

# TOWARDS SUSTAINABLE IRRIGATION AND DRAINAGE THROUGH CAPACITY BUILDING

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## ABSTRACT

Capacity building is not something new, it has been a leading issue in development for many years. But despite all the commotion, capacity building remains a concept of enormous generality and vagueness. The calls for capacity building in irrigated agriculture suffer from these same vague generalities. The result is confusion over what capacity, and a lack of it, actually means and confusion over what course of action is needed to provide it.

This paper attempts to define more clearly what capacity building means for irrigated agriculture by reviewing the conceptual thinking of social scientists over the past decade and case studies that provide good examples of capacity development in irrigation and drainage.

Although a simple definition is unlikely, one principle that is important to understanding what capacity building means is very clear both from the literature and from the practical examples, the methods used to build capacity are essential to its success. It is the reason why many people now use the term capacity development rather than capacity building as it transfers the emphasis from the end result to the process of achieving it. This is the 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. The way in which donor aid and technical cooperation contribute to this process thus become critical issues.

A simple definition may not be achievable but it is possible to make a clear statement about the territory of capacity development. For this a framework is proposed that bridges the gap between the conceptual thinking of social science and the activities of a well-functioning water sector. This may also be a useful tool for pin-pointing areas that need attention, for facilitating discussions between partners in development so there is clarity of purpose on areas of constraint and what needs to be done and for locating points of entry for donor support. The case studies help to refine the meaning of capacity development from a practical perspective and demonstrate how donors and technical cooperation can contribute positively. Elements are drawn from these experiences to support the development of a broader national strategy.

Recommendations are made for the production of guidelines on capacity development that are specific to irrigated agriculture. A consultation process is suggested to obtain more information on a range of recent capacity development initiatives, formulate the contents of guidelines to reflect the issues raised by the proposed framework and examine ways of managing this new knowledge to improve its accessibility, particularly to developing countries.

**Keywords:** Capacity Building, Irrigation, Drainage, Training, Institutions, Policy

## 1 INTRODUCTION

There is a general consensus among policy makers in the developing world and aid agencies that a lack of capacity is constraining the development and improvement of irrigated agriculture<sup>[4]</sup> as a means of reducing poverty, increasing food security and improving livelihoods among both rural and urban populations.

Capacity building is not something new, it has been a leading issue in development for many years and comes from the widely acknowledged short-comings in development assistance over the past 50 years. Morgan (1998) points out that many developing countries say they need more capacity and aid agencies are keen to supply it or at least help to create it. But despite all the commotion, capacity building, or capacity development as it is increasingly called, remains a concept of enormous generality and vagueness. It is also wrapped up in a host of concepts such as participation, empowerment, technical assistance and organisational development. Moore (1995) suggests that: *Capacity building includes everything that was covered by the different definitions of institution building and more besides...Aid agencies would be wise to have no truck with the new jargon of 'capacity building' and to insist on using language and terms that have identifiable and precise meanings.* Others (Browne 2002) talk about the weary mantra of capacity building that is not leading anywhere. The calls for capacity building in irrigated agriculture suffer from these same vague generalities. The result is confusion over what capacity, and a lack of it, actually means and confusion over what course of action is needed to provide it.

The case for improving and increasing irrigated agriculture within the framework of Integrated Water Resources Management (IWRM) to reduce poverty and improve people's livelihoods in developing countries is a strong one. Most poor people live in rural communities and rely principally on agriculture and the environment for their livelihood. They tend to be concentrated in food deficient areas on small plots of land where rainfall is unreliable and highly variable. There is either too much or too little and there are frequent long, dry spells. In Tanzania, for example, droughts have caused more than 30 percent of all natural disasters while floods have caused around 40 percent, often in the same place and the same season (NRSP 2003). Irrigation can and does play a crucial role. It can raise productivity by as much as 400 percent over traditional rainfed methods and brings a range of economic and social benefits to households and protects them from droughts by securing production. It provides work opportunities for the land-poor and for women to engage in such enterprises as vegetable production. All of this not only attacks rural poverty but also reduces urban poverty by bringing down urban food prices (IPTRID 1999).

But most poor farmers in developing countries find it difficult to take advantage of these potential benefits. They seem unable, for a variety of reasons, to take up the technologies available and to realise the benefits of improving water management. Most senior government officials recognise the problems and talk about a lack of capacity constraining development. But they tend to oversimplify this and see solutions in terms of more infrastructure and training for farmers and local professionals.

Unfortunately donors have tended to reinforce this approach. They shaped technical cooperation by concentrating on new works and providing technical assistance to fill the skills gap and to pass on know-how rather than on national priorities. Typically a donor would invest in the construction of an irrigation scheme and train public sector professionals, technicians and farmers linked to the investment. Although individuals, and the investment, gained from this it was isolated from the broader institutional context in which they functioned. Disappointingly such approaches failed to yield the expected benefits.

Over the past decade there have been two important shifts in the development process that have had a profound influence on irrigated agriculture. The first is the growing recognition that development must be 'locally owned' and technical cooperation should not seek to do things for developing countries but with them. The second is an understanding that successful irrigation farming requires much more than investment in construction and training. Farmers are being encouraged to take on more responsibility for water management and they are increasingly being exposed to market forces of the private sector. To cope with these and other pressures they are beginning to demand better support services, advice, access to new technologies, finance, equitable and fair water management regulations and legal redress when things go wrong. These are seen collectively as a lack of 'capacity' and the need is to build or develop it so that the water sector can function properly and poor farmers can take on more responsibility for their own development.

This paper takes up Moore's challenge and attempts to define more clearly what capacity building means for irrigated agriculture using language and terms that have more identifiable and precise meanings. This is achieved by looking at capacity building from two contrasting points of view. The first is based on the extensive conceptual thinking about this issue over the past decade among social scientists. From this a framework is proposed, for visualizing the components of capacity building, that bridges the gap between social science and the activities of a well-functioning irrigated water sector. Such a framework could prove useful for identifying where deficiencies lie so that useful contributions can be made. The second approach is from a practical point of view. There are an increasing number of examples of good capacity building in irrigation and drainage. Many involve support from aid donors who are beginning to reflect the shifts in development in the way they provide technical cooperation. Several of these are reviewed with the aim of clarifying what capacity building means in practical terms as well as testing the usefulness of the framework for identifying the issues.

Countries where there is significant reliance on irrigated agriculture are likely to seek a strategy for capacity development. For this reason some suggestions are made about the elements of a good strategy based on the framework and the practical experience of the case studies.

Recommendations are made for the production of guidelines on capacity development that are specific to irrigated agriculture. A consultation process is suggested to obtain more information on a range of recent capacity development initiatives, formulate the contents of guidelines to reflect the issues raised by the proposed framework and examine ways of managing this new knowledge to improve its accessibility, particularly to developing countries.

## **2 WHAT IS CAPACITY BUILDING?**

The established model for capacity building developed with the advent of the aid era following World War II. The Marshall Plan was introduced to support the rebuilding of Europe and although it was very successful it generated an overly simplistic and optimistic view of what worked; transfer capital and know-how to other countries and swift economic development would follow (Fukuda-Parr, 2000). Subsequent experience showed that this view underestimated the importance of local knowledge and institutions in the process of economic development and was compounded by aid driven by politics rather than results. Aid was then criticized for undermining local capacity rather than building it, ignoring local wishes and favouring high profile activities.

Over the past decade there has been a shift in emphasis towards seeing development as 'locally owned' so that cooperation does

not seek to do things for developing countries but with them. In support of this Fukuda-Parr (2000) points out that most countries evolved organically building their own capacities and so the assumption that developing countries should simply start from someone else's blueprint flies in the face of history. She suggests that countries should build on the wealth of local knowledge and expand these to achieve whatever goals and aspirations the country sets itself. She uses Morgan's description of capacity simply as 'the ability to perform functions, solve problems and set and achieve objectives' and raises the issue of national capacity being more than the sum of the capacity of individuals which points to the importance of people working in organisations and networking. This has become known as social capital and in its crudest terms it means 'the more people trust each other, the better off their society' (Economist 2003). Economists now recognise this as an addition to natural resources, the rule of law and the market that they believe guide the hand of selfish human actions to serve the common good.

## **2.1 Can it be defined?**

Browne (2002) aptly suggests that capacity building is both easy and hard to define. The easy part is the generic definition about skills and capabilities – the ability to perform functions, solve problems and set and achieve objectives - and is a significant step from earlier definitions that looked only at human resource development. But the difficult part is answering the questions about which skills and whose capability and this raises many more issues about the complex nature of development.

Alaerts (in Alaerts et al 1999a) looks at several definitions applied to the water sector. But he avoids recommending one, as all have limitations and focus attention on different aspects of capacity building. Those that do try to be all-inclusive tend to become rather turgid and incomprehensible. So is there an acceptable definition or is there another way of describing it?

Alaerts (in Alaerts 1999b) provides part of the answer to this by setting out the reasons why investments in the water sector have not proved effective in the past, namely, a lack of long term planning for water resources, inconsistent economic policies, poor support for users, a lack of ownership and willingness of users to pay and weak management within organisations responsible irrigated agriculture. He also points to the neglect of the key rules of the Dublin Water Conference (ICWE 1992) namely, that water should be managed as an economic good, planning and management should take place at the lowest appropriate level (subsidiarity) and that water should be managed in an integrated way. What he is in fact doing is defining the characteristics of a well-functioning water sector albeit in a negative sense and by implication he is also starting to define the elements of capacity that must be built to make good these deficiencies. This begins to put some substance on the more generic definitions that have emerged so far and broadens the issue beyond the training of individuals.

Although it seems unlikely that a simple and satisfactory definition will eventually emerge, one principle that is important to understanding what capacity development means is very clear from the literature, the methods used to build capacity are essential to its success. It is as much a process as an end product. Unlike the building of an irrigation and drainage system, which is not dependent on its construction methods for the usefulness of its canals and drains, the methods used to build capacity are vital to the outcome. This is the essential connection between the more 'concrete' actions 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 that is not dictated by externally initiated one-time events. Eade (1997) emphasises this by saying that capacity building is an approach to development, not something separate from it and not a discrete or pre-packaged technical intervention intended to bring about a pre-defined outcome. It is the reason why many people now use the term capacity development rather than capacity building. It transfers the emphasis from the end product to the process of achieving it.

## **3 A FRAMEWORK FOR IRRIGATED AGRICULTURE**

Capacity building or development in irrigated agriculture may not be easily defined but a much clearer picture is needed if problems are to be identified and actions taken to solve them.

One approach is to examine the extensive conceptual thinking about capacity building in development that has been taking place over the past decade (Fukuda-Parr 2000, Browne 2002). From this thinking a generic framework has emerged that has become widely accepted in development. It is also gaining acceptance in the water sector and so it could be a useful visualization tool for irrigated agriculture.

### **3.1 A generic framework**

Bolger (2000) describes this generic framework in terms of different levels of capacity, namely individuals, organisations and societies but emphasizes the links between them. For example, the performance of a water user association is shaped as much by society (laws, regulations) as it is by individuals (skills, leadership, relationships). Four levels of capacity emerge from this approach – individual, organizational, network/sectoral and the enabling environment (Figure 1). Each represents a level that can be examined and analysed and as well as a possible entry point for support from a donor or technical cooperation. So do these four levels provide a useful framework for describing the capacity development issues and constraints in irrigated agriculture?

The individual level is the most 'concrete' and familiar part of capacity development and involves the education and training of the various stakeholders such as farmers, local professionals, engineers and a whole range of disciplines that interact to develop irrigated agriculture. It may be short-term, on-the-job training for farmers who need water management skills or to understand the workings of a water user association or more substantial long-term training for professionals who undertake research, design irrigation works or provide advisory services.

*Figure 1 A conceptual framework for capacity development (Bolger 2000) Individuals*

The education and training of individuals is an important part of developing irrigated agriculture and it is the most familiar part of capacity development. Unfortunately it is usually the only level at which capacity development is interpreted, often in complete isolation from the other levels. This should not cause too much surprise because training lends itself to specific and identifiable 'concrete' actions that are more difficult to make at the higher levels. Some trainers would argue that everything eventually boils down to a training need even if it is an organisational deficiency. Training not only helps to improve practical skills and knowledge it can also be used to changes attitudes in the workplace.

### **3.1.1 Education**

An educated population is an essential foundation for all aspects of development but it is not usually directly related to specific issues such as irrigation and so individuals are left to decide for themselves how they will use their education. Only in the more specialised courses in colleges and universities where individuals have chosen a career in agriculture or engineering do they begin to acquire knowledge about irrigated agriculture. Persuading people to enter this area of study is where incentives such as salary, career development and security become important.

Timing is a crucial issue as it takes many years to educate a professional agriculturalist or an engineer. So both the individuals and the organisations that employ them need to plan well ahead if the demands for such skills are to be met.

Equally the kind of education that professionals receive must equip them properly for their role. But too many colleges and universities are poorly resourced. Teachers are poorly paid and have little or no equipment to work with and continue to use out-dated curriculum that is no longer relevant to the world their students will inhabit. Without institutional changes within the education system the next generation of professionals and technicians will continue to perpetuate and even strengthen existing outmoded power structures and practices. This points to the need to re-educate the educators and provide the resources to produce the professionals and technicians for tomorrow.

Overseas education and training is seen as one way of overcoming some of these inadequacies. Over the past 40 years or so governments have sent many of their top professionals for postgraduate training overseas, usually on a scholarship provided by the host country or a donor agency. This exposed young professionals to new ideas and new ways of working and has served many countries well. But it is now in rapid decline because of a lack of scholarship funding and the relatively high cost of a course in, say, Europe or USA (US\$30,000 for full support for one year) as opposed to the home or a third country (US\$2,000-5,000). Unfortunately, in many instances, this trend towards educating at home or in a third country is not matched by the resources needed to do the job well. The impact in the developed world is also profound as many international training centres have closed or are in decline with a loss of expertise that will be very difficult to replace.

The rapid changes now taking place in society and technology in the developed world will also impact in developing countries. In the developed world people now expect to pursue a number of career paths in their working lives and this has changed education from a 'one-time event' to one of 'life-long learning'. This will eventually influence working patterns and education in developing countries.

### **3.1.2 Training**

Short-term training is usually geared to the acquisition of more immediate skills for well-defined tasks such as managing canals, designing pumping stations or organising water user associations. It may be on-the-job training or special courses on particular issues for a wide range of people from farmers to professionals. They may be conducted on site, at a college or overseas. Typically, short-term training forms part of an investment in irrigation and drainage to provide the skills specifically for operating and maintaining a scheme. Although such training can be very effective for the project it is often criticized for being narrowly focused and not giving adequate attention to organisational issues and the broader context in which irrigated agriculture functions.

Increasingly short-term training is also seen as a means of changing attitudes as both farmers and engineers take on new roles in the process of irrigation management transfer and there is a shift in the objective of training from mere knowledge transfer towards increasing problem solving capacities. Competencies are a complex interaction of knowledge, skills and attitudes and some programmes are now using participative training methods to engender a continuing process of participation in subsequent water management practices. This is particularly important when individuals form groups or organisations such as water user associations to undertake joint water management functions.

Short-term training in irrigation and drainage is not without its critics. There are many instances of training courses that are not effective in matching demand with supply in a timely manner. Typical issues raised include inappropriate skills and knowledge being provided, poor training methods, curriculum too theoretical and lacking practical application and poor course timing so that skills learnt are not used or needed. It is not uncommon for attendance at a training course to be seen as a reward for good service or it is this or that person's turn to go rather than an opportunity to acquire new and useful skills.

Biswas (1996) provides a number of examples of irrelevant, inappropriate and expensive training that was either too general or not related to the job and suggests that this should be a major cause for concern.

### **3.1.3 Investing in people**

There are few who would doubt the value of educating and training individuals but the paradox is that few are willing to invest in people as enthusiastically as they invest in concrete. In spite of the rhetoric the development of individuals is not receiving the type of support it needs and deserves (Biswas 1996). The mobility and fragility of labour are perhaps the main reasons for this. Irrigation schemes do not move around but people can and do. They also get sick and some die.

There are commonly held views about professionals who received large sums of money to train overseas in irrigation development only to return home and go into building work or banking. Unfortunately this is all too often the level of perception and debate when the training of professionals is being discussed. It is seen as a waste and a reason for not continuing to train others rather than as a contribution to the nation. Critics seem to give little thought to the very systems of education and training from which they themselves have personally gained great benefit in career development, personal choice and mobility of employment.

## **3.2 Organisational Level**

At the organisational level are groups of people such as water user organisations, research groups, government extension agencies and private companies who share common objectives such as improved livelihoods at a farming level or improved water management or increased agricultural productivity at a national level. Institutions are the rules and agreements, formal and informal, and shared values that bind the organisations. So the capacity of an organisation is embedded in the ability of its individuals to work together within the established rules and values.

A wide range of organisations are integral to the success of irrigated agriculture. At farm level there are water user groups who share and manage common water interests both technically, financially and legally. Other organisations, typically government run, are mandated to provide support services for farmers while others undertake research and education roles. The private sector is also increasingly making an impact, for instance through smallholders using low-cost affordable technologies.

### **3.2.1 Support services**

Irrigation at farm level is not well served in terms of supporting organisations. Traditionally governments continue to be the only substantial organisations that can provide farmers with knowledge and skills through agricultural extension services. But these have tended to concentrate on crops, fertilizer and pesticides rather than on water, even in irrigated areas. Where governments have focused on water it has tended to be on the engineering and management of the main distribution systems and not on what happens at farm level. In cases where on-farm water management services are provided there is often a lack of resources to do the job properly. They tend to be under-funded and staffed by inexperienced people who do not have the logistical support to reach the farmers. Where there have been successes they have usually been underpinned by external aid and so there are question marks hanging over them about their sustainability once the support comes to an end. This criticism can also be applied to some developed countries as well. Since the privatisation of extension services in the UK in the 1970s there is a dearth of information on farm water management practices and much of what is available is oriented towards irrigated agricultural production and not the more environmentally sensitive water management issues that are more relevant today.

Farmers need organisations to support them but, like the investment in people, there is a preference for more concrete infrastructure. Very little has been documented and published about the role and function of irrigation advisory services and more specifically about how well they perform. There are few guidelines for others to follow (FAO 2003). This situation has not been helped in recent years by the trend of transferring irrigation management responsibilities from government to farmers and the increasing amount of irrigation advice being organised outside the traditional government agencies by NGOs that do not normally have the resources to publicise their experiences. This lack of information can mean that it is difficult to determine what services are available in a country and how well they are working and this adds to the difficulty of planning a strategy for capacity development.

### **3.2.2 Need for organisational linkages**

Government ministries involved in irrigation such as agriculture, environment, and water resources are often criticized for a lack of cooperation in what is essentially an interdisciplinary activity. Although they usually have common objectives, they tend to work independently. A typical division of responsibility is between the planning, design and operation of irrigation systems, usually the responsibility of a Ministry of Irrigation or Water Resources, and irrigated agriculture, usually the responsibility of a Ministry of

Agriculture. The former is staffed by engineers who have little knowledge of crops and farming and the latter by agriculturalists who have little knowledge of engineering and hydraulics. The sad fact is that most of those involved do not see the need for such knowledge nor for closer linkages with each other. As one senior irrigation consulting engineer put it: *my engineers do not know the difference between wheat and rice – but the really sad thing is they do not want to know*. This emphasises not just serious flaws in organisational attitude but in the education system that continues to produce young engineers who still think that a career in irrigation is only about building dams and pumping stations.

### **3.2.3 Organisational performance**

There are many instances of poor organisational performance in the irrigation sector and some emanate from a mismatch between what the organisation was set up to do and what it actually does. The reasons for this are varied and complex. A government research institute may be carrying out research that interests its staff and encourages their career development through publication but critics may point to drainage practices being promoted that do not fit well with local physical and socio-economic conditions and do not address the priorities of local people. Typically, there may be poor links between researchers and farmers. Extension services are weakened by a lack of well-trained local professionals and resources to do the job properly. The local professionals have little to offer farmers beyond formalised messages about water management and do not have the skills to cope with today's farmers seeking a livelihood from a range of natural resources. There are other similar examples.

Incentives play a crucial role in ensuring that individuals and organisations point in the right direction. Salary is important but individuals are motivated by other issues such as career prospects, security of tenure and the value of working in a worthwhile job. But there is little point in trying to improve the performance of a research institute by training its staff on the layout of field plot experiments when those same people have to do a second job in the evening to secure their livelihood.

### **3.2.4 Private sector**

Although government and farmer organisations dominate irrigation in some countries the private sector, usually NGOs, is making an impact. An example is the introduction of affordable irrigation technologies for smallholders in Asia and Africa that are manufactured locally and bought by farmers on a commercial basis. This requires organisational structures, known as supply chains, which enable companies to manufacture equipment and sell to farmers through retail outlets or agents. Farmers expect spare parts to be available as well as technical support and credit arrangements in much the same way as any other small-scale enterprise would. The principal prerequisites for this are a strong market for the agricultural produce and profitability for all those in the chain. At present markets in Asia tend to be distorted by subsidies as government encourages the development of these new institutional structures. In Africa they are in their infancy but are more reliant on market forces.

NGOs are well suited to support the creation of these new structures as they are much better at connecting with people than government departments. They are also more adaptable to what is essentially a process in which timing cannot be allowed to dictate the outcome.

### **3.2.5 Elements of effective organisations**

Kaplan (1999) provides a useful hierarchy of the elements of an effective organisation which is applicable to irrigation organisations, namely, farmer groups and the organisations that support farmers both private and public:

- A clear picture of the role of the organisation
- An organisational 'attitude' that enables it to act in a way that it can have an impact
- A clear strategy
- A defined organisational structure and procedures that reflect the strategy
- Relevant individual skills, abilities and competencies
- Sufficient and appropriate material resources.

He emphasizes that those elements of capacity at the bottom of the list are more quantifiable as they belong to the realm of material things. Those near the top belong to the intangible, invisible realm and are only observable through the effects they have. It is here that by and large the effectiveness of an organisation is determined.

Biswas (1996) suggests that good organisational performance starts at the top. First and foremost it is the essential to have a good cadre of capable senior managers in place. The institutions and policies, he argues, will then take care of themselves. This links back to the need for a good education system that can produce the professionals. Browne (2003) makes a similar point when he refers to the Indian Administrative Service as a highly respected organisation working relatively independent of political pressures. It has few problems recruiting capable professionals in spite of the modest pay levels.

## **3.3 Sector/network level**

The sector/network level is often included as part of the enabling environment but this additional level is needed to make the point that irrigation is part of the larger picture of integrated water resource management. It reflects the increasing awareness of the need for policies that integrate and cover the whole of the water sector and not just irrigation, water supplies or the environment in isolation.

It also emphasizes the important function of networking for communications and keeping people up to date. The creation, for example, of a network for capacity developers in irrigated agriculture would not only enable people to share information and expertise but it could also become a place for synthesizing experience and lessons learned, identifying research areas and encouraging the exchange of views. Several countries have already developed their own web-based networks and FAO has set up a website specifically for participative training in water agricultural management and includes an email listing to keep members in touch with the latest information (FAO 2003). CAPNET ([www.cap-net.org](http://www.cap-net.org)) is perhaps one of the largest international networks covering integrated water resources management and has a specialist section dealing with capacity building.

The ability of people in developing countries to access information and communications technologies can reduce the need for expatriate expertise. 'Scan globally and re-invent locally' (Browne 2002).

### **3.4 Enabling environment**

The enabling environment represents the broad national and international context within which irrigated agriculture can develop and this has considerable influence over what happens at the lower levels. It is concerned with policy at the highest levels in government and the ability of people at the lower levels to influence it. It is also about the socio-economic conditions that enable or discourage irrigation development and the legal framework that provides farmers with security of tenure for land and water and the power to seek legal redress when contracts are broken.

This is the most influential and yet the most difficult level to change. Some issues are well beyond the control of most countries. A typical example is the low international price of basic food crops that mean many farmers are unwilling to grow irrigated crops beyond their immediate family requirements because the costs of production are greater than the returns. This is made worse by agricultural policies that favour developed countries and the dumping of surplus food on hungry countries.

But there are also local issues to consider. Tanzania provides a positive example of recent changes in government policy that now favours rainwater harvesting as a means of supporting small groups of farmers whereas in the past runoff was considered to be a hazard and needed disposing of quickly and safely. This was a process of change that started at the grass roots and was developed and encouraged by a dedicated research group with external funding over a period of 12 years (see case studies).

In India poor, seasonal irrigation farmers using tanks to store water are now beginning to change national government plans in favour of providing them with advisory services to introduce aquaculture into the farming systems. They are doing this using a variety of influencing methods based on sound research undertaken by an external agency (NRSP 2003).

But not all is encouraging. In Bulgaria large tracts of irrigated land went out of production during the transition to a market economy in the 1990s because the market for irrigated maize collapsed and the costs of pumping water to elevated farms was high and uneconomic.. International lending agencies were encouraging farmers to take on the responsibilities for water management that traditionally belonged to the state and to invest in new irrigation infrastructure. But slow procedures in the transfer of land tenure to farmers meant that there was no enthusiasm at that time to take on these extra financial and management responsibilities.

Across the European Community there are serious concerns that new water legislation will render irrigation farming too expensive to produce crops that can be imported cheaper from elsewhere resulting in many farmers going out of business with consequent impacts on the rural economy. Few people appear to be listening to the farmers in the water debate at a time when the water demand for domestic use, industry and the environment are high on the agenda. The low priority given to agriculture is reflected in current research. Only one out of a reported forty research projects on water funded by the European Union is about agriculture.

These examples serve to show the complexity of the issues at this level and because of this initiatives that set out specifically to make changes here are quite rare (Alaerts in Alaerts 1999b). They take a great deal of time, in excess of 10 years and more, they are less predictable than contributions at the lower levels and the expertise available to support them is not readily available either in-country or internationally. However some initiatives do succeed in making significant changes and as two of the above experiences show, it may be the result of initiatives taken at the lower levels that then come through to change policy. Interestingly this is often the result of chance rather than design.

### **3.5 Extending the framework**

From the preceding sections there is strong evidence that the generic framework does provide a useful aid for categorizing irrigated agriculture in capacity development terms and a basis for discussing issues and identifying constraints. But there needs to be more than just a generic structure. A 'bridge' is needed between the social science approach and the activities of a well-functioning water sector to aid communications between the disciplines. However, there are many issues to consider and adding

them all can lead to the 'all-inclusive trap', cause confusion and paralysis whereas adding too little leads to the 'over-simplistic trap' where actions do not address important issues and so become ineffective.

A compromise is proposed here by introducing a second dimension based on the more familiar activities of planning, design, construction, operation and maintenance (Table 2). But also included is research, meaning the capacity to undertake formal research in a specialist institute or university, and education, meaning the capacity to undertake formal education in colleges, universities etc. This is not to say that these activities can be treated in isolation from all other aspects of improving water management but rather to highlight those that are central to building the platform on which irrigated agriculture stands.

Table 2 A framework for irrigated agriculture

Capacity levels	Activities of a well-functioning water sector (guiding principles: subsidiarity and participation)					
	Planning	Design	Construct.	O&M	Research	Education
IV Enabling env						
III Sector/network						
II Organisation						
I Individual						

Needs
Action
Impacts

←

The addition of this dimension is meant to further clarify thinking about what capacity means and where capacity constraints lie. Clarity about constraints can then lead to identifying what needs to be done for which actions can be taken to achieve the desired impacts (see enlargement at the right of the framework). However, the simplicity of the framework should not mask the complexity of the tasks involved. Each activity requires various individuals, organisations, networks and an enabling environment in which to flourish. But there are also issues of subsidiarity (decision-making at the lowest possible administrative level) and participation to consider. The emphasis given to each level and activity may also be very different depending on local issues such as the way irrigation is practiced (e.g. privately run smallholder irrigation, publicly owned large irrigation and drainage networks and commercial farming) and the need to solve local problems (e.g. salinity and water-logging, inadequate education facilities, irrigation management transfer).

## 4 CAPACITY DEVELOPMENT IN PRACTICE

An alternative way of looking at capacity development is from a practical point of view. There are an increasing number of examples of good capacity building. Many involve support from aid donors who are beginning to reflect the shifts in development in the way they provide technical cooperation. Several of these are reviewed with the aim of further clarifying what capacity development means as well as providing examples of how it can be achieved in practice. The case studies are also used to test the usefulness of the proposed framework for categorizing the issues raised.

Only the main points of each case study as they relate to capacity development are described; more details can be found by following up the references provided.

### 4.1 Developing farmer and institutional capacity – Zambia (FAO 2003)

This first case from Zambia is about improving knowledge and skills and changing the attitudes of local professionals and farmers.

In Zambia there is more than 100,000ha of private smallholder irrigation. The Zambian government advisory and support services are poorly developed and so smallholders rely on their own resources rather than on government support. But the government wanted to improve their productivity and to help more farmers to take up irrigation to solve the country's growing food security problem. It saw strengthening its advisory and support services to farmers as central to meeting this objective. An externally funded project with technical assistance was launched to introduce low-cost irrigation technologies as an entry point for training both local professionals and farmers.

This was an unusual move at a time when many governments were running down services and transferring responsibility for irrigation to farmers' organisations. But Zambia does not have strong private organisations that can take on a support role and so it was decided to strengthen the existing government organisation rather than to build something new.

Government staff had little contact with farmers and were more familiar with top-down approaches to training and providing advice. So participative approaches and facilitation methods formed an important part of their training in addition to the more technical subjects. Training was done in a very structured way and implemented through a pyramid process of training trainers who then trained technicians who in turn trained the farmers. The methods used were based on the experience of using similar methods, but for differing circumstances, in Nepal, Cambodia, Bangladesh and Indonesia. They have led to the production by FAO



of Guidelines on Participatory Training and Extension in Farm Water Management (PT&E-FWM) and a farmers' training manual (FAO 2003).

In four years more than 10,000 'private' farmers have been trained by the government service. A significant number of women joined the programme and indeed later in later training campaigns women outnumbered men in some districts.

The impact of the programme was measured by establishing what farmers had learnt and by measuring the uptake of technologies. But both methods produced inconclusive results, consumed a great deal of resources in data collection and proved far more complex to analyze than first envisaged. For example, the lack of a baseline survey of farmers' knowledge made it difficult to determine what they had learnt from the training or what was the true level of technology uptake. This did not mean the attempt was without worth but it did highlight the complexity evaluation.

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This case demonstrates how the provision of resources, technical assistance and training can strengthen a moribund government department, which in turn can have a significant impact on the private farming community. It also demonstrates that irrigation technology can provide a useful entry point to engage with farmers. Where private institutions are weak, the government still has a major responsibility for capacity development. The question of cost recovery from those who benefit has yet to be resolved and so the process may not continue once the external support has stopped.

#### 4.2 Creating irrigation markets – Africa (World Bank 2003)

In separate initiatives, NGOs in Niger, Kenya and Zambia and Zimbabwe imported treadle pumps from Bangladesh to help smallholders to improve their livelihoods by providing access to water. But central to their successful introduction was not just the supply and modification of the pumps to meet local conditions but the development of local private capacity to manufacture, distribute, retail and maintain pumps at relatively low cost that would sustain their continued up-take in the medium and long term.

These are examples of a new approach to development known as the *market creation approach*. This is not so much concerned with creating markets for agricultural products, although this is clearly essential, but creating markets for new affordable irrigation products. In this case treadle pumps that encourage smallholders to take up irrigated agriculture. This produces a flow of benefits downstream as the purchasing power of smallholders increased but also benefits upstream from creating the chain that would supply and support the new products.

Capacity development in this context is about setting up the new supply chains and training individuals and groups to play their part in it. But the key element is an enabling environment, in this case a market for cash crops that could be grown by smallholders that stimulates the whole chain.

Kay and Brabben (2000) reviewed several case studies on the success of this market driven approach to capacity development that emphasizes the private sector requirements of publicity and marketing to spread information about technologies, reliable agricultural inputs and the identification of crops and markets where smallholders have a comparative advantage for the sale of their produce.

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Most experiences of capacity development involve government in one way or another but this is an example of the role that the private sector can play in irrigation. External funding and technical assistance were provided but the goal was to make the whole self-funding and profitable in the same way as any other private business. Capacity development involved training and transfer of a very wide range of skills but key to the success was a vibrant market for high value agricultural produce. This case spans all the levels in the framework and although it was principally about using treadle pumps there were also elements of planning, design and construction as well.

#### 4.3 Measuring impact – Morocco (Kay 2001)

Large numbers of small, private farmers practice irrigation in group schemes in Morocco and in the past they have relied heavily on government for funding and advice. The government service wished to transfer various water management responsibilities to them and so organised the setting up of WUAs. The rural population, experiencing population pressures and water shortages, also appeared ready to take on responsibility for the management of small and medium scale irrigation schemes. Innovative ideas were used in a pilot project to integrate both government irrigation technicians and elected farmers in the day to day running of WUAs. Local, private consultants were used to implement a programme of farmer and irrigation technician training with external funding and assistance from an external consultancy.

A useful and practical method of evaluating the impact of the project was developed which could have much wider application. It was based on interviews conducted with farmers every 4-5 months to assess a range of parameters covering technical, social, managerial and administrative issues. Subjectively they decided whether a particular activity was still causing problems (negative); was not causing undue concern (neutral) or there had been noticeable improvement (positive). A statistical analysis of several surveys indicated a steady improvement in most areas. Although open to criticism the method proved to be informative, easy to organise and to analyze the results with practical outcomes.

Its success so far has encouraged a similar larger project to be undertaken and the setting up of a unit in the Ministry of Agriculture to continue the process. This is an interesting reversal of approach to the more traditional one of starting with the Ministry and then moving onto the farmers.

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This case study, unlike most others, was only about capacity development and not construction. It was externally funded with external assistance but implemented by local private consultants who worked directly with farmers once they were trained in participative methods, thus demonstrating the usefulness of the private sector in what is traditionally seen as the preserve of government. Its success was primarily due to the prevailing enabling environment.

#### 4.4 Developing a research institute – Pakistan (Ritzema & Wolters 2002)

Pakistan has a successful agricultural economy, about 80 percent of which is irrigated. But irrigation has brought problems and 6mha are seriously affected by salt and some 2mha are reported abandoned because of severe waterlogging. Poor drainage is reported to cause a 25 percent reduction main crop production.

Visionaries within Pakistan recognised the need for research to solve these problems and so were instrumental in establishing a new research institute for this purpose with UN funding. But research institutes often have a reputation for working in their own world where personal and institutional reputations developed through publications have greater importance than solving the real problems of development. There are many varied and complex reasons for this not least of which are a lack of clear policy on the role of research, a lack of resources and poorly trained and motivated staff.

Capacity development began in 1988 with Dutch technical cooperation that provided a strong focus on the technologies of drainage design and installation. At the same time the salary structure was reviewed along with staff recruitment to bring in high quality well motivated people.

Technical cooperation improved research skills, management and report writing among local staff. But almost by accident rather than by design the expatriate staff were also good capacity builders as well as technical specialists. They were experienced professionals that had learnt from many similar situations how to communicate with people and get them to take ownership of problems and solutions. They encouraged staff to think beyond the immediate technical issues and to put them into the context of drainage development and the real problems facing farmers. This was not in their job description nor was it the reason they were selected for the job. But it contributed greatly to the success of the institute which now has a growing international reputation for its research work.

Current research work is looking at the problems of participative drainage, which represents a further step in building the capacity of staff to work directly with farmers and to appreciate the complex social and cultural influences on their drainage research. Interestingly, because of the expertise that staff now have in this area the Institute has abandoned attempts to work with local NGOs because they had difficulty in adapting from their traditional village focus to the catchment thinking needed for participative drainage.

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This is an example of how the capacity of a research institute can be developed to provide useful and economically viable research that is sensitive to the cultural and social needs of rural communities provided it is properly resourced and staff have incentives to work well. It is also an example of individuals within a country that have the capacity and strategic vision to see what is needed and take action to provide it. Personal connections with aid donors and international organisations such as the International Commission on Irrigation and Drainage (ICID), which fosters relationships across the irrigation world, also played a crucial part in setting the right environment for action.

#### 4.5 Improving education and networking – India (Boonstra 2003)

India too has large tracts of irrigated agriculture that has led to areas of waterlogging and salinity. The difference between India and Pakistan was the variety of solutions needed to solve the problems in different parts of the country.

A network was set up, using Dutch funding and expertise with the Central Soil Salinity Research Institute as the centre working with four state agricultural universities in different parts of India chosen to investigate local drainage problems. Not only was drainage relatively new India but so was the idea of researching practical farming problems rather than working only in laboratory conditions. Resources were made available and researchers were supported by drainage specialists and trained to solve farmers' drainage problems by working directly with them in a participative way. Universities were chosen specifically so that the knowledge gained would feed directly into the education system and so encourage long-term changes both in knowledge and the way future professionals would address drainage issues in the future.

The immediate result was that farmers who participated and took up the drainage solutions saw substantial increases in crop yield even in the first year after installation. The universities were inundated with requests from farmers for similar systems but as they were not geared to extension, steps were taken to bring in the local government extension departments. At the institutional level staff acquired new skills and status in their working relationships with farmers. But, although there was collaboration across the network in terms of training provision, the anticipated networking on drainage issues did not work so well as each university concentrated on its own problems and solutions. The links they created naturally with others, often within their own State, were much stronger. The links between universities and research institutes worked, be it not as successful as initially foreseen.

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The case is a good example of using research as a means of building research capacity to solve real problems for farmers and working through the university sector as well as research institutes so that the results feed through into the training of future cadres of irrigation and drainage engineers. As with the Pakistan case the role of the technical specialists as capacity builders was an essential element in the programme.

#### 4.6 Creating an enabling environment – Egypt & Tanzania

##### 4.6.1 EGYPT (APP 2003, Ritzema & Wolters 2002)

Egypt has relied for centuries on irrigated agriculture for its survival and development and as a result it has developed strong formal government based organisations to manage existing schemes and to plan new ones. But since the construction of Aswan Dam drainage has become a major issue as water tables have risen and land has become saline.

The Dutch government, with its own problems of dealing with drainage, has a long history of supporting Egypt. In 1976 a panel comprising Dutch and Egyptian drainage specialists and managers was set up to examine ways of dealing with the drainage of large tracts of the Nile Valley, to develop and transfer drainage technology from The Netherlands to Egypt and to administer Dutch donor funding for a series of drainage projects. Over the past 27 years this panel has grown in importance from a convenient administrative arrangement for a wide range of drainage projects, both in the field and in drainage research, and has become the basis of a partnership with Egyptian steering, that has now widened its scope by mutual agreement to include the wider issues of water management. An important aspect is, that it is addressing issues at the highest levels in Egypt on policy formulation in the sector and most recently institutional reform and capacity development. One of its key roles is to bridge the gap between applied research and policymaking and identify and set research priorities.

This partnership is regarded as a success by both countries and has led to significant technology developments and policy changes

in Egypt. Several factors have influenced this, not least of which is the panel membership which has evolved over the years and now comprises some of the most senior government officials from both countries including representatives from all the ministries that are stakeholders in the water sector. The panel is currently chaired by the Minister of Irrigation and Water Resources. This ensures ownership of panel decisions at the highest levels in government. Other elements cited include the commitment of members, the inclusion of several women members who lead ministerial departments and the respect, natural empathy and personal relationships that have also grown over the years between panel members that has led to trust. This enables frank discussions to take place at an intimate and informal level as well as officially which is the essence of a good partnership.

It could also be argued that the 'partnership' works because of the funding provided by the Dutch government. There seems no doubt that this is important because without it the panel and its secretariat could not function. But the Egyptian ownership and driving force in the panel are probably more important factors and proponents point out that the financial support is modest in comparison with other aid donors and they have yet to develop the kind of influential panel arrangements that have existed for over 27 years.

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This is a good example of a mechanism that can help to establish an equal and influential partnership working at the highest levels in government in a situation that is always a difficult one, namely, where one partner is giving and one is receiving. It has also influenced the capacity of panel members as evidenced by their ability to change over time with the changing demands in irrigated agriculture. The Dutch would also argue that it has had a significant impact on the way in which they now administer their aid programmes to the benefit of other countries.

#### 4.6.2 TANZANIA (NRSP 2003)

Smallholders living in the tropical drylands of Tanzania, have to cope with the realities of inadequate and unreliable rainfall. Whilst policy makers recognise this and few doubt the critical importance of rainfall, they did not recognise the importance of runoff for water supply. Indeed, until recently, the overriding perception was that runoff was a hazard rather than a resource and led to soil erosion. Over many years this perception has driven government policy and programmes to the detriment of irrigation farming.

Sustained, externally donor-funded research and communications work over 12 years by a university team into the benefits of harvesting rainwater for improving productivity and smallholder livelihoods has transformed thinking at the highest levels of government. Work began initially as a research project into the technologies of rainwater harvesting but gradually the importance of communicating ideas and involving all the various stakeholders was realised if significant changes were to be made in the way in which farmers worked.

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Rainwater harvesting is now seen as a resource and has this has been incorporated in the development plans of certain district councils and NGOs, especially following the statement by the Tanzania Prime Minister that: *...the Government will strengthen and promote the use of rainwater harvesting technology, in both urban and rural areas* (Hansard Records, July 2nd, 2001).

This is an interesting example of how sustained efforts from the grass roots level can change government policy. The young age profile of the team that carried out the work is also an important lesson. They are usually less influenced by inflexible organisations, can be more up to date and flexible in their thinking, take risks and are ambitious to build their careers and make a worthwhile contribution. This is an important element to build into any strategy – the future is with the young.

#### 4.7 Manpower planning

A common theme throughout all the case studies is the practical issue of manpower, the numbers of people and the skills needed for all the tasks of water management. Manpower planning is a methodology that was developed in the 1970s and 1980s to determine future training needs in the labour market. It enabled planners to determine the numbers of people and the skills needed to bridge the gap between labour supply and demand in an industry or sector. Clearly this is not an exact science because of the problems of forecasting the future and, therefore, what labor demands are likely to be.

FAO has studied methods for predicting manpower needs for agriculture such as livestock, fisheries and forestry (FAO 1970, 1979 and 1981). In 1970 FAO prepared a manpower study, as part of its Indicative World Plan for Agricultural Development, on a country by country basis but a lack of country data on which to base projections meant that the predictions were of limited value. In 1979 FAO published a practical reference work for those working at a national level in agricultural education but again limited data was a problem and the output had to rely on empirical formulae and staff norms predicted from ratios relating manpower to land areas or numbers of farming families.

Around this same time several attempts were made to apply manpower planning to irrigation and drainage. Nigeria provides an interesting and detailed example (Carter et al 1986). Other examples include Tanzania and Zimbabwe (FAO 1985), Mexico (Haissman, 1971) Sagardoy (in FAO 1982) and a worldwide view of staffing norms (Bos and Storsbergen, 1978). All the studies recognised the importance of predicting the numbers required (quantity), ensuring they were well trained (quality) and that people worked within a sound institutional environment (organisations). But there is a tendency in many countries to remedy deficiencies in one aspect by substituting improvement in another. For example, overstaffing is common with under-qualified people working within poorly managed organisations. The importance of quality cannot be underestimated and the success of a scheme may well depend on it. Substituting more untrained people to try and make up for a lack of quality is unlikely to work. The importance of a sound methodology is as much to prevent overstaffing as to ensure adequate numerical levels.

One problem in the irrigation sector is the lack of norms for staffing levels. How many people does it take to run 1000ha of irrigation? It will be very different if it is 1-1000ha farm or 1000-1ha farms. Few countries have the experience or the data on manning levels and so irrigation specialists are often used to arrive at suitable norms and job descriptions for planning purposes.

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Without doubt, any developments in irrigation and drainage will need sufficient, properly trained manpower. This in turn means education and training facilities with sufficient capacity to support the planned development and to allow not only for the long lead-time needed to develop professional and technical skills but also for the 'wastage' into other parts of the economy. This inevitably means predicting the numbers of people needed and the skills required both to build capacity in the education and training sector as well as for the more hands-on development of irrigation. Although manpower planning may be out of favour at the moment it does have the advantage that it focuses attention on these very issues, namely numbers, skills and education and training provision. It is unfortunate that the current literature on capacity building ignores these basic issues. In the current surge of interest in the more complex institutional aspects of capacity building there is a danger of neglecting the basics of numbers and skills and there appears to be a tacit assumption that the basic skills of irrigation and drainage are being well provided when this is clearly not the case. A visit to any university department, college and school in many developing countries would quickly provide a picture of under-funding, poor curriculum development in water issues, a lack of properly trained teachers on poor salaries and inadequate facilities to support practical and classroom training. There is a strong argument for capacity building to begin here as this is where the next generation of professionals and technicians will receive their basic education.

#### 4.8 Refining the meaning

Many other similar cases could be cited but these few provide good, practical examples of capacity development and help to further refine its meaning for irrigated agriculture. They are all cases where infrastructure was not the central development objective as was traditionally the case in the past. The focus was on capacity development and not just in human resources terms. They all involved the training of individuals both in a formal and an informal sense. But all attempted to do this in the context of the organisations and institutions in which the individuals work and all tried to set this in the wider context of improving irrigated agriculture and the livelihoods of farmers.

The case studies were also good examples of the way in which the more sensitive approaches to external funding and technical cooperation, using the principles of participation and subsidiarity, contribute positively to capacity development.

An interesting aspect of the technical cooperation in Pakistan and India and to some extent in Egypt was that it started out as specialist technical help of a more traditional kind. But the external commitment in each case extended over a considerable time period and as the relationships progressed the importance of capacity development was recognised and this became one of the priority issues. The success of this had much to do with the compatibility between the expatriate professionals and the local professionals and the institutional context in which they worked. Although expatriates were selected only for their technical abilities,

they happened also to be capable and experienced enough to appreciate the difference between acquiring knowledge and just transferring it. They were able to go beyond their technical remit and to see their work in a wider development context and were able to train local staff to see their technical work in a similar way by using the principles of participation and subsidiarity. This was more by 'accident' than by design and it begs the question about how expatriate professionals are selected for capacity development work. Their technical expertise is essential but their ability to build capacity requires a wider range of communication skills and these should be recognised when selecting people for such jobs.

Although initiatives at the highest level are rare, some do succeed in making significant changes and can be the result of initiatives taken at the lower levels that then come through to change policy. Interestingly this is often the result of chance rather than design.

With regards to the usefulness of the framework, it was possible to clearly locate each case study on the matrix and to identify the contribution that each was making to the whole. From this it is proposed that the framework can be a useful tool for pin-pointing areas within irrigated agriculture that need attention. It could also provide a useful focus for discussion between partners in development so there is clarity of what is meant by capacity building, areas of constraint can be identified, and what needs to be done formulated.

## 5 TOWARDS A CAPACITY DEVELOPMENT STRATEGY

The conceptual thinking and the practical experiences of the case studies both add clarity to the meaning of capacity development but they also help to define some of the elements for a strategy for developing capacity. This is not meant to be a comprehensive recipe but a list of issues that have arisen in this study.

### 5.1 Policy environment

Without doubt the importance of a favourable policy environment and political will for development is crucial to successful irrigation development and to developing capacity and cannot be over-estimated.

Policies are largely determined by the quality and commitment of the leadership and senior management.

Within the policy, capacity development must be guided by clear strategies that address development needs and are nationally owned.

A period of review and experimentation with new approaches is essential before including them in any new policy.

### 5.2 Identifying and assessing capacity needs

Identification and assessment of capacity needs is one of the most difficult tasks. It is a question of who does it and how. It implies strategic planning capacity in a country and this too may require developing.

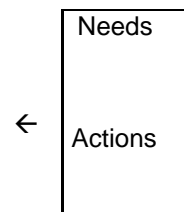
Expertise available from other countries is also limited because it needs people with interdisciplinary skills, with experience of working at high levels in government or the private sector and who are able to facilitate and not dictate discussion and decision-making.

Full participation of all the stakeholders in the public and private sectors, namely, farmers, engineers, agriculturists, researchers, educators, politicians and civil servants is essential and although it is a time consuming it is considered essential to the eventual ownership of any actions taken.

The lack of expertise and the extensive nature of consultation are unlikely to lead to a rapid conclusive or state-of-the-art solution. But it is essential that there is a locally owned consensus and that it is acted upon.

Capacity development is a complex process but complexity must not paralyze it. A framework such as the one proposed in this paper can provide a useful basis for discussions among stakeholders and for pin-pointing constraints and priorities.

Capacity levels	Activities of a well-functioning water sector (guiding principles: subsidiarity and participation)					
	Planning	Design	Construct.	O&M	Research	Education
IV Enabling env						
III Sector/network						
II Organisation						
I Individual						



The challenge is to find ways through the complexity and make useful contributions. Like irrigation engineering, it is important to appreciate the complex nature of irrigated agriculture but at some point the engineer must be able to interpret this terms of constructing a good irrigation scheme.

### 5.3 The role of donors and technical cooperation

Although it is accepted that capacity development must come from within, there is also an acceptance that the process can be supported and accelerated by outside help.

Partnership is the essence of collaboration between donor and recipient and not the traditional north-south dialogue. This is always difficult to deal with when one is seen to be giving and one is receiving. Establishing true partnerships is a challenge facing both but the cases in Pakistan and Egypt show examples of good and effective collaboration.

Identifying capacity constraints and helping both governments and the private sector to take action can be is one of the most effective ways in which external agencies can help. An outsider view can often help those inside to focus their attention on the big issues.

The stimulation that external technical cooperation encourages can help to speed up processes and broaden thinking.

Long-term collaboration influences the process positively, among others as trust and effective work relationships develop over time.

Some donors may prefer not to become involved in lengthy processes and prefer a project approach. The implications of this in terms of budgets, timing and outputs can be at odds with the process of capacity development. But there may be specific actions at the lower levels of organisations and individuals lend themselves more to the project approach – capacity development projects.

Donors need entry points into capacity development. Typically the organisation is the level at which donors wish to contribute technical assistance, budgetary or infrastructure support.

People selected to help develop capacity need much more than technical knowledge and skills. They should be capable of working in a participatory manner in the wider context of development and be able to convey such ideas to those who are being trained. This should be reflected in the selection process.

### 5.4 Organisations

It is at the organisational level that most countries suffer weaknesses. Most of the organisations supporting irrigated agriculture are government run but there is a growing input from the private sector. It is not a question of either one or the other but of the balance between them. The appropriate strengthening of both must be a priority in any strategy.

A good cadre of capable senior managers that can lead the processes of change is needed if organisations are to develop a good reputation and encourage the best people to join. Salaries are important but it is not the only criteria.

There are many advantages in working with existing organisations rather than inventing new ones. This may not always be attractive but new organisations can be a large drain on already limited management and administrative resources.

### 5.5 Individuals

Individuals are the heart of any organisation and their education and training must reflect the needs of irrigated agriculture and the roles they will play.

The 'people part of partnerships': Partnerships develop between people. While working together, more and better results will be possible over time, as mutual trust develops.

Manpower planning offers a tool for predicting the demand from manpower and a logical process for providing it through education and training. It focuses attention on the numbers of individuals needed, their skills and the education and training infrastructure needed to provide them.

Any strategy must address the young people who are less influenced by rigid organisations, are more flexible in their thinking, take risks and are ambitious to build their careers and make a worthwhile contribution.

### 5.6 Education and research

The capacity to educate future generations in the ways of irrigated agriculture and to undertake research to solve problems are

fundamental to the sustainability of irrigated agriculture. It is essential that both are given a high priority in strategy development.

Education is essential to develop the future cadres of professionals who will become the managers and leaders of organisations and capacity builders. To achieve this the development of capacity within colleges and universities and to some extent in schools will need to be considered.

Research to solve the problems of irrigation and drainage and to encourage the take up of new ideas may require developing.

Research can be most successful, when linked to investment projects, where it can show its value directly.

### **5.7 Sustainability**

Ensuring sustainability is still one of main challenges facing capacity development, particularly when it is supported by an external agency.

Sustainability is also a concept that requires careful thought. Should a training facility be sustained beyond its usefulness or should it be closed. Capacity development is not a fixed issue and any strategy must be flexible enough to meet changes in capacity needs.

## **6 CONCLUSIONS**

This paper has attempted to define more clearly what capacity development means for irrigated agriculture, using language and terms that have more identifiable and precise meanings, by reviewing the conceptual thinking of social scientists over the past decade and case studies that provide good examples of capacity development in irrigation and drainage. It is unlikely that a simple and satisfactory definition will eventually emerge. But one principle that is important to understanding what capacity development means is very clear both from the literature and from the practical examples, the methods used to build capacity are essential to its success. It 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.

All the case studies demonstrate this principle. They each involved the training of individuals and adopted the approaches of participation and subsidiarity. They attempted to do this in the context of the organisations and institutions in which the individuals work and in the wider context of improving irrigated agriculture and the livelihoods of farmers. Each involved external funding and sensitive approaches to technical cooperation that contributed positively to capacity development.

A simple definition may not be achievable but the review has shown that it is possible to make a clear statement about the territory of capacity development. For this a framework is proposed that bridges the conceptual approach to capacity development used by social science and the practical activities of a well-functioning water sector. This may also be a useful tool for pin-pointing areas that need attention and be helpful for discussions between partners in development so there is clarity of purpose on areas of constraint and what needs to be done. The case studies, that described some of the many and varied aspects of capacity development, helped to reinforce the usefulness of this framework.

Countries where there is significant reliance on irrigated agriculture are likely to seek a strategy for capacity development. For this reason some suggestions are made about the elements of a good strategy based on the framework and the practical experience of the case studies.

## **7 RECOMMENDATIONS**

This paper has demonstrated that it is possible to define the territory of capacity development in irrigated agriculture both in conceptual and practical terms. But much more is needed if people are to develop capacity in a structured way by building on the experience of others rather than trying to re-invent the wheel.

There is a great deal of knowledge and experience available from which others can benefit but it is not easily accessible. The following recommendations therefore address this issue of knowledge management.

The small number of case studies reviewed here demonstrate that there is a great deal of useful information available but it needs to be managed so that it is more accessible, particularly to developing countries, so that people can rapidly benefit from the experience of others. More case studies are needed that must go beyond the traditional descriptions of the irrigation set-up in a country and reflect all four levels of the proposed framework and the range of activities of a well-functioning water sector. To



achieve this, guidelines for capacity development that are specific to irrigated agriculture are needed based on the conceptual framework and the experience of others. These would set out practical approaches to analyzing capacity development needs, strategy development, advice on implementation, the role of donors and technical cooperation, and methods of evaluating impact. Suggesting that people write and publish is one way of getting the information needed for this but for various reasons it is unlikely to yield useful results, at least in the short term. The authors of this paper used personal interviews with capacity developers to obtain the 'real stories' about capacity development. So one approach that is recommended here is to use a similar mechanism, but on a larger scale, to bring capacity builders together in a structured consultation process to formulate the guidelines.

The objective of a consultation would be to obtain information on a wide range of recent capacity development initiatives, formulate the contents of guidelines to reflect all four levels of the proposed framework and the range of activities of a well-functioning water sector, and examine ways of managing this new knowledge to improve its accessibility. Options for communication could include the WCA-infonet knowledge management system<sup>[5]</sup> set up recently by IPTRID/FAO and the new FAO website devoted to participative training in water management<sup>[6]</sup>.

## 8 ACKNOWLEDGEMENTS

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[4] The term irrigated agriculture is used to define all the ways of controlling and managing water for agriculture in an environmentally responsible manner. It is about water control technologies and practices for the irrigation of crops, water harvesting, drainage to dispose of surplus and saline water and flood mitigation to protect people and land against water damage.

[5] [www.wcainfonet.org](http://www.wcainfonet.org) is recent addition to IPTRID/FAO networking activities and comprises a state-of-the-art Internet-based knowledge management system on water use in agriculture. It provides direct access to a wide range of information in many different countries. It is not just another website with connections to other sites – it contains only documents that have been approved by specialist editors. It has a section on capacity building and training and the author of this review is currently the editor of this section.

[6] The address of the FAO website devoted to Participatory Training and Extension in Farmers' Water Management is [www.fao.org/landandwater/aglw/farmerwatertraining/](http://www.fao.org/landandwater/aglw/farmerwatertraining/)