ECRDA
Eastern Cape Rural Development Agency

Report on Assessment of Rural Enterprise Development (RED) Hubs and the Proposed Development of a Sustainable Sorghum Production System in Eastern Cape Province, South Africa

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BIOTECH FOUNDATION INTERNATIONAL
Africa free of hunger, poverty and malnutrition

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Report by

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Cover captions

Top row: *Africa Harvest and ECRDA officials admire the final product from one of the RED Hubs and (right) during a lively discussion with members of the primary and secondary cooperatives.*

Bottom row: *Mr Navy Simukonda, ECRDA's Chief Operations Officer (right) welcomes Africa Harvest team to the ECRDA head office in East London, and (right) the site of the proposed Cradock sorghum bio-ethanol plant.*

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I. Executive Summary

The Rural Enterprise Development (RED) Hub is a novel model for transforming rural agriculture based economies, pioneered by the Eastern Cape Rural Development Authority (ECRDA). This flagship project seeks to link the production, processing and marketing components to enhance competitiveness for rural producers across economies of scale and scope. The model is based on the mega farm concept, the main objective of which is to graduate rural agriculture based producers to commercially viable economic farm units.

The success of this model is pivotal not just for the South African rural communities in the target areas in Eastern Cape, but also for smallholder production and development interventions across the continent of Africa. The model offers a clear pathway for scaling up agro-based development initiatives in rural parts of Africa even as it fosters inclusive growth and development by actively integrating youth and women into the development agenda.

Four RED hubs were established between 2014 and 2016 in Mqanduli, Ncora, Mbizana and Emalahleni. Although these are operating at various levels of production capacity and efficiency, their performance is much lower than the optimal status of the installed equipment. Alternative revenue streams, both product and service based, have been identified to enhance resource-use efficiency and expand the scope of the investment through diversification.

Community participation and ownership has emerged as a critical success factor for the RED Hubs. The proposed ownership structure is premised on cooperatives that are delineated as primary and secondary. The primary cooperatives (PCs) are tasked with primary production while the secondary cooperatives (SC) – made up of elected representatives of the PCs are in-charge of the processing, marketing and management of the Hubs.

Some of the key challenges facing the RED Hubs include: "Misalignment and lack of clarity of vision as well as limited buy-in at the primary cooperatives level; Limited/lack of business ethos and principles within and among the cooperatives; lack of financial management capacity; logistical challenges in complying with the Financial Intelligence Center Act (FICA) requirements and delays in cementing partnership agreements with private trading partners."[1]

A comprehensive, dynamic and inclusive community engagement strategy is thus imperative at the moment. The over-arching objective of this strategy will be to not only enhance community buy-in and participation but also safeguard and ensure sustainability of the substantial investment that the ECRDA has made in the four RED Hubs. In addition, the structure, management, skills and capacities of the cooperatives, both at the primary and secondary levels, will need to be addressed

1. ECRDA RED Hub initiative (June 2016 updated).pdf. A presentation by the Program management unit

with a view to strengthening their participation and effectiveness. A learning tour in Kenya is proposed as one of the immediate action items for helping address challenges facing the target cooperatives. The tour will target successful cooperatives in Kenya with the objective of providing participants with the chance to interact with other cooperators, share lessons and experiences, as well as identify alternative approaches to enhancing their efficiency. The cooperative movement in Kenya is very well developed, and was ranked 1st in Africa and 7th globally, in terms of effectiveness, by the International Cooperative Alliance (ICA).

The selection of ECRDA as a feedstock aggregator for the proposed Cradock biofuel plant is a key milestone and opportunity for grain sorghum producers in Eastern Cape. This development offers immense potential for the RED Hubs, especially those initiatives targeting youth and women, while catalyzing positive impacts on livelihoods in general.

As a start, approximately 274 000 mt of sorghum grain per annum (pa) will be required to produce 100 million liters of bio-ethanol (pa) at the Cradock plant. The market value of that requirement stands at R 904 200 000/00 based on the projected market price for sorghum -July 2017 contracts, pegged at R 3300 per ton (GrainSA).

This opportunity lends itself well to the RED Hub model where collective production is promoted and necessary machinery and inputs can be sourced in a collective manner, thereby enhancing the potential for success and profitability. The presence of a substantial commercial market is another plus. The biofuel plant would also benefit from the region's weather, which is ideal for sorghum production. There is also ample land on which to expand sorghum planting and biofuel production as needed.

A whole value chain (WVC) strategy is required to undergird the development of a sustainable supply chain for the Cradock biofuel plant. This process will, of necessity, require to be phased out over a three year period (starting in 2017) and incrementally scaled up to ramp up production as the Cradock plant comes on line. Systems such as adaptive research, seed, extension, etc., which are critical to the success of this initiative, will require to be designed, developed and rolled out in tandem with the implementation of the community engagement strategy- discussed in detail in the report.

The presence of alternative supply chains and demand for quality sorghum grain; human food, animal feed, malting, fish feeds, etc. are opportunities that could be leveraged in jump-starting commercial production. This is recommended as a means to diversifying utilization of sorghum grain and thereby enhancing the long-term sustainability of the initiative.

This report contains the key findings and recommendations of a 10-day assessment of the RED Hubs by a team of four technical staff from Africa Harvest Biotech Foundation International (Africa Harvest) that took place between the 20th and 30th of November, 2016.

The team spent time visiting the four RED Hubs, interacted with representatives of the various PC and SC in the target areas: Mqanduli, Ncora, Mbizana and Emalahleni, and visited the site where the proposed Cradock biofuel plant will be constructed.

II. Background of the assessment

Agriculture continues to play a pivotal role in catalyzing rural development in most parts of Africa, including South Africa. However, the triple challenge for agriculture in South Africa is meeting food security objectives while adapting to climate change and reducing its contribution to greenhouse gas emissions.[2]

Africa Harvest has had an operational office in South Africa since its inception in 2002, and is conversant with challenges facing the country. Sustainable agro-based rural development in Africa is at the heart, and indeed a key driver of Africa Harvest's 10-year Strategic Plan (SP) (2012-2022), the target of which is to reach 1 million rural households in 10 countries in east, west and southern Africa. The strategic thrust of this plan is anchored on developing partnerships with like-minded local/international public/private institutions that focus on empowering rural men, women and youth to initiate and participate in transformative rural development initiatives. The institution is thus actively exploring opportunities in South Africa, in alignment to its SP. Mapping of strategic partnerships, some forged in the past and new ones that can add value to emerging opportunities in rural transformation is of strategic relevance for the institution.

Strategic partnerships forged in the recent past with South African institutions involved in Africa Harvest projects include: the Council for Scientific and Industrial Research (CSIR), the Agricultural Research Council (ARC), and the University of Pretoria (UP), among others, which were involved in the implementation of the Africa Bio-fortified Sorghum (ABS) project. Various efforts have also been made towards exploring projects in the Kwa Zulu Natal (KZN) and Limpopo Provinces in South Africa.

It is this strategic thrust that informed and laid the basis for Africa Harvest and ECRDA to come together and explore avenues through which a mutually beneficial partnership could be forged. The overarching objective of this partnership is to enhance the sustainability and impact of the rural transformation agenda that ECRDA is driving in Eastern Cape Province.

An initial exploratory meeting was held between 24th and 26th August, 2016 where a decision was taken to facilitate a more thorough assessment mission comprising a technical team from Africa Harvest. The scope of engagement for this follow-up mission was to interact with beneficiaries of ECRDA investments, carry out a rapid assessment of the RED Hubs, give feedback on how to enhance ownership, impact and long-term sustainability of these investments, and provide a road map on how to establish a sustainable commercial sorghum production system to feed into the proposed bio-fuel plant at Cradock.

Therefore, a team of four technical staff from Africa Harvest visited Eastern Cape Province between 20th and 26th November 2016, upon the request of the ECRDA. The purpose of this trip was to explore opportunities for possible partnerships, with a focus on the RED Hubs and the proposed sorghum

2. Ngomane, T. (2012). The role of Agriculture, AGRISETA Annual Seminar, The Presidency, Department of Performance Monitoring and Evaluation, Rural Development in South Africa. Kempton Park, South Africa.

for bio-fuel project in Craddock. The goal of the envisaged partnership is to identify ways, approaches and opportunities to enhance the impact of investments in agriculture and agro-processing, especially with regard to increased autonomy and self-sustainability of the RED Hubs as ECRDA reduces its involvement.

The partnership is also intended to develop a sustainable road map for the production of sorghum feed stock for the proposed bio-fuel plant that is slated for construction at Cradock.

The working strategy is based on leveraging the expertise and experience that Africa Harvest has developed in commercializing sorghum production in other parts of Africa.

The Africa Harvest team during a visit to one of the RED Hubs.

The leader of the Africa Harvest delegation, Dr. Njuguna, interviews one of the workers at a RED Hub.

III. Institutional Context

a . ECRDA (http://www.ecrda.co.za)

The ECRDA is a schedule 3 (c) entity in terms of the Public Finance Management Act (PFMA) of South Africa. The ECRDA has dedicated focus to formulating, promoting and ensuring the implementation of a comprehensive integrated rural development strategy for the Eastern Cape Province.

The vision of the ECRDA is a leading and vibrant organization that improves livelihoods and develops sustainable rural communities in the Eastern Cape Province. The ECRDA's mission is to accelerate implementation of identified high-impact priority rural development programs and unlock the dormant potential of resources through partnerships, with the communities as the center of operation.

ECRDA's strategic objectives are to promote, support and facilitate rural development in the province by: mobilizing financial resources and providing financial and supportive services to persons domiciled, ordinarily resident or carrying on business; promoting and encouraging private sector investment in the province and the participation of the private sector in contributing to economic growth; promoting, assisting and encouraging the development of the province's human resources and financial infrastructure, in association with other institutions having similar or related objectives; acting as the government's agent for performing any development-related tasks and responsibilities that the government considers may be more efficiently or effectively performed by a corporate entity; driving and coordinating integrated programs of rural development, land reform and agrarian transformation; project managing rural development interventions; promoting applied research and innovative technologies for rural development; planning, monitoring and evaluating rural development; and facilitating the participation of the private sector and community organizations in rural development programs.

ECRDA has made strategic investments in 4 communities within Eastern Cape Province through what are commonly known as RED Hubs. These RED Hubs are based on the "MEGA Farm Concept" which seeks to graduate communities from smallholder producers to commercially viable economic farm units using the cooperative model. The four Hubs are at Mqanduli, Ncora, Mbizana and Emalahleni/ Lady Frere, where production, processing and marketing of various products is at different levels of scale. The investment done by ECRDA includes a milling plant, silos, tractors, combine harvester, trucks (for transport), and human resources involved in community facilitation and the technical skills required to run the mills. Maize production is done at Mqanduli, Ncora and Mbizana RED Hubs while sorghum is produced at the Emalahleni/Lady Frere RED Hub. These Hubs are intended to create a platform to spur economic activities in the rural areas resulting in: (i) increased rural incomes through the facilitation of primary production, processing, creating communal and external markets,

and linking the various types of primary production to efficient value chain systems (ii) promotion of rural savings and investment as money remains within the community; and (iii) facilitating rural transformation through iterative development agenda around the Hubs.

In addition to this, the ECRDA was appointed by the Industrial Development Cooperation (IDC) as a feedstock aggregator in the proposed Cradock sorghum bio-fuel plant. This development derives from the Industrial Biofuel Strategy approved in November 2007 by the South African Cabinet whose target was to create jobs (approximately 25 000 agricultural jobs) in the energy-crop and biofuels value chain by achieving a 2% penetration level of biofuels in the national liquid fuel supply, or 400 million liters (pa). The 2% penetration is to be achieved without jeopardizing food security by targeting new and additional land and excluding basic food crops in the initial stages. The short-term focus of 2%-10% bio-ethanol blending was targeted to be done between 2015 and 2020. So far, mandatory blending regulations came into effect on 1st October, 2015. To produce 100 million liters of bio-ethanol (pa), at the Cradock plant, 274 000 metric tons of sorghum grain would be required.

b. AFRICA HARVEST (www.africaharvest.org)

Africa Harvest was founded in 2002 and is incorporated in the USA as a 501(c) 3 non-profit foundation. Its headquarters are in Nairobi, Kenya and it has regional offices in Washington DC, USA and Johannesburg, South Africa. The vision of Africa Harvest is to be a lead contributor in making Africa free of hunger, poverty and malnutrition while its mission is to use science and technology, gender-sensitive, appropriate agricultural technologies, and innovative institutional approaches to improve the livelihoods of rural communities, particularly Small Holder Farmers (SHFs).

Africa Harvest's team of professionals has unique expertise in designing and implementing projects that link the entire agricultural value chain to enterprise development and rapid adoption of new technologies that promise major socio-economic gains.

In 2012, Africa Harvest laid out a 10 year SP (2012–2022) targeting to reach 1 million rural households in 10 countries in east, west and southern Africa aiming to: reduce rural poverty and food insecurity through improved agricultural systems by using science and technology; ensure that enhanced agricultural production is sustainable and dependable, has minimum negative environmental impact, and can cope with climate change; improve the nutrition and health of smallholder farming families and poor consumers in Africa; provide equitable access to information and knowledge on improved agricultural technologies to smallholders in Africa, and develop farmers' organizations to facilitate this process; facilitate development of agricultural value chains by involving and empowering all relevant stakeholders from farmers to consumers.

The institution has a long history of success in developing and streamlining agro-based value chains in rural parts of Africa, among smallholder farming communities, targeting food, nutrition and income security, job creation, and enterprise development. In partnership with international and national institutions, Africa Harvest has been instrumental in catalyzing rural development in an inclusive manner. It has worked on community engagement and enhancing ownership of development projects through capacity building in soft skills that promote the work done in streamlining sorghum value chains in Kenya and Tanzania using conventionally bred and improved sorghum varieties and hybrids. Africa Harvest has also been instrumental in contributing to improve nutrition among rural communities living in the arid and semi-arid lands (ASALs) of Sub-Sahara Africa through the bio-fortification of sorghum. The ABS project that was funded by the Bill and Melinda Gates Foundation and a number of global public as well as private institutions since 2005 was managed by Africa Harvest as the main grantee and has made significant strides in enhancing access to micronutrients (iron, zinc

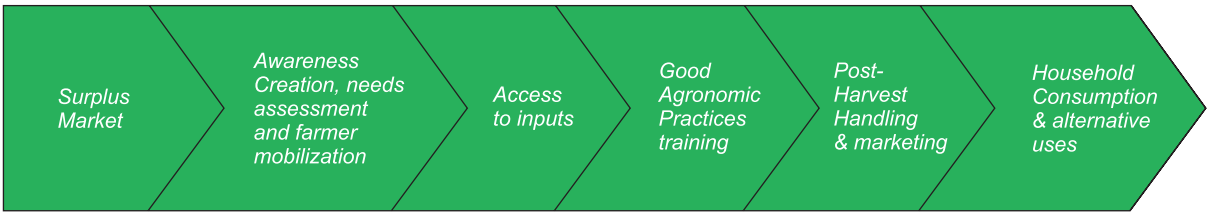


Figure 1: The WVC approach adopted by Africa Harvest to increase productivity and market access for agro-based production systems

and pro-vitamin A) targeting approximately 300 million people that depend on sorghum for their food, nutrition and livelihood choices in Africa.

Africa Harvest's experience in deploying improved technologies covers a wide variety of value chains in cereals, vegetatively propagated crops, poultry and livestock. The list includes: tissue culture banana and plantains, improved sorghums and millets, improved beans, dry-land legumes, improved poultry and goats, clonal trees, cassava and sweet potatoes. Other interventions include: community water management and conservation through the construction of sand dams, rehabilitation of earth dams, and training communities in the use of kitchen gardens (household water conservation) in the ASALs of Kenya, integrated soil fertility and water management-on farm through training in terracing, composting, retention ditches, zai pits, capturing surface run-off, use of agro-forestry species, crop rotation (using nitrogen fixing legumes and other technologies), and promoting conservation agriculture where appropriate.

The institution adopts a WVC approach that leverages and promotes market-led production geared towards graduating smallholder farmers to commercial producers. Salient features of this approach include: awareness creation, farmer mobilization into development ready units (groups, cooperatives, etc.); enhancing access to and affordability of inputs (seeds, fertilizers, crop protection, etc.); training in good agronomic practices (GAP) to unlock the genetic potential in improved varieties/hybrids, and increase productivity and quality; training in post-harvest handling to minimize losses and enhance food safety; training in utilization and alternative uses to increase household food security and nutrition; and linkage with alternative end-user markets for quality surplus produce to increase incomes and resilience.

The institution estimates its outreach, since the time it was founded in 2002, to be approximately 200 000 direct households (1 million beneficiaries) across Africa, with development interventions and appropriate solutions to address household food insecurity, enhance incomes, job creation, enterprise development, gender equity, and overall resilience in the face of changing climatic conditions.

IV. Meeting at the ECRDA office in East London

The visit to Eastern Cape Province commenced with a briefing meeting in the morning of Monday 21st November, 2016 at the ECRDA office in East London. Presentations were made by the two teams in attendance: ECRDA and Africa Harvest. This was meant to introduce the respective institutions, clarify the assignment at hand, and plan for the four days of field visits to the 4 RED Hubs and the bio-ethanol site in Cradock, Eastern Cape.

The team from Africa Harvest: (L-R) Daniel Kamanga, Doreen Marangu, Dr. Michael Njuguna and Nehemiah Mburu with Navy Simukonda, the COO of ECRDA.

V. Visit to the RED Hubs in Mqanduli, Ncora, Mbizana and Emalahleni

The team of 4 from Africa Harvest visited these four RED Hubs between the 22nd and 24th November, 2016. Accompanying this team during visits to Mqanduli, Ncora and Mbizana RED Hubs, were two ECRDA officers: The Chief Operating Officer (COO) Mr. Navy Simukonda and Mr. Luvo Qongqo, an agronomist. Mr. Roger Mclachlan joined the team at the Emalahleni RED Hub in Lady Frere as well as at the bio-ethanol plant site in Cradock.

The team interacted with a pool of beneficiaries and partners at the RED Hubs, who were mainly representatives of the SC responsible for the Hubs. These representatives were drawn from the village level PC whose role in the matrix is primary production. Each PC seconds an agreed number of representatives who make up the SC. Leadership of the SC is thus constituted from this pool of representatives. The role of the SC is to oversee operations at the RED Hub and manage the enterprise on behalf of the PC members.

ECRDA has made substantial investment in infrastructure, machinery and equipment required to support and sustain commercial activities at the RED Hubs. Each Hub is equipped with tractors, combine harvesters, silos, an automated milling plant, spraying equipment, a truck (for transport purpose), an automated weighing bridge, office and storage block.

a. Main observations

Below are the team's observations based on interactions and discussions with the representatives of the cooperatives present at the various RED Hubs.

i. Technical capacity

The capacity of equipment purchased and machinery installed at the RED Hubs is in our opinion, and based on discussions with the technical people on site, sufficient to sustain processing activities and targets based on the current level of production. The capacity of the automated mills installed at Mqanduli, Mbizana and Ncora was pegged at 950mt/hr and the storage silos at 2000 mt while the weigh bridges are fully automated. The support infrastructure like tractors, harvesters, planters, spraying equipment and trucks all add to the technical mix that's sufficient to sustain production, processing and marketing activities that the RED Hubs were designed to support. This is a critical success factor as it provides the much-needed pull to catalyze production activities subject to market off-take.

We also noted that the ECRDA has made significant strides towards training young men and women as milling supervisors and operators of the various equipment on site. This key development should be encouraged and proactively promoted as it ensures continuity and sustainability of the operations, in

The team from Africa Harvest interacting with co-op representatives at the Mqanduli RED Hub

addition to providing much needed employment for women and youth. These young people should in the future, be reference points and role models to be used in encouraging other youths to engage in value chain activities at all levels including: production, processing and marketing.

Maintenance of the plant (mill) and equipment referenced above will be a critical success/risk factor that requires close attention. This will soon be a cost center for the Hub business impacting profitability of the business. In addition, the equipment will require to be in good working condition during the post-

Young members of staff at the Ncora RED Hub, interacting with the team from Africa Harvest.

Africa Harvest's Ms. Doreen Marangu (left) and Mike Njuguna (right) get details on how the machines at the Red HUB operate.

ECRDA COO shows Mike Njuguna the final products from a RED Hub.

production (tractors to prepare land) and production phases of the business cycle to optimize efficiency and productivity. It's worth noting that the proposed establishment of a machinery and fitting warehouse at each of the RED Hubs will help mitigate this risk while enhancing the success of the Hub.

In addition, the equipment and machinery should be treated as assets and hence managed with a view to optimizing their contribution towards increasing income revenues accruing to the Hubs while minimizing their running costs. This calls for well thought out strategy to ensure long-term sustainability of these investments and in this regard, the leadership of the SC as well as the governance structure in place requires to be closely scrutinized with a bias for business oriented/minded individuals.

On the agronomics front, the target beneficiaries mentioned that productivity (per unit area) is not yet up to par. For example, producers in Mqanduli mentioned that they had achieved 50% of the potential yields per hectare (2500kg/ha instead of 5000kg/ha) during the last production season, 2015-2016. This means that the Hub is operating below capacity and therefore, long-term profitability and success of the venture are in question. The opportunity cost (foregone benefits) includes: loss of revenue for the business, and foregone profit re-distribution and overall limited buy-in from members of the society that are waiting to see (early majority segment of the technology adoption curve) before they join the cooperatives.

Limited extension services were mentioned as one of the factors contributing to this yield gap. The extension service in place at the moment is not enough to provide adequate coverage within the target implementation regions.

Alternatively, easy to access and more affordable extension approaches are needed to bridge this gap, thereby helping producers address critical agronomic challenges to enhance productivity and reduce the yield gap. A farmer based extension system that uses farmer-to-farmer extension approaches should be considered to increase the coverage of and access to services, starting with the not too technical aspects of production and GAP.

Other factors contributing to the yawning yield gap include social dynamics that will be addressed in the next section.

ii. Social dynamics

Considering that catalyzing positive social transformation is one of the key outcomes of the RED Hub initiative, the success or failure of this initiative hinges to a great extent, on social dynamics within the target communities and within the PC as well as SC, and the general political dynamics. Community based initiatives will thrive or flounder based on the extent to which the social tapestry is or is not supportive of the intervention. The level of ownership by the target community, the level of alignment with community expectations, the structures that are in place to address arising challenges, and the extent to which benefits are clearly articulated and respective roles are negotiated are critical success factors.

In the communities with which we interacted, the team noted a high positive interest as well as a palpable desire and motivation to make the RED Hub initiatives a success. A growing sense of pride in the initiative and ownership of the process was indeed discernible as the team was conducted through a tour of the facilities by representatives of the SC. Interactions with individuals further reinforced this observation. For example, interest by the community at the Mbizana RED Hub is indeed high and positive, and there is a desire and motivation to succeed in their collective efforts. This was further demonstrated and confirmed by their stated intention to increase the land under cultivation in 2017, from 2000ha to 3000ha and hence increase production, potential for high return on investment, and a lower payback period. The same was noted at the other RED Hubs.

That said, mention was made of challenges that are currently being faced at the PC stage/phase, which require to be addressed with long-term sustainability in mind. Instances of pilferage

of mature crop in the fields, side selling of produce-especially green maize, allowing animals to graze on the crop in the fields as well as absentee landlords (whose land cannot be used without their consent) were mentioned as key challenges that will need to be addressed.

The role of the political class, including local chiefs and other community leaders requires to be interrogated and leveraged to enhance community buy-in, reduce conflicts, and bring on board more producers at the primary level. A comprehensive and all-encompassing communication strategy is thus necessary. That strategy will be part of a wider, inclusive and participatory community engagement strategy seeking to enhance community buy-in, ownership, and the long-term sustainability of development interventions by ECRDA. Respected community leaders, the political class, respected spokespersons within the target communities, and other relevant bodies- including but not limited to faith-based organizations, should be engaged in the process.

iii. Management of cooperatives

Cooperatives provide an alternative model for the implementation of sustainable, community-based initiatives within South Africa. The government actively advocates the use of this model for social empowerment projects. According to the National Development Agency (NDA) and the Department of Trade and Industry (DTI) in South Africa: "Cooperatives and collective ownership schemes are important vehicles to meet the economic goals of development, broad individual empowerment, and sustainable livelihoods for communities."

It is instructive here to seek clarity on the nature of cooperatives as a means to understanding the underlying dynamics and their implications for the RED Hubs.

The two main types of cooperatives are: worker co-ops and user co-ops. The key defining feature of "worker co-ops" is that worker-members in the co-op own and control it, on the basis of "one member one vote". In this way, worker co-ops potentially provide a radical alternative to the employment relationship found in conventional enterprises; and many of the difficulties they face relate precisely to this attempt to redraw the relationships between "owners" and "producers" – when co-op members combine both roles.[3]

The main characteristic of "User Cooperatives" is the use of collective organization to create economies of scale, as a way to enhance economic access or to gain economic advantage, whether in relation to purchasing, marketing, access to financial services, access to housing, or social services.[4] In user co-ops, profits are shared on the basis of formulae agreed upon by members, but are usually linked to the extent of use of co-op services by members.

A hybrid of these two models appears to have been adopted, by design or pure default, in the management set-up of the RED Hubs. Existing cooperatives are leveraging the economies of scale approach (of user co-ops) while adopting the "one member one vote" approach and the producer ownerships model of worker co-ops.

The implication here is that a lot more work is needed to ensure that the day-to-day management of these cooperatives is in line with the purpose for which the RED Hubs have been established. The work to be done should extend to the governance structures in place at the various RED Hubs through a negotiated and inclusive approach that offers the best option for sustainability.

The community members who interacted with the team made specific mention of managerial skills that are required to enhance their capacity to serve their members, and carry out book keeping. In this regard, a capacity assessment exercise is required to map areas of need for strengthening, while developing a system that

3. Philip, Kate. (2003. Cooperatives in South Africa: Their Role in Job Creation and Poverty Reduction, South African Foundation. Accessed at: http://waqfacademy.org/wp-content/uploads/2013/03/Kate-Philip-KP.-10_2003.-Cooperatives-in-South-Africa-Their-Role-in-Job-Creation-and-Poverty-Reduction.-South-Africa.-Kate-Philip.pdf on 9th December, 2016.
4. Ibid.

Co-op representatives at Mqanduli making their presentations and contributions during the meeting with Africa Harvest team members

promotes managerial skills development and succession planning for long-term sustainability.

The youth of the community need to be brought on board and taken through the managerial skills development program to provide a stream of energetic and visionary managers who will take the initiative to the next level of success.

In addition, members of the various cooperatives: primary and secondary alike, will require capacity building in group dynamics, conflict management and resolution, as well as corporate governance approaches to enhance awareness, participation, ownership and accountability.

Lastly, a learning tour to an area in South Africa or another country in Africa, e.g. Kenya, or elsewhere where the cooperative movement has taken root and is successful among smallholder producers would further help inform this process by providing a chance to cross-pollinate ideas as well as benchmark results.

iv. Business case

The RED Hubs can be described as backward integrated processing outfits targeting mass consumer markets. Backward integration is achieved through linkage with production by the PC, which, ideally, should help minimize costs and enhance profitability if well managed.

From a Porter's five forces analysis approach,[5] ***supplier power is medium to high*** since the

5. Porter, E. Michael. (2008). The Five Competitive Forces that Shape Strategy, Harvard Business School Publishing Corporation.

producers are in control in the short-term and the cost of switching to other producers is high, not to mention the political cost of such a decision. ***Buyer power is high*** given that the main product (mealie) is a mass market commodity and there are other alternatives available in the market. ***Competitive rivalry is low*** at the moment since there are limited direct competitors in this space. ***The threat of substitution is also low*** on account of limited number of alternative uses for which land used to produce maize is put to, at the moment. ***The threat of new entry (barriers of entry) into the market is also*** low given the high cost of establishing these Hubs.

In general, therefore, the competitive profile of the RED Hubs is strong and this position should be leveraged to increase profitability and help improve livelihoods in Eastern Cape. The strategic implication here is to optimize areas of success, minimize areas of potential drawbacks and be on the look-out for areas where emerging competitive alternatives may present. Emerging competitive alternatives include substitutes for the product lines being developed at the RED Hubs, while potential opportunities existing in complementary products such as poultry feed, pig feed, could enhance profitability for the Hubs.

Samp, a highly-profitable product at the RED Hub in Ncora (left, and below) and the Super mealie product (right).

It is also worth noting that the product profile is being expanded to include animal feed (maize meal) as well as other by-products of the milling process like Samp, and that there's intention to value add by using beans packaged with Samp, as is the case in Mqanduli.

On the service side, there was mention of intention and plans to further develop a number of alternative revenue streams that include: leasing of machinery to non-members of the PCs- for land preparation and harvesting, leasing of the truck for transportation purposes, establishing a functional machinery and fitting warehouse and establishing a trading center to diversify market offerings.

While the product/service diversification strategy is indeed commendable and should be strengthened, the same should be done on the input end of the scale. Dependency on maize as the only input raw material is risky in the event of a drought, other weather related shocks or human hazards, pilferage, etc.

Another major risk to the system as currently constituted is the low volumes of produce being generated by the primary producers. In addition to seeking avenues of increasing production volumes, the Hubs should consider opening up the processing plant to other producers who are not covered by the programs (those living outside the catchment area) to help increase revenues and optimize the installed equipment. This service could be offered at a price point competitive enough to drive business to the RED Hubs while keeping in mind the cost structure to ensure that no losses are incurred in the process.

v. Communication

The RED Hubs present a compelling case for how best to scale up primary production. They provide a critical piece, market pull, that's often lacking in smallholder production regimes. The team noted this unique value proposition, where primary production is linked to a processing operation close to the production area, and the products deriving from the system being targeted at the immediate and most often ignored household market.

This is a development that needs to be well communicated to not only share the innovative approach to rural transformation but to also, hopefully, interest funders and development partners who are willing and able to take the model to larger scale and scope. We have in mind donors and social investors who are willing to take these Hubs to a whole new level and hopefully inject the much-needed managerial acumen to sustain the investment over a longer time frame.

The other front where communication is a critical success factor is in winning the minds and souls of the target beneficiaries, the political class and the general community at large. Effective community engagement would help achieve the goal of enhancing ownership of the RED Hubs by the target community and help manage human related risks, which often hamper the success of well-designed development initiatives.

vi. Recommendations

Based on observations made during the field visits, information gathered from the various groups that the team interacted with, including discussions with the ECRDA resource persons and the team's experience in rural development initiatives, below are preliminary recommendations on how to improve the process, enhance success and the long-term sustainability of the RED Hubs.

Africa Harvest is keen and ready to provide its expertise in these areas leveraging on experience gained from designing, implementing, monitoring and evaluating rural development initiatives that are similar to the RED Hubs across Africa.

The recommendation are as follows:

i. In-depth needs assessments

An in-depth needs assessment study is required to authoritatively establish the need gaps that exist in the technical, managerial, leadership, social, and other dynamics impacting both the primary and the secondary co-ops, and by extension the overall success of the RED Hubs.

The purpose of such an assessment exercise will be to help refine interventions aimed at enhancing the skills of target beneficiaries, enhance ownership of the investments by the target communities, as well as identify barriers and bottlenecks that would limit the sustainable attainment of desired outcomes. The outcome of this exercise will be to inform capacity development initiatives (outlined below).

ii. Learning tour to Kenya

The vibrant and dynamic cooperative movement in Kenya plays a critical role in the national economy. The role is particularly pronounced in the rural areas where cooperative societies have greater influence in the local economy ranging from financial services to supply of agricultural inputs, primary processing and the marketing of agricultural produce. In the urban areas, cooperative societies primarily provide the most affordable financial services to the population.

Overall, the co-operative movement in Kenya is ranked by the ICA as 1st in Africa and 7th, globally. The cooperative movement in Kenya cuts across key economic sectors including agriculture, finance, transport and housing. The movement is a model in Africa with 20,680 registered cooperatives societies with over 14 million members. The State Department of Cooperative Development estimates that 60% of Kenya's population derives their income either directly or indirectly through cooperative activities.

The cooperative societies in Kenya employ more than 300,000 people, besides providing opportunities for self-employment to many more. Savings and Credit Cooperative Societies (SACCOS); the fastest growing sub-sector in the movement, have mobilized savings of more than KES 230 billion (USD 2.3 billion). The cooperative movement commands about 60%, 64%, and 63% of the country's savings, loan, and assets respectively. About 60% of the Kenyan population earn a living from cooperatives. There are 3,280 SACCOS and they are the fastest growing sub-sector in the cooperative movement, and this sub-sector is the fastest growing in Africa. The movement provides 2 million jobs with 70% of Kenyans depending directly or indirectly on cooperatives.

The agricultural sector currently has approximately 4,414 registered cooperatives with a membership of over 1.8 million involved in the production of coffee, cotton, pyrethrum, sugarcane, tea, dairy, and fisheries.

Kenya and South Africa are the only countries in Africa with independent regulators and specific regulations for SACCOS as stipulated in the Sacco Societies Act and Cooperative Banking Act respectively.

Therefore, a learning tour in Kenya would provide an excellent opportunity to share lessons and help, cross pollinate ideas between cooperators from Kenya and their counterparts from South Africa, on a like-for-like basis.

iii. Community engagement

The success, failure, and long-term sustainability of development initiatives aimed at rural communities is dependent on the extent to which the target communities identify with and own these initiatives. Winning the minds and souls of communities is a lengthy process that is often overlooked in development circles, but is a critical success factor requiring investment in terms of time and resources, finances, people, etc.

Successful community engagement is all-inclusive, bringing together politicians, community resource persons, faith-based organizations, community spokespersons, local administration and any other respected persons or opinion shapers. A community engagement strategy is thus best articulated through a broader communication strategy, the goal of which is to either inform or persuade the target audience towards a desired cause of action. In this case, the purpose will be to persuade the community to embrace the initiative and enlist their engagement as members of the PCs.

iv. Capacity building across the board

The long-term sustainability of community based interventions and organizations (Co-ops) requires continuous improvement (Kaizen

philosophy) of existing systems and especially that of the human resource component. The skills and knowledge of various actors require to be continuously enhanced to ensure adherence to standards, support innovations that will minimize running costs while increasing revenues for the business, and entrench a culture of excellence in the management of the RED Hubs.

Areas of interest include but are not limited to: technical skills for mill operators; management and leadership skills for co-op leaders; business and enterprise development skills for youth, women and the management team running the RED Hub business operations; governance, group dynamics and conflict management skills for members of PCs; and book keeping and financial management skills for the RED Hub management teams. Short training programs can focus on farming as a business; organizational development; marketing and value chain development; business planning and development and the legal aspects of cooperatives. The needs assessment exercise proposed above will help inform the finer details of this intervention including the curriculum development priorities.

v. Supporting development of robust corporate governance structures within the cooperatives

In addition to training and capacity building of the primary as well as the SC leaders in various managerial, leadership, business and financial facets of the RED Hubs, there is a need to provide a support structure that enhances corporate governance. Corporate governance refers to a set of systems, processes and principles, which ensure that a company/association/cooperative operates in the best interest of all stakeholders. Corporate governance is about promoting fairness, transparency, and accountability.

Weak governance structures undermine the effectiveness of cooperatives, which if not checked/addressed, leads to infighting, misappropriation of resources and failure to achieve their intended purpose. It therefore behooves the ECRDA and development partners to adopt strategies meant to enhance the governance structures in place at the RED Hubs as a means of safeguarding the investment done.

A clear cooperative structure needs to be put in place in the country to foster the growth of the cooperative movement. In a properly functioning system, the first tier comprises the PCs, which are composed of individual persons with a common bond. The second tier consists of SCs, which are formed by members of the PCs. The third tier has the national cooperative organizations, which may cut across key economic sectors of agriculture, finance, transport, and housing, with a mandate to provide specialized services.

The fourth and final tier consists of the apex cooperative organization which brings together various national cooperative organizations to give the movement a single voice in addressing its concerns on the national and international stage. Its primary role is lobbying and advocacy for a favourable legal and policy environment. The apex cooperative organization also has the role of collaboration, networking, representation, and the promotion of the growth and development of the cooperative movement in the country.

Key benefits expected by strengthening the co-operative governance structure include economic empowerment and a better quality of life for the poor. Cooperatives contribute to the promotion of nationhood, social, and cultural integration.

vi. Business plan development, implementation and monitoring of success

In addition to providing a good avenue for diversification, risk mitigation and hopefully enhanced profitability, the alternative revenue generating streams being considered at the RED Hubs offer an excellent opportunity for business units that can be spun off in the future. Equipment hiring services, transportation services, mechanical and fitting services as well as the trading services that are envisaged will require to be well planned with a view to optimizing their contribution

to the transformation agenda. Business plans will need to be developed, implemented, and the success or otherwise monitored closely and frequently. To achieve the aforementioned requires the enhancement of the capacity of key staff who will be tasked with managing these facets of the business.

This facet of the business provides an excellent platform to drive inclusive development agenda targeting youth, women and other vulnerable members of the community in partnership with other partners like The Department of Rural Development (Jobs fund).

vii. Developing capacity for communication for development

Development initiatives which have shown real potential for rural transformation, such as the RED Hubs require to be shared widely for the benefit of other rural based communities willing to learn and adapt the lessons to their circumstances. As alluded to earlier, the RED Hub model is highly innovative and holds immense potential to catalyze rural development and transformation on a very wide scale. This model provides an excellent pathway for scaling rural based interventions.

Communication plays a critical role in the success of rural development initiatives by providing an avenue for capturing and sharing lessons learnt, as well as for knowledge management. Different audiences have different communication needs and as such, there's need to build the capacity of key people within ECRDA as well as the cooperatives, especially at the SC level, to communicate to alternative target audiences based on their needs.

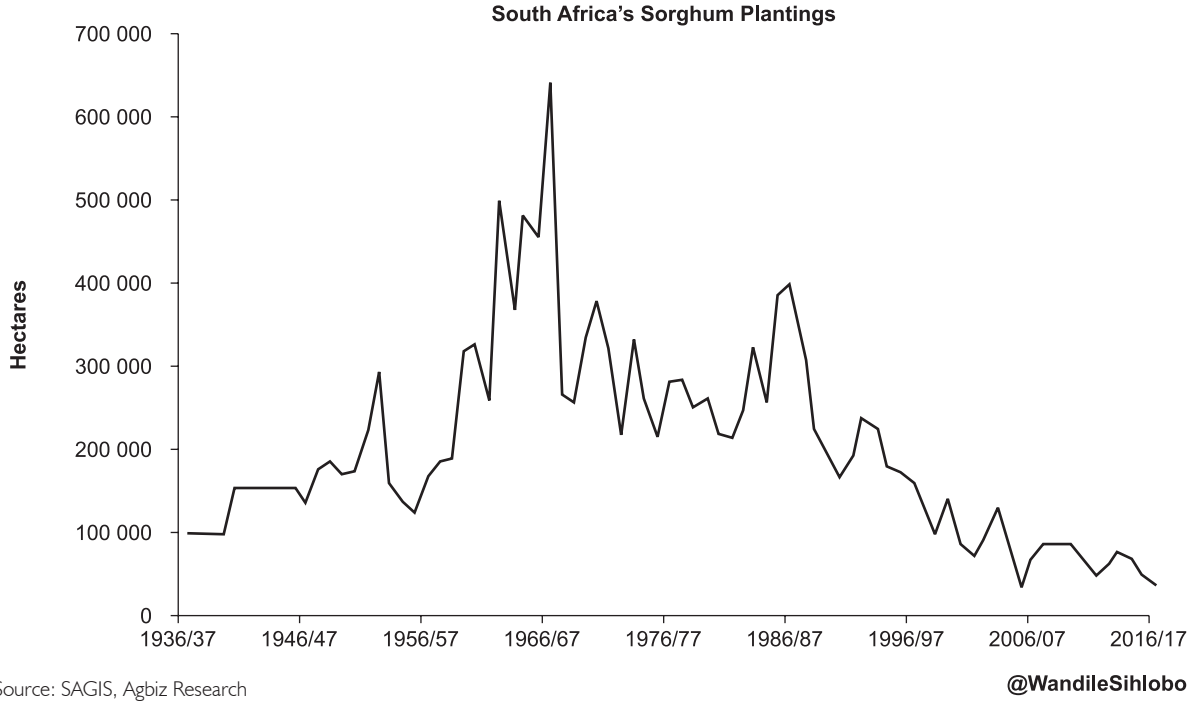
Africa Harvest can contribute to ECRDA's capacity building because it has a well-developed and experienced communication department, which is under the Communication for Development Program. This department handles all the communication needs of the organization and is also involved in Communication at the Pan-African level through Crop Life International (CLI) projects, which Africa Harvest has implemented since inception in 2002..

VI. Development of a sustainable commercial sorghum value chain in Eastern Cape Province

a. Sorghum farming in South Africa

The most recent data from the National Crop Estimate Committee paints a troubling picture of the South African sorghum industry (see graph below). The data show increase in the area planted of almost all grains and oilseeds with the exception of sorghum, which declined 24% year on year to 36,800 ha. In fact, looking at the database dating back to 1936, in 2017, SA planted the smallest sorghum crop ever. Despite this sad state of affairs, the crop is seen as key to poverty alleviation and job creation in some of the poorest rural areas, especially in the Eastern Cape Province.

The sorghum farming community in South Africa can conveniently be divided into the smallholder and commercial farmers owing to the differences in farm sizes, production and marketing methods. On average, smallholder farmers farm on 3ha which they do not own. They consume their products and are net buyers of grain. For these reasons, the total sorghum production of smallholder farmers is not known. Average sorghum yield on smallholder farms is estimated from that observed for the SADC countries to be 0.8 t/ha. In the Limpopo Province, sorghum is grown on at least 25 342 ha, with Sekhukhune (19 033 ha), Waterberg (3 410 ha) and Capricorn (2 899 ha) being the most important districts. From these data it is



Source: SAGIS, Agbiz Research

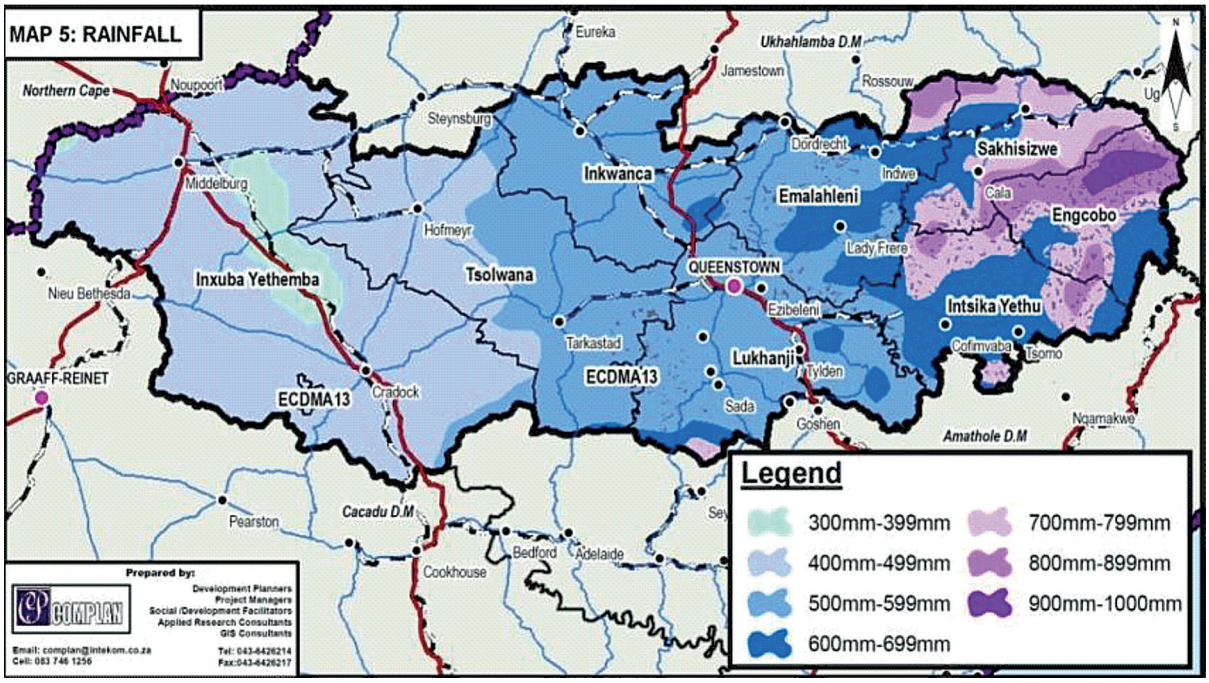


Figure 2: Rainfall distribution in Chris Hani District. *(Source: Draft Report (May 2011), Chris Hani District Municipality, Corridor Development Plan & Value Chain Analysis and Integration).*

estimated that the Limpopo Province produces more than 20 000 tons of sorghum. Sorghum is also produced in other provinces such as Mpumalanga, North West, Northern Cape, Eastern Cape, KZN and Free State. Statistics from these provinces are not available.[6]

Climatic requirements for sorghum Production

Sorghum is a warm-weather crop, which requires high temperatures for good germination and growth. The minimum temperature for germination varies from 7 to 10 °C. At a temperature of 15 °C, 80% of seeds germinate within 10 to 12 days. The best time to plant is when there is sufficient water in the soil and the soil temperature is 15 °C or higher at a depth of 10 cm. Temperature plays an important role in growth and development after germination. A temperature of 27 to 30 °C is required for optimum growth and development. The temperature can, however, be as low as 21 °C, without a dramatic effect on growth and yield.

Sorghum is grown mostly in an annual rainfall range of 300 to 750 mm. It is grown in areas which are too dry for maize. Early drought stops growth before floral initiation and the plant remains vegetative; it will resume leaf production and flower when conditions become favorable for growth. Late drought stops leaf development but not floral initiation. The crop has a relatively deep rooting system that can extract water from low sources.

While the entire Chris Hani district is considered arid and semi-arid, with an average of below 400mm of Rainfall (pa), the target project implementation area (starting point) of Emalahleni Municipality has higher rates (of rainfall), between 500-699 mm (pa) (see Figure 2 below). The area is thus suitable for sorghum production.

c. The Industrial Biofuel Strategy of 2007

The Industrial Biofuel Strategy for South Africa, the main target of which is to create jobs (approximately 25 000 agricultural jobs) in the energy-crop and biofuels value chain, received cabinet approval in November 2007.

6. Department of Agriculture, Forestry and Fisheries- SA. (2010). Sorghum Production Guidelines.

ECRDA Officers and the team from Africa Harvest at the Cradock biofuel plant site in Cradock, Eastern Cape.

The strategy aims at a 2% penetration level of biofuels in the national liquid fuel supply, or 400 million litres p.a., which would in turn provide demand for downstream production of raw materials and create jobs in the process. A key feature of the strategy was the requirement that the 2% penetration be achieved without jeopardizing food security by targeting new and additional land and excluding basic food crops in the initial stages. The short-term focus of 2%-10% bio-ethanol blending targets are to be met between 2015 and 2020, and the mandatory blending regulations have come into effect on 1st October, 2015.

274,000 mt of sorghum grain (pa) will be required to produce 100 million liters of bio-ethanol (pa) at the Cradock plant. The market value of that requirement stands at R 904 200 000/00 based on the projected market price for sorghum -July 2017 contracts, pegged at R 3300 per ton (GrainSA)[7].

ECRDA was appointed as the feedstock aggregator, for the Cradock sorghum bio-ethanol plant, by the IDC who is the main financier of the project.

The overarching objective, on the part of the ECRDA is to develop a sustainable and constant supply of grain sorghum as a feedstock for the Cradock plant while catalyzing economic, social and rural transformation through job creation, and the use of idle land within Eastern Cape.

Developing a sustainable commercial based value chain like the one envisaged in this instance requires a well thought through and coordinated WVC strategy. The presence of a ready market providing the much-needed pull for production activities is a critical success factor, ceteris paribus. The fact that ECRDA was appointed as the official aggregator for sorghum grain, as the initial feedstock require at the Cradock bio-ethanol plant is an excellent opportunity to help develop a sustainable, commercial-based sorghum production value chain. Add to this mix the presence of huge swathes of land that can be put to sorghum production, a local community, especially in Emalahleni/Lady Frere RED Hub, that has previously been engaged in sorghum production, the presence of other/alternative markets for quality sorghum grain and a willing investor in ECRDA, and you have the building blocks of a potentially transformative value proposition. The RED Hubs provide an excellent nexus from production, processing and marketing that should be harnessed to enhance the success of

7. http://www.grainsa.co.za/pages/industry-reports/safex-feeds (28/12/2016)

this initiative, catalyze community engagement and ownership, and job creation and rural transformation in Eastern Cape.

We propose to take a phased approach to developing the sorghum value chain with an immediate (12 months), medium term (12 to 24 months), and long-term (24 months onwards) planning and results spectrum. The strategy is to ramp up production through a continuous improvement process that supports the testing, adaptation, and development of improved sorghum varieties from research and links the entire value chain to alternative markets for high quality sorghum grain. The long-term sustainability of this initiative calls for a WVC approach, the focus of which should be to identify critical barriers and bottlenecks that need to be streamlined to enhance the chance for success and impact among the target beneficiaries.

For this to be attained, skills and capacities of all stakeholders along the value chain require to be enhanced, community ownership and engagement enhanced (may require mindset change to embrace commercial thinking), resources be mobilized, partnerships fostered, systems (seed, research, marketing, information, etc.) developed even as the natural resources upon which crop production will be done are conserved and managed in a sustainable manner.

The farming communities will require to be organized into production units: primary and secondary cooperatives, and their capacity developed to operate as development units, with minimal conflict and the ability to manage arising conflicts amicably.

A versatile research and development (R&D) component is key to the success of this initiative. R&D is needed to identify, adapt and disseminate productivity-enhancing sorghum varieties. Hybrids will also need to be done in tandem with other value chain development activities to ensure a seamless linkage between research and the deployment of research products for commercial use.

Appropriate inputs systems that support the timely access and affordability of high quality seed and other inputs (fertilizer, crop management inputs, credit, insurance, weather information, etc.) will also need to be strengthened (where they exist) and developed (in case they are non-existent).

GAP to enhance productivity and promote sustainable land management practices will also be required as more land is opened up and put to intensive production to optimize productivity and resource use. It will, thus, be imperative to build the capacity of the land owners, extension workers, and the farming service providers in GAP, post-harvest handling and management, and integrated soil and water management. The use of legumes as rotational crops will also be promoted to further enhance soil fertility as well as diversifying production technologies and products, household nutrition and incomes.

An affordable and sustainable extension services system will need to be designed to help promote quality production, the timely resolution of problems in the fields, and continuous improvement of the process as production is increased to meet growing demand.

Diversification of utilization and product range is also necessary to help mitigate risks like market failure even as the communities involved are empowered to develop alternative revenue stream for resilience. Therefore, alternative outlet markets that include human food, animal feed, fish feed and malting should also be part of the design of this intervention. This calls for investment in value addition and product utilization, markets and products development, as well as setting up of efficient aggregation systems to enhance commercial appeal to various end users.

Mechanization is without doubt a critical success factor in this equation if the targets are to be achieved. Machines will be needed in land preparation, planting, weeding, harvesting, and threshing of the sorghum. Fortunately, tractors

and most farm implements are available in the RED Hubs.

Other necessary inputs include: post-harvest technologies; and Purdue Improved Crop storage (PIC) bags for safe storage of produce to be used as the household.

The role played by youth in this complex matrix is critical to the long-term sustainability of the intervention and therefore requires mainstreaming in each node of the value chain; from production to processing and marketing. Indeed, one of the main challenges mentioned by the Ibuyambo cooperative members/leaders at Emalahleni in Lady Frere was the non-participation by young people in agricultural activities.

Expected outcomes will manifest in terms of increase in food security, rising levels of employment in rural communities, improved land and natural resource management, and overall improvements in rural economies. Other notable benefits include: enhanced skills and knowledge in the target communities from the capacity building efforts, as well as import substitution and the attendant savings in foreign exchanges.

The success of the RED Hubs will depend on sustainable management, and coordination of all project support and value chain activities. Before the secondary cooperatives are accorded full control of the Hubs, ECRDA should foster the cooperative process between the RED Hubs/SCs and the PCs, and between the Hubs and all other value chain stakeholders. It is pertinent that the ECRDA, the ministry of agriculture, and all other public and private institutions working with the target community coordinate their efforts and inputs to enhance synergies. A platform should be considered as a means for dialogue whose objective is to engage the community in a harmonized manner. This platform should be harnessed to avoid duplication of efforts or delivering conflicting information or directives.

d. SWOT analysis_sorghum production in Eastern Cape

Strengths

The project has a strong political, financial, and legal backing by the Government, which is necessary to succeed. There's plenty of land available and the climatic conditions are ideal for sorghum production in Eastern Cape. Other considerations include: strong partnerships that the ECRDA has developed with various players/stakeholders, which will help enhance success.

Weaknesses

Production systems required to drive production and productivity of sorghum in tandem with market requirements- with the Cradock bio-

Strengths	**Opportunities**
Strong political, financial, and legal backing	Large and potentially lucrative market available- bio-ethanol production
Land is aplenty and climatic conditions are ideal for sorghum production	Alternative markets for sorghum: malting, food and feed
Experienced player (ECRDA) in community based projects	Development of sorghum based enterprises for youth engagement
Community ready to engage through cooperatives	Commercial seed companies are available and have varieties/ hybrids in the market
	Improved production technologies are readily available
Weaknesses	**Threats**
Production systems are not in place	Climate change- drought
Community ownership and participation needs to be addressed	Social considerations including: politics and misalignment of expectations
	Use of substitute feedstock: sugar beet and corn

ethanol plant as the ultimate target, are yet to be established and will require investments in time, resources, human capital, political goodwill, etc. Additionally, community ownership and participation, which are critical success factors for the program/project will need to be addressed to enhance the chance of success.

A negotiated agreement arrived at through a consultative procedure is thus critical to the process.

Opportunities

In addition to the Cradock bio-ethanol market for sorghum, which is valued at R 900 million (274 000mt of sorghum), commercial opportunities for the alternative use of sorghum grain exists, and can be developed in tandem with production targeting the Cradock plant. These opportunities are in malting, human food, animal feed and fish feed value chains, which are yet to be exploited. Examples of such commercial opportunities include: Meadow Feeds, KSM Milling and SAB Miller. The over 200 000ha of land available in Eastern Cape is sufficient to meet the potential demand for the Cradock factory and all other potential alternative markets. The active engagement of youth in sorghum production, value addition and marketing activities along the value chain is yet another opportunity in Eastern Cape. Developing enterprises along the various nodes of the value chain, with a focus on participation of the youth can help address the problem of youth unemployment/underemployment in rural areas even as it enhances their engagement in agriculture. The presence of commercial seed companies like Pannar and others is an excellent platform for developing a vibrant seed production and marketing business line to support commercial sorghum production. Youth integration into agro-business is thus achievable through the development of a strong commercial seed production and marketing businesses. Lastly, improved sorghum technologies have been tested in the province with significant levels of success, the community is ready to engage through the cooperatives (Emalahleni) and ECRDA, and the lead institution/appointed feedstock aggregator has experience in rural development projects as demonstrated through the RED Hubs.

Threats

Climate change is a reality in Eastern Cape as evidenced by drought conditions over the last 2 years which has rendered it impossible to produce anything. The last onset of rains is also a poignant reminder of the reality of climate change, posing a real threat to the sorghum production agenda in the Province. Social considerations that include politics and how well the aspirations of various competing constituencies are managed or aligned is a source of threat to the initiative. The role of local politics in resource allocation, priority setting, and ensuring accountability of the funds utilized in the communities cannot be over-emphasized. Community participation in the RED Hub initiative has not been optimized so far, which leads to increasing the operation costs per unit, and less than optimal return on investment. The level of success will, to a large extent, be influenced by local politics, ownership and the positive engagement of the community in the target region. Last but not least, the presence of alternative feed stock like sugar beet and even corn should be taken cognizance of as the sorghum production and marketing system is being developed.

e. Implications of the SWOT analysis

Based on the foregoing assessment, the following are implications that require further consideration to make sure that the success of the sorghum value chain development initiative is enhanced. The approach is to use existing strengths to address the weaknesses, while optimizing the opportunities to minimize threats. Below are the key implications:

i. Leverage on the strong political support and backing that both ECRDA and the Cradock bio-ethanol plant have, to engage with the target communities, initiate dialogue, and develop mutually acceptable instruments to guide the process. These instruments

(MoU or other acceptable forms of engagement) require to be negotiated and reflective of the aspirations of all parties involved. Clarity should be emphasized on issues such as (but not limited to) how each party will contribute to the process, and how the benefits arising therefrom will be shared. The political class and other local leaders will play a critical role in this process. A platform for such dialogue should be developed. The desired outcome is enhanced understanding, acceptance, ownership, and participation by the target communities in the sorghum initiative. This will in turn, not just enhance the long-term sustainability of the investment but also improve the chances of positive return on investment for all stakeholders involved. That the ECRDA is well placed to mid-wife this process should help to not only guide the process, but more importantly, initiate the dialogue, propose the platform, and provide leadership.

ii. ECRDA should harness existing systems in Emalahleni and partnerships forged with various stakeholders, to jump start sorghum production in the area. These systems include: production, aggregation, and milling. Other critical success factors/ systems needed include: adaptive R&D, seed systems, extension service provision for improved productivity (GAP trainings), market diversification, enterprise development, and value addition.

iii. Aim to address the existing supply/demand gap for quality sorghum grain in alternative markets, in developing a commercially sustainable sorghum production and marketing value chain. The value chain should be developed with diversification (of use) as a guiding strategy thereby providing the pull and alignment of downstream activities. Alternative end uses include: fuel (Cradock plant), feed (Meadow Feeds), human food (KSM Milling), and malting (SAB Miller). The immediate action should be to develop off-take agreements with these key off-takers even as the production system is developed with an eye on supplying the Cradock plant once it comes on line. Demand parameters such as quality, variety, quantities, timeliness, etc., will help inform downstream production activities.

iv. Harness existing improved sorghum technologies with drought tolerant capabilities to build resilience in the face of drought and mitigate associated risks, low productivity, and crop failure. A robust R&D system to facilitate adaptive research geared towards developing varieties and hybrids of sorghum and legumes that are drought tolerant, and can be grown in the Eastern Cape agro-ecologies is thus required. Linkages with local research institutions and scientists involved in sorghum R&D is required to improve access to productivity enhancing materials from other regions or countries. This process should be seamlessly linked with the end-user requirements/parameters for synergies and sustainability.

f. Proposed implementation strategy

A WVC approach/strategy is thus required to enhance the production and productivity of sorghum. It is also to ensure the long-term sustainability of the initiative while enhancing the probabilities of a positive return on investment for all stakeholders in the value chain. The guiding philosophy of the WVC approach is a system based identification and streamlining of barriers and bottlenecks limiting production, productivity, marketing, and utilization.

We propose that the program should have four key components namely: community engagement; production and productivity enhancement; capacity building and markets development and linkages. The components will be supported by strong communication for knowledge management, a responsive results based monitoring and evaluation system, and a dynamic project management and coordination sub-component. Each of these is described below:

Component 1: Community engagement, sensitization, mobilization

The objective here is to enhance awareness of the intervention, increase community participation and ownership, and optimize resource- use through collective effort.

Farmers will be sensitized on the sorghum value chain development initiative using the RED Hubs platform, and mobilized to join and engage through the PCs. Women and youth representation in the participating PCs, is critical in bringing on board the synergies of all gender and age groups. Training in group dynamics and governance will be key to enhance awareness of individual contribution and roles as well as developing cohesive groupings where all members will be required to play a role in development activities. Based on the culture and traditions of the community, it will be key to apply an approach to community engagement that puts all existing conditions into consideration. Therefore, the process should be all-inclusive and should harness lessons learnt from past experiences by all value chain actors in developing an effective, and resource-efficient engagement strategy.

An appropriate communication strategy will need to be developed, and all stakeholders and actors engaged in its development as well as eventual roll out, will need to ensure the uniform dissemination of information.

A trade-off between mobilizing more farmers to attain the targeted 60 000ha of sorghum production by 2018 and the optimal levels of resource allocation will have to be done. This trade-off will need to be evaluated and expanded gradually in succeeding production periods to ensure that the available production equipment and inputs are engaged in timely land preparation and planting to minimize late planting, which lowers resource productivity.

High land productivity will be a driver for engaging more villages (PCs) in sorghum production.

Component 2: Production and productivity enhancement

The objective in this component is to develop and strengthen systems that support improvements in production and productivity through the following activities:

Development of inputs systems to improve access and affordability to inputs: seeds, fertilizer, crop protection inputs, information and financial services.

Timely access to and affordability of quality inputs: seeds, fertilizer, crop protection inputs, as well as information and financial services is a critical success factor in increasing production and productivity.

The input access system envisaged should be well linked to an R&D system (existing or to be developed) to provide a pathway for improved seeds; from research to farmer fields. In addition, the system should be responsive to the reality of climate change to enhance resilience, and help mitigate associated risks and shocks including drought, floods, pest infestation, etc.

The use of seeds of sorghum varieties/hybrids that are both drought tolerant and can be put to multiple uses is recommended for development and promotion in the seed systems to be developed in this initiative.

The enhancement of sorghum production and productivity in Eastern Cape is expected to be gradual as it will take time to ramp up production towards the target of 274 000mt (annual) supply to the Cradock factory. In the meantime, farmers should have access to high yielding multiple-use sorghum cultivar seeds targeting different market needs such as household consumption, milling for human food, and animal feed and malting. The strategy to be adopted is one based on addressing the most immediate needs, and to use this to attract the participation of an increasing number of community members even as the program builds a critical mass of producers. It is prudent to start with a value chain that's best understood by the target community, and whose products the community can readily utilize. An assessment of the target community is thus required to inform this process, either directly or from key informants.

Seed systems development will be based on the existing laws that govern production and distribution of planting materials in South Africa. Nonetheless, the use of quality declared seeds- produced at the PC level, will improve seed access of the open pollinated varieties, and should be encouraged at the start of the development to lower the production costs. The public and private seed companies will be engaged to establish seed distribution mechanisms of the identified varieties, which in the long run is the must sustainable approach. Where applicable, the seed companies will be encouraged to contract cooperatives in seed multiplication.

As the RED Hubs are designed to provide production, processing and marketing services for the cooperative members, it is expected that they can efficiently run agro-dealer shops. Wholesale outlets could be based at the Hubs, while retail outlets could be based at the PC levels to improve access of inputs and services to all members. This will decentralise operations and create more activities for participating members, and enterprise development opportunities, which can be taken up by women and youth.

The RED Hubs will therefore play a crucial role as the one stop shop for all inputs, but a system that ensures timely delivery of the inputs to the PCs (engaged in the actual production) will require to be reviewed, and any bottlenecks streamlined. Other key activities to be undertaken under this sub-component include: developing an information dissemination system between the secondary co-ops (RED Hubs) and the primary co-ops; setting up of participatory variety trial/ demonstration plots for the evaluation of new varieties/hybrids; linking primary co-op members with financial service providers (including ECRDA) for credit and insurance services; identifying local entrepreneurs to provide seed access services (agro-dealers); assessing the needs of these agro-dealers to assess gaps; developing training materials to address gaps identified; training the agro-dealers to fill the gaps; monitoring progress and addressing any arising issues.

A strong R&D system is needed to carry out adaptive research of new and improved varieties/ hybrids to address emerging challenges, develop alternative value chains and end uses, as well as enhance access to quality materials from other regions.

Therefore, a strong public-private-producer-partnership should undergird these activities to enhance long-term sustainability and fast track commercialization efforts.

Component 3: Capacity building in GAP and natural resource management

Access to quality improved seed and inputs is a necessary, though not sufficient, condition to improving sorghum production and productivity. Producers require skills and knowledge to fully exploit the genetic potential in these improved technologies. A comprehensive capacity building component is thus required.

The objective is to equip primary producers and extension service providers with the skills, knowledge and expertise needed to draw maximum benefit from the use of improved production technologies.

GAPs recommended from research will therefore be imparted through trainings using various appropriate methods of instruction. Issues to be covered in these trainings include: seed rates, fertilizer rates, land preparation, spacing, planting, weeding, thinning, diseases and pests, disease and pest management, sorghum growth stages and requirements, as well as when and how to harvest.

Practical trainings will be done through demonstration plots that are centrally located and from where farmers can learn as a group before applying the lessons at the individual level. The demonstration plots should be done at the primary cooperative level where the production will be done.

Other critical considerations to be given emphasis include:

Integrated soil fertility management

Soil management practices will be an integral part of the intervention/program to improve and rehabilitate degraded soils as well as maintain optimum soil quality for sustainable crop production. This will entail the management of soil organic matter, use of best tillage practices, prevention of compaction, fertilizer management, and appropriate crop choices.

Soil testing will be conducted and soil maps showing suitability for growing the crop and how management practices need to vary with soil type, slopes, and crop will be made available to the farmers. As the area is characterized by sloppy landscape, the land is prone to soil erosion and it is evident that some areas have eroded soils. Soil maps will inform the soil management regime to be employed in the different zones for optimal land productivity and environmental conservation. Targeted practices will be applied to the various zones to maintain healthy soils hence improve land productivity. Liming, farm yard manure application and the ploughing back of crops into the soil are some of the likely practices that will be applied separately or in an integrated manner.

Conservation agriculture techniques such as minimal soil disturbance, permanent soil cover and crop rotations, are strongly recommended to enhance rehabilitation of degraded soils and for maintenance of productive lands.

While mono cropping is a common agricultural practice in the target areas, it will be worthwhile incorporating intercropping with crops like cow peas, pigeon peas, mung beans, soya beans, common beans and/or other nitrogen fixing legumes. This will help in soil improvement and help diversify diets, increase fodder for livestock, and enhance household nutrition and livelihoods in the target areas.

In addition the legumes will bring several other benefits especially in the target areas where the biomass levels are very low coupled with eroded and degraded soils. The benefits will include: soil protection during fallow periods (as a cover), enhanced availability of soil nutrients, improving the soil structure and breaking compacted layers and hard pans as a rotation in a monoculture, and as weeds and pests control.

The use of farm-yard manure from livestock kept in the target area will also assist in soil fertility management by increasing the organic matter content and improving soil structure. This lends itself well to integrating livelihoods by exploiting existing synergies and thereby contributing to enhanced resilience in the target communities. A drive to promote awareness and increase the use of farm yard manure should be incorporated in the program design.

The option of dry planting of sorghum (before the onset of the rains) will be made possible with improvements in soil fertility management – to improve the soil texture, conserve moisture and break the hard pans which are common with black cotton soils. Dry planting will contribute to the expansion of the production area as the duration for land preparation and planting will be extended. This will call for the purchase of more equipment by the SC (increasing asset use and incomes), leading to improved efficiencies, increased sorghum production, and overall profitability.

On farm water management technologies

Effects of climate change vary from region to region and may include: increased incidences of droughts, changes in the rainfall patterns, distribution and quantities received or even flooding. The drought experienced in Eastern Cape over the last two years, coupled with the late onset of rains is a clear indicator of the challenges of climate change. Lesson learnt from this drought should form part of the intelligence and knowledge to be incorporated in agriculture based programs in the Province.

Therefore, we recommend that on-farm water management technologies be part and parcel of the capacity building component of this program. The objective will be to help conserve ground and rain water, manage flooding, control leaching of soil nutrients, and ensure that water is available at the critical physiological stages of crop growth.

Agriculture in general, and crop production in the area targeted for this program in Eastern Cape, is still rain-fed and although there are pockets with irrigation facilities e.g. Ncora area, sorghum production is expected to be rain-fed for the most part. Emalahleni the initial production area, receives an average of between 500 and 699mm of rainfall annually, which if well harnessed, can sustain sorghum production, considering that the crop does well with rainfall between 300 and 700mm pa.

Nonetheless, while sorghum's drought tolerant qualities and relatively deep rooting system that can extract water from low sources lends the crop well to dry conditions, the presence of adequate moisture is critical at the germination and flowering stages. If early drought stops growth before floral initiation, and the plant remains vegetative, it will resume leaf production and flower when conditions become favorable for growth. Late drought stops leaf development but not floral initiation.

Therefore, the program will promote and test drought tolerant and early maturing varieties of sorghum in tandem with on-farm water management technologies that are needed to complement the use of drought tolerant and early maturing varieties.

On-farm water management technologies that will be considered include (but are not limited to) tied ridges, terracing, harvesting of surface run-off through retention ditches, use of check dams, etc.

Component 4: Markets, development, and linkages

Markets play a critical role in value chain development activities. They not only provide a much needed demand pull based on which downstream production activities are aligned, but also a basis for resource allocation and economic trade-offs on account of the value that markets attach to competing choices. The central role that market development and linkages is accorded in the WVC strategy is, therefore, in recognition of this role.

The ultimate goal of this project is to supply the Cradock biofuel plant (the market) with quality grain sorghum in a consistent manner, thereby fulfilling the role that ECRDA has been granted as a feedstock aggregator. However, given that that target will be achieved in a gradual manner over the course of approximately 3 years, it is imperative that a production momentum be built towards that goal. That momentum can best be achieved by targeting initial production activities to address existing market demand for quality sorghum grain in the human food, animal feed, and malting industries. It will also be prudent to sustain these value chains in tandem with the production momentum targeting the Cradock biofuel plant.

Therefore, we propose that the development of a commercial sorghum production system in Eastern Cape take a multi-pronged approach to address both household consumption needs, as well as the commercial user of sorghum in food, feed, beverages and fuel.

It is thus prudent to start by feeding into already existing value chains/markets. The demand for grain sorghum by Meadow Feeds, KSM Milling and SAB Miller is currently unmet. The project should start by addressing this existing short fall by building strong partnerships with these companies. The starting point is to establish the demand parameters; volumes, quality attributes, time and prices and use that information to develop supply/value chains for these markets, working backwards to the production stage. Clarifying demand parameters such as the quality of grain required will help inform production decision including the variety of sorghum to be produced and help map the entire value chain including; where the seeds will be come from and what other systems are needed.

It is from this exercise that the project team can gauge what varieties will need to be fast tracked through adaptive research, who will produce the seeds as well as where and how to bring on board improved materials/varieties from breeding programs in other regions/countries.

Development of these initial supply/value chains will help get production momentum going in Eastern Cape allowing the project team to learn lessons that will help strengthen the process as systems are put into place. Once the seed systems, input delivery and production, harvesting, storage and transportation mechanisms are in place, supplying sorghum to the Cradock plant will be based on expansion of an already efficient operation.

In addition to supplying these value chains (Meadow Feeds, KSM Milling and SAB Miller), the processing plant installed at Emalahleni can be optimized by processing grain for local consumption and products such as human food, animal feed, local beer, etc.

An efficient market development and linkage system will therefore be designed and implemented to identify alternative uses that sorghum can be put to, new products development, branding, merchandising and distribution networks, as well as effective ways to segment, target and position.

Complementary value chains like poultry farming by individual members or primary cooperatives should also be encouraged as they will help absorb feeds from the processing plants, while schools and hospitals can serve as an outlet for the processed foods. These complementary activities are key in enhancing resilience and diversifying rural livelihoods.

While there exist many opportunities for enterprise development, the community will require empowerment to enable them to identify, establish and run viable businesses. Capacity building programs targeting youth and women will need to be developed in partnership with other development partners to enhance inclusive growth, increase job opportunities and improve livelihoods in rural areas of the Eastern Cape Province.

g. Program/Project duration and targets

We propose a 3 year program starting in 2017 and ending in 2020. The proposed target should be 10 000ha in the 2017/18 production year, which will be scaled up in the subsequent periods upon the establishment of critical systems like seeds access and others.

VII. Partnership matrix

As mentioned in the foregoing discussion, a strong public- private-producer- partnership is a critical success and sustainability factor in this initiative. As such, the following are partners that could play a role in the program based on the proposed components. The list is not conclusive and should be expanded accordingly.

Component	***Partner(s)***	***Role***
Community engagement	Local leaders/political class	Community mobilization and sensitization
	Local authorities	Sensitization and buy-in enhancement by target producer groups/communities
Production and productivity enhancement	Primary cooperatives (PC)	Primary production
	Secondary cooperatives (SC)	Processing and marketing
	Input suppliers	Supply of seeds, fertilizers, credit, insurance
	Agricultural Research Council (ARC)	Adaptive research and access to improved sorghum varieties/hybrids
	Private/public seed companies (Pannar, etc.)	Seed multiplication and related business
Capacity building	Africa Harvest	Value chain promoter: Streamlining the value chain across the board
	Other local capacity building organizations	Building skills required to enhance results, efficiency and sustainability
Markets; development and linkages	RED Hubs, Meadow Feeds, KSM Milling, SAB Miller, Cradock biofuel plants, others (Fish meal manufacturers)	Market pull for downstream (value chain) activities
	University of Pretoria (UP)	New sorghum products development

VIII. Recommendations/Proposed way forward

a. Multi-disciplinary team learning trip to Kenya

Based on the Africa Harvest tour of ECRDA Red Hubs, one of the immediate needs identified was the need for up-skilling, based on an integrated study tour to Kenya. Our view is that peer-to-peer learning (also referred to a cooperative or collaborative learning) based on formal, semi-formal or informal learning contexts, in small groups or one-on-one is the most ideal for the up-skilling needs of the ECRDA Hubs.

Africa Harvest will design a two-week tour to enable a multi-disciplinary team from ECRDA to learn together (or learning from each other), with strategically selected Kenyan peers. We believe the trip is an important foundation for future Africa Harvest interventions and interactions.

Our experience in organizing similar trips confirms that learning occurs within a context that is itself part of what is learned. This provides immediate returns, given that knowing and doing cannot be separated.

Given that learning is a process that is extended over time, the proposed trip will fast-track the achievement of the much-needed broad capacity building within ECRDA, the RED Hubs and the farmer (primary and secondary) co-ops.

Africa Harvest will identify key learnings required and match these with Kenyan institutions. Structured discussions, study tours, partnering (a buddy system), mentoring and group activities will be part of the overall up-skilling strategy.

The goal will be for mutually beneficial interactions that involve the sharing of knowledge, ideas and experience between the participants. Africa Harvest will identify and match peers in a similar situation to each other.

Learning Trip to Kenya

Subject to discussion and funding availability, we expect a team of 20-25 people, including a team of 5 from Africa Harvest. Of the Africa Harvest team, 3 will be Kenya-based. No flight costs have been included in the projected budget.

For the ECRDA, we propose to have 10 head office and/or project staff and a similar number to be drawn from the PC and SC, as well as the RED Hub employees. Since there is great need to push ahead with the sorghum transformation agenda (STA), we propose dedicated slots to accommodate those involved in the sorghum work.

Our estimate is that the trip will cost approximately USD 100 000-120 000, without including the full Africa Harvest in-kind contribution.

b. Three-year projection (March 2017–March 2020)

This proposal is for a 3 year period, 2017-2020. During the first year, the focus will be on strengthening the capacities of ECRDA, and

especially the cooperatives (both primary and secondary) to support the goals of the existing four RED Hubs. The study tour to Kenya will provide the critical foundation for the work in year one. (We expect this tour to take place towards the end of March 2017 or in early April 2017).

Additionally, activities of year 1 will also entail:

i. Review the cooperative's constitutions and business plans to ensure alignment with RED Hubs, especially when the later become autonomous, private entities;

ii. Following from the above, Africa Harvest will identify levers and methodologies that will increase active participation by members based on an incentive system. We will pilot this in at least one of the hubs (in year 1) and roll it out to the other hubs (during the project life). The goal is to get the cooperatives ready to play an effective role as private shareholders of the RED Hubs;

iii. In addition to the above, Africa Harvest will review the operational and legal interphase of cooperatives with the RED Hubs in order to clearly define the production/input relationship.

c. Africa Harvest/ECRDA Eastern Cape Sorghum Transformation Agenda (ECSTA)

i. Starting year one, Africa Harvest will undertake a baseline survey and analysis of gaps and opportunities. The intensity of the STA will intensify during years two and three.

ii. The STA will begin with the mapping of an appropriate project partnership strategy with a view to building a consortium able to attract seed funding during the project's initial three years, but with greater focus for sufficient funding after year three. The Africa Harvest/ECRDA strategy is to increase and diversify funding sources, especially for sorghum intervention, based on multi-institutional approach. In this regard, Africa Harvest had preliminary meetings with the ARC and the UP, who have previously partnered with Africa Harvest on some of our sorghum projects.

iii. The Africa Harvest STA intervention will be designed to improve food security by sorghum output significantly during the project's 3 year period. Subject to timely, sufficient funding and other interventions, we also expect the ECRDA/Africa Harvest partnership to result with new jobs created within the target communities. More specifically, we will identify wealth creation interventions through the optimal utilization of existing capacity, especially at the Lady Frere RED Hub.

d. Key project drivers

We view the key project drivers to be:

i. Integration of food production, storage, food processing, and industrial manufacturing by value chains.

ii. Identification of key value chain interventions to drive community and RED Hub growth.

iii. Investment-driven strategic partnerships with the private sector.

iv. Unleashing new economic opportunities for sorghum farmers.

ECRDA's Luvo Qongqo gives background information on how the RED Hubs were set up, and the challenges and successes they have experienced.

The Africa Harvest team with members of RED Hubs and other stakeholders.

Mr. Simukonda explains something to Dr. Njuguna during the trip to the RED Hubs..

Mr. Taylor Mburu keenly listens to an official of a cooperative in charge of one of the RED Hubs..

In the three pictures above, the Africa Harvest team interacts with diverse stakeholders involved in the RED Hubs.

Dr. Njuguna interviews one of the RED Hub employees against the backdrop of one of the silos.

Interacting with various stakeholders of the ECRDA RED Hubs

Abbreviations

ABS	Africa Bio-fortified Sorghum
AHBFI	Africa Harvest Biotech Foundation International
ARC	Agricultural Research Council
ASALs	Arid and Semi-Arid Lands
CLI	CropLife International
COO	Chief Operating Officer
CSIR	Council for Scientific and Industrial Research
DTI	Department of Trade and Industry
EC	Eastern Cape
ECRDA	Eastern Cape Rural Development Authority
ECSTA	Eastern Cape Sorghum Transformation Agenda
FICA	Financial Intelligence Centre Act
GAP	Good Agronomic Practices
Ha	Hectare
ICA	International Cooperative Alliance
IDC	Industrial Development Cooperation
KG	Kilogram
KZN	Kwa Zulu Natal
NDA	National Development Agency
PA	Per Annum
PC	Primary Cooperative
PFMA	Public Finance Management Act
PIC	Purdue Improved Crop
R&D	Research and Development
RED	Rural Enterprise Development
SACCOS	Savings and Credit Cooperative Societies
SADC	Southern Africa Development Community
SC	Secondary Cooperative
SHFs	Small Holder Farmers
SP	Strategic Plan

T/Ha	Tons per Hectare
UP	University of Pretoria
USA	United States of America
WVC	Whole Value Chain

Currency

KES	Kenyan Shilling
R	South African Rand
USD	United States Dollar

Weights and Measurements

MM	Millimeters
MT	Metric Ton; equivalent of 1000kilograms

The Africa Harvest Team

DR. MICHAEL M. NJUGUNA

Ph.D. and M.Sc. in Entrepreneurship Development (Kenyatta University and JKUAT Kenya respectively); Post-graduate Certified Diploma in Finance and Accounting (CDipAF) [UK's Association of Chartered Certified Accountants (ACCA)], B.Sc. (University of Nairobi)

Dr. Michael M. Njuguna is the Deputy Chief Executive Officer and Director Food and Nutritional Security Programmes, at Africa Harvest Biotech Foundation International. He is part of the senior management team that provides strategic leadership in policy formulation and programme implementation. He has over 20 years of international development experience in agricultural research, agri-business development, rural financing, and technology transfer. He is involved in all phases of project cycle including project initiation, development, monitoring, impact assessment and evaluation. He has worked with resource constraint communities to develop innovative approaches that support rural agricultural small enterprise development.

Dr. Njuguna has been involved in designing and implementing appropriate enterprise development models that facilitate resource marginalized households to access technologies, training, micro finance, market, input, information and infrastructure. In the last 10 years, he has played an important management role in major global consortia such as the Africa Biofortified Sorghum Project with 14 international partners, which has developed the Africa Biofortified sorghum, enriched with Vit A, iron and zinc for African smallholder farmers. He is also playing a leadership role in the pan African initiative, the Technologies for African Agricultural Transformation (TAAT), an initiative developed and implemented under the auspice of the African Development Bank. He works with a rich network of stakeholders at regional, national and grassroots levels, composed of organizations representing the CGIAR, National Agricultural Research Institutions, universities, and NGOs, extension workers, and farmers' organizations.

Dr Njuguna has the experience of working with smallholder farmers in arid and semi-arid regions of East Africa, supporting them to grow crops that are resilient to adverse climatic conditions, which has further strengthened his knowledge of integrating food security to sound ecosystem management for sustainable livelihoods of the poor. He has managed projects that focus on rehabilitation of degraded landscapes through soil and water conservation, soil fertility management, agro-forestry and short cycle livestock management to boost food production while protecting the fragile ecosystems. In the last 20 years, he has managed over 20 projects targeting food security and empowerment of poor communities living in rural areas.

He has essential people management skills and has previously been the head of administration, human resources management and finance functions at Africa Harvest. He has rich experience in prudent financial management, including planning, budgeting, budget controls, cash flow forecasts, disbursements, investments and audit oversight. He has also been involved in the preparation of partnership and project agreements, management of consultancy assignments, MOUs, research management and general administration.

Dr Njuguna has published scientific papers covering a wide range of topics such as technology development and deployment, technology adoption, social and institution issues in agriculture, and marketing models for smallholder farmers. He has contributed a chapter in a book *"Towards optimizing the impact of tissue culture banana in Kenya"* In: F. Wambugu, D. Kamanga (eds.), *Biotechnology in Africa: Emergence, Initiatives and Future.* Science Policy Reports 7, DOI 10.1007/978-3-319-04001-1_1, Springer International Publishing Switzerland, pp. 115–131.

Prior to Africa Harvest, he held the position of Programme Administrator at the International Service for Acquisition of Agri Biotech Applications, in Nairobi (ISAAA AfriCenter) for 6 years.

DANIEL G. KAMANGA

MBA (Durham, UK); Post-graduate Diploma in Mass Communication and B.A. Economics/Sociology (University of Nairobi, Kenya); Member, Chartered Institute of Marketing, CIM (UK)

Daniel is a Kenyan citizen and has lived in South Africa as a Permanent Resident for almost 20 years. He has 20+ years of work experience in the private sector (media, telecoms and financial services), as well as the development sector (micro-finance and agriculture).

He worked in micro-finance (PRIDE Africa), expanding its activities within Kenya and the East Africa region; consulted for the Nairobi Stock Exchange (NSE) during a time of significant institutional change that resulted with the trading system being transformed from a call-over to an automated system. He was also involved in the setting up the African Stock Exchanges Association (ASEA).

Daniel has worked as the Communication Director of Africa Harvest since it's inception in 2002. He was part of team that put together the Africa Biofortified Sorghum (ABS) Project funded by the Bill and Melinda Gates Foundation (BMGF). In last 10+ years, he has been part of a team that has implemented various projects and interacted with governments, civil service organizations, non-governmental organizations (NGOs) and grassroots communities.

His international career includes 5+ years representing Africa on the global biotech industry's Plant Biotech Strategy Council (PBSC). He heads the Croplife International (CLI) projects in Africa and has helped implement biotech outreach program in 10+ African countries. He is co-editor (with Dr. Florence Wambugu) of a book (Springer) *Biotechnology in Africa: Emergency, Initiatives and the Future*.

Daniel's multi-disciplinary experience will be critical to the success of the relationship between Africa Harvest and Eastern Cape Rural Development Agency (ECRDA). His business, marketing and communication expertise, as well as his people-skills, in the context of the public and private sectors will be essential, especially in the early stages of the relationship. Daniel's expansive work in various African countries, as well as his vast network and understanding of business and cultural dynamics will also help fast-track project initiation and implementation. He also brings experience of working with international organizations and successfully deploying their strategies in Africa; this experience will be critical, especially in identifying key learning points from Africa Harvest projects that can be useful in the Eastern Cape environment.

NEHEMIAH M. MUGUTHA (TAYLOR)

MBA – Management of Innovation and Technology (Portland State University, Oregon, USA); Post-graduate Diplomas in Marketing and Human Resources Management (ICM, UK) and B.Com Degree in Accounting (Kenyatta University, Kenya)

Nehemiah is a Kenyan citizen with 20+ years of work experience in various sectors of the economy including manufacturing, health and currently in rural community development (NGOs). He has worked at Africa Harvest since 2009, where he started as a Consultant engaged to assess the market viability of a banana marketing company established in partnership with smallholder banana farmers as a Special Purpose Vehicle (SPV) for enterprise development. Nehemiah is currently heading the Cereals Program at the institution, in addition to providing leadership in the Agricultural Markets and Policy Program.

Nehemiah is engaged in various capacities as a Projects and Business Development Manager. His expertise and experience in marketing, business, program/project design and management, enterprise development and technology dissemination and marketing through market-based approaches – using a market pull strategy have and continue to be of great input and contribution in value chain development, market development and commercializing agricultural development in both the crop- and animal-based value chain.

Some of the programs/projects he has helped design and manage include:

- Development of a robust, commercially sustainable Multiple Uses Sorghum (MUS) value chain in Kenya and Tanzania. Funded by EC and IFAD and joint implementation with ICRISAT (2011–2015); 60, 000 farmers reached and USD 16 million in revenues generated by smallholder rural households.
- Accelerating the Commercialization and Regional Trade in Sorghum by facilitating market-based linkages among value chain partners to increase productivity and surplus for market in Tanzania and Kenya. Funded by UNDP (AFIM) in 2012–2013; 2,500 farmers linked to regional trade opportunities and catalyzing 129% increase in volumes reaching markets with a value of USD 2.1 million in 18 months. Pioneered the Aggregator model for enhanced productivity and inclusive growth.
- Enhancing smallholder participation in Value Chains through Capacity building and organizational strengthening in Kenya and Tanzania. Funded by IFAD in 2013–2014; target value chains included maize, rice, banana and beans; 5000 households linked to market information systems to reduce transactional costs and enhance market integration.
- Scaling up the uptake of improved dry-land cereals; sorghum and millet and legumes: mung beans, cowpea and chickpea in Kenya and Tanzania (IFAD Funded 2016–2019); working with 100,000 farmers to enhance adoption, increase utilization and market appeal and development of new market-based products based on dry-land cereals and legumes.
- Promoting the integration of women and youth in poultry value chain for enhanced incomes and inclusive growth through enterprise development under the food security and ecosystem management for sustainable livelihoods among smallholder farmers in arid and semi-arid lands of Kenya: funded by IFAD (2010–2016); trained and equipped 43 youth groups and 41 mixed groups (14 women's groups) with entrepreneurial skills and facilitated linkages to enhance access to devolved funds.

Nehemiah's experience and expertise in program design, value chain development, enterprise development, marketing and markets development, capacity building and partnership engagement will be leveraged in the design, implementation, monitoring and evaluation and enhancing the long term sustainability of target initiatives, especially the development of a sustainable sorghum value chain in Eastern Cape.

DOREEN GAKII MARANGU

M. Phil., Agricultural Economics, Resource Management; B.Sc., Horticulture

Ms Doreen Marangu is a social economist and has worked at Africa Harvest for 5 years, during which time she has been involved in managing agricultural value chain development projects like the Development of Economically Viable Sorghum for Multiple Uses (SMU) Value Chains implemented in Kenya and Tanzania.

To achieve the objective of improving the livelihoods of poor rural smallholder farming households, Doreen provided leadership for the development, dissemination and uptake of new SMU varieties. She was involved in the improvement of farmers' access to markets, promotion of traditional and improved sorghum foods and development of sorghum-based food recipes and businesses; efforts designed to reduce household poverty and ensure food security. The SMU project recorded an improvement in productivity and profits from sorghum production both by farmers and by other value chain actors.

Doreen's vast experience will be critical in the Africa Harvest/ECRDA relationship, especially with regard to baseline studies, need assessments, gender-based project management, monitoring and evaluation, enterprise development, resource mapping and planning, environmental impact assessments, environmental audits, feasibility studies, project evaluations and capacity building along the value chains. Her diligence in identifying and resolving developmental problems and establishing strategies to better rural community livelihoods without adverse impacts to the environment, will be a great asset. She is skilled in Conservation Action Planning (using Miradi Adaptive Management software for conservation projects) and Project Planning and Management, a clear value addition especially in the Eastern Cape terrain where ECRDA projects are located.

As a trainer in appropriate technologies, she trained sorghum entrepreneurs in resource optimization and profiting from economies of scale as part of Africa Harvest/ICRISAT initiative. She also has experience in horticultural export compliance requirements and trained export grower company technical staff, field extension officers and farmer group leaders on good soil management practices, environment compliance and carbon emissions reduction, biological pest control methods and replication of biological pest control organisms (Europe-Africa-Caribbean-Pacific Liaison Committee – Pesticide Initiative Programme (PIP-COLEACP) initiative.

Her wide experience in environmental conservation by employing practices in integrated farming systems for sustainable agricultural practices, conservation agriculture, Integrated Pest Management (IPM), safe use of chemicals and Persistent Organic Pollutants (POPs) reduction will also come in handy in the emerging Africa Harvest/ECRDA relationship.

ABOUT AFRICA HARVEST

Vision

To be a lead contributor to freeing Africa from hunger, poverty and malnutrition

Mission

To use science and technology, gender-sensitive, appropriate agricultural technologies and innovative institutional approaches to improve the livelihoods of rural communities, particularly smallholder farmers.

Africa Harvest Board of Directors

Africa Harvest Board of Directors: (seated left to right) Dr. Florence Wambugu (CEO, Kenya), Dr. Moctar Toure (Previous Chairman, Senegal), Dr. Grace Malindi (Malawi), Ms. Larkin Martin (USA). (standing, left to right) Dr. Paco Sereme (Burkina Faso), Mr. Joseph Kibe (Kenya), Dr. Om Dangi (Canada), Mrs. Sylvia Banda (Zambia), Dr. Blessed Okole (South Africa/Cameroon, Current Chairman) and Dr. Mpoko Bokanga (Democratic Republic of Congo).

ECRDA
Eastern Cape Rural Development Agency

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