Mohan, K.R.Kakumanu and S.Raman.(2011). Spread and Economics of Micro Irrigation in India: Evidence from Nine States. **Economic and Political Weekly,** Vol XLVI, No. 26&27**.** June 25.

Smith,R., Masakhiko Gemma, K.Palanisami. 2011. "Profit Based Efficiency Measures, with an Application to Rice Production in Southern India," **Journal of Agricultural Economics, 6**2 (2): 240-356.

Palanisami, K; Giordano, Mark; Kakumanu, Krishna; Ranganathan, C.R. 2011. The stabilization value of groundwater: evidence from indian tank irrigation systems. **Hydrogeology Journal,** DOI 10.1007/s10040-011-0793-3. Nov. 4.

Palanisami, K., C.R.Ranganathan, K.R.kakumanu and Udaya N. Sekhar. 2011. "A Hybrid Model to Quantify the Impact of Climate Change on Agriculture in Godavari Basin, India", **Energy and Environmental Research,**vol1(1):

Palanisami K., R.Meinzen-Dick, Mark Giordano and Barbara Van Koppen. 2011. Tank Performance and Multiple Uses in Tamil Nadu, South India - Comparison of 2 time periods (1996-97 and 2009-10).**Irrigation and Drainage Systems**. DOI:
10.1007/s10795-011-9114-1

Karthikeyan, C and K.Palanisami, 2011. Social Interactions Among Multiple Users of —Tank Irrigation System and Its Management. **International Journal of Current Research Review**, Vol.3(8):P32-41.

Palanisami, K., Kakumanu, Krishna , D.Suresh Kumar, S.Chellamuthu,
B.Chandrasekaran, C.R.Ranganathan, Mark Giordano, "Do Investments in Water Management Research Pay? An Analysis of WaterManagement Research in India". **Water Policy** (accepted)

Amarasinghe, Upali A., Palanisami, K. and Singh, O.P. Improving canal irrigation
performance with on-farm water storages: evidence from the indira gandhinahar pariyojana project in India. **J. of Irrigation and Drainage** (Accepted)

**Books & Book Chapters:**
Palanisami, K., S.Raman and Kadiri Mohan (ed.) 2011. **Micro irrigation - Economics and Adoption,** MacMillan Publishers India, New Delhi.

N.Sekhar, A.K.Gosain and K.Palanisami (ed.) 2011. **Impact of climate change in Godavari River Basin** , MacMillan Publishers India Ltd. New Delhi.

ITP. 2011. **Water Resources Atlas of Andhra Pradesh**. Hyderabad

Palanisami, K., V.N.Sharda and D.V.Singh (ed). 2011. **Hill Water Management in the Hill Regions : Evidences from Field studies**, MacMillan Publishers India, New Delhi. (sent to publisher)

**Books in the pipeline**

Chieko Umetsu, K.Palanisami and Kume(ed.). Indian Ocean Tsunami: Learns Learnt Springer , Kyoto. ( expected publication in Jan 2012)

Palanisami,K., C.R.Ranganathan, N.Sekhar and K.Krishna Reddy (ed.) Climate change and socio economic quantification methodologies: Applications to major river basins in India. (Publication expected in Feb 2012).

**Working papers:**

Ranganathan, C. R. , Palanisami, K.., R. Kakumanu, and B. Agastin. Mainstreaming the Adaptations and Reducing the Vulnerability of the Poor to Climate Change, **ADBI Working Paper Series**, Asian Development Bank Institute, Tokyo, June 2011.

**Book chapters:**

Palanisami, K. 2011. Micro irrigation adoption in India: Role of capacity building program. In Techniques of Water Conservation and Rainwater Harvesting for Drought Management. (Eds) P.K.Mishra, M. Osman, Stendra and B.Venkateswarlu. Central Research Institute for Dryland Agriculture, Hyderabad. Pp.538-546.

Palanisami K, Shifeaw B, Joshi PK, Nedumaran and Wani SP. 2011. Impact of Watershed Projects in India and Africa: Application of Various Approaches and Methods in Integrated Watershed Management in Rainfed Agriculture (Suhas P Wani, J. Rockstrom and KL Sahrawat ed.). CRC Press, The Netherlands. Pp 349-390.

Palanisami. K., 2011. Micro irrigation in India – An Overview, in K.Palanisami, S.Raman and Kadiri Mohan (eds.), Micro Irrigation: Economics and Spread. MacMillan Publishers India Ltd, New Delhi.

Palanisami, K., Kadiri Mohan, K R Kakumanu and S.Raman, 2011.Spread and Economics of Micro Irrigation in Different States, in K.Palanisami, S.Raman and Kadiri Mohan (eds.), Micro Irrigation: Economics and Spread. MacMillan Publishers India Ltd, New Delhi.

Suresh Kumar D. and K.Palanisami. 2011. Social benefit cost analysis of Drip Irrigation, in K.Palanisami, S.Raman and Kadiri Mohan (eds.), Micro Irrigation: Economics and Spread. MacMillan Publishers India Ltd, New Delhi.

Raman, S., K.Palanisami and Kadiri Mohan, 2011. Micro irrigation : Focusing for the future, in K.Palanisami, S.Raman and Kadiri Mohan (eds.), Micro Irrigation: Economics and Spread. MacMillan Publishers India Ltd, New Delhi.

*Udaya Sekhar Nagothu, A.K. Gosain, Palanisami, K. 2011.***An introduction to climate change impacts on water resources and adaptation,** in *Udaya Sekhar Nagothu, A.K. Gosain, Palanisami, (eds.)* Impact of climate change in Godavari River Basin**.** Macmillan Publishers India Ltd, New Delhi.

*David. N. Barton, Krishna Reddy Kakumanu, K. Palanisami and Kota Tirupataiah. 2011.* **Analysis of economic incentives to manage risk at farm level in the context of climate change,** in *Udaya Sekhar Nagothu, A.K. Gosain, Palanisami, (eds.)* Impact of climate change in Godavari River Basin. Macmillan Publishers India Ltd, New Delhi.

*Palanisami, K, Krishna Reddy Kakumanu, Udaya Sekhar Nagothu, Ranganathan C.R, David N. Barton. 2011.* **Vulnerability assessment, impacts of climate change on agricultural production in the Godavari river basin, India in** *Udaya Sekhar Nagothu, A.K. Gosain, Palanisami, (eds.)* Impact of climate change in Godavari River Basin. Macmillan Publishers India Ltd, New Delhi.

*Palanisami K, Ranganathan C.R, Krishna Reddy Kakumanu and Udaya Sekhar Nagothu. 2011.* **Impact of Climate Change on Agriculture and Optimum Land and Water use Planning: Evidence from Sri Ram Sagar Project, Godavari Basin,** in *Udaya Sekhar Nagothu, A.K. Gosain, Palanisami, (eds.)* Impact of climate change in Godavari River Basin. Macmillan Publishers India Ltd, **N**ew Delhi.

## Project Reports:

Palanisami, K and Ramesh Vidya. 2011. **Water management technologies tested and promoted in the project areas**. ITP. IWMI, Hyderabad.

Palanisami, K and Ramesh Vidya. 2011.**ITP Impacts and achievements (2001-2010) (Research, Capacity Building and Policy).**ITP. IWMI, Hyderabad

**1. Bulletins:**

Palanisami. K, Kadiri Mohan, Mark Giordano and Chris Charles. 2011. **Measuring Irrigation Subsidies in Andhra Pradesh and Southern India: An Application of the GSI Method for quantifying subsidies**. Report published in International Institute for Sustainable Development, Geneva.

## 2. Papers presented at the workshops and conferences.

Attended the International conference on "Water partnership towards meeting the climate change" organized by Centre of excellence for change, Govt. Of Tamilnadu, IAMWARM project. The paper "Water security- Towards New Paradigm" by Colin Chartres, Madar Samad and K.Palanisami was presented, January 6, 2011.

Attended the International Association for the Study of the Commons (IASC) 2011 - Sustaining Commons: Sustaining our Future. Presented the paper on Multiple uses from tanks in 2 time periods. CESS, Hyderabad, 10-14th January, 2011.

Attended the Indo-US Workshop organized by the Indo-US Science & Technology Forum. Delivered the special address and presented the paper "Technology transfer – lessons from the farmer participatory action research program", MSSRF, Chennai, 4-6 March 2011.

Presented the paper "Application of Quantification methods in the estimation of stabilization value of groundwater" at the training workshop on climate change and quantification methodologies, organized by NCAP (ICAR), New Delhi March 25, 2011

Presented the paper "Application of Economic Surplus methodology in watershed evaluation" at the policy workshop organized by ICRISAT, Hyderabad, April 6, 2011

Delivered the key note cum inaugural address at the Association of Economists of Tamilandu (AET) workshop on "Prepare, present, publish and prominence", held at PSG College of Arts and Science, Coimbatore., May 28, 2011.

Presented the paper, " Adoption of Micro irrigation technologies among different states of India" to the participants of the SAARC training program on Techniques of Water Conservation and Rainwater Harvesting for Drought Management, organized by Central Research Institute for Dryland Agriculture (CRIDA), ICAR and SAARC Disaster Management Centre, Hyderabad, July 21, 2011

Delivered the lecture on Impact evaluation methods at the Training Programme on Value Chains, Adoption, Monitoring & Evaluation and Impact Assessment, HOPE Project, ICRISAT, Hyderabad, 10-12 August 2011.

Presented the paper, *Lessons leant from Indian Ocean Tsunami*. Side event. World Water Week, Stockholm Water Symposium, Aug 22, 2011.

Presented the lead paper on "India :Water reform and challenges" at the Agricultural Research and Development, 2020. Organized by CII, Chennai Dec 14, 2011.


Presented the key note paper, "Irrigation Development in the 12th Plan – Options and Priorities for Tamilnadu state" at the ITP policy Session on Tamilnadu 12th Plan – Irrigation Sector. Tamilnadu Agricultural University and ITP, Coimbatore. Dec. 28, 2011

**3. Workshops organized:**

A stakeholder workshop for ClimaWater was organized at WALAMTARI, Hyderabad on 17th February 2011.

AQUACROP Workshop was organized at MCRHRD, Jubilee hills, Hyderabad. ( in association with Irrigation Dept of AP and TN states and Bioforsk, Norway) from 14 – 18th February 2011

A Stakeholder workshop for the ClimaRice II was organised at TNAU, Coimbatore on 21st February 2011.

'FIELD DAY' programme on Paddy under Drip irrigation (a collaborative Research plot with IWMI &Bioforsk) was organized at Chinnaganapur (v), Kulchararm (M), MedakDist on 21st May.2011.

Global Subsidies Initiative (GSI) workshop at Planning department, secretariat, Govt of AP, Hyderabad on March 11, 2011.

Training program on Azolla – Livestock feed and Biofertiliser for rice at RARS, LAM was organized on 4 August 2011.

Co-convened the workshop: "Building Resilience to Tsunami Disaster in Asian Coastal Regions". Conveners: Research Institute for Humanity and Nature and IWMI-TATA Water Policy Program Research Institute for Humanity and Nature (RIHN), Kyoto, Japan, 2011 World Water Week, August 22-27,Stockholm.

CLIMAHYD stakeholders workshop was organized at Irrigation and Command Area Development, Government of AP, Hyderabad on Sept 7, 2011

Organized the Dhan- ITP workshop special session "Technologies tested and promoted in the project areas" by Vidya Ramesh & Palanisami was presented at the Madurai symposium on Sep 17, 2011

Tamilnadu Policy workshop 'Agriculture and Irrigation for the 12th Five Year Plan' State Planning Commission, Tamilnadu Agricultural University and ITP, at Coimbatore, Dec 28, 2011

Co-convened the side event: "Building Resilience to Tsunami Disaster in Asian Coastal Regions" Convenors: Research Institute for Humanity and Nature and IWMI-TATA Water Policy Program Research Institute for Humanity and Nature (RIHN), Kyoto, Japan, 2011 World Water Week, August 22-27,Stockholm.

Formed the "ITP Climate and Water Advisory Group" with members representing different organizations dealing with research, training and/or development. The group will meet once in 3 months to present and discuss the results of the climate and water related works. The suggestions from the

Group will be useful in strengthening the research and policy focus of the climate and water studies. Aug 30, 2011.

Jointly organized with Dhan Foundation a session on "Water Management Technologies to farmers" and presented the paper "ITP Technologies Tested and Promoted in Project Areas" at Madurai Symposium, Madurai during Sep 14-18, 2011.

**Deccan Chronicle, Madurai, Sep 18, 2011**

## Only 8 per cent of farmers avail drip irrigation scheme, shows TNAU research

# Experts seek drip irrigation in state

DC CORRESPONDENT
MADURAI, SEPT. 17

Water management experts have urged the state government to make drip irrigation system compulsory to encourage water efficiency among farmers.

Placing the demand, Dr K.Palanisamy, director of Hyderabad-based International Water Research Institute pointed out a research conducted by the Tamil Nadu Agricultural University according to which only eight per cent of the farmers availed drip irrigation scheme. By making drip irrigation mandatory, the government could make the farmers avail the subsidy it offers for the scheme, he said.

He was talking to reporters on the sidelines of a workshop on 'Technologies tested and promoted by IWMI – Tata Water Policy Research Programme' held as part of the Madurai symposium 2011 organised by Dhan Foundation in Madurai on Saturday.

Mr Palanisamy stressed for a mechanism to implement water technologies. Though some farmers have drip irrigation technology in place initially, they fail to undertake maintenance, he said calling for the need to have technology backup and service agents for the upkeep of such facilities.

He also pointed out the need to create or modernize thousands of tanks and ponds in the state to cope with the drop in the number of rainy days from 30 to 20 due to climate change though there is no drastic change in the quantum of rainfall. "This will cause heavy downpour for a fewer days resulting in flash floods in the state for which we need creation or modernisation of tanks and ponds. But the poor upkeep and heavy siltation of these tanks have led to reduction in storage capacity."

While 40 per cent of farmers in Tamil Nadu do not have assured irrigation facility, the situation will worsen further if due attention is not paid on protecting the existing water bodies, he said and emphasised the need for an exclusive water technology research and training institute to build the capacity of the farmers on the use of modern irrigation technologies.

Dhan Foundation executive director P.Vasimalai pointed out that the major challenge is removing silt from all the 39,000 tanks and about one lakh ponds in the state to restore their original capacity. "It needs a special drive from the government," he said.

Prof C. R. Shanmuganathan wanted the government to define the technology first and then devise subsidy schemes base don it.


## 4. Other achievements/contributions:

**Implementation model:**
A Micro irrigation implementation model was prepared and presented to the Govt of Tamilnadu in Aug 2011.

**Networking model:**
A **Climate Water Advisory Group** has been formed with representatives from Government departments in Aug 2011. This will form the climate and water network in Andhra Pradesh.

**Recognition/Awards:**

i) Appointed as **member of the 12th Five Year Plan Steering Committee** by the State Planning Commission, Govt. of Tamilnadu.

ii) ITP Received the **Best Water award** for IWMI (ITP) from Rotary club midtown, Jan 23, 2011 for the services rendered to the farming community.

iii) K. Palanisami was awarded the **Outstanding Professional Award** by the Junior Chamber International (JCI), Coimbatore Cosmo, Zone XVII on September 15, 2011 for his contribution in water conservation.

**Product (Water calculator CD):**
A water calculator CD was launched at TNAU, Coimbatore on Nov 25, 2011 as part of the TNDRIP Project activities. This helps for the irrigation scheduling of the farmers under the drip program being implemented in 100 villages. The CD will be used for the ITP-GGRC capacity building program in Gujarat state.

# VII. OTHER ACTIVITIES

**1) (a) 7th ITP Steering committee meeting**

April 28. Conducted the ITP 7th Steering committee meeting at SRTT, Mumbai. Steering committee members-Arun Pandhi, Mark Giordano, Madar Samad, Tushaar Shah and K.Palanisami participated in the meeting. David Molden participated through skype.

**(b) 8th ITP Steering Committee Meeting**

Oct 4. Conducted the ITP 8th Steering committee meeting at SRTT, Mumbai. Steering Committee members – Arun Pandhi, Mark Giordano, Peter Mc Cornick, Tushaar Shah and K. Palanisami participated in the meeting.

**2) ITP 2nd phase External REVIEW**

Review of the ITP 2nd phase was conducted by Dr Ravi Chopra, of the Peoples Science Institute, Dehradun during May 3-6, 2011 at Hyderabad.

**3) NORAD project review**

Feb 3: NORAD assessment meeting was organized at I & CAD, Jalasauda, Hyderabad. Dr. Odd Eirik Aresen and Dr. M. A. Khalid have attended the meeting from the NORAD. Farmers, irrigation department, WALAMTARI have participated in the meeting and discussed about the importance of climate change awareness and intervention of the new technologies.

**4) TNDRIP advisory committee meeting**

Attended the TNDRIp advisory Committee meeting on May 30, 2011. The Vice-chancellor, TNAU presided over the meeting. Vice president Jain Irrigation, Director WTC, Superintending Engineer, Ag.Eng, participated in the meeting. It was decided to extend the study for 1 more year covering 100 villages and 1000 farmers in Salem, Erode and Theni districts. The implementation mode of the project was also discussed. The field staff will station in the TNAU research stations and carryout the activities. Also the TNDRIP will be converging with the ongoing Govt. programs.

**5) Application to Nestle Water Award & for the UN Water – Best Practices Award**

ITP sent the application for the Nestle water award as well as the UN Water – Best Practices Award, highlighting the success stories of the capacity building aspects of the TNDRIP program.

6). Attended the ITP-GGRC project Advisory committee meeting at Vadodara on July 14 and Dec 2, 2011.

**ITP-GGRC Advisory committee meeting 12 Dec, 2011, Vadodara**

## VIII. POLICY IMPACTS

### Government of Karnataka

Dr. Palanisami along with Prof. M.G.Chandrakanth, (of the University of Agrl. Sciences, Bangalore) on Jan 31, 2011 attended the policy level discussion with Dr k.V.Raju, Economic Advisor to the Chief Minister of Karnataka State. Presented the Policy Brief " Water Sector Interventions for Karnataka" prepared by M.G.Chandrakanth and K.Palanisami. The major outcome of the discussions are: GOK will be interested to jointly implement the key water sector interventions, provided that IWMI /ITP is able to guide the interventions. Hence Dr Raju requested to prepare a document highlighting the few interventions focusing on: Issues, implementable plans, deliverables and role of IWMI/ITP. Once the draft report is ready on these lines, he will be making arrangements for presentation to the Minister and Secretaries of the Govt. of Karnataka. Key areas for focus include: micro irrigation implementation and capacity building models ( like TNDRIP, NGI).

### Government of Tamil Nadu

Dr. Palanisami had discussions with Mr Sujit Chudhary Principal Secretary to the Planning Department, Govt. Of Tamilnadu on Jan 7, 2011and presented the policy report on "Water sector Interventions for Tamilnadu' prepared by ITP. Submitted the report to the Principal Secretary, Irrigation, Govt. of Tamilnadu. Also discussed with Dr Mihir Shah, Member, National Planning Commission, New Delhi, Mr. Ashok Vardhan Shetty, Principal Secretary, Municipal Administration, Govt. Of Tamilnadu.

Based on the recommendations of the ITP studies on Tamilnadu Irrigation Sector, a team consisting of Mr. S.Damodaran, Minister for Agriculture, Govt of Tamilandu, Mr Sandeep Saxena, Principal Secretary, Agriculture Department; Mr Sellamuthu, Commissioner Horticulture; Mr. Manivasan, Commissioner of Agriculture, Mr R.Subramainan, Chief Engineer, Agrl. Engineering, Mr, Thanga Kaliaperumal, Secretary, Agrl marketing visited Gujarat state during Dec. 12-13 and interacted with officials of the Agricultural Department Govt of Gujarat. The team also visited the GGRC ltd Vadodara and selected villages and interacted with farmers.

**Document of 12th Five Year Plan to GoTN**

A policy write-up highlighting the major activities and interventions needed for Tamilnadu was prepared and discussed during the Steering Committee meeting for the 12th Plan under the State Planning Commission. The key messages include: i)Improved market access, ii) Micro Irrigation (MI) implementation, iii) Decentralized rain water-harvesting and groundwater recharge, iv) Decentralized agricultural education and research, v) Integrated agricultural extension.

## Government of Andhra Pradesh

Findings from the Subsidy Study carried out by ITP were presented to the GoAP on 11/3/2011. Mr. S.P. Tucker, Principal Secretary (Planning), GoAP, Mr. Sanjay Gupta, Special Secretary (Planning) and Dr. Tirupataiah, Director General, WALAMTARI represented the government in the meeting. Based on the suggestions the study will look into the broader aspects of subsidy across India through development of appropriate methodologies.

## Networking model:

A **Climate Water Advisory Group** has been formed with representatives from Government departments in Aug 2011. This will form the climate and water network in Andhra Pradesh.

To work on the climate Adaptation, a Consortium to address the research needs on Climate and Water issue has been constituted by ITP with representation from Irrigation Department (GoTN), MSSRF, Chennai), WALAMTARI (GoAP), and TNAU. The ClimaAdapt project will be implemented in AP and TN states through this consortium. The consortium will address the challenges and adoption strategies in Climate change and water.

## A Model for Micro Irrigation Scheme Implementation in Tamil Nadu State (TANMIA)

1. **Background**

In India, the area under micro irrigation is about 38 lakh ha, of which the drip irrigation accounts 14 lakh hectares. Maharastra (7 lakh ha), Rajasthan ( 7 lakh ha), Andhra Pradesh ( 5.6 lakh ha), Haryana ( 5 lakh ha) Karnataka (4 lakh ha), Gujarat (3 lakh ha), and Tamil Nadu (1.8 lakh ha) are the leading states in micro irrigation. However, given the higher potential for expansion of drip in the states, it is not achieved due to several problems related to new investment and management of the existing systems. In the case of Tamil Nadu, even though it is one of the water starved states in India, the coverage under micro irrigation is comparatively less. As the supply-demand gap for irrigation water in the state will be about 24% in the next 5 years, it is important to see how best the available water could be used more efficiently. Micro irrigation is one of the demand management

options, that will help the state in managing the available supplies in the future. Appropriate mechanisms to enhance the area under micro irrigation in the state should be very useful. Considering the success stories of agriculture and irrigation in the state of Gujarat, the successful micro irrigation implementation model called Gujarat Green Revolution Company (GGRC) ltd has been examined for its replicability in Tamil Nadu state. Keeping the key points in the GGRC model, a special purpose vehicle viz., Tamil Nadu Micro Irrigation Agency (TANMIA) is proposed for the Tamil Nadu state.

## 2. Objective

1. To implement uniform Micro Irrigation Scheme in the state
2. To remove all the inequalities and anomalies and ensures funds available under different scheme and sub scheme heads are utilized efficiently and benefits are extended to more and more farmers of the state effectively.

## 3. Tamil Nadu Micro Irrigation Agency (TANMIA)

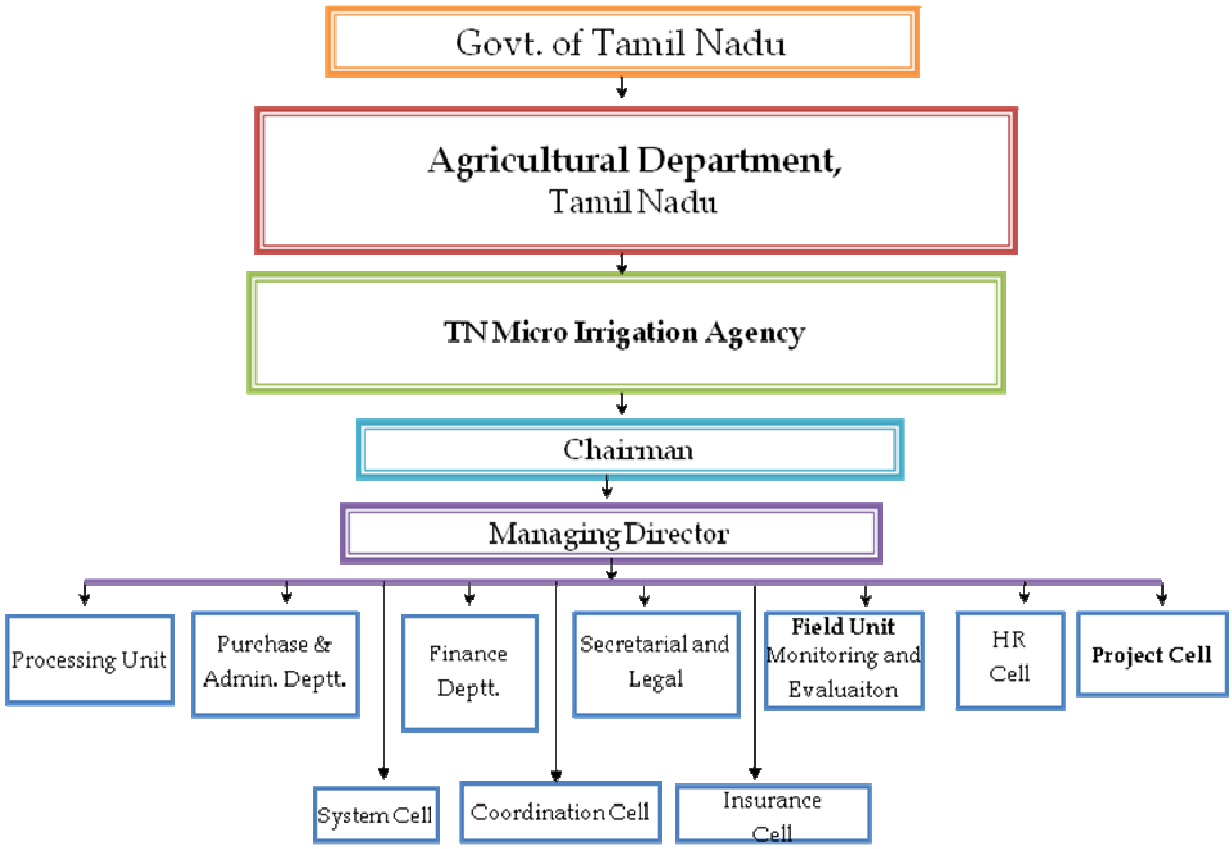
The innovative support services included are,

1. **Agronomical Services**
2. **Capacity building Services for a period of Five years**
3. **MIS Insurance Services for a period of Five years**
4. **Grievances cell is also included.**

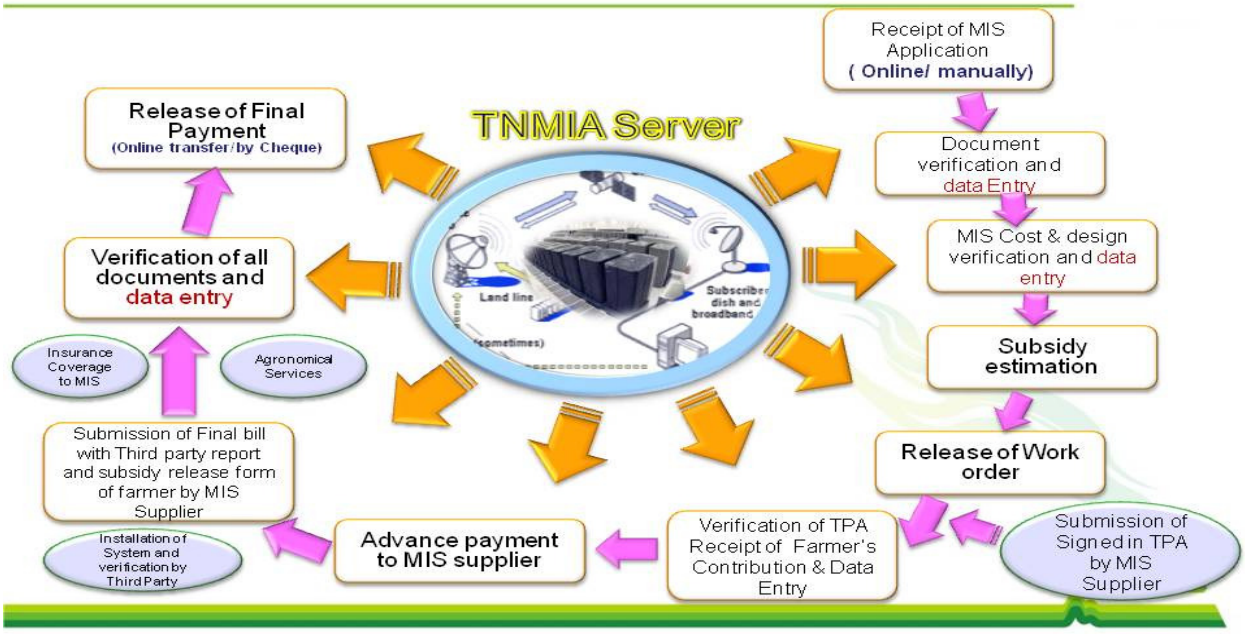
### Delivery Mechanism:

The existing infrastructure with the Agrl Depart and University can be used to form the special purpose vehicle viz., Tamil Nadu Micro Irrigation Agency (TANMIA). It will be headed by an Administrator in the level of MD and technical expert will be assigned todo the implementation in the capacity of Joint MD. The Agrl engineers and Agrl. Officers in the dept will be assigned with other responsibilities as indicated in the model ( see figure ). Convergence of the MI related activities from different departments will be done through the TANMIA. The existing TANHODA can be restructured in such a way that the staff working on micro irrigation will still be allotted to the micro irrigation related works at block level. Hence, there is no much dislocation of the staff. The advantage of the TANMIA is that it avoids the delays that normally happen at district level. The organizational structure is shown below.

# Organisation Structure and Functions




# Application Processing Steps



**Involvement of IT in effective Implementation of the Scheme:**

Considering the future potential of MIS adoption in the State, TANMIA has based its working model on a strong robust IT platform with dedicated check and balance leading to virtual elimination of any malafide intention by any stake holders and this is being regularly reviewed and updated from time to time, leading to a dynamic and robust processing system ending up with timely delivery of the goods to the farmers and ensuring that the beneficiary uses the system so as to reap the benefits in agriculture.

**Incentives built in the model**

MIS partner model- by involving NGOs/Cooperatives/corporate in the implementation process. Priority agricultural electricity connection for farmers who adopt MIS. Conceptualizing Pressurized Irrigation Network System (PINS) on canal command wherever possible

## 4. Operational Procedure

A standard Micro Irrigation Scheme operational procedure has been developed. Farmers are motivated through promotional and extensional activities for MI installation. Farmer after getting convinced about the MI benefits, contact registered MIS Suppliers and MIS suppliers prepare System design and estimate the cost. Farmer agrees on the basis of his/her contribution to be given, if any, to avail the scheme benefits and sign on all documents. The MIS application of farmer with Cost and design of system received at TANMIA and is processed. After verification of all documents, work order is released to MIS supplier for installation of system in farmers' field. Before installation, TANMIA, MIS supplier and farmer signs Tri-party Agreement (TPA) and receives farmer's contribution, if any. After installation of system, trial run is taken by Third Party Inspection Agency (TPIA). The institutions eligible for TPIA will be finalised after short listing the institutions in the state. On the basis of satisfactory report of (TPIA) & farmer, payment is released to MIS Supplier and back ended subsidy is released to farmer. On regular basis subsidy release report is sent to Govt.

## 5. Strategy Adopted:

**Standardisation of procedure:**

The micro irrigation operational procedures are standardized and made known to all stakeholders. Documents required for different category of farmers such as Loanee and Non- Loanee farmer at different stages of application processing are listed down to avoid documentation query and also to reduce total time taken for processing of application.

It is not necessary for the Farmers to visit TANMIA for submission of any documents, all documents are collected by MIS suppliers from the doorstep of farmer. Farmer only has to visit once to nearest block for signing of Tri-Party Agreement.

**Fast Decision Making Process & Participatory Approach:**

TANMIA will be an autonomous organization in decision making & implementation of MI.

As a participatory approach to take decision, all stake holders of the scheme are consulted while taking decision related to MIS. For revision of Micro Irrigation Component cost, a MIS Unit Cost revision committee will be formed constituting representatives from farming community, MIS

suppliers, Agriculture Universities and Banks. There is also a technical Committee with representative from all stakeholders, for taking any technical decision regarding MIS.

The yearly Annual Action plan is prepared and approved by State Micro Irrigation Committee (SMIC). This involves participatory process of decision making and finalisation of Annual Action Plan. The Committee constitutes representative from MIS suppliers, farmers, Govt. of TN and Govt. of India.

**Transparency & flexibility of MIS scheme:**
The implementation System is transparent and information is available to the access of public. Transparency can also be observed at every stage of application processing and financial transition. Flexibility has been given to farmer to choose his choice of MIS supplier and design the system as per his requirement.

**Use of IT in implementation of MIS scheme:**
The entire processing of MIS application will be done through dedicated computer software; The software also maintains the district wise, scheme wise, accounting of subsidy. The TANMIA website provides application forms, procedures, policies, unit cost, insurance guidelines and package of practices. The website also provides the opportunity to the public & stakeholders to access the online progress of MIS scheme and also application processing status of each beneficiary.

**Ensure quality of MIS material:**
To ensure the quality of MIS Materials, two stage quality checks are kept, once at the manufacturing site of MIS suppliers by Technical Agencies such as TNAU and second time at the field of farmers by Third Party Inspection Agencies.

MIS components having standardized ISI no. are only supplied to farmers. Specification of each components are laid down and made know to MIS suppliers so that they manufacture and Supply MIS components as per the specifications.

Technical Agencies verify the technical flaw in the material manufactured and check quality of material as per ISI norms and/or specifications of the Components.

At field level Third Party Inspection Agencies verify materials as per prescribed ISI nos., components are supplied or not and also takes trial run of MI System to judge the performance of system in the field as per the specifications

**Monitoring and evaluation**
Concurrent monitoring and evaluation will be done by the implementing agency through the use of different organizations/university.
An advisory committee with experts will be formed to guide the implementation of the TANMIA.

# IX. RECOGNITION AND AWARDS

**Recognition/Awards:**

K.Palanisami, was appointed as **member of the 12th Five Year Plan Steering Committee** by the State Planning Commission, Govt. of Tamilnadu.

K.Palanisami was awarded the **Outstanding Professional Award** by the Junior Chamber International (JCI), Coimbatore Cosmo, Zone XVII on September 15, 2011. for his contribution in water conservation.

**Rotary function meeting and Rotary award to TNDrip**

Jan 23: Rotary Club Midtown awarded "Water Management: Knowledge Empowerment" award to TNDRIP. The function was organized by the Tamilnadu Agricultural University and the Rotary Club Midtown, Coimbatore. Farmers, scientists, students attended the function.

THE HINDU • MONDAY, JANUARY 31, 2011

**RECOGNITION:** *Representatives of Tamil Nadu Agricultural University and International Water Management Institute, Hyderabad, with the award they received from Rotary Club of Coimbatore Midtown.*

**Rotary award**

The Rotary Club of Coimbatore Midtown presented a 'Recognition Award' to Tamil Nadu Agricultural University (TNAU) and International Water Management Institute (IWMI), Hyderabad, for carrying out research and promoting water conservation measures among the farming community. The Director of Water Technology Centre S. Chellamuthu on behalf of TNAU and Director of IWMI-TATA Water Policy Programme K. Palaniswami on behalf of IWMI received the award at TNAU. Vice-Chancellor of TNAU P. Murugesa Boopathi who was the chief guest, spoke on the reasons for insufficient supply of water for farming in Tamil Nadu and the prime importance of water management strategies in the State. K. Palaniswami, Director of IWMI-TATA Water Policy Programme, said that Tamil Nadu faced 15 per cent water deficit, but yet managed to hold second position in the country in agricultural development.

**Rotary Award to TNDRIP**

**Jan 23:** Participated in the TNDRIP-Rotary Club function on "Water Management: Knowledge Empowerment". The function was organized by the Tamilnadu Agricultural University, ITP and the Rotary Club Midtown, Coimbatore. Farmers, scientists attended the function.

The recognition award for the TNDRIP was given to the WTC and ITP for jointly implementing the TNDRIP program

## Great Day Award



Outstanding Professional Award received by Dr. K Palanisami from JCI COSMO (Rotary) on the 15th September 2011 at Coimbatore.

### ITP- Water Technology Centre, TNAU, Coimbatore
### Launching of water calculator CD on 25.11.2011

An irrigation water calculator for farmers to assess the water requirement of crops, based on the location, crop geometry, different stages of crop growth, drip irrigation system operating time depending on the lateral spacing, dripper spacing and dripper discharge rate and different soil type was released on 25th November 2011 by Professor Dr.P.Murugesa Boopathi, Vice-Chancellor, Tamil Nadu Agricultural University, Coimbatore.The water calculator was developed by Dr.S.Raman Water Management expert and IWMI-TATA consultant who explained the operation of CD in both languages (Tamil and English) for different crops under different field conditions. He also demonstrated the use of the calculator to the farmers. Dr.K.Palanisami, Director (IWMI-TATA water policy programme), Dr.S.Chellamuthu, Director (Water technology centre, TNAU) and farmers Mr.Ramasamy, Selvapuram village, Periyanaickaypalayam and Mr. P.Chandrasekaran, Karegoundanpalayam village of Annur Blocks were received the water calculator CD from Vice-Chancellor, Tamil Nadu Agricultural University, Coimbatore.


## X. EXTERNAL FUNDED RESEARCH

**CLIMAHYD**

Climate and hydro power in Godavari was approved which is a part of the ongoing Climate and water study in Godavari basin. The major focus is on the hydro power generation and water supplies over years. The duration is 6 months; budget is NOK 135000.

Sriramsagar Project has been selected under the Godavari river basin and Project and state (AP) level data collection is in progress. The Stakeholder Meet is planned in the month of September 2011.

**ACIAR**

A new scoping study on tank irrigation in Eastern India and Nepal has been approved by ACIAR

**JAIN Irrigation**

IWMI- Jain had agreed to develop a joint proposal on key areas relating to Micro Irrigation. Two rounds of discussions have been completed. The proposal is now under active consideration.

## XI VISITORS TO ITP OFFICE

| Month 2011 | Date | Name of the visitor | Address | Meeting / discussion with |
|---|---|---|---|---|
| Jan | 15 | Barbara van Koppen | IWMI, South Africa | Discuss the MUS paper |
| Feb | 2-3 | Nakothu Udaya Sekhar | Bioforsk, Norway | Discuss the climarice project |
| Feb | 9 | Iam Willat | ACIAR, Australia | Discuss the tank project concept note |
| March | 11 | Chris charles | IISD, Switzerland | Discuss the subsidy study |
| March | 12 | Neena Rao | Climate centre, Hyderabad | Discuss the ongoing program |
| May | 3-5 | Ravi Chopra | Peoples science Institute | For evaluating the ITP works. |
| June | 7 | Reddy | Jain Irrigation | Discuss the drip irrigation in Paddy |
| June | 21 | Nagraj Nereppa | Senior researcher, ICRISAT | Discuss the data analysis on groundwater use |
| May | 21-22 | Dr. C. R Ranganathan | Tamil Nadu Agri. University Coimbatore | To attend the Clima water discussions/ and data analysis. |
| Aug | | Dr C.R.Ranganthan,; | Professor of Mathematics, Tamilnadu Agrl. University, Coimbatore | To work on the Clima project data analysis. |
| Aug | | Dr Sekhar | Bioforsk, Norway | Clima Project meetings and field visits |
| Sept | 1-4 | Dr. C R Ranganathan | Tamil Nadu Agri, University Coimbatore | To work on the Clima project data analysis. |

## XII STAFF MOVEMENTS

Dr. Kadiri Mohan, Spl Project scientist left ITP on 30th June 2011 to undertake a new position in the Agrl University.

Dr. Madar Samad left IWMI, Hyderabad and joined IWMI, HQ Colombo effective July 1, 2011. Dr Paul Pavelic, Hydrogeologist is the new head of IWMI, Hyderabad office. He will be the new ITP Steering committee member.

Mr. Tamma Rao, Hydrologist joined ITP as a Special Project Scientist on 01.Sept.2011

Mr. Soundharajan, Irrigation Engineer joined ITP as Special Project Scientist on 12.Sept.2011

# XIII CONCLUSIONS

During this period, 15 studies were completed and 3 studies were designed and taken up across different states. Three training and capacity building programs were conducted with partner agencies. The ongoing TNDRiP project covered 800 farmers and got the Rotary Water Award for 2011.

The new drip capacity building program for GGRC was initiated in Gujarat. Initially it is focusing on 40 villages ( 400 farmers) Advisory committee was formed to help implement the program.

The ITP External Review (Phase II) was completed.

A no cost extension of the ITP for 9-months (July 2011 - March 2012) has been obtained.

ITP partnership with SRTT partners in Nagaland is ongoing with the installation of the micro irrigation in selected locations along with the capacity building by the ITP field engineer who is closely working with the NEI partners. MI pilot project in Uttaranchal is completing the 3rd crop season successfully.

In terms of research, new research methodologies such as use of total factor productivity in measuring river basin performance, economic surplus in measuring to returns to water management research, hybrid model for quantifying the impact of climate change in agriculture were applied and the outcome of the studies were given to the Govt. departments and incorporated in the training programs.

In terms of capacity building programs, two capacity building workshops/training programs ( SWAT and AQUACROP) were completed to the engineers of irrigation department, .

Regarding the policy, ITP has made efforts in studying the GGRC MI implementation model in Gujarat and translating the model to suit the Tamil Nadu state. A MI implementation model was prepared and presented to the GOTN. Based on this, GOTN team consisting of Minister for Agriculture, Principal Secretary (Agriculture), Commissioner of Agriculture, Commissioner of Horticulture, Secretary Agrl.Marketing and Chief Engineer (Ag. Engineering) visited Gujarat and held discussion with officers of GoG during December 12-13, 2011.

**Climate Water Advisory Group** was formed involving the members from irrigation department, planning department, universities, NGOs mainly to disseminate the research output for policy prescriptions. A Water Atlas for Andhra Pradesh was prepared with the cooperation of the Irrigation and command area development department.

In all, ITP progress is considered good. Further, ITP has been able to mobilize external funding for projects on Water and Climate Change Adaptation in Krishna Basin of Andhra Pradesh. ClimaHyd project was completed with the development of a new measurement methodology called building block method (BBM) in measuring the project performance. ACIAR has approved a scoping study for tank irrigation research in eastern India.