EXPLORING WAYS TO INCREASE PUBLIC INVESTMENTS IN AGRICULTURAL WATER MANAGEMENT AND IRRIGATION FOR IMPROVED AGRICULTURAL PRODUCTIVITY IN SOUTHERN AFRICA

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ABSTRACT

The paper explores the current challenges and opportunities for increasing public investments in agricultural water management and irrigation for improved agricultural productivity in Southern Africa. The analysis was based on a critical review of literature and assessment of the national agricultural investment plans and agricultural/water policies in the study countries. Despite the potential to improve agricultural productivity, irrigation does not currently play a significant role in Southern African agriculture. There have been efforts at the continental, regional and country levels to promote investments in agricultural water management and irrigation to improve and sustain agricultural productivity in Southern Africa. However, despite these commitments, actual implementation has been a challenge and the first five years of national agricultural investment plans have passed or are now coming to an end without much progress made regarding actual investments. Lack of adequate resources and institutional capacity have been some of the challenges affecting implementation of the investment plans to meet commitments in sustainable land and water management. Changes in climate also pose challenges for plans to increase area under irrigation in Southern Africa. Therefore investment planning for agricultural water management and irrigation should look beyond expanding area under irrigation to address other issues such as sustainable water use, efficiency in irrigation systems and investments in water storage to sustain irrigation investments and cropping systems in droughts and dry seasons. Overall, as countries plan for the second phase of the CAADP programme, there are opportunities to ensure that investments in agricultural water management and irrigation and complementary technologies are prioritized and allocated adequate resources for implementation.

Keywords: Agricultural water, irrigation, investment, productivity, Southern Africa

1. INTRODUCTION

African agricultural production systems and consumption patterns are vulnerable to weather, climate variability and change, global markets, and other shocks (AUC, 2014b). In addition, some of the priority issues facing the African agricultural sector include: addressing hunger and nutrition challenges; economic inequality and poverty particularly in rural areas; management of natural resources (especially land and water) and vulnerability to external shocks (AUC, 2014a). The 2014 Malabo Declaration adopted by the African Heads of State and Government, reaffirmed the importance of the agriculture in achieving shared prosperity and improved livelihoods.

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through accelerated agricultural growth and transformation (AUC, 2014b). In Southern Africa, the agricultural sector provides livelihood to over 70% of the rural population and over 95% of agricultural activities are mainly under smallholder systems and rainfed. In addition, low agricultural productivity and food insecurity remains critical challenges for millions in Southern Africa. Therefore, the development and performance of the agricultural sector remains central to efforts focused on promoting socio-economic development and reduction of poverty, food and nutrition insecurity in the region.

One of the priority resolutions of the 2014 Malabo Declaration and the Africa Union Commission Joint Conference of Ministers of Agriculture, Rural Development, Fisheries and Aquaculture to contribute to attaining accelerated growth of agricultural production and productivity was to increase investments in efficient and effective water management systems (AUC, 2014b, 2014c). The Comprehensive Africa Agriculture Development Programme (CAADP) Pillar 1 on sustainable land and water management provide a continental resolve in Africa by African Heads of State and respective Ministries to increase investments in agricultural water management (AUC & NEPAD, 2009). The 2014 Malabo Declaration re-emphasize this commitment to support accelerated agriculture-led growth and development in Africa (AUC, 2014b). At the regional level, the Southern African Development Community (SADC) member states committed in the Regional Strategic Development Plan (RISDP) to increase investments in arable agricultural land under irrigation from 3.5% to 7% (SADC, 2003). In addition, member states have various interventions focused on enhancing investments in agricultural water management. These efforts are aimed at advancing investments in agricultural water management and irrigation to improve and sustain agricultural productivity in Southern Africa and Sub-Saharan Africa.

However, despite its potential to improve productivity (You et al., 2011) and a number of initiatives indicated above, irrigation does not currently play a significant role in Southern African agriculture, as less than 5% of the arable land is under irrigation. Therefore, the objective of this paper was to explore the current challenges and opportunities for increasing public investments in agricultural water management and irrigation for improved agricultural productivity in Southern Africa. Investments in agricultural water management and irrigation are defined as public expenditures, which facilitate economic production and are usually distinguished from recurrent expenditures on operation and maintenance of infrastructure (Turral, et al., 2010). Following this concept, public investment in agricultural water management encompasses “expenditures in irrigation and drainage development, modernisation, institutional reform, improved governance, capacity building, management improvement, creation of farmer organisations, and regulatory oversight, as well as farmers’ investment in joint facilities, wells, and on-farm water storage and irrigation equipment”. The analyses focuses on three Southern African countries (Malawi, Mozambique and Zambia) that have finalized their national agricultural investment plans as part of the implementation of the Comprehensive Africa Agriculture Development Programme. Given that commitments to increase area under irrigation in the region remain largely unfulfilled, it is therefore critical to unpack the existing challenges and opportunities focused on enhancing public investments in agricultural water management and irrigation.

2. IMPORTANCE OF INVESTMENTS IN AGRICULTURAL WATER AND IRRIGATION FOR ENHANCED AGRICULTURAL PRODUCTIVITY

Despite questions raised on the performance of investments in irrigation in the past, there is evidence that investments in irrigated areas contributed to significant agricultural production growth, food security and poverty reduction in the target areas (De Fraiture, et al., 2010; Fan, et al., 2000; Huang, et al., 2006; Lipton et al., 2003; Molden, 2007; Turral et al., 2010). In addition, investments in water could potentially
benefit about 58% of the rural population in Sub-Saharan Africa (Faurès & Santini, 2008). Furthermore, investments in irrigation helped provide an important source of household income and employment opportunities. The contribution of investments in irrigation adapted to changing socio-economic and environmental conditions is expected to remain critical for future food production across the world (Magistro et al., 2007; Turrall et al., 2010; World Bank, 2007; You et al., 2011). You et al., (2011) found significant profitable irrigation potential for small-scale and large-scale systems in Africa. This means that more efforts are required to ensure investments in irrigation are aligned with developmental priorities/ goals/ policies of the countries (Turrall et al., 2010) including ensuring that changes in water scarcity, quality, etc. are integrated in the planning and implementation of irrigation investments. In addition, there is need for improved knowledge of niche areas that have greatest potential for irrigation needs as part of efforts to expand area under irrigation in Africa (You et al., 2011).

Investments in irrigation are also critical as an adaptation strategy to climate variability (both seasonal and annual). Irrigation enables the smoothing out of potential impacts of climate change variability (seasonal and inter-annual) on agricultural performance (Hassan & Nhema, 2008; Mendelsohn & Dinar, 2003; Nhema, 2003; Turrall et al., 2010). Despite the potential of irrigation to address impacts of climate change and variability, the sustainability of irrigation investments is also threatened by water scarcity due to impacts of climate change on water resources (De Fraiture et al., 2010; Turrall et al., 2010). For example, predicted changes in climate and variability in Southern Africa are expected to result in increased water scarcity (Field, et al., 2014) affecting the availability of water for irrigation. Increased water scarcity coupled with increased demand for water by crops due to changes in rainfall and temperature would require strategic investments in agricultural water management and irrigation to improve and sustain agricultural productivity in the region. This means that there is need to have comprehensive irrigation investment planning beyond focusing on increasing areas under irrigation. For example, public irrigation investment plans should address issues of sustainable water use and efficiency in irrigation systems. In addition, measures and investment centred around water storage either in dams or underground will be critical to sustain irrigation investments and cropping systems in droughts and dry seasons (De Fraiture et al., 2010; Turrall et al., 2010).

Furthermore, irrigation remains one of the many deficient productivity improving capital investments and technological inputs in Africa together with fertilisers, improved seed delivery systems, post-harvest processing facilities, access to markets, etc. (Svendsen, et al., 2009; You et al., 2011). Therefore, public investments in irrigation in Southern Africa would require complementary investments in productivity enhancing factors such as use of inorganic fertilisers, and hybrid seeds etc. Achieving the full potential of agricultural water and irrigation investments, concerted efforts would be required not only in direct investments in irrigation and associated complementary technologies but also in building institutions, providing training and market development (Svendsen et al., 2009; You et al., 2011).

Overall, with more than 70% of Africa’s poor population living in rural areas and mostly relying on agriculture for their livelihoods, the development of the agricultural sector remains critical for ending hunger and poverty in the continent (You et al., 2011). Despite its potential to improve productivity (You et al., 2011), irrigation does not currently play a significant role in Southern African agriculture. This means that investments in agricultural water management and irrigation remain critical for improving and sustaining agricultural productivity and reducing poverty in Southern Africa as in other parts of Africa.
3. METHODS

The analysis of current challenges and opportunities was based on a critical review of literature and assessment of the national agricultural investment plans and agricultural/water policies in the study countries. The review of these investment plans and agricultural/water policies was used to identify current gaps, challenges and areas that the respective governments have performed well in supporting irrigation development. Additional data on irrigation potential and area equipped for irrigation in Southern Africa was gathered from the FAO’s Aquastat website. The discussion of findings was augmented with review of published literature on agricultural water management and irrigation, particularly in Africa and other developing countries. The analyses discusses the enabling environment for investments in agricultural water management and irrigation in the three focus countries (Malawi, Mozambique and Zambia). This is followed by a discussion of agricultural water management and irrigation plans in national agricultural investment plans of Malawi, Mozambique and Zambia. The last part discusses overall challenges and opportunities for investments agricultural water management and irrigation in Southern Africa to improve agricultural productivity.

4. RESULTS AND DISCUSSION

4.1 Enabling environment for investments in agricultural water management and irrigation in Malawi, Mozambique and Zambia

The implementation of investments in agricultural water management and irrigation in Southern Africa as indicated above, are guided by continental, regional and national frameworks. Specifically at the continental level, the resolutions of the 2014 Malabo Declaration especially focusing on efforts to increase investments in efficient and effective water management systems (AUC, 2014b, 2014c). In addition, the Comprehensive Africa Agriculture Development Programme Pillar 1 on land and water management provide a continental resolve in Africa by African Heads of State and respective Ministries to increase investments in agricultural water management (AUC & NEPAD, 2009). At the regional level, the SADC Regional Indicative Strategic Development Plan and SADC water policy provide the enabling framework for implementation of investments in agricultural water management and irrigation. In addition, member countries have various policies and strategic plans that address agricultural water management and irrigation in various ways. Table 1 below summarises key policy and strategic planning documents that provide an enabling framework for investment plans for agricultural water management and irrigation in each of the focus countries: Malawi, Mozambique and Zambia.

The Malawi Growth and Development Strategy (MGDS) represents a policy shift from social consumption to sustainable development and infrastructure development. The Ministry of Agriculture and Food Security formulated the National Agricultural Policy Framework (NAPF) to harmonize agricultural policies so that they are aligned to the agriculture component of the MGDS. Both the MGDS and the NAPF are aligned to the regional and continental frameworks through the National Agricultural Investment Plan also referred to as the Agricultural Sector Wide Approach (ASWAp). However, there are three implementing ministries (Ministry of Agriculture, Ministry of Irrigation and Water Development and the Ministry of Local Government and Rural Development) which in turn are custodians of the different policies that may affect the agricultural water infrastructure investment. The challenge is how to coordinate planning and implementation of investments related to agricultural water management and irrigation from the different ministries. In addition, another critical challenge has been to raise adequate resource to implement and roll out planned activities. As a result not all targets have been met and one of the areas that still require substantial investment is agricultural water management.
Table 1. Summary of national policy and strategic plans in Malawi, Mozambique and Zambia

| National Government Strategies/Plans | Supporting Policies for agricultural water infrastructure investment | Implementing Ministries |
|-------------------------------------|---------------------------------------------------------------|------------------------|
| Malawi                             |                                                               |                        |
| Malawi Growth Development Strategy MGDS | National Agriculture Policy Framework (NAPF) 2006 | Ministry of Agriculture and Food Security |
|                                    | Agriculture Sector Wide Approach (ASWAp) 2010                | Ministry of Agriculture and Food Security |
|                                    | National Irrigation Policy and Development Strategy (2000)   | Ministry of Irrigation and Water Development |
|                                    | Water Policy (1996)                                         | Ministry of Irrigation and Water Development |
|                                    | Water Resources Management Policy and Strategy (2000)        | Ministry of Irrigation and Water Development |
|                                    | Water Resources Act (1969)                                  | Ministry of Irrigation and Water Development |
|                                    | Irrigation Act (2001)                                       | Ministry of Irrigation and Water Development |
| Mozambique                         |                                                               |                        |
| Government Five-Year Programme     | Strategic Development Plan for the Agricultural Sector (PEDSA) 2010 - 2019 | Ministry of Agriculture |
|                                    | National Investment Plan for the Agricultural Sector (PNISA) 2012 | Ministry of Agriculture |
|                                    | Agricultural Policy and Implementation Strategy              | Ministry of Agriculture |
|                                    | Water Law (1991)                                            | Ministry of the Sea, Inland Waters and Fisheries |
|                                    | National Water Policy (1995)                                | Ministry of the Sea, Inland Waters and Fisheries |
|                                    | National Irrigation Policy and its Implementation Strategy (2002) | Ministry of the Sea, Inland Waters and Fisheries |
| Zambia                             |                                                               |                        |
| The Sixth National Development Plan (SNP) | National Agricultural Policy (NAP) 2012 | Ministry of Agriculture and Livestock |
|                                    | National Agricultural Investment Plan 2014 - 2018            | Ministry of Agriculture and Livestock |
|                                    | Water Policy 1994                                           | Ministry of Energy and Water Development |
|                                    | National Irrigation Plan (NIP) (2005)                       | Ministry of Energy and Water Development |

In the case of Mozambique the Government Five-Year Programme (PQG) governs and outlines the development of basic infrastructure in the agriculture sector. In addition to the PQG, the government has the Action Plan for the Reduction of Poverty (PARP). This strategy operationalizes the recommendations of the PQG concerning actions against poverty. The PARP is a key link in the National Planning System (SNP) and is aligned with other important documents, such as Agenda 2025. The Ministry of Agriculture instigated the Agricultural Policy and Implementation Strategy...
(PAEI), the Strategic Plan for the Development of the Agricultural Sector 2011-2015 (PEDSA), the Rural Development Strategy (EDR), and the Food and Nutritional Security Strategy II (ESAN II, 2008-2015). While the Ministry of Fisheries produced the following: the Fishery Policy and Implementation Strategy (PPEI), the Fishery Master Plan 2010-2019 (PDP), and the Development Plan for Small Scale Aquaculture 2009-2013 (PDAPQ). There are so many policies backing agricultural water infrastructure investments but they’re not coordinated nor governed by the same ministry. Again, as in Malawi, in Mozambique the agriculture, land, fisheries and water fall under four different ministries making the coordination of the implementation of the agricultural water infrastructure investments quite difficult to plan, implement and monitor. The main challenge for Mozambique is that some of the policies’ planned time periods have come to an end. However, although efforts are in place to institute new ones or extended phases, the country also faced the challenge of ensuring implementation of all the plans. One of the critical challenges has been institutional capacity and availability of resources.

In Zambia, the Sixth National Development Plan (SNDP) is the current major guiding document of the agriculture sector. A subset of the SNDP is the National Agriculture Policy (NAP), which focuses on ensuring national household food security through all-year-round production and post-harvest management of food stuffs. The Government of the Republic of Zambia endorsed the CAADP Compact which is aimed at strengthening, supporting and facilitating effective implementation of the NAP and the Vision 2030 through five-year phases of National Development Plans aligned to the CAADP Pillars. The Zambian CAADP Compact stresses that there is a need to develop a National Water Supply and Sanitation Policy. It also highlights the need to develop strategies for increasing investments in the irrigation sub-sector. The coordination of the agricultural water infrastructure investments in Zambia falls under three ministries: the Ministry of Agriculture and Livestock, Ministry of Energy and Water Development and the Ministry of Community Development, Mother and Child Health.

4.2 Agricultural water management and irrigation investment plans in Malawi, Mozambique and Zambia

Table 2 presents the summary of agricultural water management and irrigation plans of Malawi, Mozambique and Zambia. For Malawi, the ASWAp’s priority investment area is on sustainable agricultural land and water management. In order to mitigate weather variability and climate change, Malawi instigated the Greenbelt Initiative which is aimed at increasing water use efficiency and strengthen irrigation potential. However, under this initiative these investments are only justified for high-value crops for local and export markets. The focus of ASWAp regarding investments in agricultural water management and irrigation include: (a) promoting increased use of irrigation, (b) promoting simple rainwater harvesting and storage systems including the construction of dams, (c) rehabilitating old and developing new small to medium scale irrigation schemes for high value commodities (to expand the area under irrigation from 20 000 ha to 40 000 ha) and (d) involving WUAs in sustainable water management, and irrigation technologies. The estimated budget on the investment on sustainable agricultural water management component was US$ 583 670 000 over the course of five years (2010 – 2014).

The National Agricultural Investment Plan of Mozambique (PNISA) outlined the investments on agricultural water infrastructure in the three subsectors (a) crop production (includes an irrigation programme), (b) aquaculture and (c) livestock. The objectives of the PNISA under crop production are outlined by the food crop programme and the agricultural irrigation programme. The Agricultural Irrigation Programme seeks to develop irrigation infrastructure in two approaches: (a) small (less than 200 ha) and (b) medium/large (equal/larger than 200 ha) irrigation areas. The strategic vision is on the development of infrastructure that would be multi-
purpose and also be used for livestock and aquaculture. The three challenges addressed by the irrigation programme are: training and operationalising public irrigation services; expanding the irrigated area by at least 50 000 ha and; raising the level of utilization of irrigation networks from the current 60% to 80%. The investments are geared towards rehabilitation and construction of hydro-agricultural infrastructure, promote low-cost irrigation and conservation of surface and ground water resources for irrigation in drier areas. MT 24 285 429 (for five years) was set aside for this programme.

Zambia’s National Agriculture Investment Plan has four main investment programmes: (a) sustainable natural resources management, (b) agricultural production and productivity improvement, (c) market access, and (d) food and nutrition security and disaster risk management. The water investment component is in the first programme and this programme is aimed at ensuring efficient water-use and irrigation. The total budget allocated for the sustainable natural resources management programme over five years is US$280 800 000. The outcome indicators for this component include: (a) a 20% increase in the number of farmers with access to irrigation infrastructure for high value crops and, (b) an increase in the area under irrigation to 188 000 ha.

Overall, the above review of the agricultural water management and irrigation investment allocations in the national agricultural investment plans of the three countries indicate national commitments to increase investments in these areas. However, despite these commitments, actual implementation has been a challenge and the first five years have passed without much progress. Lack of adequate financial resources and institutional capacity have been some of the constraints affecting implementation of the investment plans. Under the CAADP Programme national governments are expected to raise the bulk of the resources domestically with the rest coming from international donors and other sources. However, most of the countries in Southern Africa have not been able to raise enough domestic resources to drive implementation of national agricultural investment plans, particularly focusing on agricultural water management and irrigation.

4.3 Overall, opportunities and challenges for investments in agricultural water management and irrigation in Southern Africa

Table 3 below summarises area under irrigation in Southern Africa. The results indicate that the share of irrigation potential equipped for irrigation ranges from as low as 2% in Angola to 72% in Madagascar and the average for the region is 30%. Most of the Southern African countries are still to meet the commitments of both CAADP and the RSIDP. This means that despite the potential for irrigation in the region, there is need for more efforts to increase investments in agricultural water management and irrigation as part of efforts to improve agricultural productivity. Despite the potential for irrigation to improve agricultural productivity in Southern Africa, the challenge for planning, implementation and evaluation of such investments is how to integrate the changing socio-economic and environmental factors. For example, it is critical that the investments are strategically targeted to ensure that they address a range of factors that include alignment with agricultural priorities, higher socio-economic returns, environmental impacts etc. (Inocencio et al., 2007; Turral et al., 2010). Furthermore, despite the great potential and opportunities for investments in irrigation in Southern Africa as in other parts of Africa (Peacock, et al., 2007; You et al., 2011) the other challenge for decision makers is how to design and implement innovative approaches for agricultural water management and irrigation investments to ensure that the expected outcomes are realised and attractive (Peacock et al., 2007).
| National Agricultural Investment Plan                      | Investment Focus Area on agricultural water  | Investment Components of the Focused Area                                                                 | Investment Value |
|-----------------------------------------------------------|----------------------------------------------|------------------------------------------------------------------------------------------------------------|------------------|
| Malawi                                                   | Sustainable Agricultural Land and Water management | • Promoting increased use of irrigation.  
• Promoting simple rainwater harvesting and storage systems including the construction of dams.  
• Rehabilitating old and developing new small to medium scale irrigation schemes for high value commodities (to expand the area under irrigation from 20 000 ha to 40 000 ha).  
• Involving WUAs in sustainable water management, use efficient irrigation technologies. | US$583 670000    |
| Mozambique                                               | Production and Productivity                  | • Promote the use of improved technologies including low-cost irrigation  
• Training and operationalise public irrigation services.  
• Expand the irrigated area by at least 50 000 ha.  
• Raise the level of utilization of irrigation networks from the current 60% to 80%. | MT 35 573 729     |
| Zambia                                                   | Sustainable Natural Resources Management     | • 20% increase in the number of farmers with access to irrigation infrastructure for high value crops.  
• An increase in the area under irrigation to 188 000 ha.  
• Strengthen a total of 750 Water Users Association and rehabilitating and constructing new irrigation schemes  
• Multi-purpose dams (45 small and 2 large) as well as 50 weirs will be constructed  
• 5000 pumps and 1900 renewable energy pumps for 5000 ha | US$169 250 000    |
Table 3. Irrigation potential and area equipped with irrigation in Southern Africa

| Country      | Irrigation Potential (1000ha) | Area equipped for irrigation | % of irrigation potential equipped for irrigation | % of the area equipped for irrigation actually irrigated |
|--------------|-------------------------------|------------------------------|--------------------------------------------------|--------------------------------------------------------|
|              | 1 000ha                       | Year                         |                                                  |                                                        |
| Angola       | 3700,00                       | 85,63                        | 2005                                             | 2,31                                                   | 13,47 2005                          |
| Botswana     | 13,00                         | 1,44                         | 2002                                             | 11,07                                                  |                                                |
| D. R. Congo  | 7000,00                       | 1050,00                      |                                                  | 15,00                                                  |                                                |
| Lesotho      | 12,50                         | 2,64                         | 1999                                             | 21,10                                                  | 2,54 1999                             |
| Madagascar   | 1517,00                       | 1086,00                      | 2000                                             | 71,59                                                  |                                                |
| Malawi       | 161,90                        | 73,50                        | 2006                                             | 45,40                                                  |                                                |
| Mauritius    | 33,00                         | 21,22                        | 2002                                             | 64,30                                                  | 98,02 2002                           |
| Mozambique   | 3072,00                       | 118,10                       | 2001                                             | 3,84                                                   | 33,92 2001                           |
| Namibia      | 47,30                         | 7,57                         | 2002                                             | 16,01                                                  |                                                |
| Seychelles   | 1,00                          | 0,26                         | 2003                                             | 26,00                                                  | 76,92 2003                           |
| South Africa | 1670,00                       | 49,85                        | 2000                                             | 53,48                                                  | 89,95 2002                           |
| Swaziland    | 2132,00                       | 184,30                       | 2002                                             | 8,64                                                   |                                                |
| Tanzania     | 523,00                        | 155,90                       | 2002                                             | 29,81                                                  | 100,00 2002                          |
| Zimbabwe     | 365,6                         | 175,0                        | 2014                                             | 47,87                                                  | 71,41 1999                           |

Source: (FAO, 2016)

Another critical challenge is how to target and prioritise agricultural water management and irrigation investments for the best outcomes. Targeting of high potential irrigated and rainfed areas has the potential to generate highest productivity returns as they generate high agricultural output and economic growth at lower costs than in marginal areas (Fan et al., 2000; Turral et al., 2010). However, public investments in irrigation targeted for marginal areas has been found to generate higher marginal returns compared to investments in high-potential irrigated and rainfed areas (Fan et al., 2000). The challenge for Southern African countries is creating a balance between investments in these high potential areas and in marginal areas where most of the rural poor resides and are in dire need of efforts to improve the productivity of their lands which are mainly rainfed. Efforts to drive inclusive agricultural growth and development within the Malabo Declaration means that considerable efforts should be put in designing public investments in irrigation that allows the rural subsistence farmers to actively benefit. The analysis of the current national investment plans for the selected countries in the region, however, do not provide detailed investment plans specifically targeting these smallholder farmers in marginal lands. In addition, there is no explicit layout of public investments in irrigation to support agricultural growth and development. The expectation if that the ongoing revisions of the national agricultural investment plans to integrate Malabo Declaration commitments would explicitly consider the need to invest in irrigation to support smallholder agricultural production located in marginal areas.

Compared to the past large scale irrigation approaches implemented based on top-down approaches, investment plans in Southern Africa should emphasise bottom-up approaches where beneficiaries are actively involved. Bottom-up approaches that address cultural, social and environmental aspects are critical for successful planning and implementation of irrigation investments and associated technologies (van Schilfgaarde, 1994). In addition, irrigation policies in Sub-Saharan Africa prioritise...
investments in small irrigation schemes to enhance agricultural productivity and food security achievement and integration of cultural traditions (Faures et al., 2007). Successful implementation of public investments in agricultural water management and irrigation in Southern Africa as in the rest of Sub-Saharan Africa would also need to learn from past investments and ensure that success factors are strengthened and failures are avoided (García-Bolaños et al., 2011). Given the scarcity and competing needs for resources, public investments in irrigation should be able to produce higher social benefits/returns through for example productivity growth and poverty reduction (Fan et al., 2000) to be economically justified.

5. CONCLUSIONS

The main objective of this paper was to explore the current challenges and opportunities for increasing public investments in agricultural water and irrigation for improved agricultural productivity in Southern Africa. The analysis of current challenges and opportunities was based on a critical review of literature and assessment of the national agricultural investment plans and agricultural/water policies in the study countries. Some of the challenges for investments in agricultural water management and irrigation in Southern Africa include: acquiring adequate resources for increasing current investment levels to meet continental, regional and country level commitments in sustainable land and water management. In addition to supporting investments in agricultural water management and irrigation, substantial efforts are required to invest in complementary capital and technological inputs such as with fertilisers, improved seed delivery systems, post-harvest processing facilities, access to markets, etc. To ensure achievement of full potential of agricultural water management and irrigation investments, countries would need to direct resources to invest in complementary technological inputs as well as building institutions, providing training and market development.

Changes in climate and variability also pose challenges for plans to increase area under irrigation in Southern Africa. It is therefore, critical that investment planning for agricultural water management and irrigation looks beyond expanding area under irrigation to address other issues such as sustainable water use, efficiency in irrigation systems and investments in water storage to sustain irrigation investments and cropping systems in droughts and dry seasons. Another challenge is the need to gather improved knowledge of niche areas that have greatest potential for irrigation needs. Despite the great potential and opportunities for investments in irrigation in Southern Africa as in other parts of Africa the other challenge for decision makers is how to design and implement innovative approaches for agricultural water management and irrigation investments to ensure that the expected outcomes are realised and attractive. The challenge for Southern African countries is creating a balance between investments in these high potential areas and in marginal areas where most of the rural poor resides and are in dire need of efforts to improve the productivity of their lands which are mainly rainfed. Efforts to drive inclusive agricultural growth and development within the Malabo Declaration means that considerable efforts should be put in designing public investments in irrigation that allows the rural subsistence farmers to actively benefit.

Overall, the above review of the agricultural water management and irrigation investment allocations in the national agricultural investment plans of the three countries indicate national commitments to increase investments in these areas. However, despite these commitments, actual implementation has been a challenge and the first five years have passed or are now coming to an end without much progress made regarding actual investments. Lack of adequate financial resources and institutional capacity have been some of the constraints affecting implementation of the investment plans. Under the CAADP Programme national governments are expected to raise the bulk of the resources domestically with the rest coming from
international donors and other sources. However, most of the countries in Southern Africa have not been able to raise enough domestic resources to drive implementation of national agricultural investment plans, particularly focusing on agricultural water management and irrigation.

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