Andhra Pradesh Farmer Managed Groundwater Systems (APFAMGS) Project

Demand Side Management of Groundwater

IMPLEMENTING AGENCY:

BHARATI INTEGRATED RURAL DEVELOPMENT SOCIETY

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APFAMGS PROJECT - AN ENABLING INTERVENTION FOR MANAGING GROUNDWATER DEPLETION

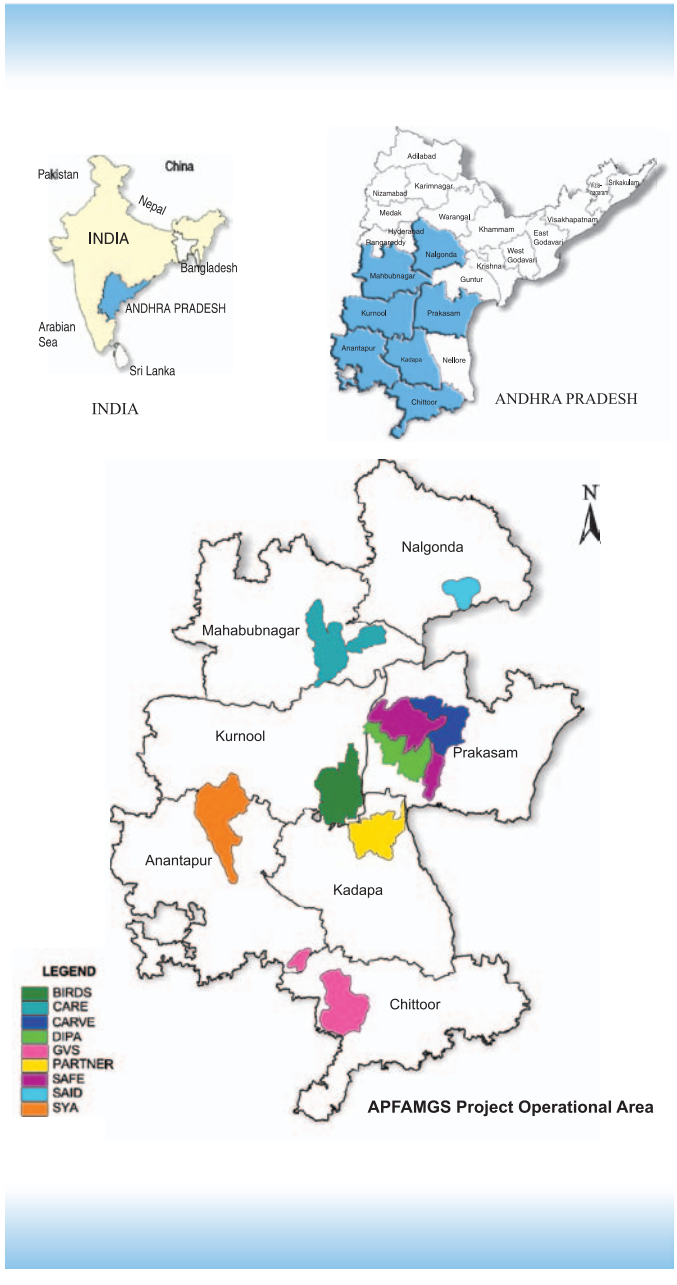
Andhra Pradesh Farmer Managed Groundwater Systems (APFAMGS) project's key premise is behavioural change leading to voluntary self regulation. In seven drought prone districts of Andhra Pradesh, India, thousands of farmers residing in 638 habitations spread over several hundred kilometers have voluntarily taken number of steps to reduce groundwater pumping, for tiding over problem of groundwater depletion.

Launched in July 2003, the APFAMGS project is a partnership with farmers for implementing Demand Side Groundwater Management concept. This project demonstrates an alternative model to the Supply Side approach which calls for spending billions for creating new structures.

Royal Netherlands Embassy, New Delhi, provided the funds for the project. The project implementation is guided by Food and Agricultural Organization (FAO) of the United Nations. APFAMGS is a Nationally Executed (NEX) partnership project between an NGO Bharatiya Integrated Rural Development Society (BIRDS) and FAO. BIRDS implements the project in seven districts in Andhra Pradesh through a federation of 9 NGO's.

The NGO's in partnership with farmers have successfully tapped farmer's wisdom and capacities in controlling their own situation and reducing vulnerability to fast spreading crisis of groundwater depletion and crop failures.

The project's operational framework is the Hydrological Unit (HU) or micro basins. The project is being implemented in 638 villages across seven drought-prone districts of Andhra Pradesh by local partner NGO's. The project reaches out to over Nine hundred thousand population forming part of Anantapur, Chittoor, Kadapa Kurnool, Mahabubnagar, Nalgonda and Prakasam..



PROJECT OBJECTIVES

The objective of the project as stated in the project document is to equip groundwater farmer users with the necessary data, skills and knowledge to manage groundwater resources available to them in a sustainable manner, mainly through managing and monitoring their own demand. The project does not profess to secure livelihoods, alleviate poverty, or increase incomes of project participants. The assumption is that access to scientific data and knowledge will enable farmers to make appropriate choices and decisions regarding the use of groundwater resources and agricultural practices.

Objectives of APFAMGS project

- About 3,000 Men and Women farmers are in a position to understand groundwater systems within which they are operating at about 650 habitations in Andhra Pradesh, in a scientific manner, by the year 2008.
- Hydrological data base, using GIS platform, is developed for usage of Groundwater Management Committees, covering 650 habitations, by the year 2006.
- About 6,500 farm families enabled for adoption of alternative agricultural practices suiting the availability of groundwater, by the year 2008.
- Community based institutions established for alternative management of groundwater resources with equal representation/ participation of men and women, covering about 650 habitations, by the year 2008.

PROJECT ACTIVITIES

APFAMGS project is an enabling intervention for reinforcing the internal strength and coping mechanism of farmers to explore and find out stable solution to the issues of ground water depletion and its adverse consequences. The project implementation follows series of steps to make the invisible groundwater fully understood by the farmers and thereby take appropriate actions. The various steps include:

- Strengthen local institutions at the habitation and hydrologic unit level to bring on center stage discussions on emerging water crisis especially on groundwater
- Demystify the science of hydrology through Farmer Water Schools (FWS) and train the farmers to take over all data collection leading to proper understanding of local water resource availability
- Change perception of groundwater from private property to that of a “common good” (individual farmers take decisions for collective good)
- Articulate and share information across hydrological units through Crop Water Budgeting Workshops for

evolving common strategies that limit damage to the groundwater system without sacrificing individual interest

- Establish new relationship between farmers and groundwater by reducing stress on the aquifer
- Adopt numerous steps at the farm level in improving crop water efficiency, implement water saving techniques and reduce chemical pollution
- Implement local groundwater governance transgressing beyond individual holdings and habitations, without being coercive
- Enable farmers voluntarily take painful decisions (reduce pumping, prevent construction of new wells, crop diversification, reduced application of chemical fertilizer/pesticides)

GLOBAL RELEVANCE OF APFAMGS PROJECT

Groundwater development in regions with fast growing population and high density of borewell/ tubewell construction is attaining un-sustainable limits. Declining groundwater levels, land subsidence, increasing minerals like arsenic, fluoride, salinity are the common ill effects.

India, China, Pakistan, Bangladesh, Yemen, Jordan, Mexico are some of the countries already witnessing the negative consequences of groundwater over pumping. Despite all the problems, groundwater provides the best opportunity for human development. Groundwater is easily accessible to a large number of users and provides cheap, convenient, individual supplies. Groundwater development is also largely self-financing, its largely private development and use ensure automatic cost recovery. When it is not degraded by human intervention, the major advantage of groundwater is its good potable quality.

Institutional and technological innovations by individual users adopting a collective approach offers the best opportunity for ensuring its upkeep and thereby its sustainability. Knowledgeable development of the groundwater resource provides the best opportunity for engaging large population with their families in the irrigation sector. Destruction of the groundwater resource is a major risk in fighting rural poverty

APFAMGS project has filled a vacuum in innovations in the groundwater sector by initiating a new model which addresses the issue of reducing/deteriorating groundwater resource by bringing in behavioral changes in the users. This approach continually engages the users by providing skills, capacity and knowledge that goes to promote innovations for reducing the consumption as well as improving the performance efficiency.

The project tested the relevance of its approach through an International workshop attended by participants from 13 countries. The operational methodology and the field level activities were presented to the participants over 2 weeks. The participants spend long time in the field interacting with the farmers and thereafter concluded that project approach could be replicated with necessary changes appropriate to the local situations.

Project USP

The unique aspect of the project is that it does not offer any incentives in the form of cash or subsidies to the farmers. What it offers is the means to increase their knowledge about the status of their groundwater resources by giving them the equipment and skills to collect and analyse rainfall and groundwater data. The project also facilitates access to information about water saving techniques, improving agricultural practices and ways to regulate and manage their own demand for water.

PEOPLE'S INSTITUTIONS

Institutional Intervention is integrated with technical component for managing groundwater depletion. A multi layer inclusive institution that is vertically integrated has been thought of in the project. Ground water Management Committee (GMC) has been conceived to be a village level institution of the farmers-men and women. Several GMC's within a given hydrological boundary join together to form a Hydrological Unit Network (HUN).

The GMC, HUN are the critical instruments for providing the "demonstration effect" of the learning's from the project

to the larger community of farmers beyond the project area. The institutions have equal membership of men and women. These institutions have provided good opportunities for women to come forward and lead in specific areas, while in many situations enabled men and women to come together and take actions leading to good impact. Literacy has never been a criterion which determines participation, particularly since the project emphasizes NFE methods for every aspect of implementation.

Over the years all the Hydrological Unit level institutions have been provided with legal cover, which provides them the status to receive funds as well as carry out business activities. Most of the people's institutions continue to perform their roles with distinction and have achieved varied levels of maturity, prompting the local NGO's to hand over major responsibilities to the people's Institutions to run the programme of reducing groundwater misuse and ensure its sustainability.

GENDER MAINSTREAMING

The project has strong gender interface keeping the practical and strategic gender needs at the core. Gender in the project, occupies a cross cutting space encompassing all the components and processes. The project has approached to bridge the gender gap as well as help in establishing self esteem and confidence.

The gender approach implies that attitudes, roles and responsibilities of men and women are taken into account, that it is recognized that both sexes do not necessarily have same access to or control over resources, that work benefit and impacts may be different for both groups. The gender approach in this project created that open mindedness and aimed at the fullest participation of both women and men.

Women who are active partners in the project are married and are highly responsible in meeting both basic as well as

strategic needs. Gender sensitization helped men and women to understand their roles and responsibilities and widen their thinking from routine assumptions. Support from men in women participation is a great achievement in the project. The other influencing family members were also sensitized through different gender modules that extend their support by assisting women to have space and time to attend to common good things. Though the initiation was small the starting point has been crucial.

Non literate women form major segment, through participatory trainings these women have been enabled to understand technologies and face challenges. The education level is quite high from illiterate to post graduation which also reflects that the project with its high technical component could equally attract the attention of variety of women. The project addressed both practical gender needs, such as improving women's conditions through the provision of water and sanitation closer to their houses, as well as strategic gender needs: improving women's position in society by increasing her awareness of her situation and her capacity to take decisions and influence change.

ENHANCING FARMERS KNOWLEDGE

The greatest strength of the APFAMGS project is to offer to the farmers knowledge about their own water resources and how these can be managed, and the means to collect, and analyse data related to its availability and distribution. The data collection, management and analysis are done by the farmers themselves. The farmers have the freedom to decide how they want to use the knowledge. No solutions are provided to the farmer participants. Farmers are enabled to deliberate on the new knowledge to innovate or adopt appropriate interventions that would help them improve crop water efficiency, reduce wastages, contain groundwater level decline and minimize pollution of water sources.

Capacity enhancement and training is the foundation upon which the project has been built. Capacity enhancement and training activities have been planned for the all the different components of the project. These activities are timed in relation to the hydrological year. In addition, need based training is also conducted. Formal and informal techniques are used as per the subject and target group. These techniques include cultural shows, practical training, exposure visits, exchange visits and workshops. Training is given in all aspect of implementation, to ensure that the

activities fulfill the purpose and there is as much uniformity as possible across the project.

At the community level, there are various levels and types of capacity enhancement activities, from creating awareness in the community, to technical training related to recording rainfall, and measuring draft from observation wells. Information and knowledge is imparted to the community through awareness generation programmes, using local folk art forms such as the kalajatha, which has emerged as a powerful and effective medium of communication.

PARTICIPATORY HYDROLOGIC MONITORING (PHM)

Participatory Hydrological Monitoring has been a strategy adopted by the project to transform individual groundwater users to water resource literates. Based on the knowledge, the farmers have started appreciating the causes leading to groundwater level changes, rainfall-recharge relationship, pumping capacity of borewells and water requirement for different types of crops.

2026 observation wells (one well for every sqkm) have been established for monitoring the well characteristics. Fortnightly water level monitoring are carried out by farmer volunteer's (both women and men farmers).

Daily rainfall measurement is collected from rain gauge stations distributed for every 5sq.kms in the project area. Rainfall Measurement is carried out by farmers themselves after establishing over 190 rain gauge stations in the project area spread over 65 drainage units. The rain gauge stations are so located as to record even the smallest variations in rainfall distribution. The rainfall measurement volunteers are both men and women farmers who have donated that piece of land where rain gauge is established and have also qualified after successfully undergoing technical training. Rainfall is recorded religiously at 08.30 hrs across the project and the same displayed for the farmers to take decisions related to all agricultural operations. Knowledge of rainfall data has also enabled the farmers to understand the recharge promoting rainfall events.

To understand the pumping capacity of the borewells the farmers carry out discharge measurement. Along with the discharge measurement, water level measurements are also recorded. Discharge measurements are carried out by the farmers in over 700 monitoring observation wells. This is accomplished by measuring the time taken to fill a known capacity of drum. Along with the discharge the farmers also measure the drawdown. Based on the measurement the farmers have a good understanding of the pumping capacity of the wells, well performance, water requirement for different crops and the ways and means to increase the water use efficiency.

To qualify to be a volunteer the farmers have to undergo training (4 modules) and only the successful candidates are eligible to become a PHM volunteer. The rigorous training is only to ensure that there is no dilution in technical observations. The volunteers are provided with measuring tools like electrical water level indicator, stop watch, measuring drums ets (which is shared by number of volunteers).

Volunteers maintain a log book of Hydrological Monitoring Records (HMR). The HMR data is also exhibited for public viewing on display boards maintained at strategic locations in the Habitation.

Seasonal groundwater quality measurements are carried out from public drinking water wells.

FARMER WATER SCHOOLS

APFAMGS adopts the FWS approach to prepare the farmers to take charge of managing their ground water. FWS is an adaptation from the Farmer Field School (FFS) and follows the non-formal and participative approach for information sharing. FWS strategy adopted by APFAMGS project promotes group learning, improves the skills and capacities of farmers and shares knowledge amongst the farmers. This approach has been implemented beginning from June 2006 to May 2007 as part of First Water School to diagnose the different problems related to groundwater depletion, and implement local solutions for arresting the groundwater decline, improving water use efficiency and enhancing the returns from the cropping system. The second FWS have been initiated in 2007-08 attended by 10,000 farmers.

Under the FWS umbrella all 10,000 farmers meet once every 15 days through 300 water schools to understand groundwater changes in the respective area for the entire hydrological season. Based on the understanding the farmers adopt suitable modification in their agricultural practices that can lead to significant reductions in groundwater use.

CROP WATER BUDGETING

The over arching theme or the guiding principle of the project is to demystify science, and equip farmers with the technical knowledge of how to collect, manage and use scientific information about water to make agriculture sustainable. The project has achieved this very successfully.

As part of Crop Water Budgeting (CWB) the farmers collectively make their crop plans, depending upon water

availability. Following the agriculture season, a survey is conducted on crop adoption which is also discussed in the GMC to analyse the impact of the CWB and crop adoption. The project does not want to limit the choices that farmers can make in terms of the crops that can be grown in a particular Hydrological Unit, rather the emphasis is on improving the water use efficiency (less water for more productivity). The project does not advocate changes in crops being grown traditionally or for commercial gain. The project respects the farmer's traditional knowledge and understands that the farmer has enough knowledge to be able to take relevant decisions.

Although the emphasis is on water efficient methods and examples of use of water saving devices namely drips, sprinklers and rain guns are seen as a follow-up to better awareness levels, examples of cultivation of water intensive crops can also be found. In some places GMC's and HUN's are able to act as pressure groups to advocate for change in cropping, use of sustainable agricultural practices and water saving technologies.

REDUCTION IN GROUNDWATER PUMPING

Availability of two year data from number of Hydrological units shows that groundwater pumping for agricultural use has been significantly reduced by a number of farmers in the project area. In 14 hydrological units groundwater pumping has been reduced as compared to earlier years while in 9 hydrological units there is moderation in pumping. In all the hydrological units a number of farmers have reduced pumping, yet it is not significant enough to have a drainage basin level impact.

ABSTAINING FROM PADDY

The most preferred crop in the seven districts forming part of the project area is the high water requirement crop paddy and in small amount sugar cane. Even while groundwater levels continue to fall steeply, paddy still continues to be the preferred crop by all groundwater users be it big, medium or small farmers. Knowledge on the groundwater crisis by the farmers in the project area prompted the GMC's and HUN's to develop crop plans that addressed the issue of water use. The crop plans developed after the water balance estimation is to devise strategies in reducing the groundwater pumping from the wells. One of the water saving method adopted by the farmers has been by abstaining from paddy cultivation. Except for 4 hydrological units al the others have reduced area under paddy cultivation ranging from a few acres to several hundred

acres. Thus a 50% reduction in area under paddy has been witnessed over the project area.

CROP DIVERSIFICATION

Crop diversification have been adopted by the farmers as part of water saving and reducing groundwater pumping. Crop diversification has looked at crops (traditional as well as new) which can be integrated within the existing cropping system. Pulses, oil seeds, fruits, vegetables, flowers have all become part of cropping system. A two fold increase in the crop varieties is now seen. Farmers have become market savy to offset reduced groundwater pumping. The risks associated with commercial crops like monoculture, reduced area under food crops, loss in soil fertility, are also being addressed simultaneously.

USE OF WATER SAVING DEVICES

The farmers have started adopting water saving devices in order to reduce water losses. Issues of conveyance through pipelines, reduction of Evapo-transpiration, increased retention of soil moisture have been successfully addressed. Water saving devices such as Sprinkler and Drip Irrigation have been introduced for crops like Groundnut, Sunflower, Bengal Gram, Chilies and horticultural crops. Conveyance pipelines have been implemented by most farmers. An assessment shows that 8.26% of groundwater pumping has been reduced over the project area only by adopting water savings techniques. Savings have been equivalent 10.25 MCM over the project area in two years, 2005-07. Techniques for improving the moisture retention have been adopted which includes Border strip, Ridge & furrow Check basin, Alternate furrow, Vermicompost, Mulching, Double ring method Paddy husk mulching etc.

FOOD SECURITY AND NUTRITION

Achievement of Food Security and improved nutrition is kept in the centre stage while making cropping plans. The project has been carrying out Food and nutrition status assessment in all the 650 habitations. The survey is carried out by the community themselves to assess the extent of area under of food crops, expenditure on food crops and number of government programmes focused on food and nutrition availed. Major findings showed clear shift from food crops to cash crops and decline in meal diversity. Close

to 45% of children availed of the Mid Day meal schemes of the government and improved their health and nutrition.

The survey results are discussed in the habitation meetings, to promote the appropriate interventions in improving food security and nutritional status and overcome micro-nutrient deficiencies. In order to ensure protection of wild fruits and vegetables that have high nutritional value, the project carried out a detailed inventory and compiled them in the book "Nourishing Traditions".

EMERGENCE OF LOCAL GROUNDWATER GOVERNANCE

Improved knowledge base of Farmers and conduct of Annual Crop Water Budgeting exercise provided clear understanding of the groundwater resource availability. Equipped with the groundwater resource data, the farmers from 650 habitations developed crop plan for the Rabi season (Oct-Jan -05-06, 06-07) for over 65,000 acres of land, all dependent on groundwater. Using the acquired knowledge the farmers ensured adherence to the crop plans that promoted only less water requiring crops, avoided any groundwater wastage, improved water use efficiency and adopted new water saving devices.

Adopting a new approach the stakeholders for first time brought into operation new groundwater governance that transgressed beyond individual holdings and habitations, yet was not coercive. The invisibility of the groundwater resource did not deter them from having full access to understanding the resource availability and dynamics. The ability of the stakeholders to articulate and share the information across the hydrological unit helped them to evolve common strategies that limiting the damage while at the same time safeguarding individual interest. New form of local governance on groundwater has thus emerged comprising of farmer stake holders who have a concern on the sustainability of groundwater and see a need to come together and take painful decisions on their own without waiting for the governments to do.

CREATION OF TRAINED MANPOWER

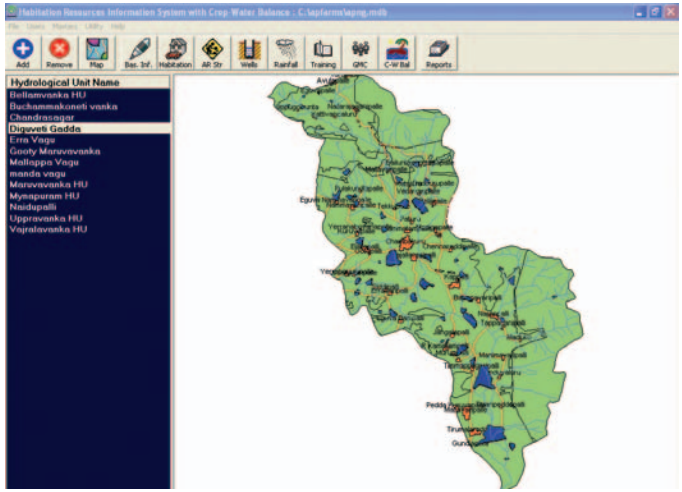
Farmer Water Schools have provided a platform for developing a cadre of village level trainers who are fully equipped to bring in the Demand Side Management approach for managing groundwater crisis. The Farmer Water School has looked beyond the traditional elite in taking knowledge to the common farmers who can apply them directly on farm and also share them with a larger audience. The project has successfully created the first batch of over 10,000 farmers who have already emerged as trainers to other farmers both under the project programme as well as for the government run Farmer Field School.

OPTIMIZATION OF FLOOD FLOWS THROUGH ARTIFICIAL GROUNDWATER RECHARGE (AGR)

Crop Water Balance (CWB) exercise carried out in the project shows that 59 of the 63 Hydrological Units show groundwater development far more than recharge resulting in deficit water balance. The CWB has also identified over

exploited aquifers. To improve the groundwater situation in favourable basins flood flows have been trapped in natural depressions like tanks/ponds. The flood waters have been directly routed to the over-exploited aquifers using injection wells. This approach has helped managed the floods, while increasing recharge to highly over-exploited aquifers. In number of areas abandoned open wells have also been used to trap the flood flows and transfer them to the aquifers.

DATA BASE (HRIS)

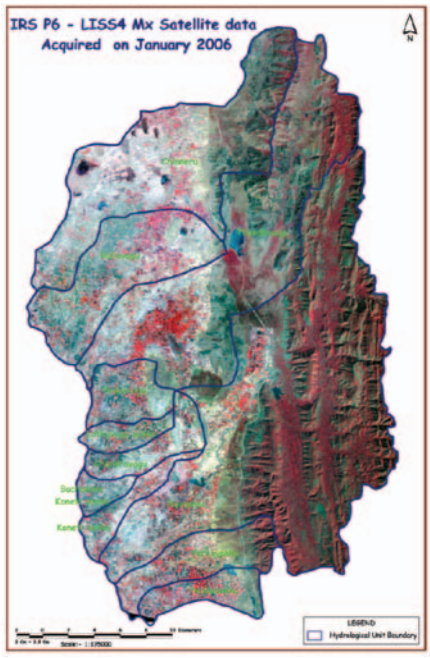


Habitation Resource Information System (HRIS) is a storehouse of information of all data generated in the project both at the habitation level and consolidated at the hydrological unit level. The data is organised at individual farmer level.

HRIS can capture all varieties of data including static information pertaining to habitation, land use, soil, geology as well as dynamic information related to meteorology, hydrology, agriculture, and cropping in an organized and efficient manner. To provide maximum value to the user, the software is GIS enabled; however, it can work without maps also in case they are not available. HRIS+ software has been successfully implemented in all the 9 field offices of the PNGOs, TST and Nodal office. The data entry is in different stages of completion. With the completion of the data entry (updated upto Dec 2005) the initial task envisaged under HRIS+ shall be completed. All the data stored in the data base will be bench mark data against which all future changes can be compared and evaluated.

GEOGRAPHIC INFORMATION SYSTEM (GIS)

Demystification of GIS applications have been taken up by the project. The aim is to customize GIS applications for use by rural communities. The focus is on the design and implementation of a farmer friendly GIS for accessing information about individual and shared resources without external facilitators. With new insight on their resources both in space and time it is expected that tough decision making with regard to natural resources and particularly in crop planning matching the water resource availability becomes possible. It is likely that communities may avoid resource-related conflicts as they build consensus on their availability. GIS is directly made available to the farmers through "Information Kiosk". The kiosk integrates GIS technology with Remote Sensing, Internet and basic computations (modelling). The Kiosk shall enable novice beginners to use GIS and



other applications. The Kiosk GIS shall have maps which are easier to navigate and will have GIS functionality, limited to the essentials. The project has created GIS datasets for the entire project area. The different thematic layers created includes, Hydrological Unit (HU Boundary), Tanks, Rivers, Drainage network, Road network, Canals, Settlements and Spot heights.

INFORMATION KIOSK

The Information Kiosk is a user friendly interface with a complicated set of data that will be translated to the farmer in a way he understands and accepts. The Information Kiosk shall make the data base come up with set of queries that is of concern to the farmer. The answer to the queries shall be built using analytical /graphical tools, GIS multi-thematic overlays, report etc. Issues of concern related to water use and its efficiency, cropping plan matching the resource potential, crop production, pumping efficiency, yields, markets, prices etc shall be computed and presented in a friendly graphical fashion. The user will be provided an opportunity to forecast the water use, crop production, and saving for various hypothetical situations. The answers to various queries can be presented temporarily for comparison with real life situations.

APFAMGS Website

APFAMGS project web site www.apfamgs.org is an internal communication medium while disseminating the project learning's. The Web site enables access and sharing of information between project partners thus reducing huge paper work as well reducing communication time. Web site with a dedicated internal communication module has reduced considerably need for periodical meetings as well enabled complete transparency in information exchange.

The website is a library of information on the APFAMGS project. All the important activities are recorded and the related documents, presentations, media information, events, current news, photo gallery, exposure visits, technical papers, publication, GMC, HRIS, details of project partners, training materials etc. which is updated in regular intervals to keep one and all in tune with the project activities. APFAMGS has this placed all its publication in the public domain and accepts feed backs

IMPACT OF PROJECT IMPLEMENTATION

The impact of 4 years of implementation of APFAMFS project at the field level is revealing. Behavioural change has led to empowerment and enhanced confidence level for taking knowledgeable decisions.

- Integrated scientific technology with social transformation and general change issues (non technology)
- Change in perception of groundwater as private property to that of a "common good (individual farmers take decisions for collective good)
- Farmers have internalized all learning's to apply in decision making
- Risks associated with crop failures have been fully eliminated.
- Stakeholders have brought into operation new groundwater governance that transgresses beyond individual holdings and habitations, without being coercive.
- The invisibility of the groundwater resource has not deterred farmers from having full access to understanding the water resource availability and dynamics.
- The ability of the stakeholders to articulate and share the information across the hydrological unit has helped evolve common strategies for limiting the damage while at the same time safeguarding individual interest.
- Increased profits from diversified cropping
- Farmers ownership of technical data and information
- Change in cropping pattern from water intensive to water efficient crops
- Reduced migration
- Opportunities for emerging leadership among women
- Government agencies, Funding agencies acknowledge the project impact and new proposals incorporate the project concept.

Based on the opportunities provided, the farmers have taken collective action to reduce groundwater use. Number of changes that have been witnessed include:

Benefits of adopting Crop Changes Farmer's Reflections

Narasimha Reddy, GMC member, from Kethagudi village of Prakasam District knows that the groundwater pumping in the Yadavagu Hydrological Unit is far more than that is being replenished by rainfall recharge. He also is clear that this is the time to act or else in a few years all borewells shall go dry and the future generation will curse them. So the GMC's in the HU have decided not to grow crops that require much water. The members also understand that maximum lowering of water levels take place in the month of month of April and May and so they have decided to take up crops that can be harvested before beginning of April. All the members have decided to stop operating borewells for 2 to 3 months between April to June every year.

P. Laxman Swamy from Mukundapuram of Allagadda Mandal. GMC member from Thundlavagu Hydrological Unit: says by measuring water levels, discharge from borewells and calculation of annual water balance we have gained good understanding on the water resource availability and crop water requirements. I have now calculated that I have to make available 12 million liters of water per acre to raise one acre of paddy while I need to pump only 3 million liters of water for raising one acre of green gram. This understanding along with knowledge on water balance in the HU has helped me to plan my cropping system. We also now understand that on Bengal gram and Green gram seeds there are a subsidy offered by government which never reached us. Now the Agriculture Officers also find easier to interact with us and inform of all the schemes of the government.

GVS G. SRINIVASULA REDDY, Secretary of HUN Committee of GVS APFAGMS Project. Before the project came, we did not have any idea about ground water levels. So we used to pump ground water indiscriminately. We used to cultivate more land than was possible and so we incurred heavy losses. Now we have observation bore wells to estimate the available volume of water. So we can plan our crops. There are changes in farming methods. There is awareness of chemical fertilizers. We used to spray any chemicals suggested by the shop-keeper. But now we know the names of the chemicals. We even prepare our own organic fertilizers solutions and pesticides.

The project is mainly for the farmers. It is about groundwater management. We have to save groundwater now; otherwise there will be no water in future. Crop water Budgeting is conducted in HUN Committee level. We first collect information regarding areas and crops under bore wells. All GMCs collect this information; then we calculate how much water is being used for which crops. Using discharge levels we estimate the available ground water whether it is in surplus or in deficit. Then we will decide as to how much land should be cultivated in the future. For example, the groundwater of our HUN area is in deficit, because sugar cane was grown in large areas. We discussed this matter in GMC and decided to change the crop.

We try to convince such farmers saying that if we don't save water now, we may not have water even for drinking. GMC committee is in charge of these stations. For example there is a rain gauge station in the neighboring village. The person in charge of the station is taking good care of it. At present the GMCs are quite strong. We are able to conduct GMC meetings even if the project staff is absent. But the HUN Committees should be strengthened more. We are preparing to conduct HUN meetings and Crop water Budgeting Workshops.

For example, there is sugar cane crop which is cultivated in large areas. It needs lot of water. We will have to reduce sugar cane and grow crops like tomato, mulberry so that we can make up the deficit in ground water. Yes we could desilt our irrigation tank and the tank bed soil was spread in our fields. We applied for loans at the Banks for purchasing drips and sprinklers but there was delay in file moment. When the District Collector attended gramasabha in our village, GMC brought the matters to his notice and we could get the drips and sprinklers within two days. An institute from Banglore called GKVK Krishividya Kendra, conducted training programme on tomato crop under participated technology development. GMC was responsible for this. Savings groups like velugu, dwakra don't talk about water. We talk about water but are not able to create any assets. So we also started saving money. Now our GMC is having Rs. 14,000/- We bought 5 amp sprayers which we rent out to farmers.

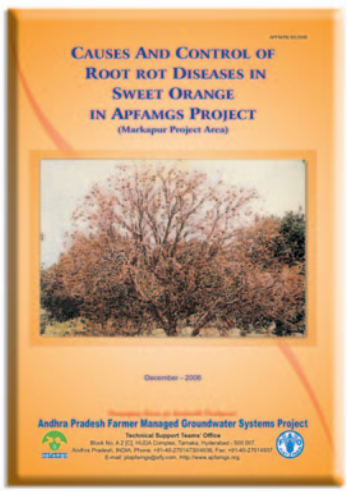
We are able to take up such activities through our GMC. We conduct Farmers Field School also. For example there is tomato crop, we studied pests that affect tomato crop, and we learnt water saving methods like sprinklers and drip irrigation. All cannot afford to use drip irrigation. It costs Rs. 20,000/- for one acre. Mulching method is cheaper. We now learn these farming methods in Farmer's Field School.

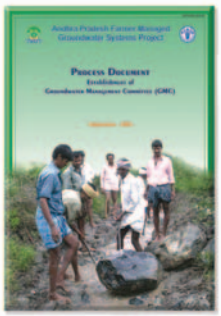
FUTURE WORK PLAN:

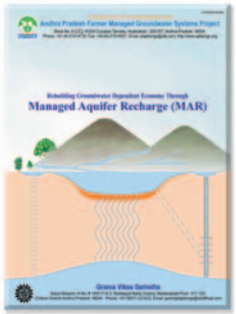
- Facilitate Hydrological Unit Networks (HUN) to emerge as pressure groups to influence government and community based organizations on Demand Side groundwater Management
- Enable Hydrological Unit Networks (HUN) to establish marketing co-operatives for bargaining fair prices, to market organic produce and to source all inputs at reasonable cost.
- Work towards reducing the water deficits through improved Water Use Efficiency.
- Enable improved recharge and optimize flood flows
- Integrate rainfed agriculture areas along with Irrigated agriculture
- Work towards improved Agricultural biodiversity, dietary diversity and ensure food security
- Sensitize farmers on the risks of HIV/AIDS in farming sector
- Establish new models of groundwater governance leading to establishment of water republics.
- Disseminate the project learning's to the neighbouring areas for ensuring district level coverage.
- Establish working relationship with government departments (Gram Panchayat, District Water Management Agency, State Groundwater Department) for disseminating project learnings.
- Establish **Jala Jana Vedika** (JJV), a watchdog group for ensuring investments in water sector are judicious, are farmer friendly (rather than favouring contractors), ensure efficient use of available resources and does not promote over-exploitation.

Project Publications

Project Publications







Project Staffing

District	Anantapur
PNGO	SYA
Field Office	Gooty
Secretary	Mr. S.C. Hassan
Hydrological Facilitator	D.Kamalakar
Gender Facilitator	M. Ramadevi
Non Formal Education Coordinator	D. Karunakar
Village Coordinator1	M. Subhan Basha
Village Coordinator2	L. Chandranna
Village Coordinator3	M. Mahanandi
Village Coordinator4	H. Hayathun
Village Coordinator5	N. Venkata Reddy
Village Coordinator6	M. Srinivas Rao
Document Assistant	A. Anumantharaidu
Office Assistant	M. Sreenivasulu

District	Chittoor
PNGO	GVS
Field Office	Madanapalli
Secretary	Mr. CH. Rambabu
Agriculture Facilitator	G.R. Amarendrudu
Institutional Development Facilitator	G. Balaji
Non Formal Education Coordinator	G.S. Madhu Kumar
Village Coordinator1	C. Nagi Reddy
Village Coordinator2	L. Chakrapani
Village Coordinator3	T. Reddamma
Village Coordinator4	K.Vasanthamma
Village Coordinator5	M. Mechappa
Village Coordinator6	J. Sasikala
Document Assistant	L. Yella Reddy
Office Assistant	K. Subbaraju

District	Kadapa
PNGO	PARTNER
Field Office	Porumamilla
Secretary	Mr. P. Nazeer Khan
Agriculture Facilitator	I.Subramanyam
Institutional Development Facilitator	G.S. Noorullah
Non Formal Education Coordinator	T. Venu Gopal
Village Coordinator1	A. Lakshmi Suchutra
Village Coordinator2	S.K. Abdul Razzak
Village Coordinator3	G. Divya
Village Coordinator4	B.Bhargavi
Village Coordinator5	M. Eswaraiah
Village Coordinator6	D. Murthu Javali
Document Assistant	G. Kiran Kumar
Office Assistant	B. Pratap Kumar

District	Kurnool
PNGO	BIRDS
Field Office	Allagadda
Secretary	Mr. Jossaiah
Hydrological Facilitator	G. Nagaraju
Non Formal Education Coordinator	VGN Jayapradha
Village Coordinator1	P. Raju
Village Coordinator2	K. Esther Rani
Village Coordinator3	O. Sampath Kumar
Village Coordinator4	Y.D.V Prabhakar
Village Coordinator5	K. Sreedevi
Document Assistant	M. Annamma
Office Assistant	M. Chinna Gurappa

District	Mahabubnagar
PNGO	CARE
Field Office	Achampet
Secretary	Dr. T.N. Reddy
Hydrological Facilitator	L.S. Goud
Gender Facilitator	M. Sreedevi
Non Formal Education Coordinator	C.H. Sriramulu Naidu
Village Coordinator1	V. Varda Reddy
Village Coordinator2	P. Sangyamaiah
Village Coordinator3	M. Aruna Kumari
Village Coordinator4	Y. Ushanna
Village Coordinator5	G. Ramanamma
Village Coordinator6	M. Venkateshwara Reddy
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Office Assistant	A. Sujatha

District	Nalgonda
PNGO	SAID
Field Office	Miryalaguda
Secretary	Mr. A. Sujan
Hydrological Facilitator	K. Srinivas Reddy
Non Formal Education Coordinator	G. Suvarna Latha
Village Coordinator1	A. Srinivas
Village Coordinator2	B. Syam Prasad
Village Coordinator3	D. Swapna
Village Coordinator4	P. Karunakar
Village Coordinator5	Ch. Lalitha kumari
Village Coordinator6	K. Murali
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Office Assistant	K. Prashanth

District	Prakasam
PNGO	**CARVE**
Field Office	**Markapur**
Secretary	Mr. G. Ravindra Kumar
Hydrological Facilitator	B. Umamaheshwara Rao
Institutional Development Facilitator	G. Dhanamjaya Rao
Non Formal Education Coordinator	P. Daya Raj
Village Coordinator1	K. Srinivasa Rao
Village Coordinator2	S. Sailaja
Village Coordinator3	G. Elegabeth Rani
Village Coordinator4	S. Rajashekar
Village Coordinator5	G. Rangaiah
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District	Prakasam
PNGO	**SAFE**
Field Office	**Cumbhum**
Secretary	Mr. M. Madhukar Reddy
Institutional Development Facilitator	A.P. Swamy
Non Formal Education Coordinator	B. Sesikala
Village Coordinator1	R. Rama Devi
Village Coordinator2	T. Oblesu
Village Coordinator3	D. Thirual
Village Coordinator4	D. Ratnakar
Village Coordinator5	D. Abdulla
Village Coordinator6	G. Naga Raju
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District	Prakasam
PNGO	**DIPA**
Field Office	**Giddaluru**
Secretary	Mr. B. Yesudas
Hydrological Facilitator	S. Hussain
Gender Facilitator	K. Bhagyamma
Institutional Development Facilitator	P. Santha Kumari
Village Coordinator1	L. Mary Suvarna
Village Coordinator2	N. Laxmaiah
Village Coordinator3	K. Bhaskar
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Mr. V.Paul Raja Rao	Executive Director
Mr. P. Prasad	Manager Accounts
Mr. R. Innaiah Babu	Cashier cum Accountant
Mr. B.L. Narasimha Reddy	Cashier cum Accountant
Mr. G. Bhaskar Reddy	Systems Manager
Mr. K. Raghavendra Rao	Documentation Assistant
Mr. D. Vijay Mohan	Documentation Assistant
Mr. M. Yusuf Khan	Administration Assistant
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Mr. D.C.A. Raju	Driver
Mr. S. Habibulla	Driver
Mr. P. Mark	Office Assistant
Mr. S. Vasu Devudu	Office Assistant

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