REPORT ON FIELD MISSIONS IN THREE PILOT COLLEGES OF AGRICULTURE IN ZIMBABWE ON INSTITUTIONAL DYNAMICS, KNOWLEDGE OF THE GEOGRAPHICAL LOCATION AND EDUCATIONAL PRACTICES

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ABOUT THE COLLEGES OF AGRICULTURE

Mazowe Veterinary College

Mazowe Veterinary College was established in 1982 through funds donated by the Food and Agriculture Organisation of the United Nations, United Nations Development Programme and the Swiss Government, with the primary objective of training auxillary extension personnel. The College was handed over to the Zimbabwean Government in 1985, which is now fully responsible for its maintenance and viability. Mazowe Veterinary College is found in Mashonaland Central Province of Zimbabwe.

Chibhero College of Agriculture

Chibhero College of Agriculture was founded in 1961. It falls under the Department of Agriculture Education and Farmer Training in Zimbabwe's Ministry of Agriculture, Mechanisation and Irrigation Development. Chibhero College is found in Mashonaland West Province of Zimbabwe.

Mlezu College of Agriculture

Mlezu Agricultural College was established in 1958. It falls under the Department of Agriculture Education and Farmer Training in the Ministry of Agriculture, Mechanisation and Irrigation Development. The College is found in Midlands Province of Zimbabwe

Esigodini College of Agriculture

Esigodini College of Agriculture falls under the Department of Agriculture Education and Farmer Training in the Ministry of Agriculture, Mechanisation and Irrigation Development. The College is located in Matabeleland South Province of Zimbabwe.

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We are grateful for the National Designated Entity (NDE) – Ministry of Environment, Water and Climate (MoEWC) for facilitation of all processes and activities concerning the Technical Assistance from the Climate Technology Centre and Network (CTCN).

We hope that this Report reflects our shared and equal interactions with participants during the Field Missions. Any errors or omissions remain the sole responsibility of the authors and not of MoAMID, MoEWC, UNEP – DTU, GIT, UNFCCC and CTCN.

LIST OF ACRONYMS

AGRITEX	Department of Agricultural and Technical Extension Services
BUSE	Bindura University of Science Education
CA	Conservation Agriculture
CIMMYT	International Maize and Wheat Improvement Center
CSA	Climate-Smart Agriculture
CTCN	Climate Technology Centre and Network
DTU	Technical University of Denmark
FAQ	Frequently Asked Question
FGD	Focus Group Discussion
GIT	Green Impact Trust
GMO	Genetically Modified Organism
MoAMID	Ministry of Agriculture, Mechanisation and Irrigation Development
MoEWC	Ministry of Environment, Water and Climate
NDE	National Designated Entity
NGO	Non-Governmental Organization
TA	Technical Assistance
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

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1. INTRODUCTION

Climate-Smart Agriculture (CSA) is about practices and technologies that sustainably increase productivity, support farmers' adaptation (resilience) to climate change, and where possible, reduce greenhouse gas emissions and increase carbon sequestration. CSA strengthens food security and delivers environmental benefits.[1] Food demand is expected to double by 2050, at the same time that climate science is suggesting that our agricultural production methods needs to adjust to less predictable rainfall, warmer temperatures, more frequent extreme weather events.[2] There are a number of techniques that fall under CSA such as mulching, intercropping, conservation agriculture, improved soil and water management, crop rotation, and integrated crop-livestock management.

1.1.BACKGROUND AND PURPOSE OF THE STUDY

Green Impact Trust (GIT) took a collaborative initiative to build upon the outcomes of the Curriculum Review Workshop held by my Ministry of Agriculture, Mechanisation and Irrigation Development (MoAMID) during the month of July 2015, where it was identified that there is a lack of climate change education and practical climate change approaches among the present agriculture extension workers, providing professional extension services to Zimbabwe's largely majority rural farming community and newly resettled farmers in Zimbabwe's agriculture community. The Curriculum Review Workshop asserted the need to provide CSA training to the present and future agriculture extension workers and agriculture college students on climate change issues. The Workshop also noted the necessity of climate change education and awareness among the students in Colleges of Agriculture in Zimbabwe.

GIT subsequently made a request for Technical Assistance (TA) to Develop a Climate-Smart Agriculture Manual for Professional Level and University Level Agriculture Education in Zimbabwe through National Designated Entity (NDE) – Ministry of Environment, Water and Climate (MoEWC) – of the Climate Technology Centre and Network (CTCN). This work fits within the scope of the United Nations Framework Convention on Climate Change (UNFCCC).

In order to come up with the CSA Manual, the CTCN TA notes the need to conduct a thorough literature review of the existing documents that relate to agriculture practices as well as a Field Mission to Four Pilot Colleges to get an in-depth understanding of the institutional dynamics i.e.

[1] FARA (2016). Olaleye Adesola, Emmanuel Tambi, Solomon Bangali, 2016. Efficiency of Two Climate-Smart Agriculture Technologies in Eastern and Southern Africa: Evidence from Ethiopia and Lesotho. Forum for Agricultural Research in Africa (FARA), Accra, Ghana.

[2] FAO (2013). Climate-Smart Agriculture Sourcebook. Rome: Food and Agriculture Organisation of the United Nations.

the role of the Ministry of Agriculture; agricultural research institutions; agriculture extension offices; universities; and farmers unions. The Colleges of Agriculture proposed in the CTCN Response Plan are: Chibhero; Mlezu; Mazowe; and Esigodini.[3]

1.2.ABOUT THIS REPORT

This Report provides the key findings from the Field Missions to Three Selected Colleges of Agriculture as part of Planned Activities in the Climate Technology Centre and Network (CTCN) Technical Assistance Response Plan. The Report is organised around five sections, each of which touches on important aspects on the Field Missions. The terms "College of Agriculture" and "Agricultural College" are used interchangeably in this Report.

[3] The Field Team could not visit Esigodini College of Agriculture due to resource and financial constraints. A total of three out of four Colleges of Agriculture constituted the Field Missions, i.e. Mazowe; Chibhero; and Mlezu.

2. CLIMATE CHANGE EDUCATION AND AWARENESS IN TERITIARY INSITUTIONS IN ZIMBABWE

The *National Climate Change Response Strategy, Draft Climate Policy, Nationally Determined Contributions, Zimbabwe's Agriculture Investment Plan and other National Documents* underscore the urgency to promote Climate-Smart Agriculture (CSA) as part of the efforts to enhance food and nutrition security in Zimbabwe. These National Documents are centered on strategies of strengthening capacity to generate new forms of empirical knowledge, technologies and agricultural support services that meet emerging research and development challenges arising from increased climate change and variability. Therefore, climate change education and awareness is critical among the students enrolled in Colleges of Agriculture.

3. STUDY METHODOLOGY AND LIMITATIONS

The study followed a Participatory Approach which involved interaction with various stakeholders, and Qualitative Methods were used to gather data.

3.1.STUDY APPROACHES

3.1.1. Phase 1: Field Mission Preparatory Phase

The Field Team familiarized themselves with the CTCN TA Response Plan Section 2 and Activity 1. Section 2 broadly describes the TA and Activity 1 describes the Literature Review of the Existing Literature, respectively. A Research Guide which consisted of various questions was then developed to assist the Field Team.

3.1.2. Phase 2: Field Study Phase

The Field Study proceeded as detailed below:

Date Visited	Name of College	Number of Participants	Description of Participants
21 July 2016	Mazowe Veterinary College	20 (est.)	Animal Production Personnel & Lecturers
21 July 2016	Chibhero College of Agriculture	10	Lecturers & Deputy Principal
29 July 2016	Mlezu College of Agriculture	10	Lecturers & Principal

3.2.METHODS OF DATA GATHERING

Qualitative Methods were used to gather data. These methods comprised: Focus Group Discussions (FGD), Interviews, and Meetings. Each FGD lasted about an hour with the Field Team equally sharing the tasks and providing clarification where it was needed.

Tools	Purpose	Where	By Whom
Meetings	To collect literature and general information on the Pilot College of Agriculture	Mazowe Veterinary College, Chibhero College of Agriculture, & Mlezu Agricultural College	Field Team
Focus Group Discussion	To collect literature and general information on the Pilot College of Agriculture	Mazowe Veterinary College, Chibhero College of Agriculture, & Mlezu Agricultural College	Field Team

3.3.LIMITATIONS OF THE STUDY

The study consulted various sources of literature to validate some of the findings that participants raised during the focus group discussions and meetings. The Field Team conducted a limited number of interviews during the build up to the Field Missions. The interviews were done to acquaint the Country Partners with the work of GIT and the National Programme on Developing a Climate-Smart Agriculture Manual for Agriculture Education in Zimbabwe.

4. FINDINGS

4.1.FINDINGS FROM MAZOWE VETERINARY COLLEGE

Participants from Mazowe Veterinary College expressed a number of issues during the FGD. Among the issues raised was that they rear a number of livestock species namely cattle, pigs, rabbits, chicken, sheep, and bees. The issues raised by the participants were in response to the probe guided by the Research Guide.

Animal Production and Management

- There is a need for suitable animal breeds for the different areas of the country (Agro-ecological Zones).

- There is a need for on-farm climate-smart approaches that can be used by people adopting CSA.
- Animal welfare is regarded highly at the College, in particular Animal Housing.
- Animal waste (manure) is used in the Horticulture Section.
- Water used for cleaning will end up in the septic tanks.

Disease Management, Control and Surveillance

- There is a disease control and management system in place, as well as disease surveillance.
- The incinerator is used for all disposal of animal waste.
- Post-mortems are carried out on all dead animals.

Integrated Systems for Climate-Smart Agriculture

Chicken waste is used as part of animal feed (urea) and in the gardens. The participants indicated that minimum amounts of urea are used in animal feed as urea sometimes leads to poisoning. Urea is known to cause high growth rates. Pig waste is used as feed for fish. The participants indicated that this was one form of an integrated system in their animal operations.

4.2.FINDINGS FROM CHIBHERO COLLEGE OF AGRICULTURE

Partnerships and Initiatives in Climate-Smart Agriculture

- The country's extension system through the Department of Agricultural and Technical Extension Services (AGRITEX) had the issue of climate-smart agriculture in their programmes. AGRITEX was active in the areas of climate-smart agriculture.
- There was previous work done by International Maize and Wheat Improvement Center (CIMMYT) on Conservation Agriculture (CA).
- There was a Demonstration Centre at Chibhero College of Agriculture.
- The College has a partnership with Bindura University of Science Education (BUSE).

Renewable Energy

Chibhero College of Agriculture has a biogas plant which is used to heat water used for various purposes (e.g. cooking and in student shower rooms). The plant was built by the College taking from a pilot project by a Non-Governmental Organisation (NGO) with the communities in and around the College. The bio gas plant uses cow dung. The participants indicated that the bio gas plant reduces deforestation as it is an alternative source of energy. The output from the biogas is used in crop fields. The size of the bio gas plant is equal to the size of the herd of cattle.

Participants indicated that in terms of waste, the preference was in this order: pig waste→poultry waste→cattle→human waste.

Bio gas has multiple purposes such as application in dairy farms, community, and poultry (lighting purposes). Its broader benefit is in conserving the environment.

Alternative Agricultural Practices

The participants indicated that they were moving away from conventional tillage through practices such as conservation agriculture.

One question raised was the claim that CSA seemed to have low efficiency when compared to conventional tillage.

It was agreed by participants that there was a need for a mindset shift through education to counter the negative stereotypes in new approaches such as climate-smart agriculture.

Environmental Sustainability

Participants expressed concern regarding new food and agriculture technologies such as biotechnology in particular Genetically Modified Organisms (GMOs). There were mainly interested in the facts surrounding GMOs and whether they were of any benefit to the agricultural community in Zimbabwe. There were ethical considerations raised concerning GMOs.

Closely linked with the environmental sustainability were issues of health and nutrition. The participants asked whether CSA does address any nutrition concerns.

4.3.FINDINGS FROM MLEZU COLLEGE OF AGRICULTURE

Participants at Mlezu College of Agriculture raised a number of issues which are detailed below:

Soil and Water Conservation Practices

The participants noted that there used conservation agriculture to conserve their soil. They did this through basins (15 cm x 15 cm) and the use of crop residues and grass in-between the basins. Participants also indicated that they applied manure to their crops (maize, vegetables and tomatoes). Even though crop residues were used, participants indicated that 30% of the crop residues were left in the field.

There was also interest in the differences between drip and flood irrigation. The participants highlighted that the Mlezu Agricultural College used drip irrigation in their horticulture section. The Irrigation staff members responded to the concerns surrounding the irrigation practices: surface and drip irrigation, with one of their responses touching on the soil loss and leaching of nutrients in surface irrigation.

There was also concern of pollution of the water sources by the nearby and surrounding mines. The issue of wildlife management was also raised by the participants.

Renewable Energy

Biogas is used as an alternative source of energy at the College. The participants expressed the benefits that biogas was providing to them in terms of the dining hall energy requirements. They also expressed concern on why the term "Climate-Smart Agriculture" was being used so vigorously now more than ever. The issue of efficiency of the energy systems was also raised by the participants.

Out-of-the Box Thinking

Participants expressed the need for out-of-the box thinking in CSA. The need to move away from rain-fed agriculture was stressed by all the participants.

Information and Management Systems for Climate-Smart Agriculture

There was also a need for the recording of statistics and tracking of information and as well as new knowledge in CSA. It was also noted that statistics could improve the renewable energy (biogas) work the institution was engaged in as well as generate evidence for policy and practice.

Risks Assessments in Climate-Smart Agriculture

The participants expressed the need to consider the advantages and disadvantages of each new technology.

Continuous Research and Development in Climate-Smart Agriculture

The issue of continuous research in CSA was also raised by participants. This was indicated because CSA was a new practice and its benefits needed to be clear to the agriculture community in Zimbabwe. The differences between traditional and modern systems of farming was highlighted with some participants noting that CA and CSA were often confused in research and

development work. There was a need for scientists, farmers, and researchers to lay out which trajectory to take among the options that were available. The issue of carbon credits was also raised as an area to explore in CSA.

One participant also noted the importance of investing in indigenous trees. Mlezu Agricultural College has a nursery and an orchard where research and development work was carried out. Indigenous trees were noted as part of the afforestation efforts by the institution.

The issue of Demonstration Centres was also raised by the Field Team as being part of the Response Plan. Among the pilot Colleges some would be Demonstration Centres in the areas where their competitive advantage and strengths lay.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1.CONCLUSIONS

The most important aspect of the Field Mission are research and knowledge gaps that exist within the Curriculum, Institutions, Student Development, and Community and Stakeholder Engagement. These research and knowledge gaps can potentially be addressed through the Climate-Smart Agriculture Manual for Agriculture Education in Zimbabwe. The study showed that albeit not entirely new to the Colleges of Agriculture, the concept of CSA was innovative and could fundamentally change how new knowledge in assimilated and used in various ways via agricultural education in Zimbabwe.

5.2.RECOMMENDATIONS

- The study established the need to connect the content students study in class with the concept of climate-smart agriculture.
- There is a need to compile a Frequently Asked Question (FAQ) on climate-smart agriculture guide.
- There is a need for an expert on GMOs to engage staff and students at Chibhero College of Agriculture.
- There should be strategies for each agro-ecological zone in Zimbabwe.
- There is a need for prominent people from the College and Organizations to champion some of the new concepts around climate change.
- There is a need to foster student excellence, for example, through pilot initiatives with a select group of students to test out the climate-smart agriculture manual.

APPENDIX A: RESEARCH GUIDE FOR THE FIELD MISSIONS

Section 1: Curriculum Review

This section focuses on finding out the relevance of climate smart agriculture manual into current agricultural college curriculum. The section will also cover issues such as specific module assessments, supporting academic resources, new technologies and research work introduced in the agricultural sector.

a. How is the current agricultural college diploma training programmes modified towards climate change mitigation and adaptation?
b. How is the integration of technologies consistent or applicable to local agricultural education?

Section 2: College of Agriculture

This section focuses on issues that include, but not limited to the growth of agricultural college farms as practical points of reference in agricultural research and development, and community outreach activities.

c. How is your college addressing climate change mitigation and adaptation in its activities?
d. What are the gaps in trying to integrate climate change mitigation and adaptation in theory and practice? How are you addressing the gaps?
e. How is the agricultural college reaching out to its surrounding communities in terms of research and extension support? What are the challenges and opportunities?

Section 3: Student Development

This section focuses on finding out the extent of relevance of student training in relation to demands and/or changes in industry. The section will also focus on finding the extent that current supportive resources are ensuring that capacity building continues to produce high quality agricultural extension personnel, agricultural entrepreneurs.

f. How are students absorbing training, both theory and practice? What are the current
g. How is the student attachment stage training provide to new farmers, industry, government programs, etc? (Attachment; Employment; Entrepreneurship; etc.)
h. T what extent is the integration from diploma level to degree level consistent in building a future (employee, farm manager, entrepreneur, etc)?

Section 4: Community and Stakeholder (Researchers; Industry; Rural Communities; Famers Unions; Financial Sector)

This section focuses on assessing the value of agricultural colleges to the agricultural sector, which includes but not limited to production, processing, distribution, marketing, research, and efficiency.

i. What are some of the ways agricultural colleges are contributing to the growth and development of knowledge of climate change mitigation and adaptation
j. What are some of the ways agricultural colleges need to do in order to lead in the innovation and development of agricultural technologies (knowledge, skills, engineering, etc) in Zimbabwe