

**THEME: DEVELOPMENT FOR WATER, FOOD AND NUTRITION SECURITY IN A
COMPETITIVE ENVIRONMENT**

BACKGROUND PAPER – Sub-Theme 2

ST-2: Role of Civil Society and Non-State Actors with Focus on Farmers and Extension Facilities

Contributors:

Olcay Unver
Food and Agriculture Organization of the United Nations,

Melvyn Kay
Water management consultant, RTCS Ltd, UK

Konda Chavva
Food and Agriculture Organization of the United Nations

Amali Abraham Amali
Graduate Student, TH Köln, University of Applied Sciences, Cologne, Germany



ICID•CIID

International Commission on Irrigation and Drainage (ICID)

48 Nyaya Marg, Chanakyapuri, New Delhi - 110021, India

E-mail: icid@icid.org, Website: <http://www.icid.org>

Background Paper

Role of Civil Society and Non-State Actors with Focus on Farmers and Extension Facilities

1. INTRODUCTION

Coping with food insecurity from crop failures brought about by droughts and disease has long been a challenge for mankind. So too has the tradition of providing relevant and useful information services to help farmers deal with the problems. Various sources of information and advice are available in most countries but for various reasons there is still a dearth of support for many millions of impoverished smallholder farmers in many developing countries who struggle with poor literacy and lack technological know-how to improve their livelihoods.

Over the coming decades, significant changes are anticipated that will no doubt increase the challenges facing smallholders. Climate change and the uncertainties of seasonal rainfall on which many smallholders rely for producing food, rapidly growing populations in developing countries, and increasing pollution – too little to too dirty’ – all add the risks of both water and food security (Box 1). This is happening at a time when water resources management is shifting away from government planning and control to a more adaptive and flexible model involving many more stakeholders. Concerns about food security, once expressed only in the national and international media, are now commonplace in local media and serve to create anxiety among impoverished rural communities.

Box 1. After A Decade of Steady Decline, Hunger Is on The Rise Again

The number of undernourished people has increased to nearly 821 million in 2017, from 804 million in 2016 (FAO, 2018a). Most live in rural communities in water scarce regions¹ where a lack of water availability for agriculture can slow down the achievement of SDG 2 (of the United Nation's 2030 Agenda for Sustainable Development) that aims to end hunger, achieve food security and improve nutrition, and promote sustainable agriculture. Water scarcity and food insecurity go hand in hand.

Agriculture already accounts for almost 70% of all freshwater withdrawals and is seen as one of the key areas for future water-saving to bring future water demands into balance with available water resources. Much potential exists for improving water-use efficiency and water productivity in irrigated agriculture (Boutraa, 2010; IWMI, 2017; Unver et al, 2017).

Many governments continue to look to their smallholder farmers to increase food production and to find ways to “produce more with less”. Doing this requires not only boosting production but also improving nutritional productivity of water from planning irrigation systems and assessing their performance to extending advice to farmers (Lundqvist and Unver, 2018). Farmers will need incentives to produce more but they will also need to increase their capacity to cope with the changes taking place at a time when governments are seeking ways of reducing public spending and traditional state-funded agricultural support services are in decline. Smallholders will inevitably need to take more personal responsibility for developing their capacity. This is still about life-long learning – transferring good science from the laboratory to the field, putting innovative technologies into practice to increase their productivity, and developing the skills to engage with the commercial food value chains that link farmers to the markets and consumers. But farmers will need to find new ways of learning and rely more on their own resources, on the private sector, and on support from civil society organisations (CSOs) and non-governmental organisations (NGOs).

1 Countries are considered water-stressed if they withdraw more than 25% of their renewable freshwater resources. They approach physical water scarcity when more than 60% is withdrawn and face severe physical water scarcity when more than 75% is withdrawn (FAO, 2016).

This background paper examines the changing nature of farmer support services, particularly the increasing importance of agricultural water management and irrigation as water becomes the limiting resource for food production, how food markets are growing and can incentivise smallholders to produce more, and critically, how farmers are finding new ways of acquiring the knowledge and expertise they need to do this.

2. THE ADVENT OF FARMER SUPPORT (EXTENSION)

Advice to farmers on how best to use limited water resources to grow food has a long and chequered history highlighted by archaeologists who uncovered clay tablets used in Mesopotamia and inscribed with advice on watering crops. Extension services as we know them today emerged in northern Europe in the 1900s following major crop failures, droughts, and famine. Across Africa and Asia, farmer extension services emerged during colonial times as fledgling government departments of agriculture began to introduce agricultural education in schools, and missionaries brought agricultural advice alongside religious work.

Thus, began the formal structures for agricultural extension, organised predominantly by central and local governments, with support from agricultural colleges, research centres, and various farmer organisations. Government-run services matured as funding increased and staff were better trained and more professional. But the services also grew and changed. The demand increased from focusing on crop production alone to include specialist advisory services like irrigation water management, marketing, and sustaining rural livelihoods, and more recently advice on protecting the aquatic environments on which smallholder livelihoods depended. Services thus became more complex, costly to run, and inevitably more bureaucratic with distinct 'top-heavy' and 'top-down' hierarchical administrations.

Agricultural extension is still widely recognised as an essential mechanism for delivering information and advice to the many millions of smallholders, men and women, who still subsist on farms less than one hectare and struggle to produce enough food for their families. They do not always have access to improved seeds, fertilisers, irrigation, and finance and have little resilience to the natural elements such as floods, droughts, pests, and diseases, and to volatile market prices. Low motivation, poor literacy levels, a lack of technological know-how, and the high risks of failure, all conspire to constrain smallholders from entering the cash economy.

The demand for extension continues but governments, looking for ways to reduce public spending, can often find themselves unable to afford to fund. Let alone services that farmers have come to rely on. Many developed country governments have found it attractive to pass on the responsibility to farmers and to the private and voluntary sectors. Commercial farmers, profiting from advice are increasingly expected to pay for it.

These trends are beginning to take hold to some extent in the developing world as well. However, the case is much weaker in countries where farming still dominates national economies and where the priority for many millions of smallholder farmers is to increase food production both for their own needs and to support national food security. UNDP (2012) reported that poor rural infrastructure, weak institutions, poor research and access to innovative technologies, low productivity, reduced government investment and official development assistance, as well as limited engagement with the private sector, all hinder the process of commercialising agriculture.

2.1 Irrigation advisory services

Irrigation advisory services have grown alongside the traditional agricultural extension services as water resources can limit production. In 2002 Smith and Munoz classified irrigation advisory services promoted since the 1970s according to the different objectives and type of advice, target groups, service provider, and the different tools and communication methods used to reach irrigating farmers (Table 1). These are wide ranging services from specialist crop water scheduling to planning and design, and advisory services for on-farm irrigation practices for both large schemes involving many smallholders and individual smallholder farms.

Table 1: Irrigation extension services

Service	Details
Crop water management/ scheduling services	Advise farmers on when and how to irrigate. Different devices and tools are promoted to provide farmers with guidelines and instructions on how to determine the correct time and application depth of the irrigation. This is the type of advisory service most widely introduced in many developed countries.
Irrigation performance analysis services	The analysis of irrigation system performance. This is carried out by a specialized field survey team who measure in the field a number of key indicators to assess the efficiency and performance of an irrigation system.
Design and installation services	Advice on the investment and installation of irrigation equipment is of direct interest to the provider and a range of services are available from the private sector to provide information and advice on design and installation as well use and maintenance of the irrigation equipment. Two basic services may be distinguished, namely, irrigation equipment providers and irrigation system designers.
Environment and water quality services	Concern about the environmental degradation linked to irrigated agriculture has resulted in strict regulations and legislation in many countries. To advise farmers on environmental hazards and to have them to comply with the regulations, advisory services are set up to monitor chemical and biological water composition, groundwater depth and water quality, water logging and salinity conditions, health hazards related to water borne diseases
Irrigation management support services	Many governments have adopted policies to transfer the management of irrigation systems to the beneficiaries and farmers, as government agencies have proved unable to maintain the irrigation systems in a sustainable manner. A process of irrigation management transfer (IMT) was initiated plus the formation of Water Users Associations (WUA) as the local organisation to take over responsibility for operation and maintenance of the irrigation system. Participatory irrigation management (PIM) is the guiding principle with appropriate legislation put in place to facilitate the transfer process.
Agricultural advisory services	Although not directly to be classified under irrigation advisory services, agricultural services are nevertheless closely linked and need to be integrated in the package of advisory services to be provided to irrigation farmers.
Target group	
Large scale farmers	Predominant in developed countries. Individual approach possible as their resources and technical know-how are well advanced. Moreover, they will be able to pay for services offered, which provides opportunities for the private sector and makes the financial sustainability of such services much more achievable.
Small holders	Predominant in developing countries. The individual farmer is more difficult to reach and often he is unable to pay for such services. The agricultural extension service is in most cases the appropriate agency, which can effectively provide advice to farmers. However, knowledge and experience of the extension service in irrigation is very limited and technical messages need to be simple and adapted to knowledge level. In addition, farmers can be reached through radio, television and local meetings. Extension leaflets and posters are common tools for information dissemination.
Water user associations and farmer groups	Farmers groups and water users' associations managing a common water resource for irrigation require support and advice on the management of the irrigation system. Although their financial resources may initially be weak, they may be able to pay for advisory and consultancy services through water fee collection. Groups of individual farmers interested in advice on irrigation practices may be easier and more effectively reached as groups rather than as individuals. Farmer field schools and farmers field days are typical opportunities to introduce irrigation advice to individual farmers. Reference is made in this to the FAO Participatory training and extension approach, which is oriented towards the group approach.
Commercial estates	Commercial estates will have a strong financial management and are best able to appreciate advisory services and be willing to pay for them. In some cases, they will establish a dedicated unit for irrigation management within their own organisation

Support service providers	
Irrigation agencies	<p>The irrigation agency will typically have the national mandate for the development, management and monitoring of water resources for irrigation and drainage. In many countries emphasis has been traditionally on the planning and design of irrigation development and the responsibility for the management of the larger state operated irrigation systems. With the IMT devolution process initiated in many countries and resources for new development strongly limited, the role of the irrigation agency is changing into a more service-oriented agency in particular to support the water users associations in managing their irrigation systems.</p> <p>Many agencies are not yet well prepared for their new role, nor motivated and they have little capacity and means for this new role. There is a need to strengthen their ability as services providers through a process of training and capacity building.</p>
Agricultural agencies	<p>Although the agricultural agency provides by tradition an extensive extension service reaching all farmers including smallholders, their knowledge and skills in irrigation techniques are very limited.</p>
Irrigation extension services	<p>In a limited number of countries, a dedicated service has been established for irrigation in order to advise farmers in all aspects of irrigation, including the formation of water users associations. The financial resources to establish and maintain such services may however not be sustainable without financial support.</p>
Irrigation equipment suppliers	<p>The growth in modern irrigation equipment such as sprinkler and drip irrigation systems have resulted in a quite extensive and growing irrigation industry, which is interested in an effective information stream to potential clients. Their role in promoting relevant information often in close cooperation with regional irrigation agencies and irrigation research and extension services has become increasingly important in particular in developed countries.</p>
Non-governmental organisations (NGOs)	<p>Several non-profit organisations with special aims directed to social development or environmental concerns can play a role in providing relevant advice to individual farmers and farmers groups. The introduction of the treadle pump for irrigation in Asia and Africa is a good example of the role of the international NGOs in demonstrating the technique and in establishing the local manufacturing and service capacity.</p>
Private consultants	<p>Where farmers are able to pay private consultants can play a highly successful role in irrigation advisory services. They have proved successful in providing irrigation scheduling services and field evaluation assessments.</p>

Smith and Munoz identified several constraints that have limited the effectiveness of services:

- (a) Irrigation scheduling developed by research institutes are not user-friendly
- (b) Irrigation management advice defined by irrigation experts who do not always respond to the needs and priorities of farmers, thus low acceptance rates
- (c) Complexities of good irrigation management not easily translated into simple operational guidelines for farmers
- (d) Irrigation advisory services linked to development projects with limited time duration and thus not sustainable beyond the project life
- (e) State training and advisory services have low priority and limited funding
- (f) Services have limited reach because of a lack of staff and communication facilities.

The authors overall assessment was that although some farmers had profited from the services and were actively adopting new technologies, generally experiences were mixed. They also commented that in many cases the demand for irrigation advice was based on the desire of planners, water resources developers, and irrigation experts to see that less water was withdrawn for irrigation.

Unver et al (2017) argue that water managers, regulators and those involved in broad management performance tend to use measures of efficiency, while farmers are more interested in productivity. As a result, irrigation management advice does not always respond to the real interests and priorities of farmers, and results in low acceptance rates.

3. TAKING RESPONSIBILITY -- WORKING TOGETHER

As public services have declined or were already weak, and in some fragile states, did not exist, the challenges facing farmers have not gone away. They continue to face a common set of challenges around water security – economic water scarcity, under-investment in infrastructure, and weak organisations and institutions. Common challenges can bring people together to collectively resolve problems and take responsibility for their livelihoods.

3.1 CSOs, CBOs, and FBOs

As water resources management shifts from “water government” to water governance, civil society organisations (CSOs) are closing the gaps left by inadequate ‘formal’ state services. They are playing integrative roles by bridging the current stream of ideas on the importance of good water governance with sustainable growth and the common interest of citizens (Wetlands International, 2017).

CSOs is a ‘catch-all’ term for a wide range of informal networks within communities that collectively provide benefits to their communities (Box 2). Community based organisations (CBOs) are a form of CSO that work specifically within and for the benefit of a community. In the more fragile states CSOs are usually the only institutional structures within communities, whereas in states with declining state services, CSOs usually complement or replace them.

Farmer-based organisations (FBOs) are another form of CSO and have grown out of a desire among smallholder farmers to work together for their mutual benefit. Examples of FBOs include Water User Associations (WUAs), farmers’ credit unions, and producer groups. Such groups are becoming increasingly important as they provide a mechanism for smallholder farmers to engage with the private sector.

Box 2. CSOs, CBOs, FBOs, and NGOs

Some definitions but the lines between them are not always clear and are disputed.

Civil society organisations (CSOs) are a ‘catch-all’ for any group of people working towards a common goal. They are usually voluntary organisations and are separate from the State and the market. They include NGOs, professional associations, social partners, and universities that can play an important role in improving local ownership of development processes.

Community-based organisations (CBOs) is essentially another name for CSOs that work specifically within communities and neighbourhoods. They are non-profit and are synonymous with community work and development.

Farmer-based organisations (FBOs) are another form of CSO. They are groups of commodity-based and market-oriented smallholder farmers who agree to work together to market their produce. They may also cooperate on the inputs needed to enhance productivity.

Non-governmental organizations (NGOs) are a form of CSO but usually they are more formally structured and registered with government. They are non-profit organizations, independent of government and funded by donations, though some rely primarily on voluntary inputs. They engage in many activities but in the context of this paper this include natural resources management initiatives, like sustainable water management, and working with farmers to build capacity, improve farm productivity and incomes, develop links between farms and markets, and engage in sustainability issues that are also important for rural livelihoods.

3.2 NGOs

Some consider non-governmental organisations (NGOs) as CSOs. They are organisations that support farmer groups and have two main roles: service delivery and advocacy. They operate in most countries and range from small, local grass-roots organisations to large organisations that are almost indistinguishable from state and international institutions (Box 3). Their value comes from being rooted in the societies they serve and their independence of actions that otherwise limits governments and market organisations. International development donors often see them as an effective means of interacting directly with civil society and working in the interests of the poor. When state institutions are weak, or do not exist, NGOs are often the only source of basic services to poor communities.

Box 3. Global Water Partnership – An International Network Works Through CSOs

In the water sector, an international network like the Global Water Partnership² (GWP), which promotes integrated water resources management (IWRM), relies on CSOs in member countries to provide effective two-way communications that ensures the needs of the public are made known to government and vice-versa. They encourage the public, as water users and taxpayers, to actively participate in planning and managing water resources.

Since the 1980s, NGOs have typically stepped in to provide access to information on agricultural development when public services, such as research and extension do not have the capacity to reach out to farmers. They provide a range of support services to farmers such as advice on finance and credit, marketing, insurance, and legal matters, and can act as brokers to establish links between rural populations and other support services from the state and the private sector. They can help to communicate farmer problems to governments through advocacy and hold governments to account for their rural strategies and activities.

Some NGOs are developing a professional outlook by providing specialised technical and consultancy services, manage microfinance institutions, and commercialise agricultural products. They occasionally keep NGO status because of tax privileges and donor preferences to work with NGOs but many are being encouraged toward private business status (Box 4).

Box 4. NGOs Transfer Treadle Pump Technology to Africa



Treadle pumps are low-cost, simple human-powered suction pumps designed to replace engine-driven pumps to lift water from shallow depths to irrigate smallholder farms of 1-1.5 ha. The Lutheran World Federation (an NGO) developed the pump in Bangladesh in the 1970s using local materials to help lift impoverished farmers out of poverty. NGOs like, IDE, Kickstart, and others introduced and re-designed the pump for use in sub-Saharan Africa with considerable success. Some treadle pumps have now been adapted to sprinkler and drip irrigation systems.

Although the current number of pumps installed is not known, it is estimated that there are many thousands used in Bangladesh, India, Kenya, Malawi, Niger, Zambia, and Zimbabwe. With pumps cost less than US\$150 and some NGOs have established supply chains for spares and pump maintenance and entry points for farmers into commercial food markets.

Sources: Practical Action³; Kay & Brabben, 2000

3.3 Building social capital

Sustainable development requires us all to look beyond technology transfer and human capital development to increasing social capital which is about building community processes for collectively managing scarce resources.

CSOs form part of a community's 'social capital' – broadly meaning the trust that grows as people, work together for a common cause. This plays an important part in the lives of poor people who tend to invest heavily in social cohesion for their survival. When communities are cohesive, they are better positioned

2 https://www.gwp.org/en/learn/iwrm-toolbox/Institutional_Arrangements/coordination_and_facilitation/Civil_society_organisations/

3 <https://www.goldstandard.org/projects/treadle-pumps-project>

to attract government and NGO resources. International NGOs also rely on social capital to influence development.

Thus, external support from donor aid or NGOs to strengthen CSOs can be beneficial but there is always the risk that imposing new rules can overwhelm local CSOs rather than enhance them (Allouche, 2014). An appropriate and productive balance is needed between formal and informal service delivery, water governance mechanisms, and appropriate investments.

3.4 Small is beautiful but...

CSOs tend to work with small groups of farmers and although Schumacher (1988) suggested that 'small is beautiful', too many small activities can create land scape problems which need catchment, regional, or national level solutions for sustainable development. A most prominent example in irrigation is the over-exploitation of groundwater. Many millions of smallholder farmers have been successfully lifted out of poverty by pumping groundwater for irrigation to supply produce to lucrative urban food markets. But the abstractions are largely unregulated and unsustainable as evidenced by falling groundwater levels and aquifer contamination through salt intrusion (Shah, 2014). In this case, the challenge becomes one of strengthening formal state institutions and human capacity that can regulate groundwater abstraction but work with the informal (bottom-up) systems rather than try to replace them. (see Section 7 Working together at a landscape level)

4. 'COMMERCIALISING' ADVISORY SERVICES

Smallholder farmers, despite all the problems they face, are still the bedrock of agri-food supply in most developing countries, but they are facing immense change. Most have only known subsistence farming and government support services, they now face the uncertainties and unprecedented growth in domestic markets, and a wave of investments by local and international food manufacturers and retailers that want to supply food to domestic consumers and for export (Vorley et al., 2008). Modern food markets are driven by increasing urbanisation, economic growth, and consumer preferences. The traditional public sector-led agro-industries are giving way to the private sector, businesses and food retailing have grown and are adapting to these changes (UNDP, 2012).

The good news is that modern markets offer the 'pull' that encourages smallholders to produce more and increase farm income. They increase economic opportunities for producers, particularly those who grow high-value crops, like fresh fruit and vegetables. Markets can incentivise smallholders to adapt to these changes, but they must also learn that markets bring risks of over-production and low prices which can threaten the inexperienced. Irrigation offers more farmer-control over timeliness of supply, and produce quantity and quality which are essential components in producing food for increasingly sophisticated urban customers.

There are many examples of agro-business investment across sub-Saharan Africa, like fruit concentrate processing in Nigeria, soya bean and other oil seed plants across east Africa and grain production to replace imports to serve the brewing industries (UNDP, 2012). Although buyers usually favour large-scale suppliers, in many developing countries they do not exist, and so the biggest challenge for modern agri-food businesses is how to engage with the many thousands of smallholder farmers and organise the supply of produce that delivers the benefits of logistics, economies of scale, traceability, and private sector standards (Vorley et al., 2008). However, businesses are wary of high transaction costs, and large numbers of fragmented smallholders are seen as high-risk, unreliable, and lacking technical skills and technologies to produce the right products at the right time (quality, timeliness, and consistency).

4.1 Smallholder business models

Some agro-industries have established large farms to ensure supplies, but many realise that resilience depends on sustainable development and working with smallholders who own and farm the land. Agro-industries have searched for business models ("what a company does and how it makes money from doing it") that are sensitive to emerging markets, include smallholder producers and address the needs of processors and retailers to manage costs and risks (Rwelamira, 2015). Three workable models have emerged that link smallholder farmers to agribusiness and changing markets (Table 2). Complementing the models is the growth in support services for smallholders, often provided by the link companies in the value chain, rather than by the state. They tend to be integrated services focused on producing the

crop, rather than the 'siloes' of public services with specialists focused on soil management, pest and disease control, water management and irrigation.

Table 2. Typical business models for smallholder producers. Source: Vorley et al., 2008 in Rwelamira 2015

Model	Driver	Motivation
Producer driven	Smallholder groups, Farmer-Based Organisations (FBOs), associations, cooperatives	Access to new markets, increased bargaining power, access to inputs, technical assistance, secure market position, farmer empowerment
Buyer driven	Processors, retailers, exporters, traders, wholesalers	Access to land, supplies, increase volumes, supply niche markets
Intermediary driven	NGOs, development agencies, governments	Local and national economic development, farmer empowerment

4.1.1 Produce-Driven

Producer-driven models are smallholder-based groups that form with a collective desire to participate in a market though they have had a mixed record in providing members with economic benefits in accessing markets (Vorley et al., 2008).

4.1.2 Buyer-Driven

Buyer-driven models tend to be more robust. They centre around commercial companies that approach existing FBOs or act as a catalyst to form them, and provide finance, agricultural inputs, and technical advice. The company provides specialist extension staff to advise farmers on all aspects of production, harvesting, storage, and transport. Irrigation advice would be an integral part of the extension package rather than some separate service. The sugar industry in South Africa is an example of this approach. It encourages smallholders to engage with commercial sugar producers. Sugar companies usually have large estates that supply cane, but they rely also on supplies from both local commercial farmers and groups of smallholders surrounding their estates. The sugar producer provides the inputs and technical advice for growers who would not normally be able to afford such services. The growers benefit from an assured income and the company benefit from additional and flexible cane supplies.

4.1.3 Intermediary Driven

A third model uses NGOs as intermediaries to encourage commercial companies to engage with FBOs and equally to encourage and train farmers to form FBOs in readiness for engaging with private companies. There are many ups and downs but there are cases where FBOs led by NGOs and the public sector can work well especially when the NGO has a strong business development focus. Important too, are a clear and consistent focus on the business case and a timeline for removing the support. NGOs taking on this role also need strong managerial structures and financial support from donors and charities on a par with the businesses they engage with. Equality of power and standing among the company, FBOs and the NGO engenders trust that is essential to building the business relationships between companies and FBOs.

An example of an NGO as an intermediary is Kilimo Trust⁴: a Ugandan-based NGO with strong business experience (Box 5) (Kilimo Trust, 2011). Others include FARM-Africa and Farm Concern International, long established and well-funded NGOs operating across east Africa, with the capacity to organise farmers groups and link them to the value chain groups⁵.

In Bangladesh, there is a spectrum of institutions formed by farmers and many are supported by NGOs. BRAC⁶ is a prominent national NGO engaged in supporting FBOs that also operates internationally.

4 www.kilimotrust.org

5 www.farmafrika.org and www.farmconcern.org

6 BRAC was formerly Bangladesh Rural Advancement Committee <http://www.brac.net/>

International NGOs undertaking similar work in Bangladesh include Action Aid, Save the Children, and World Vision (FAO, 2014).

Whatever the approach some form of grouping or organisation is crucial if smallholders are expected to engage with the value chain (Rwelamira, 2015).

Box 5. Kilimo Trust Links Smallholder Farmers with Markets

Kilimo Trust (KT) is a Ugandan based NGO, established in 2005, and funded by various international aid and charitable organisations including Bill & Melinda Gates Foundation, GIZ and many others. It supports smallholder farmers, typically farming 1-1.5 hectares to engage with markets and agri-businesses. KL works to establish FBOs and connect them with a lead commercial company already established in the value chain. They also assist FBOs to select suitable input suppliers and other services they will need to meet the exacting standards and requirements of the value chain. Between 2011 and 2018 KT has helped over 137,000 smallholders across east Africa to access markets using this approach. KL often works through small NGOs with local knowledge of producers, markets and commercial companies. KT supports irrigation interests as one of the many skills farmers need to work in the commercial sector.

How big is an FBO? – The ‘30-ton truck’ story

KT say that if you have enough good quality produce to fill a 30-ton truck and it can be reliably brought together in one place for collection then both smallholder farmers and transporters can profit from accessing markets. The challenge for smallholder farmers is to work together so they can bulk their produce. This means understanding the demands of business, appreciating contractual arrangements, and producing quality products on time.

Millers provide extension services to rice growers

Rice is the fastest growing food source in Africa with annual demand growing at close to 5%. In 2014 K initiated a 4-year programme across Burkina Faso, Ghana, Nigeria, and Tanzania to increase both irrigated and rainfed rice production among 30,000 smallholder farmers with the aim of doubling farm incomes. KT provided matched funding to eight rice-milling companies with established value chains to work with local FBOs and to bring them into their value chain. FBOs were formed and contracted to supply the millers with rice who in turn provided on-farm support services and inputs, including micro-finance, and market access. Irrigation advice was an integral part of the support package. Over the 4-year period, irrigated rice yields increased from 2 to 4 Tons per hectare (rainfed yields increased from 1.5 to 3.6 Tons per hectare) and average annual farm incomes increased from US\$86 to US\$338 for irrigated rice (rainfed from US\$55 to US\$108).

Source: Kilimo Trust, 2018

5. DEVELOPING CAPACITY

“Strong formal and informal institutions and human resources underpin good water governance. However, there is an acute lack of capacity, which is constraining the development and management of water resources in all its facets in most developing countries, particularly across sub-Saharan Africa and South and South-eastern Asia.” UN, 2018.

The United Nations synthesis report on SDG 6 (UN, 2018) drew attention to the fact that this is not a new problem, it is one of the leading constraints to water-related development for decades. FAO (2018b) reaffirmed these concerns and the need to strengthen capacity on family farms.

The need for comprehensive capacity-development programmes to create a cadre of specialists and technicians is well recognized. However, funds are often allocated for developing infrastructure rather than people. FAO (2004) reported serious deficiencies in human capacity among rainfed and irrigating farmers and institutional capacity among state organisations that traditionally provide support to farmers. Such criticisms are widely accepted among water professionals and aid agencies, although hard evidence to support the claims is sparse. However, indirect evidence comes from research that links water and economic growth (Sadoff et al., 2015). This shows that highly variable and ‘difficult’ hydrology, which affects most developing countries, and low investment in water security leads to low growth. In turn this implies not only a lack of funding but also a lack of institutional and human capacity to absorb investment.

Smallholders require finance, infrastructure, and technology, but they are not substituting for knowledge and skills needed to take advantage of them. Capacity is often expressed in negative terms, like a lack

of capacity or inadequate capacity but this attitude is linked with past ‘top-down’ management approaches that set objectives for state organisations and encourage spending on infrastructure with ‘bolt-on’ training programmes. This was often followed by disappointment when the objectives were not met (ASARECA, 2007). A more positive approach is now emerging that puts capacity at the heart of sustainable development which suggests that public and private bodies should support smallholders to define their own path for development including their capacity to meet their aspirations. Farmer-led irrigation is an initiative led by Growing Africa’s Agriculture (AGRA)⁷ and the World Bank⁸ to unlock innovation, entrepreneurship, and positive change among smallholder farmers.

Embedded in capacity development is participation and empowering people to take responsibility for their own livelihoods. This includes developing individual capacity through education and training for farmers and professionals; organisational capacity, through water user associations, extension agencies, and private sector companies; and the capacity of states to create a socio-economic environment in which organisations and private companies can function and prosper.

The nature of smallholder farming and FBOs, will mean that the traditional ‘top down’ extension of ‘one size fits all’ messages will no longer be appropriate. Smallholders will still need extension, but agents will need to deal with a whole range of local farming issues as they try to identify problems, teach smallholders, and learn from them while working as facilitators rather than decision-makers – offering them a ‘shop window’ from which smallholders can select options that suit them.

Participatory approaches have proved to be an effective way of engaging with smallholders to adopt good water management practices and technologies. These include FAO’s programme in Participatory Training in On-farm Water Management and the Farmer Field Schools (FFSs). FFSs have helped increase production, productivity, and income in rural households (Davis et al., 2010). Effective communication strategies used in advisory services include farmer field days, farmer meetings, and in more recent times web-based information, mobile phones, radio and television (FAO, 2008; GFRAS, 2019).

More direct links between smallholder groups and research will become important rather than the ‘top down’ approach of promoting research through extension agents. Many researchers do not understand smallholder problems as is evidenced by the limited use of indigenous knowledge when researching new technologies. They will need to ensure their research is demand-led and directly addressing the needs of smallholders. The concept of ‘research farmers’ needs more exploration as more research is done on-farm. While researchers must learn to engage with smallholders, smallholders must also learn how to work with researchers if they are to benefit from their expertise and speed up farmer adoption of new technologies (ASARECA, 2007).

Capacity to produce more will also come from technological changes. Rural electrification using solar energy and cell phones can strengthen extension, advice, and expertise, and provide real-time information on irrigation, on-farm processing, and market advice. Opportunities may also exist for adopting biotechnologies and producing bio-fuels close to where they will be used, thus substituting for imports and generating off-farm income.

6. MAINTAINING CSO/NGO SYSTEMS POST-SUPPORT PERIOD

Most efforts to establish extension support services start with financial and at times, logistic seed inputs from the government or multilateral funded projects. The efforts run well as long as the necessary inputs, like funds for day-to-day operations are available. However, once communities are approached to pay for the running and operations costs, the problems of sustainability take over. Many times, corpus is provided which can generate adequate returns for maintaining the core services of the CSO/ NGO. Due to inflation and other effects, the corpus becomes insufficient and additional financial resources are needed to maintain the services. The beneficiary groups should see adequate value in continuing to pay some of their income towards upkeep of the entity. One example is Amul cooperative which has become a leader in the white revolution in India. This business model which makes economic sense to all levels

⁷ <https://agra.org/what-is-farmer-led-irrigation-unlocking-innovation-for-livelihood-food-and-water-security/>

⁸ <http://www.worldbank.org/en/news/feature/2018/09/05/innovation-entrepreneurship-positive-change-join-the-farmer-led-irrigation-revolution>

of beneficiaries from the grassroots level to a corporate manager. Some water user association efforts are not able to ramp up, and are thus constrained when formulating demands for water from the government.

Entities involved in water management should be long-lasting and self-supporting. Water being part of the common pool resource, community participation and adjustments of concerns at inter-community level extending up to inter-regional level is necessary otherwise, the local policies adopted in a micro-context may harm the overall allocation and equity regime in downstream regions. In such cases, long-surviving CSO networks can help to resolve conflicts at regional level.

7. WORKING TOGETHER AT LANDSCAPE LEVEL – CASE STUDIES

There are many situations when CSOs/NGOs help lots of individuals and small farmer groups to improve their livelihoods and in doing so they create big problems at a landscape level⁹. They cannot solve them as individuals or small groups; they require a collective approach on a much larger scale. It is often referred to as the ‘tragedy of the commons’, when one group of smallholders takes action to sustain their livelihoods which begins to capture or degrade resources to the detriment of other groups and the ecosystems on which they all rely (Ostrom, 1990). In the absence of strong national institutions, CSOs/NGOs are stepping into the governance role to help communities to create sustainable solutions.

In 2011, FAO reported that in some regions, achievements in food production were associated with degrading land and water resources and causing related ecosystem goods and services to deteriorate. Changes in land use reduce water availability and quality, and in turn water shortages and poor water quality affect ability to produce more from the land. As GWP (2016) pointed out, farmers are often in danger of ‘killing the goose that lays the golden eggs’.

Smallholder farmers rely on aquatic ecosystems for services like clean and reliable water, soil fertility, and pollination. But they also need to protect the systems on which they rely. This means engaging all those involved to develop a deeper understanding of their landscapes and resource availability; prioritise actions and design appropriate strategies for effective resources management. Involving economically and socially marginalised groups is an essential part of this process as they are often the most vulnerable.

FAO has developed natural resource management models that involve working with diverse stakeholders within a landscape to define shared productivity and sustainable management objectives and identify capacity gaps. This includes working with local extension services and CSOs to develop capacity and build social capital (FAO, 2017a, b).

7.1 In India

The Andhra Pradesh Farmer Managed Groundwater Systems project, coordinated by FAO, demonstrated that Indian farmers in Farmer Field School (FFS)¹⁰ groups could work together at landscape level and reduce over-exploited groundwater. Community members collected and shared groundwater data, estimated water available for the dry season crops, and reduced abstraction while improving crop production. Likewise, a project used the same farmer groups using an FFS-style intervention to help farmers to adapt to climate change at a local community level (Box 6).

7.2 In the Near East

In Jordan, CSOs/NGOs stand as the only refuge between farmers and government in areas where public trust is either broken or on the brink of collapse. This highlights the fragility in the country and the key role that CSOs/NGOs are playing as they have stepped in to bridge the gap between people, research, and governance.

In the Jordanian ‘Badia’ – or desert, CSOs/NGOs are creating the link between researchers and smallholder farmers to restore and sustain their livelihoods. The Badia experiences extremes of land and water degradation and climate change is just making the situation significantly worse. This is an

⁹ Landscapes are contiguous areas with common ecological, cultural and socio-economic characteristics (WWF, 2002)

¹⁰ <http://www.fao.org/3/i2561e/i2561e01.pdf>

importance ecosystem in Jordan, it covers a large area and the risks of degradation are compounded by smallholder farmers who have to contend with low and unreliable rainfall, depleted groundwater, and salinization, all of which are rendering farming uneconomic.

Box 6. Farmer-Managed Groundwater Systems in Andhra Pradesh

The Andhra Pradesh Farmer Managed Groundwater Systems project demonstrated that it is essential for smallholders within a hydrological unit to understand groundwater recharge and balance, and the effectiveness of working together as a community to sustain their livelihoods. A participatory hydrological monitoring programme was established to build **farmers' groundwater knowledge**, data, and skills and 638 Groundwater Monitoring Committees (GMCs) were formed at village-level to monitor local groundwater resources. These were federated into 63 Hydrological Unit Networks (HUNs) at the hydrological unit level. The GMCs and HUNs in each hydrological unit estimated the total groundwater available and planned cropping systems that were climate resilient and matched with water availability.

The farmer-led GMCs disseminated information to the entire farming community within each hydrological unit and acted as pressure groups. This encouraged water-saving and harvesting projects, promoted low investment organic agriculture and helped formulate rules that would ensure inter-annual sustainability of limited groundwater resources. The results were positive across most of the pilot area. Groundwater abstraction was substantially reduced through diversified cropping and water-saving practices and farm income increased.

A key outcome was farmer-to-farmer outreach. Farmer participants adapted local art forms, symbols, and materials to demystify groundwater science and disseminate key messages on groundwater management. The government acknowledged this approach as an effective model for groundwater management and adaptation to climate change in rain-fed areas of the country.

Source: World Bank, 2010

Restoring the Badia is being piloted by ICARDA and researchers work through CSOs/NGOs to improve traditional rainwater harvesting techniques and diversify agriculture away from traditional, and vulnerable, monocropping. Techniques are being re-introduced to improve 'green' water, utilization like contour ridges and furrows, runoff strips, and bunds, which also minimise soil erosion, capture sediment runoff, and increase soil fertility. Other examples of CSO/NGO involvement in Jordan are described in Box 7.

Box 7. CSOs Support Smallholders in Water Scarce Jordan

Re-using wastewater for agriculture in Amman

In Amman, Jordan's capital city, CSOs have worked closely with farmers to debunk socio-economic myths about re-using (grey) wastewater for irrigating food crops. One in every six household in Amman practices urban agriculture and there is stiff competition between domestic use and agricultural water consumption heightened by high water prices. Many households practice both rainwater harvesting and re-use of grey water for agriculture which has increased household incomes by US\$70 in a country where the average monthly income is about US\$130. This is mostly attributed to the work of CSOs/NGOs in raising the capacity of smallholder farmers to increase production, explore new water management techniques and agricultural practices that are helping to increase farmer incomes and food insecurity in a water scarce region.

Irrigation champions and WISE Irrigators (Hakim) in Azraq Basin (2)

Turning the now brown Azraq Lake back to its original blue colour is a laudable goal but doing so threatens local smallholder farmer livelihoods and food security that abstract lake water for irrigating their crops. Striking a balance between **sustaining and improving the lake's aquatic ecosystems** and the needs of farmers proved difficult for government which lacked trust among local farming communities. To resolve this, local CSOs/NGOs stepped in and have teamed up with research institutes to work with smallholders and develop Irrigation Champions and WISE irrigators or Hakim as locally known. Irrigation champions focus on training and licensing local university graduates as water/irrigation supervisors and experts. Hakim is a title solely reserved for farmers who adopt Water Innovation technologies and the services of the Irrigation Champions. The competitive and highly prized title has increased water-efficient irrigation technology adoption rates, and this has stimulated local industries to provide irrigation services.

Source: Mougeot, 2006

7.3 In Guatemala

In Guatemala, CSOs/NGOs have entrenched and facilitated gender networks to safeguard water quality and ecosystem services (Colom, 2015). The “River Contract”; as a participatory management tool in the pilot Matarraña river basin emphasises the ability of CSOs/NGOs to help avoid complex political frameworks and ensure dialogue to resolve water-related conflict. From cities to farmlands, NGOs and (especially) CSOs have played pivotal roles in achieving the desired level of integration by acting as catalysts, citizen representatives, capacity builders, service providers and information brokers. In agriculture, CSOs/NGOs represent the interest of smallholders; provide technical expertise, knowledge, and capacity; serving as policy watchdogs to ensure transparency and accountability from her position of independence.

8. CONCLUSIONS AND FUTURE OUTLOOK

This background paper examined the changing nature of farmer support services, particularly the increasing importance of agricultural water management and irrigation as water becomes the limiting resource for food production; how food markets are growing and can incentivise smallholders to produce more, and critically, how farmers are finding new ways of acquiring the knowledge and expertise they need to do this.

Despite their many problems, smallholders are still the bedrock of food production in most developing countries and governments continue to look to them to ‘produce more with less’. Most have only known subsistence farming, and though many have benefited from state-funded support services, these are now in decline as governments seek ways of reducing public expenditure.

Smallholders will inevitably need to take more personal responsibility for developing their capacity. They will increasingly need to rely on their own resources, on the private sector, and on support from CSOs (includes NGOs) to acquire knowledge and skills, and build social capital so they can confidently engage with commercial value chains that connect farmers to food markets. CSOs are beginning to close the gap left by inadequate ‘formal’ state services by helping farmers to help themselves by forming producer groups to tackle issues collectively rather than on their own.

New business models are emerging that ‘commercialise’ advisory services driven largely by ‘market pull’ which encourages smallholders to produce more. There are a growing number of examples of agri-businesses learning how to engage with the many thousands of smallholder farmers, and equally, how smallholders are learning to organise themselves so they can respond to agri-business needs. CSOs are helping to build the valuable links between business and smallholders and the links between agricultural research and smallholders that overcome the inadequacies of traditional extension services. Irrigation, as part of an integrated approach to service provision, offers more farmer-control over timeliness of supply, and produce quantity and quality which are essential components in producing food for increasingly sophisticated urban customers.

In the absence of strong national institutions, CSOs are also stepping into governance roles to help communities create sustainable solutions for landscape level problems like sustaining aquatic ecosystems on which farmers depend for ecosystem services. However, care will be needed at this level to ensure an appropriate and productive balance between formal and informal service delivery, water governance mechanisms, and appropriate investments.

There are wide-ranging services for irrigators from specialist crop water scheduling to planning and design, and advisory services for on-farm irrigation practices for both large schemes involving many smallholders and individual smallholder farms. But advice from irrigation experts has not always been well received. Support needs to respond more to the real interests and priorities of farmers rather than the desires of water resources managers and researchers.

Essentially, all CSOs form part of a community’s ‘social capital’ – broadly meaning the trust that grows as people, come together for a common cause. This plays an important part in the lives of poor people who tend to invest heavily in social cohesion for their survival. When communities are cohesive, they are better positioned to attract government and NGO resources

Finally, capacity is still the main constraint as support has always been for infrastructure rather than on capacity development. However, there are signs that this is changing as the private sector and others

focus on production and are beginning to support smallholders with the wherewithal to produce the goods. Technology too is helping with rural electrification, solar energy and cell phone which strengthen extension and empower farmers with market knowledge.

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