

8. Capacity Building for improved water management in Andhra Pradesh: the design and implementation of the APWAM project

by

T.V. Satyanarayana, Principal Scientist (Soil & Water Eng), Acharya N.G. Ranga Agricultural University, Bapatla, Andhra Pradesh, India

C. Terwisscha van Scheltinga, Researcher Water Management and Capacity Building, Alterra-ILRI, Wageningen, The Netherlands

J. Boonstra, CTA, Andhra Pradesh Water Management Project, Alterra-ILRI, Wageningen, The Netherlands

and

B. Mukunda Rao, Scientist, Andhra Pradesh Water Management Project, Acharya N.G. Ranga Agricultural University, Bapatla, Andhra Pradesh, India

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Abstract

Due to the limited availability of water since 2000, water management has become an important issue in recent years in the State of Andhra Pradesh, India. The Acharya N.G. Ranga Agricultural University (ANGRAU) has initiated a project aimed at improvement of water management. The project works within the framework of the university structure, at 5 network research centres with 5 multi-disciplinary teams at each centre, focussing on water use efficiency in agriculture, equity in water distribution and preservation of the agricultural production potential (combating waterlogging and salinity).

Though water management is the main focus of the project, capacity building is an important element. The project is designed in a participatory manner, so that both at the individual, as well as the organizational level, activities for capacity building are undertaken. At the individual level, farmers, technical staff of line departments and university staff (researchers and field staff) are involved in training, study tours, workshops and seminars to enhance the awareness, knowledge and skills. At the organizational level, in a step-wise approach, the participatory research activities are involving the Water User Associations, the Departments of Agriculture, Irrigation and Groundwater, the University, NGOs, FAO and Alterra-ILRI. The project is designed within the framework of policy and legislation of the State of Andhra Pradesh on water management, which is creating the enabling environment.

In the paper, the integrated approach followed by the project has been described, and experiences and challenges are elaborated. Main conclusion is that the changes in water management practices are only possible with the active support of all stakeholders involved and that this requires mind set changing and capacity building at all levels.

Introduction

Worldwide, water scarcity forces water managers and users to balance the need for water with the available supplies. The need for water can no longer be met by just developing more water resources. Within agriculture, as the largest user of fresh water resources, efficiency improvements need to be made wherever possible. Using the framework of Integrated Water Resources Management (IWRM), balanced decisions on water allocation to different users as well as to different sectors need to be taken.

This changed focus in water management brings with it a need for capacity building. Capacity building is needed both at the individual and institutional level. Rather technical educated professionals need to move towards IWRM, to be able to design and implement comprehensive solutions in an increasingly complex situation of water management. Policies and legislation are needed as an enabling environment.

A framework of how capacity building can be described was presented by Kay and Terwisscha van Scheltinga (2003) at the 9th International Drainage Workshop in Utrecht. This framework is based on the experiences in capacity building in mainly technical oriented projects in the water sector. During workshops in Montpellier (2003) and Moscow (2004) organized by ICID, FAO and IPTRID, the concept of capacity building and needs assessment for capacity building in agricultural water management were further discussed (FAO/ICID, 2004 and ICID/IPTRID, 2005). In short it can be said that capacity building takes place at three levels, individual, institutional and enabling environment level. The methods used to build capacity are essential to its success.

Capacity building is as much a process as an end product. This is the essential connection between the more 'concrete' aspects of capacity building such as individual training, establishing irrigation organisations and changing the legal system etc and the less tangible aspects that suggest it can only be done in response to internal initiatives with local ownership and leadership over a flexible time frame. It is the reason why many people now use the term capacity development rather than capacity building. It transfers the emphasis from the end result to the process of achieving it (Kay and Terwisscha van Scheltinga, 2003).¹

While the discussions on the one hand contribute to more clarity about the concept of capacity building, on the other hand they raised new questions. One of these is how capacity building can be addressed in the design and implementation of water management projects. The case study presented in this paper, documents the experiences of a water management project presently under implementation, where capacity building is an important and integral element of the project: the APWAM project in Andhra Pradesh.

In order to assess the design and implementation of the APWAM project, the developments in irrigated agriculture in Andhra Pradesh are described in Chapter 2, followed by a presentation of the project and its activities in Chapter 3. The project's approach to capacity building is highlighted in Chapter 4, while in Chapter 5 conclusions are drawn.

¹ In this paper the distinction between capacity development and capacity building is not made, as it is not made as such in the project. The APWAM project staff feels comfortable with the term 'capacity building' and therefore that term is used in this paper.

Irrigated agriculture in Andhra Pradesh

Introduction to irrigated agriculture in Andhra Pradesh

In Andhra Pradesh (AP), the introduction of canal irrigation has boosted agricultural productivity and resulted in considerable direct and indirect benefits to the farmers and the society. Sixty percent of AP's agricultural production and over 70 percent of AP's population relies directly or indirectly on agriculture for their livelihoods (Oblitas and Peter, 1999).

However, irrigated agriculture is facing problems in terms of water distribution and management. Within the system, tail end farmers are getting water late or not at all. Land uncovered with crops may lead to salinization of the soils. At the state level, there is increasing uncertainty of timing and availability of irrigation supplies due to irrigation developments by upstream states, i.e. Karnataka and Maharashtra. Also it has been observed that in rainfed areas the groundwater levels are declining, while these are raising in canal irrigation commands, leading to waterlogging especially at the tail-end (APWAM, 2004).

As such, benefits of irrigated agriculture are not uniformly spread due to water distribution. This is compounded by the fact that most small farmers (less than 0.5 ha) have only one plot each, and that the plots in tail-end reaches mostly belong to small farmers (van Koppen, 2002).

Involved parties in irrigated agriculture like the Government of Andhra Pradesh through its Irrigation and Command Area Development Department (I&CADD), as well as its Agricultural Department (AD) and the Acharya N.G. Ranga Agricultural University (ANGRAU) developed approaches for effective change. I&CADD and AD are involved through the reform programme in implementation and the formation of WUAs (see 2.2), and ANGRAU through its research and networking activities (see 2.3).

Reform in irrigated agriculture in Andhra Pradesh

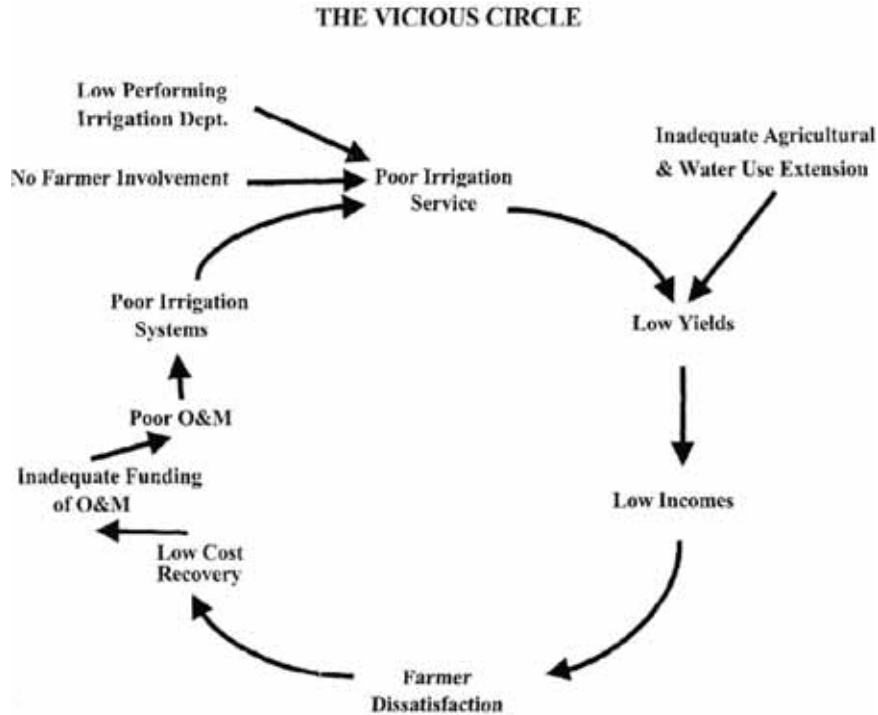
Oblitas and Peter (1999) formulated the problems and challenges experienced in irrigated agriculture as a persistent vicious circle (Figure 1) in which poor irrigation services result in low yields and low incomes. This in turn contributes to low cost recovery, inadequate funding of O&M and consequent poor O&M, which then results consequently in poor irrigation systems and related poor irrigation service. With the concept of 'Janmabhoomi' (land of re-birth) new ways for communities and the Government to work together to improve their economic and social wellbeing were introduced in Andhra Pradesh mid 1990s. This reform programme with central themes such as people's participation, grassroots orientation, cultural changes in the way Government works and focus on self-help and self-reliance of people, lead to the formulation of fundamental changes in the irrigation sector.

The reform programme can break the earlier mentioned 'Vicious Circle' and transform it into a 'Virtuous Circle' (Figure 2). It may be noted that in this figure, the relationship between the WUAs and the Government is through the Irrigation and Command Area Development Department (I&CADD), while the Agriculture Department (AD) is mainly involved in agricultural and water use extension.

The Government's shift to a role of facilitation instead of implementation is supported by

- Training
- Organizational change
- The Andhra Pradesh Farmers Management of Irrigation Systems (APFMIS) Act and Rules, which provide the legal basis for the take-over of management and maintenance of irrigation systems by WUAs, and the progressive re-orientation of government-farmer roles to a partnership (Oblitas and Peter, 1999).

Figure 1. The Vicious Circle



Source: Oblitas and Peter (1999, p 9)

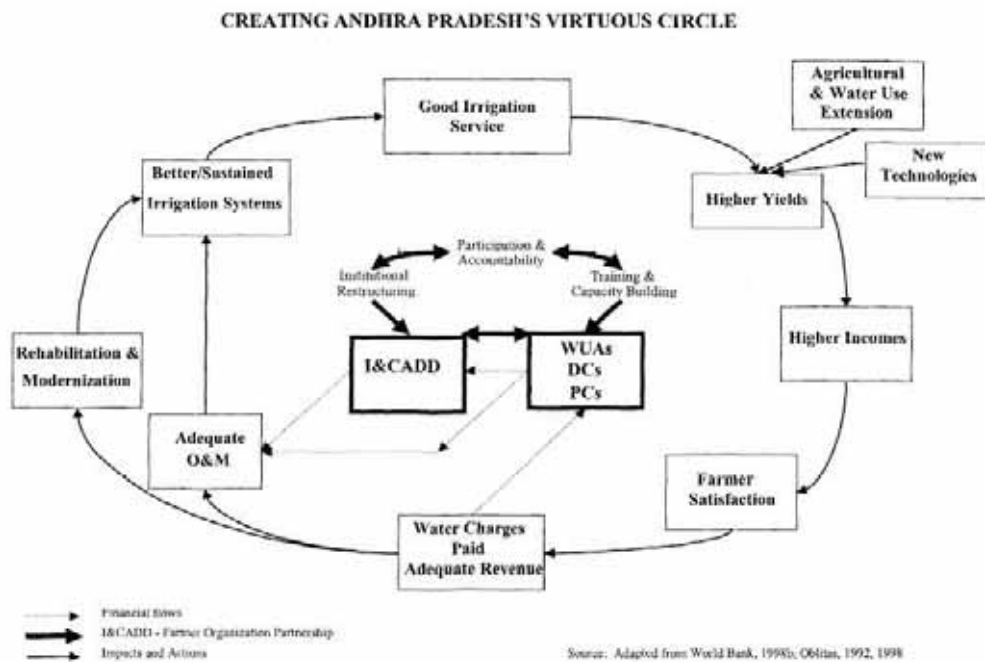
Altogether, the reform was introduced with a number of simultaneous or rapidly sequenced actions, also referred to as a 'big bang approach'. Activities included, for instance, the threefold increase in water charges, passing the APFMIS Act and Rules, WUA and then DC elections, the maintenance and rehabilitation programme, and the Irrigated Agriculture Intensification Programme (IAIP). Over 10 000 water user associations (WUAs) have been created covering the entire surface irrigated area of 4.8 million hectares (ha). The reform programme has been funded by the Government of Andhra Pradesh (GoAP) with support from the World Bank.

This altogether forms an important step towards IWRM in AP. Besides reporting the progress, Oblitas and Peter (1999) also stress the consolidation efforts required for the reform programme in general and support of the WUAs in particular. In their discussion of the likely way forward, they highlight the need for:

- creating financial interlinkages;
- strengthening the partnership between the Government and the farmers;
- improving water resources management;
- technologies for further agricultural growth; and
- choosing change.

Besides the Irrigation and Command Area Department and the Agriculture Department, also the Universities are in the process of changing their approach towards working with farmers. The ANGRAU has the strongest extension wing compared to other state agricultural universities in India.

Figure 2. Creating Andhra Pradesh's virtuous circle

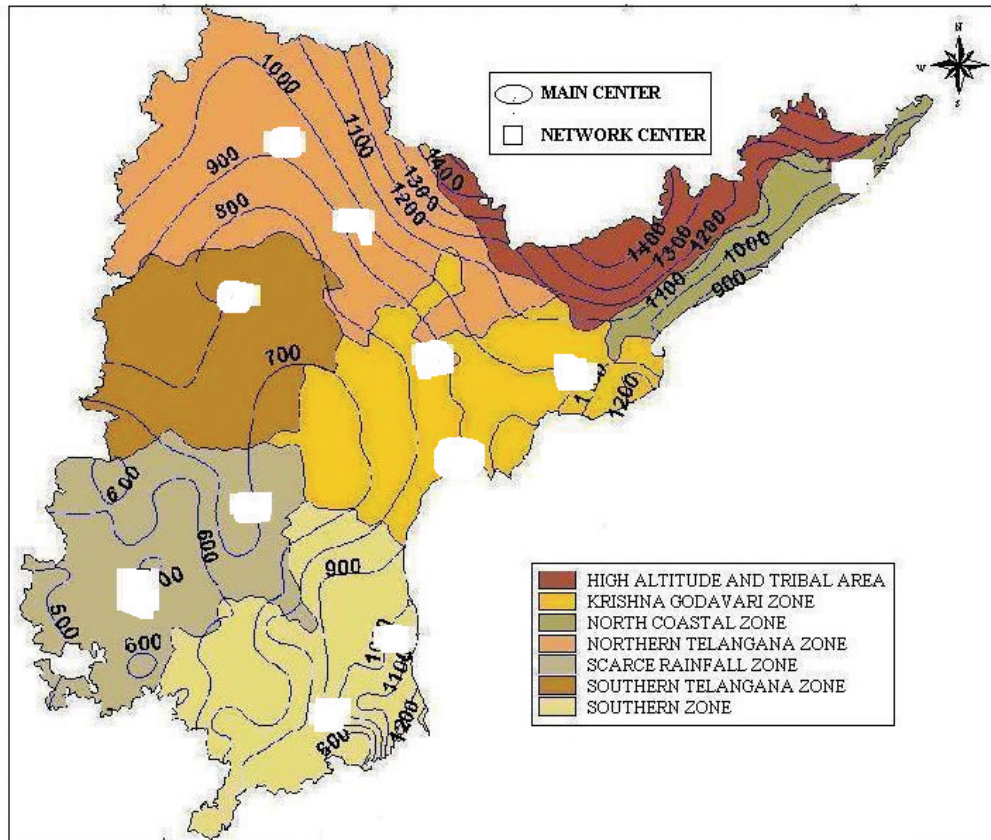


Source: Oblitas and Peter (1999, p 55)

Research in irrigated agriculture in Andhra Pradesh

Within Andhra Pradesh, all agricultural research is undertaken through the Acharya N.G. Ranga Agricultural University (ANGRAU). The University has an Academic Council which guides the academic administration of the University and is oriented towards education of students, while the Research and Extension Advisory Council guides the research and extension activities (<http://www.angrau.net/>). Research takes place at 67 research field stations, in all 7 agro-climatic zones of Andhra Pradesh (see map 1), under the overall guidance of the Director of Research.

Map 1. Agro-climatic Zones with annual Rainfall (mm) Isohyets of andhra Pradesh



While in the past agricultural research would most often take place at the fields of the research stations, the scientists of Acharya N.G. Ranga Agricultural University (ANGRAU) have positive experience with operational research as of 1996, moving out to farmers’ fields and working together with farmers and implementing agencies on improvements in water management on problematic fields (final doc IDNP, 2003 or 2004). The scientists observed in the field the effect for farmers of the water scarcity in recent years. At district level, the University has been operating the District Agricultural Advisory and Transfer of Technology Centers (DAATTC) consisting of multi-disciplinary teams of scientists. These centers work in close coordination with 1200 farmers on an average in a district and all officials of the Agriculture Department. Also at state level, they were involved in the discussions on changes in water management and the government reform process.

In 2001 ANGRAU brought together all stakeholders to assess the role research and educational institutes play in interacting with policy makers, government departments and water users to ensure the sustainable use of water by the agricultural sector. A three-day workshop was held in the State of Andhra Pradesh, under the central theme ‘Capacity Building for Agricultural Water Demand Management’ (Souvenir doc, 2001) (Vehmeyer and Wolters, 2004).

Over the years, the experiences in working together with farmers and implementing agencies confirmed for researchers the necessity to work in close relation with the practice. However, the reform process in the State of Andhra Pradesh has not been completed yet. Water Users Associations do not yet have the required capabilities. Problems like water efficiency, unequal water distribution as well as loss of land and production due to waterlogging and salinity problems remain well visible. In order to provide knowledge and experience in this regard and address these problems actively, a network project of operational research was formulated: the Andhra Pradesh Water Management Project (APWAM). The APWAM project got funding through FAO from the Netherlands and started early 2004.

The design and implementation of the APWAM project

The design and implementation of the APWAM project are best explained by stating the objectives, organizational structure and the activities of the project.

Objectives of the APWAM project

The overall objectives of the project are:

- 1) Enhancing implementation of integrated water resources management (IWRM) in Andhra Pradesh.
- 2) Improvement of the water use efficiency in agriculture within the framework of IWRM.
- 3) Bringing equity in water distribution in the command areas.
- 4) Preservation of the agricultural production capacity of agricultural lands in irrigated command areas. Achieve a higher and more sustainable agricultural production capacity of the land by combating waterlogging and salinity. (APWAM, 2004; Alterra-ILRI, 2005).

The specific project objectives are to:

1. Enhance participatory research and implementation skills of ANGRAU staff of the five Research Centres in the field of Integrated Water Resources Management (IWRM).
2. Develop IWRM enhancing techniques and have them adopted by farmers in the pilot areas implemented by the five Research Centres in Andhra Pradesh.
3. Establish a monitoring system for long-term impact of IWRM enhancing measures at ANGRAU.

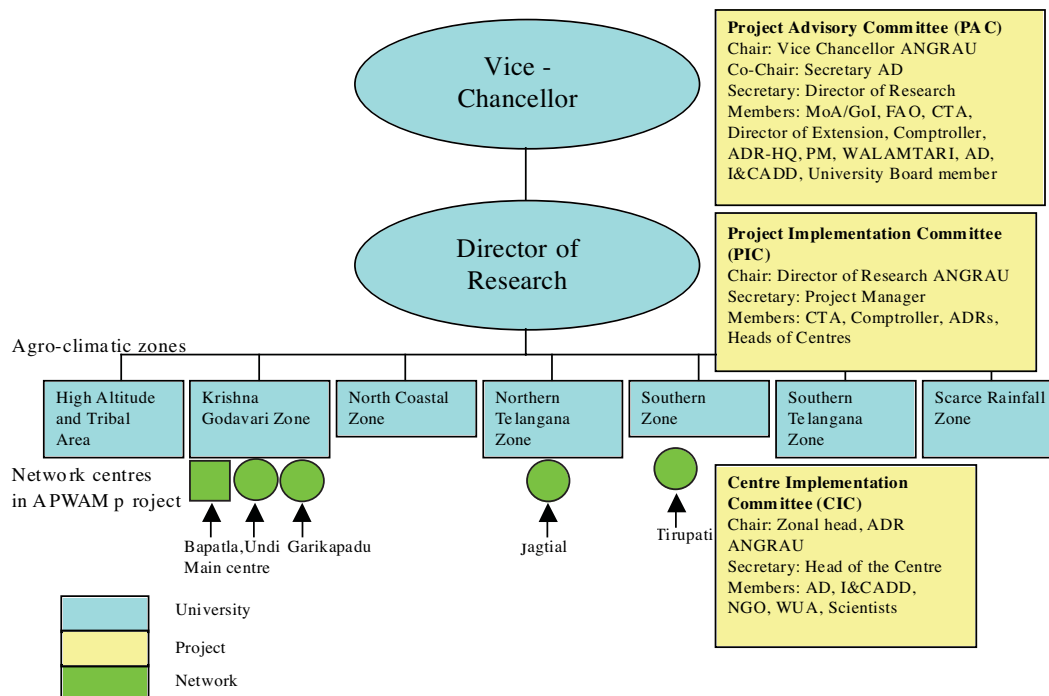
Organizational set-up of the APWAM project

The project is designed in such a way, that a network is created which basically operates within the structure of the university, while at the same time it has been provided a certain amount of 'freedom' to experiment with changes both in the focus, content, implementation as well as the organization of the research.

The main centre of the project is located at Bapatla, and headed by the Principal Scientist/Project Manager. There are four network research centres, in Garikapadu, Undi, Jagtial and Tirupati, with a multi-disciplinary team at each centre (see Figure 3). The disciplines represented are agronomy, soils, soil and water engineering, agricultural economy and agricultural extension. The integration of these disciplines around 'water' is an innovative step taken by the University. The most senior scientist of the team is the Head of the centre.

Figure 3: Project structure of the APWAM Project

Project structure of the APWAM Project at the Acharya N.G. Ranga Agricultural University, Andhra Pradesh



At each of the network centres there is a Centre Implementation Committee (CIC) headed by the Associate Director of Research of the zone. The CIC prepares the technical programme, monitors and reviews the progress. The Director of Research is heading the Project Implementation Committee, which is responsible for the approval of programmes, monitoring and review of the progress, ensuring cooperation, finalizing nominations for training and study tours.

A Project Advisory Committee chaired by the Vice-Chancellor, ANGRAU and co-chaired by the Secretary (Agriculture), GoAP, is supervising and guiding the implementation of project activities. The Committee also provides the overall strategy for the project.

The government implementing agencies in irrigated agriculture, the Agriculture Department (AD) and the Irrigation and Command Area Development Department (I&CADD) are involved both in the CIC as well as in the PAC.

Farmers are involved through the Water User Associations, in the CIC of the project.

NGOs are involved in organizing the WUA. They therefore also participate in the CIC.

A representative of WALAMTARI, the state level training institute of I&CADD is involved in the PAC.

Alterra-ILRI, Wageningen University and Research Centre, is ANGRAU's partner for knowledge transfer and coordination. The organization has appointed a CTA, who provides administrative and technical services to the project, and participates in the project's PAC and PIC.

Activities within the APWAM project

Based on the overall and project objectives, as specified in the project proposal, the results and corresponding activities of the project were formulated in more detail in a logical framework during the inception workshop in March 2004. All stakeholders in the project participated in this activity. The resulting activities have been updated after the 1st Annual Workshop in May 2005 for each network centre separately (APWAM, 2005).

Each of the five centres has prepared a programme of activities. Overall, the activities are under 7 headings. All centres participate in all activities except for activities 4 and 5.

1. Reconnaissance survey of agricultural water management
2. Benchmarking survey of agricultural water management
3. Increase agricultural water use efficiency in pilot areas
 - 3.1 Installation of measuring instruments/structures
 - 3.2 Introduction of less water requiring crops/methods
 - 3.3 Reduction of irrigation/drain water losses
 - 3.4 Enhance cropping intensity and agricultural productivity
 - 3.5 Reduction of uncertainty of irrigation supply
 - 3.6 Monitoring of pilot areas as a whole
4. Irrigation Performance Assessment of Krishna Western Delta
5. Appraisal of Water Management Practices by Computer Simulation
6. Participation, empowerment, awareness and partnerships of stakeholders
 - 6.1 Participatory water management
 - 6.2 Farmers empowerment through NGO partnerships
 - 6.3 Enhanced awareness farming community on improved water management
 - 6.4 Enhanced awareness Line Departments and WUAs on improved water management
7. Capacity building on improved agricultural water management

The main center at Bapatla coordinates activities 4 and 5 with participation of scientists from the Project, University and the line departments. Working groups have been formed by the main center which meet regularly at the main center to carry out the activities.

Every centre works in a project area with xx pilot areas. The project area is along a branch/distributary in farmers' fields. The pilot areas are small areas within the project area, three selected outlet service areas per minor. The work at the level of the minor is aiming at the improvement of the system, while the work at the level of the outlet is aiming at demonstrations to reduce the overall agricultural water demand (irrigation water demand in particular. At the tail end groundwater and/or re-use of drainage water can be considered as well).

The paradigm shift implemented by the University in APWAM Project is that the researchers are carrying out their activities in the farmers' fields. The farmers' fields in the irrigated commands are selected as the pilot areas. The Research Associates belonging to all the disciplines and the field staff of the project stay in villages in which the pilot areas are situated. This gives ample opportunity for the Project staff to live and work with the farmers. This also provides an environment for capacity building of the staff to work with the farmers and to understand their problems.

Information exchange between the centres is done in annual workshops. For instance in the First Annual Workshop held at RARS, Tirupati, 10-12 March 2005, both the results of the first year, as well as the programme for the second year, were presented (APWAM, 2005).

To facilitate the exchange of information and to up-scale the results of the research activities to command area scale to enable the line departments to use the project results, three working groups have been established, one on 'RS/GIS for Canal Irrigation System Performance Evaluation', a second one on 'Hydrological Modelling' and the third one on 'Irrigation Modernisation and Management Improvement'. Besides the scientists at the network centres, the scientists from other colleges and research stations of ANGRAU in Hyderabad and Bapatla participate in these working groups.

The Working Group on 'Irrigation Modernisation and Management Improvement' consists of engineers from WALAMTARI, I&CADD, agricultural officers from AD, farmers from WUAs and scientists from ANGRAU. The WUAs are involved to train them on Proper Water Use and Regulation in the irrigation commands. Some NGOs which have good track record of working with farmers have been associated to establish strong links with WUAs and farmers.

Experiences with capacity building in the APWAM project

The aim of the project is to contribute to increased knowledge and experience in IWRM through enhancing participatory research and implementation skills, developing IWRM enhancing techniques, adoption by farmers, and monitoring long-term impact of IWRM enhancing measures. The project as such can therefore be labelled as a capacity building project. So while the project's main focus is IWRM, all activities have elements of capacity building. Researchers will enhance their knowledge and experience, as well as farmers and government staff of implementing agencies. Ultimately, the research stations of ANGRAU, as well as WUAs, AD and I&CADD will gain in their capacity for IWRM.

Within the project, several activities outside the research and implementation activities are undertaken under the heading of capacity building.

Activities undertaken in this regard are divided into five groups:

1. Training
2. Study tours
3. Seminars and conferences
4. Awareness raising (State and farmer's level, plus IWRM workshops)
5. Advisory services

These activities are mainly capacity building at the individual level. As referred to in the introduction (Chapter 1), capacity building also takes place at the organizational level and at the level of the enabling environment. The levels are linked together, for example, farmer associations are only possible when at the level of the enabling environment the policy and laws are in place, while the capacity of individual farmers and engineers (e.g. knowledge and skills, leadership, communication) and the organisations (people working together within established rules and values, interacting with other organisations) need to be there in order to make them effective.

Individual level

Training encompasses training at the individual level for scientists, farmers and government staff of implementing agencies. Even though not foreseen in the initial set-up of the project, it has also been possible to establish an active link with FAO on capacity building. This has, so far, resulted in training for staff of AD on Increase in Agricultural Productivity, and for staff of I&CADD on water measurement, regulation and irrigation modernisation. The Water Management Cell of the FAO Regional Office at Bangkok has organised two training workshops on Irrigation Modernisation, Management Improvement and Benchmarking to field engineers in May and August 2005 in Krishna Delta of Andhra Pradesh where the main center of the project is situated. With this Capacity Build-Up the I&CADD will be able to prepare modernisation plans for different irrigation projects in Andhra Pradesh. The first such modernisation plan is for the Krishna Delta which irrigates about 0.5 million hectares.

Organizational level

The project's aim to work towards IWRM has been translated into practical research on water use efficiency, water distribution and productivity. The research activities as such are a contribution to capacity building in IWRM in the state of Andhra Pradesh. It is most likely that changes in working methods occur, and these in their turn will result in changes at the organizational level for research, implementation of water management by the line agencies, and by the operation of the WUAs. The experience in working with NGOs as such, is new and for the first time an agricultural university is working with NGOs for a Water Management Project.

Enabling environment

The APFMIS Act of 1997 creates an enabling environment for the management of irrigation water through Water Users' Associations. However, so far, not enough capacity is in place for water management. The WUAs are formed under the Department of Irrigation (I&CADD). The Agricultural Department therefore has no link with WUA, and therefore extension is not linked to the water users directly. This is experienced as a drawback particularly while advocating crop cultivation methods using less water as done by ANGRAU. Also the implementation of systems of water delivery to the crop based on the weather forecast is becoming extremely difficult under the poor link situation between the AD and I&CADD. During the project, a link between the WUA, agricultural research, I&CADD and AD is established, thus addressing the gap between the right policy and effective research in water management. Hence, the project is part of the whole changing view of the Government of Andhra Pradesh and the reform efforts.

The project contributes with research and demonstrations to find solutions for water use efficiency and productivity. It can make a contribution to the reform process by preparing stakeholders for their role in IWRM.

Conclusions

The APWAM project, on improvements in water use efficiency and productivity, aims to contribute to a movement towards IWRM in Andhra Pradesh, and undertakes capacity building in order to achieve this.

The capacity building comprises activities at the individual level for researchers, farmers and government staff, such as training, collaborative research, workshops and study tours.

There is also a part of capacity building in the project which is not labelled directly as capacity building: working together with farmers and government in the pilot areas, in order to come to new approaches in water management. Besides capacity building at the individual level, these activities also have an impact at the organizational and enabling environment levels: when farmers, engineers and scientists can work together to achieve that water can be used more efficiently, this contributes to the wish of the Government of Andhra Pradesh, to become a facilitator.

Therefore, capacity building takes place in this project at all three levels indicated by Kay and Terwisscha van Scheltinga (2003). The activities at the three levels are interlinked, and in practice both in the design and implementation of the project not separately distinguished. The project is not centred around the capacity building per se, but around a rather technical/scientific programme on water management towards IWRM and from there focussing on capacity building.

The project is embedded in the existing structure of the University. It has a link to the existing set-up of the Water User Associations under the I&CADD; to work within the existing structure, is both an advantage as well as a drawback.

By building capacity at all three levels, with active support from all stakeholders, the project is contributing to changes in water management practices and a movement towards IWRM in the state of Andhra Pradesh.

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