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CONSERVATION AGRICULTURE:
TIME TO REAP THE BENEFITS

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INTRODUCTION

Policymakers and government officials have for years maintained that agriculture possesses the potential to significantly contribute to national wealth, job creation and food security.[1] Namibia's leaders have also placed significant emphasis on sustainable natural resource management and conservation. This compels government and stakeholders in the agricultural sector to consider and adopt agricultural methods that both enhance production as well as protect and conserve the natural environment.

This paper will provide an overview of Conservation Agriculture (CA) covering definitions, benefits and plans to promote this type of agricultural practice in Namibia. Furthermore, implementation efforts and issues will be outlined in an attempt to give a status assessment of CA in the country.

WHAT IS CONSERVATIVE AGRICULTURE?

Namibia's Ministry of Agriculture, Water and Forestry (MAWF) defines CA as:

> "… an approach to managing agro-ecosystems for improved and sustained productivity, increased profits and food security, while preserving and enhancing the resource base and the environment."[2]

CA is comprised of three key principles namely:

- Minimum soil disturbance
- Permanent, organic soil cover
- Diversification of crop species grown and crop rotation[3] [4]

"CA provides a host of advantages both in terms of stable and increased agricultural production and the protection of natural resources."

The two first principles concern the tillage or the preparation of land for agricultural cultivation. The last principle involves the management of both crop types planted and in a specific order to preserve soil health and nutrients to boost sustained productivity.[5]

Minimum soil disturbance refers to methods that to a large extent avoid the ploughing of land – a conventional approach to cultivation that, however, pulverises and compacts the soil which impacts negatively on soil health and impedes water infiltration. Instead CA emphasises the need to ensure that the land for cultivation is disturbed as little as possible. There are various methods that can be used to plant seeds without extensive soil disruption such as the use of special implements that create only a small slot or narrow seedbed in which seeds are placed.[6] Regardless of which method is applied soil disturbance through tillage needs to be kept to a minimum.[7]

One critical aspect of ensuring the success of CA as a viable production method is that land for cultivation is permanently covered by organic plant materials. This is also referred to as soil cover.[8] Primarily soil cover consists of plant material that is left over from harvested crops such as stalks, leaves and seed pods.[9] This 'leftover organic material' is called crop residue. According to a CA fact sheet published by the United Nations' Food and Agriculture Organisation (FAO):

[1] Nangolo, Martha and Alweendo, Ndapwa. Agriculture in Namibia: an overview. February 2020. 1.
[2] GRN. Comprehensive Conservation Agriculture Programme for Namibia 2015 – 2019. 2015. 3.
[3] Ibid., 5.
[4] Kaur, Ramanjit, Jaidka, Manpreet and Rajni. Conservation Agriculture: A Boon for Overall Sustainability. In Indian Farmers' Digest, July 2019. 15.
[5] Ibid., 17.
[6] Ibid., 15-6.
[7] FAO. The Status of Conservation Agriculture in Southern Africa: Challenges and Opportunities for Expansion. REOSA Technical Brief 03, July 2010. 2.
[8] Kaur, et al. 16.
[9] https://en.wikipedia.org/wiki/Crop_residue

> "Covering the soil protects it from the physical impact of rain and wind and helps retain soil moisture and stabilise soil temperature in the surface layers. Insects, fungi, bacteria and other macro- and micro-fauna and flora thrive in this environment. Their activity breaks down the mulch and incorporates it into the soil, improving soil fertility over time."[10]

Soil cover has the further advantage of curbing plant diseases and weeds. As crop residue breaks down over time the soil cover can be supplemented by adding further mulch material such as dried weeds. CA guidance also recommends that farmers should plant cover crops such as legumes. Such crops should however be chosen and planted to ensure "minimum competition" with the intended main crop.[11]

According to Kaur et al, a field can be considered cultivated under the CA method if 30 percent or more of the land is covered by crop residue. Where soil erosion through wind is the primary concern – slightly more than one ton of soil cover should be provided for each hectare of agriculture land.[12]

The final principle of CA is the diversification and rotation of crops on any given cultivated land. It is thus important for soil health, disease prevention and improved productivity to farm with different crops at different times or concurrently during the season. The planting of crops together or one-after each other is also referred to as association.[13] CA does involve different types of cropping systems which determine the association and rotation of crops. It should be noted that it is important to carefully consider what type of crops to plant as there are wrong associations that can have negative effects.[14]

WHAT ARE THE BENEFITS OF APPLYING CA IN NAMIBIA?

Based on the description above it can be argued that CA provides a host of advantages both in terms of stable and increased agricultural production and the protection of natural resources. CA therefore stands in contrast to 'intensive' or 'industrial agriculture' which is held to maximise crop production at the expense of the environment; although this is a simplification as concerns about nature's health has also led to the development of more sustainable intensive farming methods.[15]

Consequently agriculturalists, environmentalists and development experts among others, have hailed CA as a "win-win" approach in agriculture – benefiting both farmers as well as the natural environment. In addition, CA is seen as a form of climate smart agriculture (CSA) – a way to both adapt to and mitigate harmful impacts of climate change.[16] The potential of CA to build more resilience in local communities towards climate change effects and protecting natural resources is one prominent reason why this approach has become so popular with donors, government ministries, civil society organisations and research agencies.[17]

[10] FAO. Farming for the Future in Southern Africa: An Introduction to Conservation Agriculture. REOSA Technical Brief 01, July 2010. n. p.
[11] Ibid.
[12] Kaur, et al. 16.
[13] FAO. Farming for the Future in Southern Africa: An Introduction to Conservation Agriculture. REOSA Technical Brief 01, July 2010. n. p.
[14] Ibid.
[15] https://en.wikipedia.org/wiki/Intensive_farming
[16] For a discussion on climate change effects on Namibia see Remmert, Dietrich. Weak Policies & Conflicting Visions: Drought, Water Shortages and Climate Change in Namibia. March 2020.
[17] Angelsen, Arild. "Synergies and trade-offs between forestland management and food system." In FAO-IPCC Expert Meeting on Climate Change, Land Use and Food Security: Final Meeting Report; January 23-25, 2017. 2017. 52.

For Namibia, CA is especially important because of two pertinent and interlinked challenges in addition to climate change. These are namely food security and the need to protect the country's fragile ecosystems.

Food Security

Food security can roughly be defined when people have adequate access to affordable and nutritious foodstuffs.[18] While Namibia has made significant strides in socio-economic development since independence, the country still faces a myriad of challenges. For many people living in rural areas agriculture remains crucial to securing their livelihood. Urbanisation and overall development has decreased the country's reliance on farming activities over the past decades. However, agriculture remains important in terms of employment, particularly in the informal sector.[19] Hence most farming in Namibia is 'subsistence based' – meaning that the production of crops and raising livestock is for one's own consumption. Such farming is often seen as small-scale, using low-technology methods, requiring low skill levels, and being labour intensive. It is commonly practised by the poorer segments of society. In Namibia, "19.8 percent of households depend on subsistence farming as a main source of income."[20] Therefore, subsistence farming constitutes the basis for food security for many citizens.

"A significant minority of citizens often suffer from food insecurity whereby they are not able to produce or access adequate, nutritious and affordable foodstuffs."

Overall, the country's agricultural production is severely limited due to Namibia's "dry semi-arid climate". Average rainfall is limited and highly variable, droughts and floods are common.[21] Consequently, farming activities, particularly by subsistence farmers, are vulnerable to disruptions and the loss of harvests and livestock. A significant minority of citizens often suffer from food insecurity whereby they are not able to produce or access adequate, nutritious and affordable foodstuffs. For example multi-year droughts over the past ten years have resulted in hundreds of thousands of citizens becoming food insecure.[22] Women active in subsistence farming are especially negatively impacted by natural disasters such as drought. Hence, regional studies indicate that women's health, education and equity suffers disproportionately and can be long-lasting.[23]

Improving food security for Namibian citizens such as vulnerable and disadvantaged subsistence farmers is therefore crucial to alleviating hunger and improving other development outcomes. CA is seen as beneficial to food security in a number of ways. Foremost is the argument that the method leads to more stable or even a marked increase in crop yields.[24] In addition CA can lend itself to reducing the costs of production for farmers, reduces the use of water and nutrients and is more resilient to stresses such as detrimental weather conditions.[25] It can thus be argued that the widespread adoption of CA by Namibian farmers could result in an improvement in food security for many citizens.

Ecosystem Benefits

As a predominantly semi-arid and arid country, Namibia's environment is classified as fragile. This means that local environments and the conditions that make them possible can easily be damaged, especially by human activities. Consequently a deteriorated environment is far less capable of supporting and sustaining natural life. In turn humans will struggle to support themselves from a degraded and unproductive environment. It is therefore crucial for citizens and indeed all humans to minimise

[18] Remmert, 16.
[19] Sherbourne, Robin. Guide to the Namibian Economy 2017. November 2016. 109.
[20] Nangolo and Alweendo. 2 & 7.
[21] Ibid., 7.
[22] Remmert, 16.
[23] Nangolo and Alweendo, 7.
[24] Friedrich Theodor, Derpsch Rolf and Kassam, Amir. Overview of the Global Spread of Conservation Agriculture. In Field Actions Science Reports. Special Issue 6. November 6, 2012. 2.
[25] Bhan, Suraj and Behera, U. K. Conservation agriculture in India – Problems, prospects and policy issues. In International Soil and Water Conservation Research. Vol. 2, No. 4, 2014. 3 – 4.

negative impacts on the natural environment and to strive for a more balanced and sustainable use of natural resources.[26]

Globally, industrialised, intensive agriculture is increasingly acknowledged as harmful to the natural environment. Intensive, large-scale agricultural production as prevalent today in many Western countries is dependent on the use of excessive amounts of artificial fertiliser; much of this, however, is not absorbed by crops. Instead much of it ends up in ground-water, rivers and oceans where it impacts negatively on the environment.[27] Moreover, researchers have noted that traditional, mechanized agriculture is associated with harmful soil erosion, surface and ground-water pollution and extensive water use.[28] CA, by comparison is arguably a much more environmentally-friendly farming method, indeed proponents argue it can both preserve and enhance the local environment. Thus, for example, minimal or no ploughing or tilling of land for cultivation significantly limits the overall degradation of the soil. As a result the soil structure is more cohesive and better structured, making it far more resilient to erosion through strong winds and other weather effects such as floods. The loss of soil especially the fertile top-soil is therefore minimised through erosion.[29]

The practice of CA leads to a general improvement of soil health over the long-term, creating an overall more beneficial situation for sustainable agricultural production and conservation of the environment. Since the soil is naturally more fertile and resistant to diseases, pests and weeds the need to utilise fertiliser, pesticides and herbicides is reduced (CA principles do not prohibit the use of these inputs). This in turn leads to better ground-water quality, as pollution from agrochemicals – from the above mentioned inputs – is reduced.[30]

Already possessing a fragile natural environment, Namibia has over the past decades been subject to unsustainable agricultural practices. Livestock overstocking and overgrazing, for example, have led to substantial soil erosion with the end result being that the feed quality of existing grasses has declined. While the livestock has adapted to this situation it now requires even more grazing land and environmental degradation is continuing.[31] It can thus be strongly argued that it is crucial for Namibia to apply, sustain and advance sustainable agricultural production methods including CA.

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REGULATORY ENVIRONMENT AND CHALLENGES

Over the past decades the government has drafted and passed a number of laws on the management, use and protection of the natural environment. In addition, some environmental laws enacted prior to 1990 remain relevant. Some of this legislation also covers aspects of arable land use and agricultural production like the Communal Land Reform Act and the Plant Quarantine Act.[32] Moreover, there are a wide range of government policies and strategies that deal with various themes of environmental management and seek to promote sustainable development of natural resources.[33]

Given the limited scope of this paper, this section will briefly highlight some of the policies and plans directly relevant to CA. These are:

[26] Garrard Svenja, Heyns Piet, Pfaffenthaler Michelle and Schneider Gabi. Environmental Awareness for Sustainable Development: a resource book for Namibia, 2017. 20.
[27] Heinrich Böll Foundation & University of Kiel's Future Ocean Cluster of Excellence. Ocean Atlas: Facts and Figures on the Threats to Our Marine Ecosystems, 2017. 14-5.
[28] Bhan and Behera, 2.
[29] Ibid.
[30] Friedrich, et al. 2.
[31] Garrard, et al. 33.
[32] Ruppel Oliver C. Environmental law in Namibia: an overview, in Environmental Law and Policy in Namibia. Ruppel Oliver C., and Ruppel-Schlichting Katharina (Eds). Third edition 2016. 41 & 6.
[33] Ibid., 34 – 5.

"NDP5 states that by 2022 a minimum of 50 percent of farmers should practice CA."

- Namibia's 5th National Development Plan (NDP5)
- Namibia Agriculture Policy of 2015
- National Climate Change Strategy and Action Plan 2013 – 2020

Given the importance that government has for years attached to improving economic growth and productivity of the agricultural sector – government has published a number of policies and plans focused on agriculture. Moreover, the agricultural sector is mentioned in many national plans and strategies but not necessarily in detail or as a core theme. One prime example is NDP5, a broad national strategy that sets out the country's development goals from 2017 to 2022. The plan states that a marked increase in agricultural production is one of five "game changers" that could ensure Namibia develops a more productive and stronger economy.[34] NDP5 states that smallholder farmers, in particular, will be supported to improve production and thus food security. Consequently, smallholder and communal farmers will be encouraged to "organise themselves into cooperatives" while being offered assistance with infrastructure, additional land, seeds and market access. In turn, the state will give preference to locally-produced goods when it comes to procurement for the supply of food to hospitals and schools for example.[35]

NDP5 lists a number of ambitious agricultural sector targets to be achieved by various strategies. Among others, the plan states that by 2022 a minimum of 50 percent of farmers should practice CA.[36] Finally, CA is also prioritised as one method to improve sustainable land management in order to conserve and make use of natural resources in a sustainable manner.[37]

The National Climate Change Strategy and Action Plan 2013-2020 (NCCSAP) is another national strategic document that is relevant to although not focused on CA. This document sets out a broad and comprehensive plan to implement the objectives of Namibia's climate change responses as featured in the National Policy on Climate Change.[38]The NCCSAP acknowledges that the agricultural sector is particularly vulnerable to climate change with a corresponding risk to food security.[39] Thus, the document outlines a number of adaptation and mitigation strategies to reduce the impact and increase the resilience of the agricultural sector to climate change. These include goals such as: developing, identifying and disseminating climate-resilient crop farming practices, promoting sustainable land management methods, and limiting harmful greenhouse gases through improved land use.[40] CA is highly relevant to all these strategies and approaches. However, the policy document only mentions CA once – in reference to the promotion of crop diversity and natural soil carbon storage.[41]

Lastly, it is important to briefly review government's main policy that focuses exclusively on the country's agricultural sector – the National Agriculture Policy of 2015 (NAP). Again, like the preceding official documents the policy emphasises the authorities' main objective of "increased and sustained" agricultural production.[42] The document furthermore notes that all agricultural activities should take place in a sustainable manner with regards to the use of natural resources.[43] There are a wide plethora of policy statements and objectives that can be associated with CA and its

[34] GRN. Namibia's 5th National Development Plan. n. d. 7.
[35] Ibid., 9.
[36] Ibid., 21.
[37] Ibid., 84.
[38] Remmert, 11.
[39] GRN. National Climate Change Strategy and Action Plan 2013 – 2020. n. d. 23 - 4
[40] Ibid., 35 & 38.
[41] Ibid., 49.
[42] GRN. Namibia Agriculture Policy. December 2015. 6.
[43] Ibid., 2.

principles such as crop diversification, combating plant pests and soil conservation. The practice of CA is, however, only referred to once in the document – specifically for the implementation of a dedicated CA programme.[44]

Overall, the policy environment can be seen as favourable to CA and government has clearly endorsed and promoted agricultural methods that are environmentally sustainable, productive and promote climate change resilience. However, the documents presented here do have various shortcomings and raise a number of concerns, even though CA has received its own dedicated initiative – the Comprehensive Conservation Agricultural Programme (CCAP). Specifically, they provide little detail on the implementation of CA and how the method is categorised and prioritised with respect to other agricultural activities. For example, the Ministry of Agriculture, Water and Land Reform (MAWLR)[45] has for many years implemented the Dry Land Crop Production Programme (DCPP) which provides various subsidised agricultural inputs and services to farmers including seeds, fertiliser and tillage assistance through tractors.[46] It is unclear how DCPP fits in with the promotion and implementation of CA by the government. Some of DCPP's supported inputs such as subsidised weeding services are in line with CA principles while the provision of mechanised disc harrows for tillage services stands in contradiction to CA as disking compacts and thus degrades soils.[47] In its correspondence with IPPR regarding this research paper, the MAWLR did not clarify which of these approaches was receiving priority. The Ministry simply noted that all programmes such as the DCPP, Green Schemes, CCAP and "the Cereal and Horticulture Value Chains", among others, spoke to the goals set out in NDP5 and the Harambee Prosperity Plan i.e. boosting agricultural output and improving food security.[48]

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It is evident that DCPP is a much larger and costlier initiative than the CCAP; the former provided at least one benefit to around 44,000 farmers while under the latter just under 400 farmers were trained in CA in 2016/17.[49] This difference in the number of beneficiaries tends to indicate that the Ministry attaches more importance to DCPP than CA.

Government has in the past been accused of neglecting CA methods while continuing to push smallholders towards unsustainable farming methods. In 2012 and again in 2013 *Insight Namibia* magazine reported that the MAWF was ignoring advice from experts and community preferences for the provision of ripper furrows – a ploughing implement suitable for CA and had instead procured disc harrows and tractors from Brazil.[50] Conversely, local agriculture expert Piers Vigne stated that in his view the Ministry had always supported CA adoption.[51] In its written response to research questions from IPPR, the Ministry stated that CA is "one of the highly prioritised agronomic programmes" of the government and CCAP was receiving funding as were other programmes with due consideration of the national economic situation.[52]

[44] Ibid., 8 - 9.
[45] Following a reorganisation of government institutions, the MAWF lost its forestry department to the Ministry of Environment and it was merged with the Ministry of Land Reform in early 2020; becoming the MAWLR.
[46] MAWF. Annual Report 2016/17. n. d. 17-8.
[47] *Insight Namibia*. "A deal that makes no sense." May 2012. http://www.insight.com.na/a-deal-that-makes-no-sense/
[48] MAWLR. Response to Institute for Public Policy Research (IPPR) questions to MAWLR regarding CA. July 23, 2020.
[49] MAWF. Annual Report 2016/17. n. d. 17-9.
[50] *Insight Namibia*. "A deal that makes no sense." May 2012. http://www.insight.com.na/a-deal-that-makes-no-sense/ & "Avoiding responsibility." June 2013. http://www.insight.com.na/avoiding-responsibility/
[51] Interview with agriculture expert Piers Vigne, Windhoek, October 11, 2019.
[52] MAWLR. Response to Institute for Public Policy Research (IPPR) questions to MAWLR regarding CA. July 23, 2020.

Leaving aside claims about CA methods being deliberately sidelined, it is clear that the benefits (in terms of increased crop production) of using CA tillage implements such as ripper furrows as opposed to disc harrows have been documented in Namibia.[53] What is evident is that Namibia is struggling to promote and implement CA to local farmers and communities. These issues will be discussed briefly in the next section.

Comprehensive Conservation Agricultural Programme 2015 – 2019

Government's CCAP is detailed in a stand-alone document. In the plan the MAWF commits itself to promote and develop CA as the basis for sustainable crop production in the country, with the support of stakeholders. Among others the document lists the following programme objectives:

- Increasing awareness and knowledge of CA among farmers, extension staff, researchers and policymakers
- Increasing farmers' CA skills and providing crucial inputs such as equipment and market access
- Institutionalising the programme and providing coordination
- Developing standards and monitoring and evaluating the CA adoption progress

The plan states that CA will be promoted to all farmers including smallholders, commercial and those active on government green schemes. The document further contains a long list of activities to be carried out by a variety of stakeholders to advance CA, as well as a five-year timetable and a rough budget. Programme activity descriptions provide limited information on how they should be undertaken. In addition, the document makes no references to quantifiable targets.

"What is evident is that Namibia is struggling to promote and implement CA to local farmers and communities."

IMPLEMENTATION STATUS OF CA

Determining the extent of CA adoption by Namibia's farmers is challenging. Most available statistics do not detail the type of crop farming utilised and there are hardly any specific academic studies on CA in the country.[54] This research paper was only able to assess a handful of government and donor reports that give some idea of the scale of the farming method. Only two academic studies that focused on CA practice in Namibia could be located. However, there is more information available concerning the country's neighbours, specifically Zambia, South Africa and Zimbabwe. This paper will mostly look at available information from Namibia while also reflecting on crucial findings in the Southern African region.

It is evident that CA adoption has been actively promoted at least since the start of this decade and probably longer. The main drivers and promoters of CA programmes have been the Ministry of Agriculture, Water and Land Reform (MAWLR), the Ministry of Environment, Forestry and Tourism (MEFT) and international and country-specific donor organisations including the United Nations Development Programme (UNDP), Global Environment Facility (GEF), Food and Agricultural Organisation of the United Nations (FAO), United States Agency for International Development (USAID) and the German Agency for International Cooperation (GIZ). These organisations have financed, supported and implemented a number of agri-

[53] Huq, Saleemul and Faulkner, Lucy. Taking Effective Community-based Adaptation to Scale: An Assessment of the GEF Small Grants Programme Community-Based Adaptation Project in Namibia. June 2013. 31.

[54] Taapopi, M. Kamwi, J. M. and Siyambango, N. Perception of Farmers on Conservation Agriculture for ClimateChange Adaptation in Namibia, in Environment and Natural Resources Research, Vol. 8, No. 3. 2018. 34.

cultural and conservation programmes that either contain elements of CA or make it their main focus. The bundling of CA activities with other initiatives such as forestry management and water conservation is sensible. However, it does make it difficult to determine the size and impact of CA activities. Thus, for example, under the USAID supported Southern African Regional Environmental Program (SAREP), CA activities were conducted in Angola, Botswana and Namibia. According to the final project report, around 200 Namibians received training on CA under SAREP, as did citizens from Botswana and Angola. Yet only the latter two countries seem to have had success with CA implementation by recording higher crop yields.[55] It is unfortunate that the SAREP report does not provide any information regarding positive outcomes or if and why Namibian farmers seemingly failed to reap any benefits from the CA training.

Far more sobering for the implementation progress of CA in the country is the insight provided by a comprehensive and critical mid-term project review of the "Scaling up community resilience to climate variability and climate change in Northern Namibia, with a special focus on women and children" project (known as SCORE). In a nutshell, the five-year project (2015-2019) aimed to create "adaptive capacity and resilient production systems and livelihoods" in seven northern regions of Namibia. In addition, the project sought to address previously identified barriers that hinder people from adopting climate smart practices, such as a lack of information.[56] To achieve this, the project design called for a multitude of activities including water harvesting, drip-irrigation infrastructure, introducing CA practices, and encouraging crop-diversification and so forth. In addition, it was also intended to pilot micro-finance schemes and facilitate market access for small hold farmers with private sector entities. Finally, lessons and best-practices drawn from project components were intended to feed back into regional and national level forums to ensure that such positive efforts would inform future policy formulations and budgetary allocations.[57] The project budget comes to around U$23 million of which the bulk is provided by the Namibian government.

It can be stated that the SCORE project is an ambitious, complex and sizeable undertaking which should result in a sustainable level of CA adoption by beneficiaries. Yet the assessment concludes that the project performance is unsatisfactory based on most evaluation criteria. Thus, the project has so far failed in its aim to build the adaptive capacity and resilience of local agricultural systems towards climate change impacts in a holistic manner. Instead, activities have focused on simply demonstrating conservation agriculture methods without adequately tying these initiatives to supportive and additional measures.[58] Some of these, such as drip-irrigation and flood and drought control activities, have been implemented but in an unconnected manner. Of particular concern for the reviewer is the fact that no monitoring and evaluation plan, which could have indicated progress and issues with various project aspects, had been developed and applied. Furthermore, the reviewer laments the fact that both academia and civil society has been absent from project implementation on the ground. Insight Namibia's coverage of the issue claims that government deliberately excluded non-government stakeholders from CA programmes.[59] The review does acknowledge that the project has exceeded the targeted number of participants – reaching over 4,000 people. But the review doubts whether CA and other climate-smart livelihoods methods will be adopted by targeted communities in

[55] USAID. Final Report: Southern African Regional Environmental Program. n. d. 16, 42-4, 74.
[56] GRN & UNDP. SCORE: Project Mid-term Review Report. n. d. 3. https://erc.undp.org/evaluation/documents/download/10790
[57] Ibid., 14 – 6.
[58] Ibid., 4 – 5.
[59] Insight Namibia. "A deal that makes no sense." May 2012. http://www.insight.com.na/a-deal-that-makes-no-sense/

a sustainable fashion without drastic project adjustments and improvements.[60] With regards to the performance of SCORE, the MAWLR did acknowledge implementation shortfalls stating that:

> "It is important to state that the SCORE project formulation had limited MAWLR staff involvement. This project was hosted by the Ministry of Environment and Tourism at the formulation stage. During implementation the SCORE project regional staff were operating from the Regional Council, being supervised by officials with no agricultural background. Although the situation was corrected after some years, this action affected the overall performance of the SCORE project."[61]

There have also been positive CA programme implementation examples such as the Conservation Tillage Project Namibia (CONTILL) which ran from 2005 to 2011.[62] Implemented in 2008, a UNDP/GEF administered small grants programme, which focused on community-based adaption with regards to climate change, reportedly achieved considerable success with CA. The smallholders that had adopted the CA method under the programme were able to boost their households' food security and resilience to adverse climatic impacts.[63] A study on the programme states:

> "Latest findings show that 4,660 kg of pearl millet per hectare have been harvested when using the CA technique in an existing drought context, compared to 300 kg per hectare under the current nationally-promoted disc harrowing approach in a non-drought context."[64]

"Notwithstanding past successful CA programmes, recent information seems to indicate that the method has not yet been widely adopted in Namibia."

Notwithstanding past successful CA programmes, recent information seems to indicate that the method has not yet been widely adopted in Namibia. A study conducted by Taapopi, Kamwi and Siyambango in 2018 in the Omusati region found that farmers were aware of CA methods and its benefits. However, many farmers lacked know-how with regards to the methods and even those that practiced them did not apply all CA principles.[65] The authors observed that:

> "The lack of availability and affordability of equipment, ploughing services, agricultural inputs such as seeds, manure, and fertiliser were identified to be major constraints for farmers to adopt CA."[66]

Interestingly, these issues are longstanding and have been noted by other researchers and the FAO.[67] It seems that such barriers as well as region-specific issues have in the past limited the adoption and spread of CA in Africa – specifically with regards to smallholder farmers.[68]

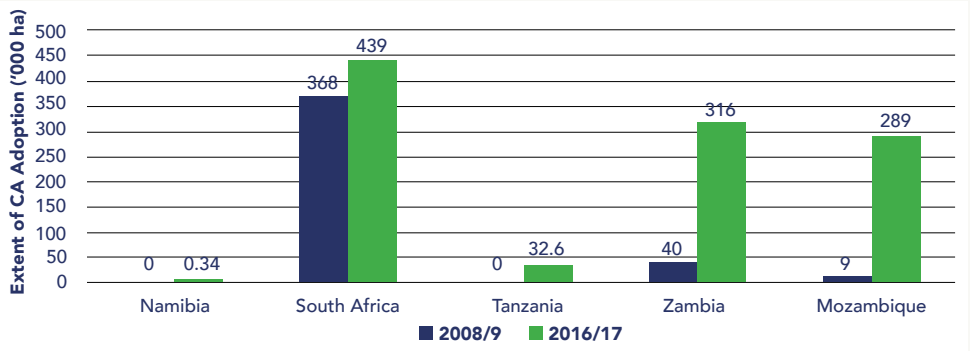
A more positive appraisal of CA adoption in Africa is provided by Kassam, Friedrich and Derpsch – who have regularly researched and published reports on the global status of CA. In their more recent report from 2018 they estimate that globally the cropland under CA cultivation has increased from 106 million hectares (M/ha) in 2008/9 to 180 M/ha in 2015/16. The authors observe that CA is now practised on all continents – substantiating the belief that CA can be adapted and practiced in

[60] MAWLR. Response to Institute for Public Policy Research (IPPR) questions to MAWLR regarding CA. July 23, 2020.
[61] GRN & UNDP. 4 – 6.
[62] Insight Namibia. "A deal that makes no sense." May 2012. http://www.insight.com.na/a-deal-that-makes-no-sense/
[63] Huq, et. al. 3, 14 & 31.
[64] Ibid., 30.
[65] Taapopi, et. al. 33.
[66] Ibid., 42.
[67] Ibid., 41-2.
[68] FAO. Socio-Economic Analysis of Conservation Agriculture in Southern Africa. January 2011. 18.

all agricultural landscapes[69] Furthermore, according to the assessment CA is practised in in 78 countries in 2015/16 across the world marking a considerable increase from only 36 in 2008/9. It is however noticeable that Africa together with Europe are laggards when it comes to adaption of the CA method. Hence, Africa only has an estimated 1.56 million hectares of cropland under CA cultivation which constitutes less than one percent of the global total figure.[70] Given that CA research and development projects have been implemented in African nations since the 1990s including in Tanzania, Zambia, South Africa and Kenya – the actual area of cropland under CA cultivation is rather disappointing.[71]

The latest figures available for CA cultivation for Namibia stem from 2013/14 and are sourced from an FAO agriculture database. According to this information the country had 340 hectares of arable land under CA cultivation.[72] On average, annual production of crops takes place on around 305,000 hectares of cultivated land[73] – indicating that CA is hardly practised among Namibia's farmers. Namibia also fares poorly when compared to other Southern African countries that have adopted CA (see Graph 1).[74]

Graph 1: CA Adoption Selected Countries



The MAWLR stated that it had developed and implemented "monitoring and reporting tools" as part of the CCAP and had collected and compiled data on national CA adoption since 2016. According to the MAWLR Strategic Plan 2017/18 – 2021/22, the Ministry is targeting 13,000 farmers to "implement at least one" of the three key CA principles when cultivating their land. It was further stated that the total number of hectares cultivated using ripper furrows was 7,710 while land with soil cover was reported to be 1,636 hectares.[75] It is not clear if the ripper method and the soil cover was applied over the same cultivated land. Furthermore, it is uncertain why the Ministry chose such a limiting indicator to track CA adoption. The data does show that some few farmers in the country practice selected CA methods even though the total area of hectares cultivated is very modest. The literature sourced for this research paper often emphasises that "full benefits" of the method can only be realised when all three key principles of CA are applied concurrently.[76] Kassam and his co-authors, whose latest estimated of Namibia's CA cultivation is 340 hectares, state that:

[69] Kassam, A. Friedrich, T. and Derpsch, R. Global spread of Conservation Agriculture. In International Journal of Environmental Studies. August 2018. 1-2. https://doi.org/10.1080/00207233.2018.1494927
[70] Ibid., 7 & 10.
[71] Ibid., 4.
[72] Ibdi., 8.
[73] Mendelsohn, John. Farming Systems in Namibia. 2006. 11.
[74] Figures for Graph 1: Kassam, et. al. 17.
[75] MAWLR. Response to Institute for Public Policy Research (IPPR) questions to MAWLR regarding CA. July 23, 2020.
[76] FAO. Farming for the Future in Southern Africa: An Introduction to Conservation Agriculture. REOSA Technical Brief 01, July 2010. n. p.

> "If the three principles are applied separately, they do not constitute a CA system. For example, the use of no-till practice on its own does not qualify the production system to be CA based, unless it is linked to the application of the other two practices…"[77]

Environmental consultant Ben Begbie-Clench, who has worked on environmental projects with communities from resettlement farms and communal areas, notes that in his experience there are few efforts undertaken to improve sustainable land management including CA. Instead, once farming or grazing land was degraded and water supply depleted farmers simply moved to a new area.

He did however acknowledge that CA does have the potential to achieve reasonable yields for an arid country like Namibia, especially when coupled with additional environmental conservation measures like water saving.[78]

"The agricultural sector does not attract enough investment nor has it received adequate government funding."

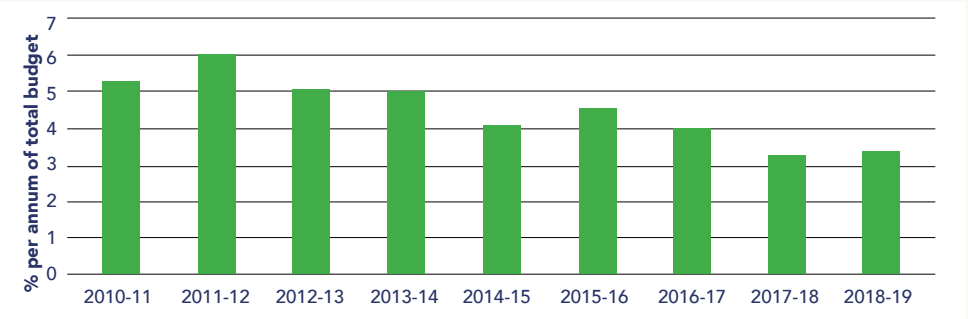
In their 2018 assessment Kassam, Friedrich and Derpsch point out that Africa has made impressive gains in CA adoption from 2008 – 2016 based on the percentage increase of the cultivation area which comes to 211 percent. The authors also foresee that the uptake of CA will accelerate on the continent.[79]

Besides the barriers that have been mentioned already regarding CA adoption, there are a number of other issues that implementation efforts have to contend with. These are highlighted in reports documenting CA projects in Namibia's neighbours as well as in research which focuses on national and regional climate change analysis. A number of these observations are also echoed by local farming experts and observers justifying their inclusion in this paper. Barriers and issues are detailed briefly below and it should be noted that the list does not claim to be exhaustive.

The main national level issue that relates to policymaking and budgetary allocation is the fact that the agricultural sector does not attract enough investment nor has it received adequate government funding. These issues have hampered the development of the sector for a considerable time and reflect a consistently small annual budget allocation to the MAWLR. Over the past years Namibia's government has increasingly allocated lower amounts of funding to the Ministry, totalling on average just slightly over four percent per annum from 2012/13 to 2018/19 (see Graph 2).[80]

Furthermore, investment in agriculture is weak having remained fairly constant since independence. Consequently, the overall economic performance of the sector has declined since independence with regards to overall contribution to the country's GDP.[81]

Graph 2: Budget allocation to MAWLR



[77] Kassam, et. al. 2-3.
[78] Interview with Ben Begbie-Clench, Windhoek, October 15, 2019.
[79] Kassam, et. al. 10.
[80] Figures for Graph 2: Sherbourne, Robin. Guide to the Namibian Economy 2017. 62-3, November 2016.
[81] Sherbourne, Robin. Guide to the Namibian Economy 2017. November 2016. 128-9.

Professor Helmke Sartorius von Bach, UNAM academic and farmer, has also lamented the lack of funding from central government noting that agriculture required adequate support to realise national economic benefits in terms of employment and improved food security.[82] With regard to CA, a newspaper article from mid-2019 reflected rather critically on the implementation success of the agricultural method. The article notes that Namibia had not "reaped the expected benefits" from CA, adding that the progress of the CCAP had been held back by drought and the lack of funds. Indeed, a ministerial spokesperson said the programme cost of N$96 million for the five-year programme – this does not reflect government's budgetary commitment but is rather an estimate of necessary funds required. The spokesperson implied that stakeholder backing, including from donors was crucially to meet CCAP targets.[83] Responses to IPPR research questions on CA provided by the MAWLR confirm the newspaper article's information. The Ministry noted that CA implementation in Namibia is expected to materialise "through stakeholder joint efforts." Government had allocated a total of just over N$42 million for CCAP over the 2017/18 – 2020/21 financial period (notwithstanding that the CCAP was slated to run from 2016 to 2019).[84]

The reliance on outside donor funding for the CA programme implementation is not necessarily negative since government only has limited finance and resources available. However, an over reliance on external finance means that such projects do not receive state budgetary allocations. An assessment on barriers to climate change adaption measures, including sustainable farming practices states:

> "Many projects are driven by donor funding and are usually results-oriented and time-limited. The sustainability of these projects is questionable as there is a lack of capacity and resources to continue implementing activities once donor organisations pull out."[85]

Finally, it is positive to note that the MAWLR has stated that it is evaluating the CCAP together with the FAO. This is done to inform the development of a new climate-resilient support programme.[86] Therefore it can be cautiously expected that the evaluation will produce an informative list of 'lessons-learned' that can be used efficiently to address problems in CA projects and design better programmes in the future. This, however, will require an objective and critical assessment of CCAP which is not a given.

Barriers to CA Adoption

Issues that have more to do with project implementation as well as technical and social aspects of CA are mentioned in various regional and national literatures as well as by local observers. It is clear that many nations in Southern Africa struggle with similar problems when it comes to adopting CA. The list below is a summary of the main issues that have been identified:

- MAWLR extension services which provide support and advice to farmers are limited; being constrained by a lack of funding as well as Namibia's size and sparse population. The ratio of extension service staff to farmers is around one to 3-5,000.

"It is clear that many nations in Southern Africa struggle with similar problems when it comes to adopting CA."

[82] Interview with Prof. von Bach, Helmke, Sartorius, Windhoek, November 31, 2019.
[83] Schlechter, Deon. "Conservation agriculture still struggling after thirteen years." In New Era. July 30, 2019. https://neweralive.na/posts/conservation-agriculture-still-struggling-after-thirteen-years
[84] MAWLR. Response to IPPR questions to MAWLR regarding CA. July 23, 2020.
[85] Davies, Julia. Barriers and Enablers to Climate Change Adaptation in North-Central Namibia. September 2017. n. p.
[86] MAWLR. Response to IPPR questions to MAWLR regarding CA. July 23, 2020.

- Agricultural extension services are pragmatic when it comes to providing support; this means that staff often make-do with equipment and resources that are on hand. While in general commendable this often leads to non-adherence to CA principles such as providing the wrong tillage equipment to farmers since the correct plough is not available.
- Communal farmers often share and compete for land with cattle ranchers or own livestock themselves. This means that land intended for cultivation is often used by livestock. In addition, farmers oftentimes prefer to use organic residue intended for soil cover as feed for cattle.
- For best results CA needs to be consistently practiced for at least three to five years. Thus the method requires commitment and a level of perseverance to proof its productivity. This however, often acts as dis-incentive to farmers, especially if projects are only supported over a limited timeframe.
- Communal smallholder farmers often don't hold title deeds to their fields and have a poor sense of ownership. In addition, on-going disputes over land foster insecurity among farmers – making them reluctant to invest into longer-term, sustainable farming methods.
- Tending land and weeding off-season is seen as peculiar and against traditional practice; farmers are therefore reluctant to work over this time for fear of embarrassment. Off-season work also places extra demand on labour which smallholders and especially women struggle to meet.[87]

[87] Information from: Interview with Prof. von Bach, Helmke, Sartorius, Windhoek, November 31, 2019. Interview with Ben Begbie-Clench, Windhoek, October 15, 2019. Davies, Julia. Barriers and Enablers to Climate

CONCLUSION AND RECOMMENDATIONS

This paper has sought to present an overview of CA, its application and status in Namibia. As a sustainable agricultural method, CA has struggled to take hold in the country even after a decade and a half of promotion and support programmes. Available literature shows that local CA projects face implementation and funding issues in addition to a range of technical and social barriers. Moreover, Namibia's experience with CA is not isolated as the Southern African region in general has struggled to adopt and advance this agricultural method. It is also notable that contrary to longstanding government statements and policies which on paper endorse CA and overall agricultural development – the government has consistently underfunded the agricultural sector.

Furthermore, information and statistics on the magnitude and progress of CA in the country is very limited making it challenging to determine the actual status of adoption. The lack of concrete project evaluations and assessments that are publicly available means information on potential problems and lessons that might have been learned is few and far between. Regional experiences and documents on climate change adaption measures give some indication of the barriers to CA adoption. However, it is unclear if this information will be enough to sufficiently inform future CA projects in the country so that a repeat of mistakes can be avoided.

Finally, international literature is mostly supportive of the CA method. CA's usefulness for an arid and food-insecure country like Namibia is not in dispute. However, it is also evident that CA requires significant resources, promotion and funding to ensure more widespread adoption. In addition, national policies and strategies need to take into account barriers to adoption and actively seek to address them. MAWLR has acknowledged that the successful adoption of CA by farmers requires a range of additional factors such as a market for cover crops. CA was therefore characterised as a long term investment.

1. There is limited documentation available that critically evaluates past and current CA programmes in the country. Namibia should carry out a comprehensive stock-taking exercise to determine the exact status of CA in the country. The reported planned evaluation of the CCAP by government is a good starting point.

2. It is evident that government would need to increase budget allocations to the agricultural sector and CA initiatives to realise ambitious national agricultural targets. Alternatively, donor and commercial interests could advance CA but this would require more commitment from donor organisations and a more conducive investment climate for private businesses.

3. Namibian stakeholders should explore the promotion of CA to larger smallholding operations and commercial farms as these have access to more resources and could practise the method on a greater scale.

RECOMMENDED FURTHER READING

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