Scoping Study on Existing CIS and CSA Relevant Units and Engagements in Selected RUFORUM-member Zimbabwean Universities

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Scoping Study Report

Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA)

June 2022

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About AICCRA reports

Titles in this series aim to disseminate interim climate change, agriculture, and food security research and practices and stimulate feedback from the scientific community.

About AICCRA

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Executive Summary

RUFORUM conducted a scoping study to identify areas of CSA and CIS convergence for selected Zimbabwean member universities from 20th November to March 2022. Consultations were made with the Deans of the Faculties of Agriculture and related disciplines of member universities through zoom and then individual guestionnaires to identify the focal persons who are involved in Climate Smart Agriculture teaching and research. Two staff members from Zimbabwe representing Africawide countries participated in a three-day workshop in Benin as a side event during the RUFORUM Triennial Conference and Annual General Meeting (https://www.ruforum.org/Triennial2021/ https://www.ruforum.org/AGM2022) from 11th to 13 December 2021. The two members participated in a meeting together with CSA and CIS experts representing 9 countries: Kenya, Zambia, Ethiopia, the Democratic Republic of Congo, Benin, Burundi, Uganda, Ghana and Zimbabwe. The experts analyzed the causes of low adoption and utilization of CSA practices & CIS tools and identified the different interventions needed to enhance this shortcoming. Seven priorities were identified, and it was agreed that the proposed priority CSA be subjected to national wide consultations in the respective countries. This report was compiled to meet the following objectives: i) review and compile information about CSA and conduct an inventory of existing programmes and courses related to CSA and potential resource persons in Zimbabwean universities, and ii) conduct country-specific consultations and consensus building on the priority CSA.

The report showed that in the 4 Universities sampled, various courses and course units with aspects of CSA and CIS are taught. These courses cover a wide range of the proposed clustered priority areas and are course units offered for undergraduate programmes. Furthermore, the national consultations revealed that the Zimbabwean government has a high level of commitment to CSA/CIS mainstreaming adaptation and mitigation goals into agricultural planning processes and has developed several climate policy & legislative frameworks. These policies were identified and prioritized for CSA intervention.

Introduction

Agriculture is the backbone of Zimbabwe, as of most developing countries in Africa and globally. Actually, the global demand for agricultural products is estimated to increase by approximately 60% to 70% by 2050, particularly in response to population growth (Silva, 2018, Rosegrant, Fernandez & Sinha, 2009). However, climate change and variability presents challenges of projected increases in temperature and variability in precipitation. In Zimbabwe, 1990 – 2019 maize yield assessments have shown a declining trend, while sorghum, pearl millet and finger millet have been affected to a less extent (FEWS, 2019). Additionally, despite better adaptation of animals to climate shocks than crops, regions where livestock is expected to contribute increasingly to food security are the regions identified as the most vulnerable to climate change (FAO, 2016). Globally, strategies to increase climate action include scaling up both climate change mitigation and adaptation. In Zimbabwe, in particular, academia has also been involved in addressing climate change challenges through for instance, determination of greenhouse gas inventories, assessment of mitigation, adaptation and vulnerability, research on appropriate farming systems and compilation of country reports. Among these strategies, climate smart agriculture (CSA) has emerged as a potential to build resilience in agricultural systems, consequently leading to increased food nutrition security. Some of the CSA practices include land restoration and agroforestry systems, crop diversification, integrated soil

fertility and management, water harvesting and management, post-harvest handling, sustainable bioenergy, and livestock and aquaculture management. There are a variety of CSA practices in Zimbabwe, aimed at directly or indirectly enhancing agricultural productivity, reducing greenhouse gas emissions and improving resilience of food systems (See Table 1).

The objective of this study was to compile information about CSA practices and interventions; and provide inventory of existing universities' course units / academic programmes related to CSA. This review was conducted through literature review and desktop study of various reports and curricula of institutions of higher learning in Zimbabwe. It also involved consulting academics in the selected institutions.

Table 1. Com	mon CSA practice	es in the farming systems of Zimbabwe	
CSA Cluster	CSA type	Description	Potential
Integrated Soil Fertility Management		A combination of soil management practices such as crop rotation, mulching and reduced soil disturbance.	It has potential to achieve sustainable and profitable agriculture, simultaneously improving livelihoods of smallholder farmers through the application of minimal soil disturbance, permanent soil cover and crop rotation.
	Intercropping	This is the cultivation of two different crops that complement each other on same piece of land simultaneously.	Intercropping helps in nitrogen fixation, thereby improving soil quality for potential increases in high yields.
V	Vermicomposting	Vermicompost is the product of the decomposition process using various species of worms, usually red wigglers, white worms, and other earthworms, to create a mixture of decomposing vegetable or food waste, bedding materials, and vermicast.	It is a nutrient source that improves soil chemical and physical properties, suppresses disease, and is a source of plant growth promoting compounds. Vermicompost contains appreciable amounts of the following nutrient Nitrogen, Phosphorus, Potassium, Sodium, Calcium and Magnesium, Copper, Zinc, and Sulphur Nutrients such as nitrates, exchangeable P and soluble K, Ca and Mg are in the forms that are readily taken up by plants Some of its benefits include use of water for irrigation, greater numbers of fruits per plant, and greater numbers of seeds per year in cereal crops.
Crop Diversification	Small grains production	Traditional grains such as sorghum, millet and rapoko are drought tolerant and resistant to pests and diseases hence are more ecologically compatible with drylands compared to maize. They also have long storage life and are seldom attacked by insects and pests.	Traditional grains have potential to food and nutrition security
Livestock and aquaculture management	Small livestock production	This is a diversification strategy insured against poor crop harvests. It includes production of livestock goats, sheep, rabbits and indigenous poultry, mostly to sustain rural livelihoods in developing countries such as Zimbabwe.	Production of small livestock is key to issues of food security and nutrition, as well as being a source of organic fertilizer and income. (Phiri et al., 2020). The livestock can be easily sold and is a source of food – meat, milk, eggs, milk etc.

	Aquaculture	This is the cultivation of aquatic organisms such as fish in controlled aquatic environments for any commercial, recreational or public purpose.	Aquaculture has potential to improve food security and nutrition by increasing food production and boosting economic growth.
Land restoration and Agroforestry System	Holistic management	This system uses a decision-making process to help ensure that land restoration actions are ecologically, socially and economically sound based on the context described by the people involved.	It has potential to better inform land management through socially, environmentally, and financially balanced decisions.

Key Findings

Of the eight (8) priority areas, Zimbabwean universities ranked Land Restoration and Agroforestry as high priority, followed by Livestock and Aquaculture Management (LAM), crop diversification (CD) and Sustainable Bio-energy (SBE) (See Table 2).

Table 2: Clustered priority areas for Zimbabwe	
Clusters	Zimbabwe
Land Restoration and Agroforestry system (LRA)	1
Livestock and Aquaculture Management (LAM)	2
Crop diversification (CD)	3
Sustainable Bio-Energy (SBE)	4

Key: Ranking of **1** to **4**, where **1** indicates the highest rank, while **4** indicates the lowest rank in terms of priority.

Climate Smart Agriculture-Relevant Policies and Strategies in Zimbabwe

Zimbabwe is one of the countries honoring the Paris Agreement on climate change that was adopted by 196 Parties at COP 21 in Paris on December 12, 2015. From the Paris Agreement, Zimbabwe initiated actions to implement various policies and strategies, as shown in Tables 3 and 4.

Table 3: Policies relevant to	agriculture and climate change in Zimbabwe
Document	Brief notes about the policy
National Agriculture Policy Framework (NAPF) (2018- 2030)	The overall objective of the NAPF is to provide policy guidance and direction on how to promote and support the sustainable flow of investments to transform the agricultural sector through increased and sustained agricultural production, productivity and competitiveness. The NAPF provides a relevant and evidence-based framework to guide and coordinate the development of sector-specific policies that will provide more details, priorities, implementing means, and enforcement mechanisms
National Climate Policy (2018)	The National Climate Policy aims to enable Zimbabwe to establish the legal structures to regulate businesses in climate-related matters, and enable them to reduce their greenhouse gas emissions. It seeks to create a pathway towards a climate resilient and low carbon development economy in which the people have enough adaptive capacity and continue to develop in harmony with the environment. To achieve this, the Policy is supported by the National Climate Change Response Strategy, National Adaptation Plan, Low Carbon Development Strategy, National Environmental Policy, Renewable Energy Policy, and Forest Policy among other related policies and strategies that are aimed at achieving sustainable development.
The Comprehensive Agricultural Policy Framework (2012-2032)	The Comprehensive Agricultural Policy Framework is a multi-sectoral policy that gives the situation analysis of the agricultural sector, highlights the vision, goals, objectives and detailed policy statements and strategies for the

	development of the Zimbabwean agricultural sector during the period 2012- 2032. The vision of the agriculture sector is a prosperous, diverse and competitive agriculture sector, ensuring food and nutrition security significantly contributing to national development.
Zimbabwe CSA Investment Plan	This CSAIP identifies and prioritizes packages of CSA investments and policy actions that will support improvement across three key CSA pillars, namely the achievement of a more productive, resilient, and low-emissions agricultural sector. It provides guidance on implementation mechanisms for these CSA interventions, discussing details such as investment costs and supporting institutional arrangements. It seeks to align goals and objectives across Zimbabwe's existing agricultural policies and climate change strategies, which will contribute to the achievement of the country's vision 2030, and the nationally determined contributions (NDCs), among others.
CAADP	CAADP is about boosting investment to stimulate growth in the agricultural sector. This means bringing together the public and private sectors and civil society – at the continental, regional and national levels – to increase investment, improve coordination, share knowledge, successes and failures, encourage one another and to promote joint and separate efforts.

Table 4: Adaptation and mitigation options recognized within the climate change strategies associated with agriculture and climate change in the National Climate Change Action Plan in Zimbabwe

NCCAP Adaptation Options	NCCAP Mitigation Options
 Conservation agriculture Water harvesting and management Agroforestry Integrated soil fertility management Traditional grains Drip irrigation Indigenous livestock breeds Strategic food reserve/post harvest Adverse-weather insurance services Climate information Mainstream climate change into agricultural production Extension services Livelihood diversification Fodder production and conservation 	 Agroforestry and agroecology Conservation tillage Controlled burning and use of fire guards Regenerative agriculture Restoration of forest on degraded lands Avoiding deforestation with REDD+ Pasture and rangeland management Alternative energy sources cook-stoves

Academic programmes and Course Units Related to CSA in the selected Zimbabwean Universities

Table 5 below shows the different university programmes and course units which have elements of the CSA and / or CIS in selected Universities of Zimbabwe and for the different identified priority areas. It is clear that SBE has only one course which has an element of CSA and/or CIS in Chinyonyi University of Technology, Great Zimbabwe University and Gwanda State University. At Lupane State University, there is no taught course related to SBE.

In Zimbabwe, the following course units will have strong elements or can have CSA and/or CIS infused; Reclamation of Degraded Lands; Soil and Water Conservation Engineering; Soil and Water Conservation; Heritage-Based Natural Resource Management; Aquaculture and Fisheries Management; Integrated lake basin management; Climate change and aquatic ecosystem health; Agrometeorology and climate change; Practical Agriculture; Restoration Ecology; Weather and Climate; dryland resource management; Pasture and Range Management; Integrated production systems; Irrigation Agronomy; Sustainable Bio-energy (SBE) (See Table 2).

Table 5: CHINHOYI UNIVERSITY OF TECHNOLOGY

LRA	CD	SBE	LAM
Reclamation of Degraded Lands CUAE 509	Principles of Crop Production CUAE 225	CUWEC418Global Environmental Issues and Climate Change	Rangeland Ecology Management CUAP 207
Environmental Impact Assessment CUAE 511	Crop Ecology and Physiology CUCS 124		Animal Nutrition CUAP 208
Hydrology CUAE 228	Plant Stress Physiology and Adaptation CUCS XXX		Animal Health and Welfare CUAP XXX
Soil and Water Conservation Engineering CUAE 403	Global Environmental Issues and Climate Change CUCS 422		Small Stock Production CUAP XXX
Soil and Water Conservation CUES 441	Perennial Crop Production CUCS 223		Beef Cattle, Goat and Sheep Production CUAP 402
CUWEC401 Restoration Ecology	Annual Crop Production CUCS 222		Pig and Poultry Production CUAP 403
CUWEC103/CUGEC116T, Fundamentals of Social Ecology / Society and the Environment			Dairy Production CUAP 407
CUWEC 211 Wildlife Ecology and Management			Animal Feed Production CUAP XXX
CUWEC404Ethnobiology			CUWEC 116 Limnology and Ichthyology
CUWEC 205 Environmental Policy and Law			CUWEC212Aquaculture and Fisheries Management

CUWEC219 Heritage- Based Natural Resource Management	CUWEC219 Heritage- Based Natural Resource Management	CUWEC 213Rangeland Ecology and Management
CUWEC416 Reserve Design and Protected Area Management		CUWFS 402 Climate change and aquatic ecosystem health
		CUWFS 202 Stream ecology and watershed science
		CUWFS 407Integrated lake basin management
		CUWFS 408 Community- based management of fisheries resources

GREAT ZIMBABWE UNIVERSITY

LRA	CD	SBE	LAM
AIW 408 Meteorology and Climate Change ASP 404 Agro-forestry ASP 408 Environmental Science and Pollution ALW 202 Pasture and Range Management AGIS 401 Geographic Information Systems and Remote Sensing ASP 404 Agroforestry AWF225 Heritage Based Natural Resource Management HGGES101 Weather and Climate HGGES 203 Meteorology and Climatology HGGES403 Agriculture and the Environment	AIW 208 Drought Preparedness Management AAA 404 Farm Management APRAC 101 Practical Agriculture I APRAC 102 Practical Agriculture II ASP 213 Crop Production Systems ASP 407 Dry Land Farming Practices ASP 216 Seed Science and Technology ASP 413 Small Grain Production ASP 403 Plant Pathology ASP 411 Plant Breeding ASP 215 Entomology and Insect Pest Management ASP 407 Dry Land Farming Practice	HGGES420 Energy and the Environment	AL 208 Beef Production AL 207 Pig and Poultry Production Systems ALW 202 Pasture and Range Management AL 209 Livestock Improvement AL 404 Animal Breeding AL 406 Sheep and goat Production Systems ALW 203 Introduction to Animal Production ALW 201 Animal Nutrition

GWANDA STATE UNIVERSITY

LRA	CD	SBE	LAM
LAS 2203 Pasture and Forage Agronomy	LCS 2111 Farm Management and Entrepreneurship		LAS 4102 Beef Cattle, goat and Sheep production
LCS 4103 Soil and water conservation	LCS 1204 Introduction to Agricultural Economics		LAS 4203 Pig and Poultry Production
LAS 2202 Natural Resource Management	LAS 1108 Agriculture Practice LCS 1203 Plant Biology		LAS 2109 Range Ecology Management

LAS 4207 Climate Smart Agriculture	LCS 2108 Principles of Crop Production	LAS 1201 Introduction to Genetics
LCS 2201 Soil Fertility Management	LCS 2105 Crop Ecology and Physiology	LAS 2204 Animal breeding
LCS 1104 Introduction to Soil Science	LCS 2205 Perennial Crop production	LAS 2201 Animal Health and Welfare
	LCS 2211 Horticulture	LAS 4201 Animal Feed
	LCS 2206 Annual Crop production	production
	LCS 4102 Pielowy and	LAS 2107 Animal Nutrition
	Management of Plant pests	
	LCS 4105 Plant Biotechnology	
	LCS 4106 Weed Biology and management	
	LCS 4202 Biology and Management of Plant Pathogens	
	LCS 2109 Genetics and Plant Breeding	
	LCS 1201 Introduction to Entomology and parasitology	
	LCS 4209 Crop Breeding	

LUPANE STATE UNIVERSITY			
LRA	CD	SBE	LAM
ASCS4108 Agroclimatology	ASIE2205 Irrigation Agronomy		ASAS2107 Fresh water fish production
ASSS2113 Irrigation and			
Drainage	ASCS4200 Seed Science and Technology		ASAW4106 Pasture and Range Management
ASSS2212 Land evaluation			
and land use planning	ASCS4203 Plant Breeding and Technology		
ASCS4105 Agrometeorology and climate change			
ASSS4102 Environment Impact Assessment			
ASAS4116 Integrated			
production systems			

Table 2: Clustered priority areas for Zimbabwe

Training theme	Description		Application
Ū	•	Beneficiaries	in
Practical understanding of the CSA approach.	The CSA and CIS approach is obviously attractive and compelling in principle, but its application in the context of diverse agro-ecologies and highly heterogeneous farming systems, conditions and socio-economic policies still requires concrete success stories. Gathering clear empirical messages to inform farmers and policymakers and support scaling-up initiatives will depend on how well the CSA concept is understood in practice, allowing for continuous two-way adaptations and feedback mechanisms between researchers and practitioners, farmers and policymakers. There are also gaps on design thinking for CSA and CIS.	Staff and students	Limbabwe
Agriculture-livestock aquaculture integration	Previous initiatives have not included aquaculture in the crop- livestock integration projects. With an increasing expansion of aquaculture on the continent, training is necessary to support effective integration of aquaculture to already adopted integrated farming systems, Capacity building on aquaculture value chain initiatives	Students	High
Principles of agro-ecology farming system	Conducting agricultural activities on the basis of ecological principles is crucial for maintenance of healthy ecosystems at the same time addressing the challenges for food shortage and ecosystem degradation. There is a need to strength this aspect in training of future lecturers and students.	Staff and students	Medium
Gender issues and CSA	Staff and students need more awareness on how women can be sustainably supported through a community-centered	Staff and students	Medium

	approach to adopting and adapting livelihood strategies in innovative ways, based on current and future climate change scenarios.		
Applications of Biotechnology in CSA	There is a need to learn about the science behind biotechnology application in area of CSA. This include employ biotechnology to enhance crop productivity and quality; build positive attitude concerning bioethics in relation to biotechnology.		
Training theme	Description	Beneficiaries	Application in Zimbabwe
Practical understanding of the CSA approach.	The CSA and CIS approach is obviously attractive and compelling in principle, but its application in the context of diverse agro-ecologies and highly heterogeneous farming systems, conditions and socio-economic policies still requires concrete success stories. Gathering clear empirical messages to inform farmers and policymakers and support scaling-up initiatives will depend on how well the CSA concept is understood in practice, allowing for continuous two-way adaptations and feedback mechanisms between researchers and practitioners, farmers and policymakers. There are also gaps on design thinking for CSA and CIS.	Staff and students	High
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	ecosystems at the same time addressing the challenges for food shortage and ecosystem degradation. There is a need to strength this aspect in training of future lecturers and students.		
Gender issues and CSA	Staff and students need more awareness on how women can be sustainably supported through a community-centered approach to adopting and adapting livelihood strategies in innovative ways, based on current and future climate change scenarios.	Staff and students	Medium
Applications of Biotechnology in CSA	There is a need to learn about the science behind biotechnology application in area of CSA. This include employ biotechnology to enhance crop productivity and quality; build positive attitude concerning bioethics in relation to biotechnology.		
GIS and remote sensing in CSA amd CIS	Use of GIS and RS will support CSA through increased access to CIS and facilitate precision and digital agriculture.	Staff	High
Indigenous knowledge systems (IKS) on land use and CSA	Tapping on IKS for CSA and CIS	Students and staff	Medium
Ethnobotanical plant use and ethnoveterinary medicines for crop and livestock production	The training will focus on promoting the use of environment friendly and locally resources for pest and disease control in crops and animals.	Staff	High
Climate smart post-harvest processing and storage techniques	A variety of these techniques are now available but known by end- users.	Students and staff	High
Breeding of adapted livestock breeds and crop varieties	Various approaches promoting animal breeds and crop varieties that are adapted to the region exist and need to be disseminated.	Staff	High
CSA and CIS and the Development agenda	Mainstreaming the development agenda in CSA and CIS and vice versa is crucial for achieving local, national and international sustainable development agenda.	students and staff	High
Climate Finance for CSA	Inadequate knowledge on financial opportunities for CSA projects	Students and staff	High

The role of the media in CIS and CSA promotion	Enhancing the role of the media as a tool in promoting and raising awareness on climate actions among stakeholders	Students, staff and climate experts/practitioners	
Climate Finance for CSA and CIS	Funding opportunities for CSA and CIS initiatives need to be disseminated.	Students and staff	High

Existing human resources in CSA and CIS in selected Zimbabwean universities

Figure 1 below shows the existing CSA and / or CIS capacity in the selected Universities of Zimbabwe. Obviously, the number of Professor and Associated Professor involved in CSA and / or CIS teaching is generally lower compared to the number of lecturer and senior lecturers. Similarly, the number of female staff involved in teaching courses linked to CSA and /or CIS is relatively low compared to the male staff.



Figure 1 Staff involved in CSA and/or CIS teaching in selected Universities in Zimbabwe

Conclusions and Recommendations

Based on the four (4) Zimbabwean Universities sampled, various courses and course units with aspects of CSA and CIS are taught. These courses cover a wide range of the proposed clustered priority areas and are course units offered for undergraduate programmes. It is recommended that instead of infusing some aspects of CSA and CIS in some degree courses, proper modules on CSA and CIS be developed and taught at both undergraduate and postgraduate levels. This is essential in order to build adequate expertise/capacity in various aspects of CSA and CIS among the academia to further research and training on CSA & CIS. The national consultations revealed that the Zimbabwean government has a high level of commitment to CSA/CIS mainstreaming adaptation and mitigation goals into agricultural planning processes and has developed several climate policy & legislative frameworks. These policies were identified and prioritized for CSA intervention. It is recommended that though the Policy environment is conducive, the Government and its partners need to do more in putting in place strong funding strategies in order to strengthen CSA and CIS in learning institutions.



About AICCRA

Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) is a project that helps deliver a climate-smart African future driven by science and innovation in agriculture.

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