



Maji SASA! – Water stewardship action for small-holders in Africa

Participatory R&D to mitigate risk and embed water stewardship within small-holder supply chains

Interim evaluation, October 2018: Summary results and emerging lessons

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DIAGEO



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Water Witness International is a charity registered in the UK which carries out research and advocacy, and takes action to ensure fair and sustainable use of water.

Executive Summary

Maji SASA! emerged from implementation of the Alliance for Water Stewardship (AWS) standard at Serengeti Brewery Limited's Moshi site which revealed significant water and climate related risks in the brewery's supply chain. The initiative is managed by the NGO Water Witness International with funding from Diageo plc., GIZ's International Water Stewardship Programme (IWaSP) and the Scottish Government's Climate Justice Fund, and is a collaboration between Serengeti Breweries Ltd (SBL), the NGOs Shahidi wa Maji, Trias, the Selian Agricultural Research Institute (SARI) and Tanzania's Ministry of Water and Irrigation, Ministry of Agriculture and District Governments of Arusha, Hanang and Siha, and Nelson Mandela Institute of Science and Technology. Its objectives are to:

- characterize, understand and address the water and climate related risks and opportunities facing the barley supply-chain of Serengeti Brewery Limited (SBL) Moshi;
- demonstrate the business and developmental benefits of water and climate risk mitigation in supply chains;
- develop a transferable approach and guidance of value to the membership of the Alliance for Water Stewardship (AWS) and others concerned with sustainable supply-chains, corporate engagement on water and smallholder resilience.

SBL obtains raw materials, barley, sorghum and maize through direct relationships with small farmers and on the open market. These suppliers face a range of water-related business risks, including impacts of erratic rainfall on yields, flood and drought events, pollution and catchment degradation, regulatory non-compliance, water conflict, and the inadequacy of water supply, sanitation and water-related infrastructure. Barley, the primary input for the brewery is highly vulnerable to erratic rainfall and uncertainty regarding its local availability in dry years presents a very significant business risk.

Analysis of the root causes of these challenges supported the development of six modules of support to improve the water security and reduce business, water and climate risks for small-to-medium sized farm enterprises.

Support packages comprising training, joint analysis and planning, and intervention pilots were designed, implemented and evaluated on: conservation agriculture; climate resilient agronomy; rights, obligations and empowerment; weather indexed insurance; entrepreneurship and financial risk management; and water supply and sanitation. Almost a thousand training days were provided to farmers across these modules. Based on interim evaluation key lessons and recommendations are summarized, together with a table of barriers and opportunities for more sustainable barley production.

This interim report will be followed by further evaluation after subsequent harvests to assess how the project's impacts have translated into farmer profitability, sustainability and resilience.

Key lessons and recommendations

1. Farmer and participant feedback is positive. The support provided through Maji SASA! is highly valued.
2. Action plans are in place to address barriers to adoption of conservation agriculture, improved agronomy, farmer empowerment, improved business planning and insurance services (see table below), though resources and capacity for implementation of these remain limited.
3. Farmers report that the knowledge gained will enable increased barley production and coping in dry years.
4. Farmers report commitment to working with SBL in the future.
5. Farmers are able to make better informed decisions, can calculate their anticipated and actual profits, and have a better understanding of how to deal with risks.
6. Extension workers report intent to scale lessons and use training materials at District level.
7. Further evaluation is required (and is planned) after subsequent harvests to assess if these benefits translate into farmer profitability, sustainability and resilience.
8. The initiative quickly identified structural barriers to sustainable and resilient supply chains for further consideration and action by SBL and others. These include:
 - a. *insecure land tenure;*
 - b. *limited access to affordable finance, farm inputs, machinery and technical advice;*
 - c. *the financial viability of barley production for smallholders.*
9. SBL should consider additional training and exchange visits to farmers and bundling of insurance with inputs of either barley seeds or bank loans, and group insurance and premium payment to be arranged by SBL as part of their contractual engagement with farmers.
10. Interim results suggest that the AWS standard has value for improving supply chain security and resilience.
11. Aligning supply chain management with AWS requirements are likely to bring down transaction costs in future.
12. The methodology and tools will be shared via AWS guidance alongside AWS standard v2.0.

Barriers and opportunities for barley supply chain sustainability in Tanzania

Conservation Agriculture	<ol style="list-style-type: none"> 1. Lack of soil testing services and technical expertise in using the information for soil and crop management. 2. High costs associated with soil testing, advisory services and fertilizers which were beyond the means of most farmers. 3. Limited knowledge of fertilizer suppliers, fertilizer types and their appropriate use in barley production. 4. Lack of access to appropriate farm machinery for conservation agriculture. 5. Sloping terrain causing fertilizers washing and pollution of downstream water sources
Improved agronomy	<ol style="list-style-type: none"> 1. Limited capacity to develop production plan and crop calendar 2. Inadequate supply of improved barley seeds from SBL in amounts requested by farmers 3. Limited financial investment capacity for inputs (seeds, fertilizers and pesticides) 4. Grain breakage and peeling during harvesting caused by using an old combine harvester. 5. Lack of storage facilities on farm for safe long-term storage 6. Inadequate agronomy extension services and low engagement of existing government extension officers 7. Limited choices of barley seed varieties supplied by SBL (only Nguzo and Fanaka). 8. Limited agronomic performance in the local environment of supplied seed: current varieties succumb to drought and diseases stress.
Improved land tenure and legal compliance	<ol style="list-style-type: none"> 1. Customary practice of free grazing of residues in-situ, and lack of knowledge in the community on the environmental benefits of crop residue retention 2. Resources scarcity and competing economic benefits of using residue as animal feed 3. Tree planting and land regeneration are not valued by the community 4. Lack of enforcement of bylaws to control the practice of free grazing of crop residues insitu 5. Seasonal land hire by barley producers - most of the barley producers do not own private land parcel for barley production 6. Lack of knowledge of procedures for acquiring land titles or sub-lease 7. Village have no land use plans or bylaws 8. Lack of knowledge of procedures and conditions for acquiring Certificate of Customary Rights of Occupancy (CCROs)
Sustainable barley production and farm business planning	<ol style="list-style-type: none"> 1. Insecurity of land tenure is a major constraint to financial sustainability and resilience. 2. Loan conditions for barley farmers are punitive and unsustainable, with maximum terms of 12 months and interest rates of typically 23% and farmers houses used as loan security. 3. The short-term nature of contracts with SBL undermines the ability of farmers to plan effectively for sustainability and future resilience. 4. Profitability varies dramatically from year to year with farmers reporting 40% incidence of barley crop failure despite high levels of inputs and investment. 5. Without structural changes, the business viability of growing barley perspective is unclear.
Weather indexed and crop insurance	<ol style="list-style-type: none"> 1. Farmers did not have the cash flow available to afford the premium. 2. They were reluctant to pay the premium themselves directly to the insurance company even with ongoing liaison calls. 3. The farmers needed more training on crop insurance. 4. The premiums had to be paid before the rains started but the decision-making process may have extended into the rainy period.

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1. Introduction

This report summarises the interim results and emerging lessons generated by the Maji SASA! Initiative, a collaborative programme of work in Tanzania funded by Diageo plc., GIZ's International Water Stewardship Programme (IWaSP) and the Scottish Government's Climate Justice Fund and managed by the NGO Water Witness International.

Maji SASA aims to characterize, understand and address the water and climate related risks and opportunities facing a complex and dispersed supply-chain of agricultural smallholders in Africa. In doing so it aims to:

- demonstrate the business and developmental benefits of water and climate risk mitigation in supply chains;
- develop a transferable approach and guidance of value to the membership of the Alliance for Water Stewardship (AWS) and others concerned with sustainable supply-chains, corporate engagement on water and smallholder resilience.

The initiative is the result of constructive collaboration and partnership between Serengeti Breweries Ltd, East African Breweries Ltd, Diageo, GIZ, Scottish Government, the NGOs Shahidi wa Maji, Trias and Water Witness International, the Selian Agricultural Research Institute (SARI) and Tanzania's Ministry of Water and Irrigation, Ministry of Agriculture and District Governments of Arusha, Hanang and Siha, and Nelson Mandela Institute of Science and Technology.

The report first provides contextual background and introduces the methodology used, before setting out interim results, key lessons and recommendations.

2. Background

In 2016, Serengeti Breweries Ltd (SBL) began implementation of the Alliance for Water Stewardship's (AWS) international water stewardship standard at its brewery in Moshi, Tanzania. As well as supporting the sustainability of SBL's business model, this work aligned with the 'Water Blueprint' global sustainability strategy of Diageo plc, SBL's parent company.

As a risk-based approach to water stewardship, the AWS standard focuses effort on the priority water challenges facing the site and its stakeholders. The AWS standard also specifically requires a site to 'understand its indirect water use' (i.e. the water used to produce raw materials used by the site) and, as an advanced criteria (4.6) to: 'maintain or improve its indirect water use'.

The analysis and consultation undertaken in response to these requirements quickly revealed that a significant water stewardship priority facing SBL was to address the water and climate risks facing its suppliers. SBL obtains raw materials, barley, sorghum and maize through direct relationships with small farmers and on the open market. These suppliers face a range of water-related business risks, including impacts of erratic rainfall on yields, flood and drought events, pollution and catchment degradation, regulatory non-compliance, water conflict, and the inadequacy of water supply, sanitation and water-related infrastructure. Barley, the primary input for the brewery is highly vulnerable to erratic rainfall and uncertainty regarding its local availability in dry years presents a very significant business risk.

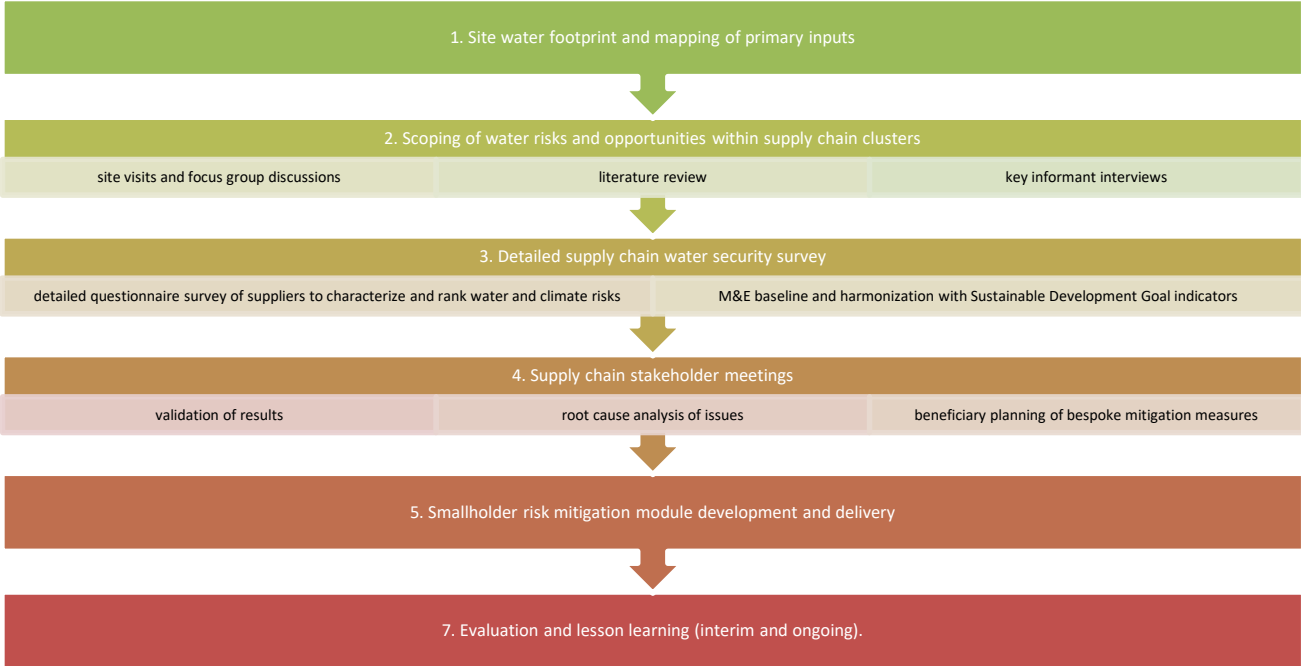
Diageo and SBL therefore worked with the AWS accredited NGO, Water Witness International (WWI) and its local partner Shahidi wa Maji (SwM) to design and attract funding for a programme of work to better understand and address these supply chain water risks. As the first exercise to characterize water risk and opportunity in a large, diverse and dispersed agricultural supply chain, and to then target and evaluate action to address these, the work is globally pioneering. The results, lessons and methods developed should be of wider interest to those concerned with improved corporate sustainability practice and the many water stewardship stakeholders who require an efficient and effective means of targeting action in supply chains. The strategic value of the work is recognized by the International Water Stewardship Programme (IWaSP) through their co-financing to document the Maji SASA methodology as a transferable approach.

The work addresses a gap in international guidance on water stewardship in relation to how to assess and respond to supply chain and indirect water use risk by developing, testing and sharing a methodology for this. This work enables Diageo to contribute to mitigating shared supply-chain water risks and deliver commitments within the Diageo Water Blueprint including to: ‘Equip suppliers with tools to protect water resources in the most water stressed locations’.

1. Approach and methodology

The full transferable methodology developed by Maji SASA!, and supporting tools, materials and resources are documented separately, though a summary is provided here in Figure 1 below

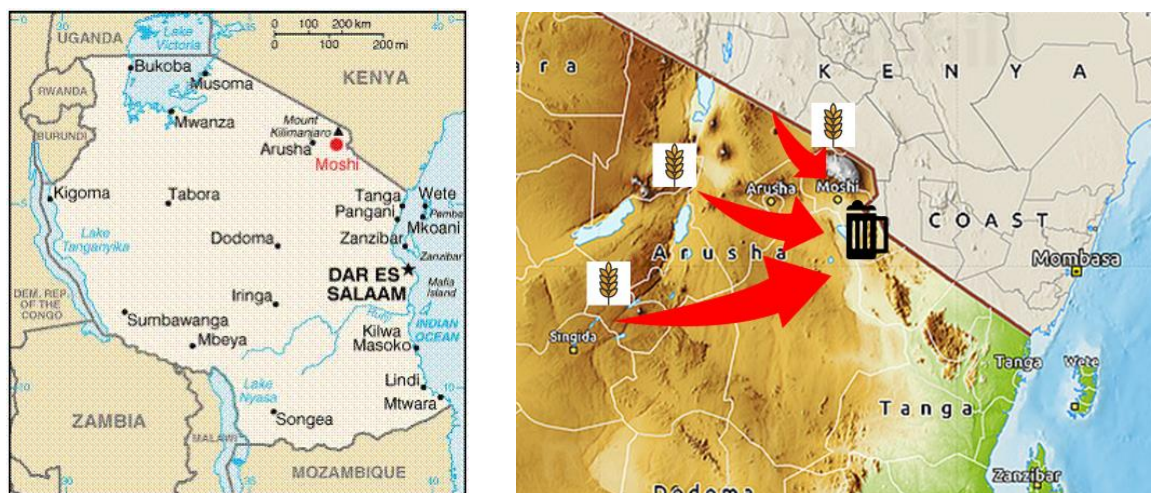
Figure 1. Stepwise methodology adopted by the Maji SASA! Initiative.



2. Results

Water footprint analysis and mapping of primary inputs for the SBL brewery site reveals that the primary input of barley is sourced from supplier clusters comprising around 100 farmers at Ngara Nairobi in West Kilimanjaro, at Katesh and Basotu in Hanang District and Likamba in Arusha District (See Figure 2.)

Figure 2. Geographically dispersed barley supply chain providing inputs to SBL at Moshi.



Based on scoping analysis it was revealed that barley farmers supplying SBL face significant water and climate related risks (see Table 1) and that these are shared by farmers in Arusha (pop. 323,198), Hanang (pop. 275,900) and Siha (pop. 116,313) Districts.

Detailed questionnaires provided further detail on the nature of water risks and opportunities and challenges facing supply chain farmers and their current status was benchmarked against a range of SDG indicators (see Figure 3 and Plate 1).

Analysis of the root causes of these challenges with farmers themselves supported the development of six modules of support to improve the water security and reduce business, water and climate risks for small-to-medium sized farm enterprises. The team used participatory methods to identify the problems faced, and prioritise potential solutions. Data was triangulated against expert inputs and focus group meetings with Village leaders, District and National Government Officers, SBL, and experts in the wider NGO and farming communities.

Support packages comprising training, joint analysis and planning, infrastructure and intervention pilots were designed, implemented and evaluated on: conservation agriculture¹; climate resilient agronomy¹; rights, obligations and empowerment¹; weather indexed insurance²; entrepreneurship and financial risk management³; and water supply and sanitation⁴.

¹ Developed and delivered by Selian Agricultural Research Institute

² Developed and delivered by ACRE

³ Developed and delivered by Trias Tanzania

⁴ Developed and delivered by District of Mbulu Development Department and WaterAid.

Interim results for each are set out below and are drawn from participatory evaluations by NM-IST and WWI. Note that a final evaluation following further harvest cycles is planned to trace the impact of these interventions on farm productivity, sustainability and resilience.

Table 1. Findings of scoping analysis work on water and climate risks within SBLs Barley supply chain.

- 1. The current situation is not sustainable for barley farmers or SBL.** Farmers face a range of severe climate and water related risks which undermine the quality and quantity of production, and the viability of barley growing in the future.
- 2. Water management, agronomy, soil fertility, productivity, security of land tenure and climate resilience are closely inter-related.** Productivity cannot be addressed without addressing water risks, and water risks cannot be addressed without considering holistic farm management.
- 3. There is currently no support for SBL barley farmers to mitigate water risks, including drought, and this needs to be addressed as part of a wider model of integrated support.**
- 4. Support and interventions need to be cost-effective, proportionate and tailored.** This is because the nature of problems faced and their solutions vary depending on context. Not all issues/solutions are common between areas but the following table captures key generic challenges and potential solutions.

Supply chain/farmer challenges	Potential solutions
<p>Water availability Erratic rainfall – late onset and low totals, coupled with limited groundwater availability, soil water availability and low potential for irrigation. Regular and widespread impact on yield, loss of seed crop and harvest</p>	<p>Conservation farming training and support: minimum tillage, contour ploughing, rotation, stubble retention.</p> <p>General agronomy training: sowing, fertiliser application, moisture retention, soil fertility, harvest losses.</p>
<p>Poor agronomy Inappropriate farming techniques leading to climate vulnerability, low productivity, soil and water resource degradation. Inappropriate application of fertilizers and pesticides and risks of pollution.</p>	
<p>Resource degradation and conflict Poor fertility and erosion. Soil loss to water courses. Relatedly there is a lack of mechanization (Likamba) for conservation farming, over-grazing and conflict with pastoralists.</p>	<p>Financial and business management training: risk management, and improved access to and understanding of loans and financial services.</p> <p>Weather Indexed Insurance: research and development of an affordable solution</p> <p>Support for mechanisation loans/ Improved/longer contracts</p> <p>Improved security of land tenure: through engagement with government</p>
<p>Poor farm business planning Limited risk management planning in response to uncertain climate. Limited business and financial acumen and limited access to financial services.</p>	
<p>Inadequate access to water and sanitation Lack of access to drinking water and sanitation in the community and at field level leading to lost time fetching water, or due to ill health.</p>	
<p>Insecure land tenure Non-optimal or short term or illegal land leasing agreements. Limited incentives to invest in land and water stewardship</p>	<p>Strategic deployment of WASH in supply chain communities</p> <p>Improved understanding and capacity to act on rights, obligations and conflict management/resolution</p>

Figure 3. Water challenges facing SBL supply chain farmers, by production area, ranked by severity.

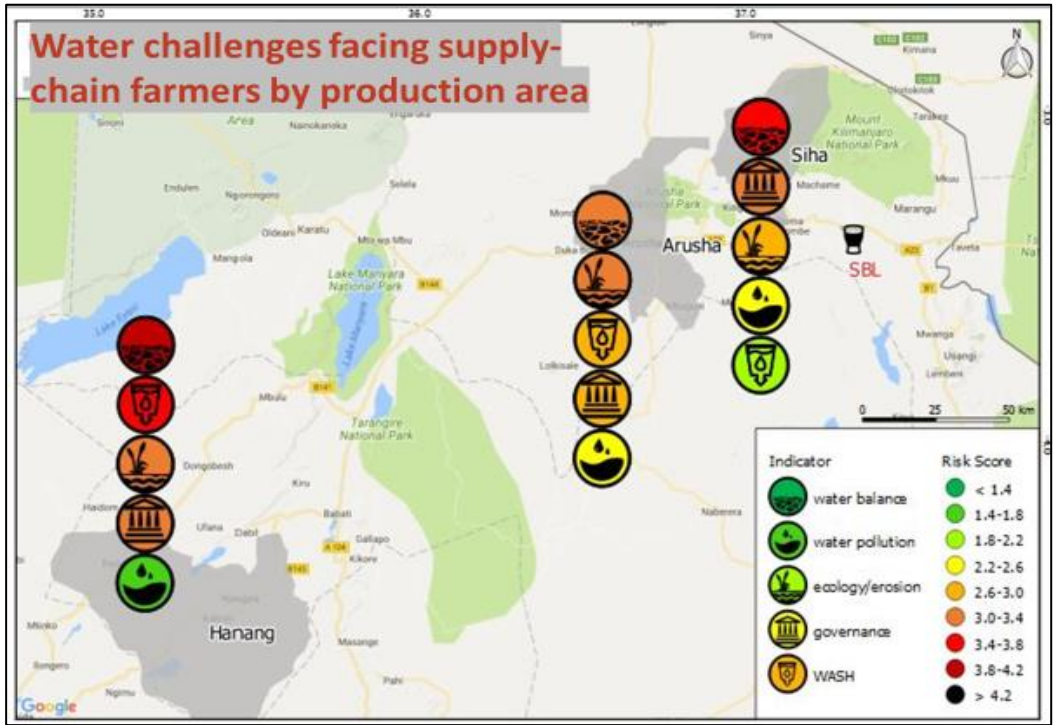


Plate1. NM-IST Enumeration team undertaking online questionnaires with SBL smallholders.



3.1 Climate resilient agricultural practice

The Selian Agricultural Research Institute (SARI) was engaged to provide support to farmers on climate resilient agriculture and environmental rights, obligations and empowerment. Specifically, they: conducted soil analysis; organised study visits; provided bespoke training and farmer mentoring in conservation agriculture techniques; climate smart agronomy, and water and land law; and developed action plans to take forward and implement measures with farmers to improve their resilience.

Modules on conservation agriculture were attended by 60 people including 9 District extension workers. 79 people including 10 extension workers attended sessions on general agronomy, and 82 people including 16 extension workers attended the sessions on right and empowerment. In total 442 training days were provided including farmer training sessions, study visits and planning meetings.

Figure 4. Farmer support modules developed and delivered by SARI



3.1.1. Conservation Agriculture

In this module, participants were equipped with knowledge of sustainable production techniques and resilience to drought through improved soil and water management. Conservation agriculture is a proven approach to improving land productivity and drought resilience through careful management of soil organic matter content and soil water, and nutrient retention properties (conservation tillage, stubble retention etc). A bespoke farmer training manual on conservation agriculture for barley production in Tanzania was produced in both English and Swahili. Training delivered was interactive,

based on farmers prior understanding, context and needs, and included study visits to farms using CA techniques.

There was particular interest from farmers in soil health testing to determine best management practices including fertilizer regimes and minimum soil disturbance practices. Farmers lack exposure to soil testing services, to know-how on soil health and on how to translate this information into soil management actions. They found new knowledge useful on efficient soil water use, organic carbon management and balancing soil fertility.

The barriers and opportunities facing the farmers in application of this knowledge were analysed and action plans developed to address these within each farmer grouping. Barriers to adoption of conservation agriculture by farmers in the SBL supply chain to be addressed include:

1. Lack of soil testing services and technical expertise in using the information for soil and crop management.
2. High costs associated with soil testing, advisory services and fertilizers which were beyond the means of most farmers.
3. Limited knowledge of fertilizer suppliers, fertilizer types and their appropriate use in barley production.
4. Lack of access to appropriate farm machinery for conservation agriculture
5. Sloping terrain causing fertilizers washing and pollution of downstream water sources

3.1.2. General agronomy

SARI also developed and produced a bespoke training module on good agronomic practice for barley production in Tanzania. This included topics such as seed selection, crop calendar planning, soil nutrient management, post-harvest care etc. Participants particularly valued new knowledge and advice on barley production planning and the cropping calendar. Other areas of practice flagged for strengthening and ongoing support were: timely supply of improved seeds; management of grain loss at harvesting; managing grain quality pre- and post-harvest and better coordination and co-operation in extension services to address emerging challenges, such as new weeds, diseases and pests.

Farmers developed group plans to implement the knowledge gained and tackle barriers to implementation which they identified as:

1. Limited capacity to develop production plan and crop calendar
2. Inadequate supply of improved barley seeds from SBL in amounts requested by farmers
3. Limited financial investment capacity for inputs (seeds, fertilizers and pesticides)
4. Grain breakage and peeling during harvesting caused by using an old combine harvester.
5. Lack of storage facilities on farm for safe long-term storage
6. Inadequate agronomy extension services and low engagement of existing government extension officers
7. Limited choices of barley seed varieties supplied by SBL (only Nguzo and Fanaka).
8. Limited agronomic performance in the local environment of supplied seed: current varieties succumb to drought and diseases stress.

3.1.3. Farmer rights, obligations and empowerment

A key barrier to sustainable barley production is the insecure land tenure facing most of the farmers in the supply chain who hold short term annual leases from local government. This holds them back from investing in the land (in irrigation, or crop fencing to keep cattle off and retain stubble for example) and incentivizes short term planning (such as extractive and unsustainable use of soil nutrients). The logic behind this module was to support farmers to fulfil their own legal obligations towards land and water stewardship whilst empowering them to plan and advocate for more secure land tenure through providing a thorough understanding of their legal rights and obligations

The farmer rights, obligations and empowerment module was revelatory to most participants who were previously unaware of environmental, water and land-use policies and laws, and their interface with agricultural practice. Action was required on: aligning practice with bylaws; stubble retention; environmental and water management advice and extension services; long-term access to land and land ownership security through granted rights and a Certificate of Customary Rights of Occupancy (CCRO). Barriers to adoption of lessons and alignment identified included:

1. Customary practice of free grazing of residues in-situ, and lack of knowledge in the community on the environmental benefits of crop residue retention
2. Resources scarcity and competing economic benefits of using residue as animal feed
3. Inadequate adherence to soil erosion control practices on sloping land
4. Tree planting and land regeneration are not valued by the community
5. Water-source degradation by human activities such as livestock watering or farming
6. Inadequate understanding of community role in water resource and supply management
7. Lack of enforcement of bylaws to control the practice of free grazing of crop residues insitu
8. Seasonal land hire by barley producers - most of the barley producers do not own private land parcel for barley production
9. Lack of knowledge of procedures for acquiring land titles or sub-lease
10. Village have no land use plans or bylaws
11. Lack of knowledge of procedures and conditions for acquiring Certificate of Customary Rights of Occupancy (CCROs)

3.2. Entrepreneurship and financial risk management

A key barrier to sustainable production and improved resilience was identified as the limited capability of barley farmers to plan the farm business and financial investment in the face of multiple risks including drought, limited financial services and for some, limited knowledge of financial planning. The NGO Trias was therefore engaged to support farmers and their communities with business entrepreneurship training and mentoring. The objective was to equip the farmers with the knowledge and tools to assess their farm enterprises and to make informed decisions about financial and climate related risk, and to reflect these within individual business plans developed for each farm.

Drawing on analysis of the baseline data Trias decided that the 'BUS' methodology in combination with a risk assessment and mitigation training would be most suitable. The BUS methodology is a certified and tested methodology developed by the Andreas Hermes Academy (AHA) and implemented by Trias staff and AHA certified trainers of Tanzanian farmer organizations 'MVIWATA'.

Modules each comprising 3 days covered: i) entrepreneurship capacities and success factors; ii) the business enterprise and its market; and iii) business planning, financing and resourcing. An additional module was delivered to build business resilience to drought and erratic rainfall by considering the financial implications of seasonality, climate risk, and mitigation strategies. Throughout, the focus on the individual bespoke needs of each farmer ensured high levels of ownership, participation and relevance. For each module there was an evaluation and follow up mentorship visits by qualified business advisors.

A total of 64 farmers were reached (45 men and 19 women) by the training, with detailed business plans developed for 36 of these. The climate risk mitigation and financial management module was attended by 62 farmers. 407 farmer training days were delivered in total together with 54 follow up coaching days. Training was appreciated and well attended by participants in all 3 districts. Evaluation indicates that as a result of this support farmers are:

- newly aware and have documented the strengths and objectives of their SMEs and have learned how to better communicate.
- better able to analyze their economic, physical and social environment in relation to their enterprise, and appreciate the importance of long-term planning to goal achievement.
- better able to identify key farming challenges and means of mitigation.
- able to develop bespoke business plans and market analysis (36 developed).
- able to plan the diversification of their enterprises and crop types to reduce exposure to climate risks.

Lessons and recommendations

- Specific focus and additional effort is required to facilitate more effective engagement of women in entrepreneurship training.
- All participants appreciated the training and gave positive feedback on the participatory methodology, use of images and drawings, and the trainers' ability and experience.
- Farmers particularly valued the idea of managing their farms as a business, the idea of time keeping and tracking resource inputs, and the risk assessment and financial literacy sessions.
- Farmers said that more time was needed for the training and follow up, and that training should take place during November to December when they have more time.
- Most farmers had never undertaken profit calculations, but by the end of the training 36 farmers were able to draft a business plan.

The training can be considered successful in improving awareness and ability of the farmers on business planning, financial literacy and managing financial risks. Farmers are now capacitated to make informed decisions, can calculate their anticipated and actual profits, and have a better understanding of how to deal with risks. Further analysis will be required after subsequent harvests in order to assess how well this learning has translated into farm business profitability, sustainability and resilience.

The engagement and analysis by Trias also flagged an urgent need to explore the financial viability of barley farming for smallholders in more detail. For many farmers there are major risks associated with growing the crop which remain significant barriers to their future well-being and productivity. These include:

1. Insecurity of land tenure is a major constraint to financial sustainability and resilience.

2. Loan conditions for barley farmers are punitive and unsustainable, with maximum terms of 12 months and interest rates of typically 23% and farmers houses used as loan security.
3. The short-term nature of contracts with SBL undermines the ability of farmers to plan effectively for sustainability and future resilience.
4. Profitability varies dramatically from year to year with farmers reporting 40% incidence of barley crop failure despite high levels of inputs and investment.
5. Without structural changes, the viability of growing barley from a business perspective is unclear.

In light of these findings it is suggested that the suitability of SBLs current engagement model be re-assessed to ensure the sustainability of its barley supply chain in Tanzania.

3.3. Weather indexed and crop insurance

A total of 41 barley farmers were trained by ACRE (Agriculture and Climate Risk Enterprise Ltd) on crop insurance, including weather-indexed insurance. In parallel, ACRE worked with a range of insurance providers to develop bespoke insurance products for SBLs farmers, based on specific conditions in Ngare-Nairobi, Likamba, and Basotu. Premiums ranged between 4.4% and 7.5% and it was arranged for payments to be made via M-Pesa. Independent evaluation of the training by NM-IST showed that farmer participants valued the knowledge provided and understood the role and mechanics of crop insurance, with around 50% of those trained indicating an intent to take out crop insurance. Ngare-Nairobi and Basotu preferred the weather-indexed insurance (WII) whereas farmers in Likamba opted for the multi-peril crop insurance (MPCI). This farmer testimony from Ngare Nairobi was typical:

I think there will be some positive changes if we practice what we have been taught today. Now, after signing up for this insurance we won't be afraid of any natural disasters. Even if something bad happens, you are sure to have your investment costs back. My family will survive.

Subsequent discussions and analysis revealed that none of the farmers trained actually took out insurance and that the reasons for this included:

1. Farmers did not have the cash flow available to afford the premium.
2. They were reluctant to pay the premium themselves directly to the insurance company even with ongoing liaison calls.
3. The farmers needed more training on crop insurance.
4. The premiums had to be paid before the rains started but the decision making process may have extended into the rainy period.

Recommended responses include:

- a. Additional training and exchange visits to farmers which have benefited from crop insurance;
- b. Bundling of insurance with inputs either barley seeds or bank loans;
- c. Group insurance, premium payment to be arranged by SBL as part of their contractual engagement with farmers.

3.4. Water supply sanitation and hygiene

Primary focus for this module was in Basotu where several thousand villagers are unable to access reliable drinking water and safe sanitation. A previously existing gravity supply scheme supplying the village of Galangal was in disrepair and overburdened which meant water had been unavailable for 5 days out of 7. The nearest potable water was a 15 km round trip. In light of this situation:

- A bill of quantities prepared for borehole rehabilitation was prepared by DMDD at the request of the Maji SASA! team.
- The District Water Office provided new power supply to improve borehole supply (independent of Maji SASA!)
- NB - the gravity supply scheme has since been repaired by the local water authority.
- There is ongoing liaison with WaterAid and District Water Officer to ensure WASH management structures, infrastructure, operation and maintenance and community awareness are adequate.

Further analysis of the situation is needed to evaluate the impact and role of Maji SASA! and the need for further engagement.

4. Key lessons and recommendations

- Farmer and participant feedback is positive. The support provided through Maji SASA! is highly valued.
- Action plans are in place to address barriers to adoption of conservation agriculture, improved agronomy, farmer empowerment, improved business planning and insurance services, though resources and capacity for implementation of these remain limited.
- Farmers report that the knowledge gained will enable increased barley production and coping in dry years.
- Farmers report commitment to working with SBL in the future.
- Farmers are able to make better informed decisions, can calculate their anticipated and actual profits, and have a better understanding of how to deal with risks.
- Extension workers report intent to scale lessons and use training materials at District level.
- The initiative quickly identified structural barriers to sustainable and resilient supply chains for further consideration and action. These include:
 - *insecure land tenure;*
 - *limited access to affordable finance, farm inputs, machinery and technical advice;*
 - *the financial viability of barley production for smallholders.*
- Further evaluation is required (and is planned) after subsequent harvests to assess if this translates into farmer profitability, sustainability and resilience.
- Interim results suggest that the AWS standard has value for improving supply chain security and resilience.
- Aligning supply chain management with AWS requirements are likely to bring down transaction costs.
- The methodology and tools will be shared via AWS guidance alongside AWS standard v2.0.