

Rural Information Kiosk -Taking IT to farmers for improving crop water efficiency in areas subjected to groundwater distress - an FAO-India initiative

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Abstract

In this, the digital information age, people in developed countries and a substantial section of the population in the developing countries access the internet and World Wide Web to seek information on various subjects of interest/concern through the application of information and communication technologies (ICT). In many countries of the developing world and also the not so developed, there is still a substantial number of people who have no access to these technologies as a result of which they are increasingly disadvantaged in their access to information. A number of factors create this divide, even in areas where technology has penetrated, however what is obvious is the limitation in the content and the way information is made available to the users. Most information providers focus on the hardware and software tools and rehash the information drawn from different sources for creating beautiful documents / web sites that are of little value to the rural problems of farmers/ farmer institutions/governments working in tough environments subject to severe constraints in the availability and distribution of natural resources, especially water.

Food and Agriculture Organization (FAO)India through one of its project in India, Andhra Pradesh Farmer Managed Groundwater System (APFAMGS) has literally made available, with a click, information on sustainable groundwater management for improving crop water efficiency. The Information Kiosk provide information to farmers even to illiterates by adopting the concept of animations, graphics and audiovisual means. The Information Kiosk serves while serving as an information source has limited options to project the impact of individual farm level water use practices at the Hydrological Unit Level. Kiosk makes an attempt to bridge the digital divide between the scientific community and the principle stake holders i.e. farmers community.

The project concept of participative data collection and analysis by rural communities has developed a sense of ownership among the farmers and IT offers a medium to appreciate the data with ease and familiarity. The Rural Information Kiosk, as developed by APFAMGS integrates Information Technology with GIS, World Wide Web and communication tools for providing solutions to the farmers on the varied What-If scenarios. The data base and Kiosk with their simple friendly design has made farmers handle the technology with ease. Incorporation of Non Formal Education tools methodology has provided easy entry for first generation IT learners into an otherwise exclusive club.

1. Widening divide in accessing Information Technology

Information Technology in rural India is perceived as a technical product for use by the young, primarily male (although the workforce in the IT Sector has substantial women representation) workforce largely for providing entertainment along with limited information. The use of IT for paying regular service providers' bills is an area that is increasingly becoming popular. For commercial reasons, the substantiate application of IT has been focused on areas that are easy to implement and

have limited risks. IT as an enabler of new sources of information of value and a Decision Support Tool is more a subject matter of unending research than of any real practical use.

People in many disadvantaged groups are often precluded from making use of IT because of the perceived low levels of knowledge and barriers in understanding because of lack of formal literacy skills. In such areas, the focus is in communicating with the various groups through the staging of dramas, skits and through the strong community networks. Leveraging the ability of the computer to demonstrate effectively and to have it emerge as a better communication medium can only make it popular and acceptable. IT promoters have not made serious efforts in competing with the formal medium of communication in rural areas and

continued to work in their self-defined comfort zone of working with the young and mobile group of rural population who are keen to migrate to the urban areas, or even, when the opportunity arises, to distant shores. IT has been influencing the thinking of the youth as they are more exposed to technology and are willing to invest and to use it largely for non agricultural tasks, whereas older people, both men and women avoid the use of Information technology as it is considered a non productive tool. The legacy of caste and class issues in India has also contributed a lot to the Information Technology Divide, whereby upper castes have better access to education, are more exposed to English and have access to communications (telephone).

2. FAO initiatives in making IT relevant for improving crop water use efficiency

FAO-APFAMGS has with limited but specific objectives taken the fruits of IT growth to rural India as a tool for helping in creation of a natural resource information knowledgebase and thereby help in managing the threatened natural resource - Groundwater. With this intent the project took several steps in order to bridge this divide.

To begin with, the team engaged the community in highlighting the problems related to unsustainable development of natural resources like groundwater. They initiated steps for the community to collect technical data on their own related to

- Rainfall
- Surface Runoff
- Groundwater Levels
- Groundwater Pumping
- Groundwater Quality
- Individual Farmer Level Crop Plans
- Computation of Water Balance for Hydrological Unit

A series of steps were adopted for systematic organization of the newly conceptualized Hydrological Resource Information System (HRIS) data base, to be managed by the community and pertinent to sustainable management of groundwater resources in drought prone areas. This envisaged:

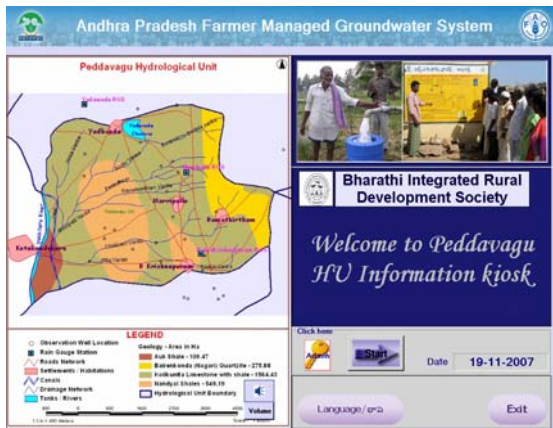
- systematic recording of data collected by individual farmers in separate log books (referred to as Hydrological Monitoring Records)
- Primary Validation of all data within a habitation by entering on a common display board at the village centre.

- Secondary Validation of data from several habitations by sharing at the Hydrological Unit level
- Consolidation of data within an Hydrological Unit while carrying out water balance estimation (referred to as Crop Water Budgeting)
- Data computerization at the NGO level for individual Hydrological Unit.

The data collection is a community driven initiative that successfully adopts a defined sequence of steps to strengthen local institutions at the habitation and hydrologic unit level to bring on center stage discussions on emerging water crisis especially on groundwater. The Science of Hydrology is demystified for encouraging farmers to participate in technical data collection thereby leading to proper understanding of local water resource availability. The database thus created emerges as an important source of information that is instrumental in helping the farmers to adopt numerous techniques at the farm level to improve crop water efficiency, to implement water saving techniques and to reduce groundwater contamination.

3. Habitation Resources Information System (HRIS)

The Habitation Resources Information System (HRIS) is a customized store house of data collected by farmers that is stored in a computerized format. The data entry is carried out in rural surroundings in the office of the NGO that is working with the community in data collection and data organization. The HRIS software is developed by the FAO-APFAMGS project using the services of consultants having adequate experience of working with data emerging from rural areas. The software is strong on technical specification while being amenable for application in tough rural situations by non computer literate users. HRIS runs on the standard Windows Platform, and is developed utilizing the MS-Access database on the Visual Basic platform. The design is modular featuring a number of independent modules that are seamlessly integrated. The software offers a number of data validation tools, and makes available both pre-defined reports as well as user defined reports and graphs



HRIS+ brings together on a single standard, expandable platform

- Demographic Data
- Socio Economic Data
- Hydrological related data
- Habitation related data
- Crop Related Data
- Spatial
- Time based
- Historical and current
- Observed and derived

The system computes the water balance based on the inputs provided and brings forth the results of the computation in easy and understandable graphical formats.

HRIS provides a GIS interface and comes with advanced graphical capability. It provides a full visual perspective to cropping systems, groundwater level and water quality data.

Today, it is a one stop data warehouse incorporating validated data collected by 4000 plus farmers and contains information on more than 25000 groundwater dependent farmers collated over four years starting June 2004. The data includes information from 650 habitations on demographic details, natural resource endowments, groundwater dynamics, individual farmer level cropping, water use and economic returns.

4. Demystifying GIS

Marginalization of rural communities in drawing the benefits of GIS technology has been a serious concern of people working in rural areas of India. Application of GIS for optimization of available water, agriculture, and forests and other natural resources and rural infrastructure have been limited to specialists trained in GIS skills. The access to

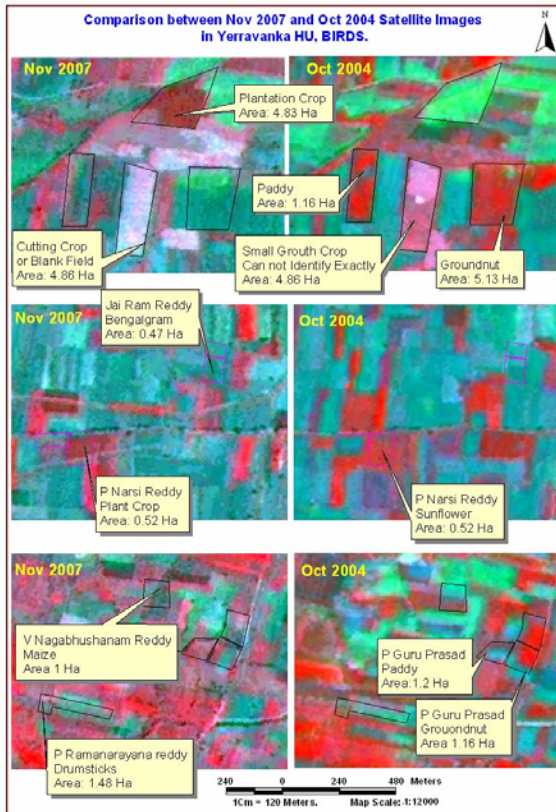
GIS tools and information has been largely for the researcher, the policy analyst, the planner and the administrator within government institutions. In the absence of on-the-ground authentication by the local community, the reliability of many of the inferences is debatable. The exclusive use of GIS by select groups and institutions and marginalization of rural users with reference to GIS utilization is a cause for concern. Use of this technology of high potential directly by rural community has been attempted by the APFAMGS project. Demystification of GIS applications has been taken up in order to customize and implement 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 resource management by individual farmers for collective good is a distinct possibility.

The utilization of GIS directly by the farmers is facilitated through "Information Kiosk". The kiosk integrates GIS technology with Remote Sensing, Internet and basic data computations (modeling). GIS maps and images are displayed within the Information Kiosk to enable the farmers to visualize them as both individual layers as well as integrated multi thematic maps. The maps provide static information such as locations, geology and geomorphology and incorporate an interface for users to zoom in and out of select layers of information for viewing as well as for comparing and evaluating different scenarios.

5. Validating Cropping changes adopted by farmers for reducing groundwater distress

The APFAMGS project has been working with over 25000 farmers, who over the last four or more years have adopted numerous changes in the cropping system for containing the severe decline in groundwater levels witnessed over the past few decades. Satellite image data pertaining to two different periods (2004 and 2007) have been analyzed to pick up individual farmer level cropping systems adopting water saving practices and thereby assess the changes over the larger Hydrological Unit. The cropping change data has been shared with the farmers for them to actually see and appreciate the impact of improved crop water use

efficiency on a regional scale on the improved groundwater availability and reduction in distress



6. Disseminating community initiatives on Demand Side Groundwater Management using dedicated Web Site (www.apfamgs.org)

FAO- APFAMGS have created a dedicated web site (www.apfamgs.org) to serve as an interface between the rural communities and the outside world. This website, while updating the viewers on the activities of the farmers in the 650 habitations, provides an opportunity to educate the audience on the capabilities of the farmers with respect to technical data collection, data analysis, interpretation and follow-up action by individual farmers as a response to collectively arrest the severe decline in groundwater levels. The website provides the viewers with all the documents that house the farmer level data related to crop adoption, water savings and economic returns. The website provides, for the first time, the audience with an opportunity to get information on the wide variety of data collection by farmers, frequency and also notifies the cost for purchase of data. Thus the web site becomes an addition economic enabler as it is also a medium to sell farmer collected data to researchers, practitioners and planners.



7. Information Kiosk

The Information Kiosk, as conceived by the project is a facility that rural communities avail of to examine the data they collected in different graphical forms and tables - without the support of an outsider. The Kiosk plays a catalytic and enabling role in ensuring sharing of data using the same hardware, software and analytical tool a researcher/planner uses in an urban settings, albeit with a different interface. Here, IT provides an opportunity to the rural communities to use tools that support them in decision making related to groundwater use and cropping system changes.

The Kiosk software is totally touch screen driven (no physical keyboard) with large icons displaying limited but focused data supported by graphics and animations. Local language is used (though the system has multi-lingual capability) and has very simple and clear navigational paths. The hardware is state of the art, but insulated from the users. It is compatible with other applications, and stores the entire project wide information, performs advanced computations, yet displays only the essentials information. The current implementation of the Kiosk is a multifunctional computer system installed at rural locations using the data stores transferred after suitable modification from the computerized HRIS database, thus enabling the farmers to see the data as well as its interpretation in graphical form so that they can appreciate the issues better.



The kiosk supports background music and an optional Audio input. Users have the options to screen moves through the system. It provides a water balance Calculator (graphics and slider support enabled) with a What-If prediction tool for individual farmers to assess the impact of their cropping system on the overall water availability in the Hydrologic system.

8. Future role for IT in Decision Making

The FAO project has successfully optimized traditional communication tools (Non Formal Education) in combination with IT in the design of Farmers Information kiosk. IT tools including computerized data base, GIS, Internet, communication tools have been integrated with traditional art, models in combination with animations to promote the concept of Information Kiosk. The Kiosk has been optimized for empowering the community with knowledge on issues related to water availability, cropping systems matching with the water availability, water saving techniques, organic agriculture practices etc.

The next step is to make available the fruits of advanced modeling capabilities within the reach of farmers for developing their seasonal crop plans as well as plan for the short/long term agriculture. The model, probably for the first time, builds a partnership between farmers and researchers. Researchers can work on the data provided by the farmers for understanding the physical boundaries of the aquifer, recharge, pumping, interaction with surface water, crop water requirement and other phenomenon to model the behavior of the aquifer over time.

The model will continue to receive inputs from the data collected by farmers related to meteorology, lithology, hydraulics and Hydrology. The

researchers together with the community would together finalise the conceptual model. A good calibration and verification of the model is critical for ensuring reasonable predictions. The different queries for the prediction need to be developed in consultation with the future requirement of the community. The aquifer response to the different development patterns shall help in guiding the farmers in developing their short term and long term groundwater development strategies. The impact of global phenomena like climate change will also be factored into the model.

Information Kiosk will continue to be the output device with which the farmer communicate be with the Model. An inter-phase need to be developed to translate the farmer enquiries into queries that the model has been programmed to run. The translator will bring to the user the response of the model in the way they best understand.

Till the day IT starts serving the rural agriculture sector in India it will continue to be threatened by various external elements that are completely at odds with the development process. FAO-APFAMGS have embarked on this journey of bringing IT of value to small farmers, which in the long run is bound to assure better opportunities for the IT sector at large in the rural markets.

For additional details log on www.apfamgs.org,

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