

# Introduction

## Challenges facing farmers in the East Africa region

The value of farming is on the rise again. After years of neglect, smallholder farmers—the lynchpin of rural production—are resuming their position as a major focus for development (World Bank, 2013). In part, this reflects a broad international consensus<sup>1</sup> that land, soil, and water are part of an emerging ‘critical nexus’<sup>2</sup> of issues facing the world’s population. By mid-century, around 9 billion people will require food security and much of this will still be derived from rural production systems, placing these systems at the heart of the sustainable development agenda.<sup>3</sup> The high demand side driven by population growth is accompanied by uncertainty on the supply side: climate variability and associated rainfall extremes are changing farming practices, including those in East Africa (Kristjanson et al., 2012); already there are signs that future risk – and perception of risk – is shaping the current actions and decisions of rural populations. As atmospheric warming alters the boundaries of agroecologies and shifts the hydrological cycle, these impacts will intersect further with a range of other factors, including the spread of pests and vectors of human and livestock diseases. Political-institutional environments will, in turn, respond through policy in a range of sectors, shaping the ways in which future generations perceive and experience farming as a livelihood system.

Other secondary impacts that are part of this critical nexus and that may cause additional impacts on farm productivity include demand for biomass energy. Many East African landscapes are already severely denuded, with loss of tree cover to fuel household demand for energy to cook and heat rendering soils increasingly vulnerable to extreme weather events. A critical nexus of energy, water, food, and land issues is now at the hub of global policy debates and represents a form of ‘wicked’ problem requiring multidirectional and multilevel solutions (Allouche et al., 2014). Simple solutions will not work and context will be all-important, including the wider policy and support environment that can encourage greater gender equality, address rights issues and access to resources, and ensure that decision making at a local level is grounded in effective knowledge systems.

Currently, much global policy—including at a regional level in East Africa—emphasizes irrigation development to meet food demand. Whilst this is an important approach in some contexts, there are recognized limits to how far this can expand in many parts of the world.<sup>4</sup> By a large margin, most farming in East Africa and in many parts of the world is rainfed. Better management of rainfed agriculture and/or use of supplementary irrigation at an appropriate scale can achieve significant long-term impacts. This understanding is at the heart of the water-smart agriculture (WaSA) concept and forms the backbone of this sourcebook.<sup>5</sup> In its simplest sense, WaSA is an approach to farming that balances water availability, access, and use across the range of water sources, according to principles of socioeconomic, environmental, and technical sustainability. It seeks to maximize returns for farmers while protecting ecosystems and ensuring more equal outcomes within farming communities. Central to the concept is continuous learning through which farmer experience is increasingly part of action research approaches that feed back into decision making at local and national levels.

A core focus of WaSA is the crucial impact that women farmers in particular can have within learning-based approaches. This gendered dimension is central to WaSA. A recent report by the World Bank (2014) shows that a key hindrance to agricultural development and broader growth is the wide and pervasive gender gap in agricultural productivity. While women comprise nearly half of the labor force in Africa’s agriculture sector, and more than half in several countries, on the whole, they produce less per hectare than men (World Bank 2014).

<sup>1</sup> 2014 was the FAO International Year of Family Farming; the African Union Year of Agriculture and Food Security; and 2015 is the International Year of Soils.

<sup>2</sup> The idea of a ‘critical nexus’ emerges out of the related concepts of the water-food-energy nexus and ‘nexus development’.

<sup>3</sup> [http://www.ifad.org/events/gc/38/doc/conceptnote\\_e\\_web.pdf](http://www.ifad.org/events/gc/38/doc/conceptnote_e_web.pdf)

<sup>4</sup> [http://www.fao.org/fileadmin/user\\_upload/esag/docs/AT2050\\_revison\\_summary.pdf](http://www.fao.org/fileadmin/user_upload/esag/docs/AT2050_revison_summary.pdf)

<sup>5</sup> <http://www.gwieastafrica.org/water-smart-agriculture-podcast/>

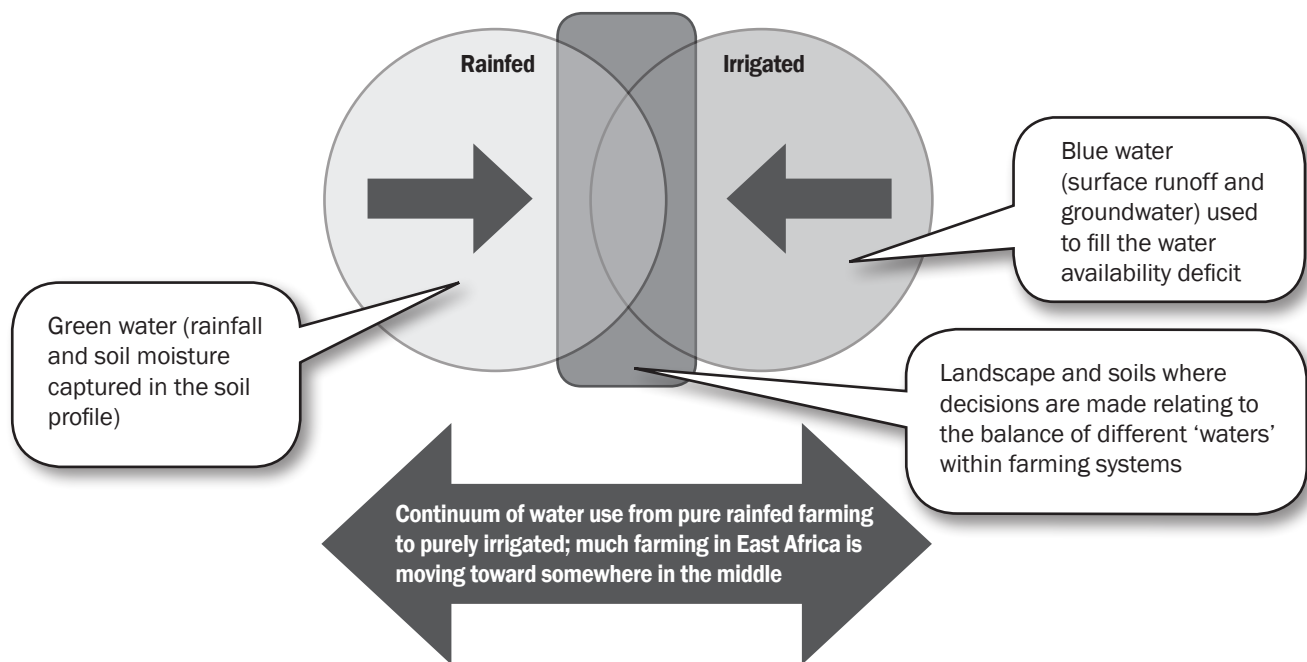


Fig. 1. Water-smart agriculture conceptual model

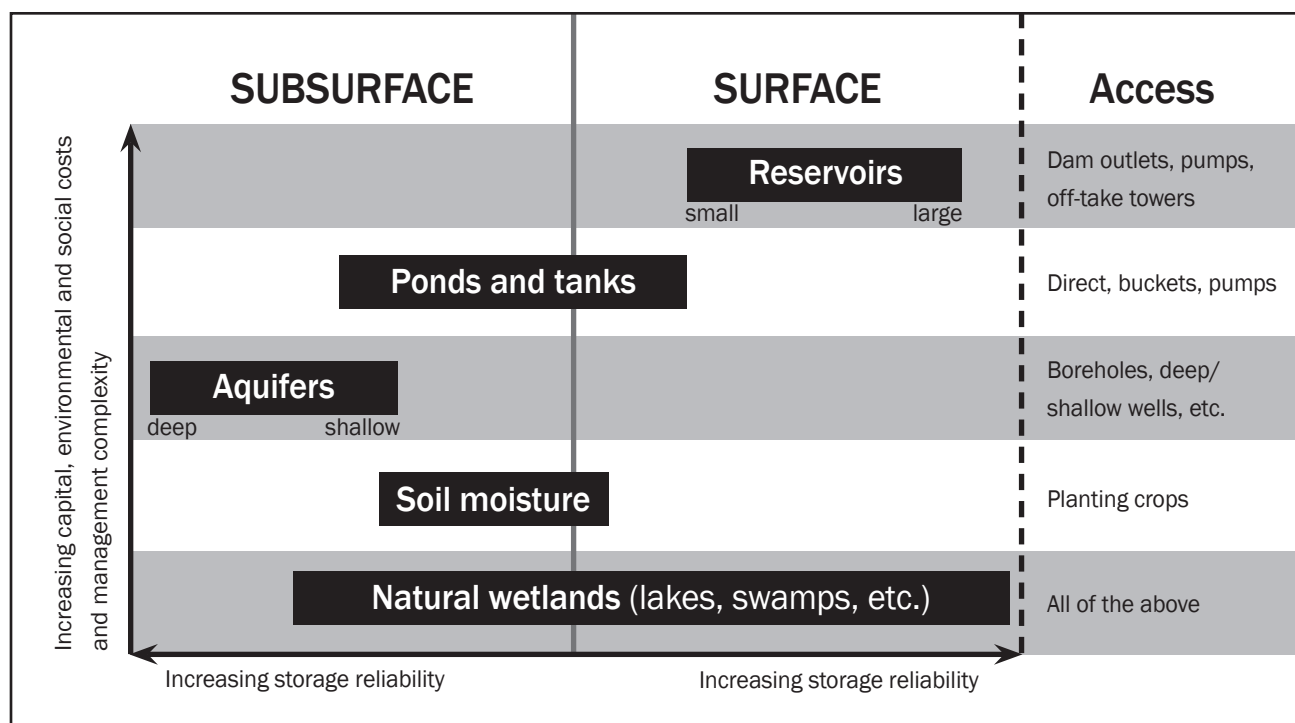
## Water-smart agriculture *theory of change*

As a set of theoretical and practical approaches broadly nested under the term ‘water-smart agriculture’ (WaSA), this sourcebook complements materials on climate-smart agriculture but addresses the specific challenges and uncertainties surrounding water availability, access, and use, particularly within systems reliant on rainfall. In that sense it presents WaSA as a subset of CSA—and in some ways a more practical and tangible starting point to implementation. Many of the challenges facing farmers to adapt and increase resilience to a changing climate within landscapes either directly or indirectly are water-related, from capturing and storing uncertain rainfall and managing declining aquifers to supporting better soil moisture retention and crop use efficiency. Many choices relate to the range of storage and use options presented in Figure 2.

At the same time, these are not new challenges. Farmers in East Africa have been dealing with rainfall uncertainty for hundreds if not thousands of years. A crucial difference now is that institutional, policy, and communication environments have markedly changed in recent years and are now sufficient to enable substantial uptake and dissemination of new ideas and approaches, including across shorter time scales. Markets are now more accessible, information more readily acquired and shared—through mobile networks and the internet—and labor mobility is greater than ever. This provides opportunities for farmers to become more productive, generate greater returns from farming, and become advocates of new farming approaches – including WaSA. Within this more dynamic environment the sourcebook seeks to make a major difference by strengthening the environment of support for water management within smallholder farming systems.

The term ‘water-smart agriculture’ was coined by CARE during action research undertaken in the period 2013-2014. This was built on the undertakings included within a regional charter on *Investing in Water for Smallholder Agriculture* signed in Morogoro, Tanzania, in August 2013 by more than 40 government decision makers, civil society practitioners, journalists, and academic researchers—including the International Water Management Institute (IWMI) and Food and Agriculture Organization (FAO)<sup>6</sup>. These undertakings included ‘enhancing the exchange of knowledge and evidence on best practices in agricultural water management

<sup>6</sup> [http://www.gwieastafrica.org/media/GWI\\_RegionalCharter.pdf](http://www.gwieastafrica.org/media/GWI_RegionalCharter.pdf)



**Fig. 2.** A continuum of water storage options. (Source: McCartney and Smakhtin)

with a specific focus on the role of women farmers and empowering farmers as the ultimate decision makers through improving their knowledge, practices, skills, and potential to invest in their own futures.’ Based on these undertakings, CARE with IWMI and Water, Land and Ecosystems (WLE) developed further the WaSA concept at a regional meeting in May 2014 and agreed to make it the centerpiece of this sourcebook. Ultimately, ‘water-smart agriculture’ is about packaging the right choices effectively and helping farmers to help themselves through farmer-to-farmer uptake and dissemination. The theory of change presented here helps to highlight key features of the approach.

Effective packaging of inputs to agriculture is central to the theory of change. Different packages will seek a sustainable balance between rainfed and irrigated farming across agroecological contexts. In all cases, this is to be based on informed understanding of physical, social, and economic barriers and opportunities, including rainfall, soils, markets, technologies, methods of financing, and the capacities of individuals and institutions. The second core idea is that nothing should remain static. Learning (and through learning, disseminating best practice) should be a constant process. This sourcebook provides a starting point, drawing on good practices across different country and regional contexts, but is not an end point. While the material presented is based on practices drawn together at three writeshops held in Ethiopia, Tanzania, and Uganda and additional regional-level harvesting of the literature, the intention is to make this volume a way of kickstarting future consolidation of more best practice and experience that can be refined over time via a regional knowledge platform.

To date and based on the experiencing of developing WaSA, the following emerging ‘WaSA principles’ provide guidance on using the material within this book:

1. Maximizing outcomes that are owned locally: WaSA involves assisting farmers to identify and apply ‘best fit’ water management regimes that improve water capture, storage, and use in given socioeconomic, technical, and agroecological environments. A central feature is ensuring that the ultimate water delivery vehicle – the soil system – is continually enhanced and supported to nourish crops, support livestock, and cater for other domestic and broader societal needs.

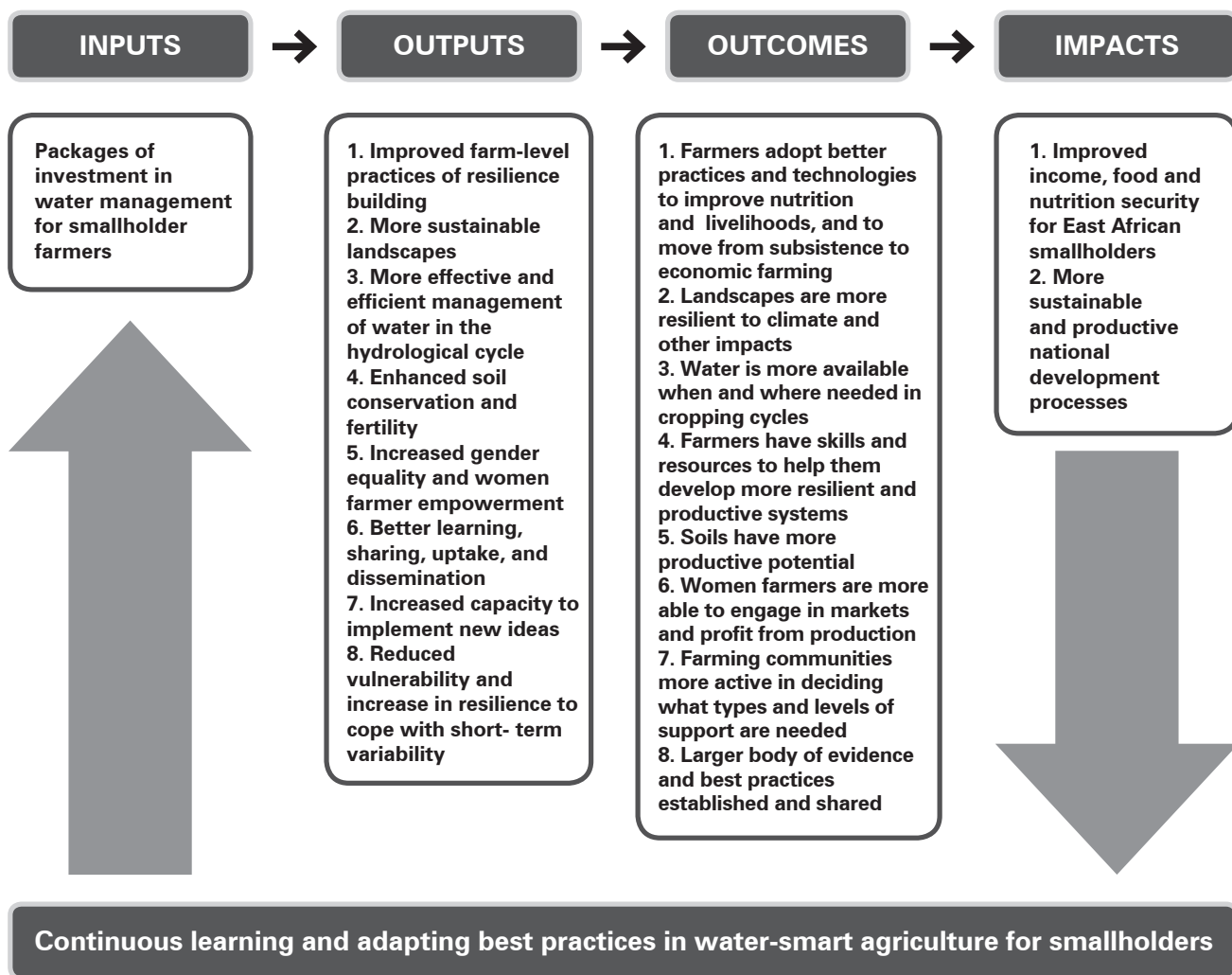


Fig. 3. Water-smart agriculture theory of change

2. Ensuring sustainability of resources: Water conservation and efficient use is central to WaSA, but so is bringing more water into farming systems in order to capture opportunities for value enhancement, including in dry seasons. Sustainability at scale means ensuring that resource utilization does not have a negative impact on other users and uses (e.g., household supplies and ecosystem flows). Importantly, it also recognizes the interactions of supply and demand at a landscape level recognizing water as a common pooled resource in many agricultural communities.
3. Transitioning to prosperity: WaSA is about using water more effectively and equitably to reduce risk and enhance farmer resilience. But it is also about enabling transitions through seizing opportunities to shift from low input-output (and frequently subsistence-based) farming to more profitable and food-secure systems that generate increased net returns to farm households. A central core of WaSA is the conviction that better water management now provides a key to unlocking future farmer prosperity.
4. Building in learning and sharing: A key part of the ‘smart’ in WaSA is shared learning on what works within and between different farming contexts. Learning based on action research with farmers, nested within learning and practice alliances, farmer field schools, and/or other forms of institutional innovation, is critical to precipitating the changes described above and to ensuring the continual refining of different WaSA ‘package’ approaches. With the advent of smart phone technology and rapid uptake in rural areas of East Africa, major advances in sharing practice can take place at relatively low cost. This will help to create, maintain, and evolve best practice, inform policy and continually meet evolving needs in East Africa and further afield.

# Toward the practice of WaSA in East Africa

Above all, this sourcebook is about supporting the practical uptake of WaSA in East Africa. For clarity, the sourcebook is divided into five sections: Building Resilience, Sustaining Landscapes, Managing Water, Conserving Soils, and Addressing Learning and Complexity. This subdivision is based on the materials produced at three writeshops supplemented by selected supporting literature that is more regional in outlook and provides a broader context to the case study material. While there is no one model presented of what to do, the following outcomes can help shape choices made in moving to the practice of WaSA in East Africa:

- ◆ **empower farmers**—and those working with them—to address water-related risks, capture opportunities for dry-season production, strengthen and share new knowledge, skills, and other capacities, and instill stronger governance of water (and soils) in each local context, leading, in the long-term, to the wider public good of enhanced water availability for all watershed and ecosystem users;
- ◆ **accelerate gains in production** based on principles of sustainable intensification, producing more but at the same time ensuring more efficient utilization of rainfall (e.g., higher production from available rainfall) before seeking additional water from other sources;
- ◆ **improve soil health** by applying principles of good soil ‘governance,’ including soil and water conservation and landscape management in order to benefit from enhanced water storage, greater soil fertility, and, ultimately, more nutritional value from crop production;
- ◆ **support collective action at the watershed scale and establish good water governance** so that water savings made in agriculture can be allocated in ways that will strengthen water security for all, including reducing potential conflict between upstream and downstream users within shared watersheds; and, in addition, conserve and enhance the services provided by ecosystems that support food security and underpin future sustainable agriculture.

## References

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