CLIMATE-SMART INNOVATION TOOL

A Curriculum Innovation Support Tool

A mediating tool to review and initiate Climate-Smart responsive curriculum and learning practices within the agricultural system.

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Contents

Acronyms

AgriSETA   Agriculture Sector Education and Training Authority

AISHE   Auditing Instrument for Sustainability in Higher Education

DAFF   Department of Agriculture, Forestry and Fisheries

DHET   Department of Higher Education & Training

ELRC   Environmental Learning Research Centre

FANRPAN   Food, Agriculture and Natural Resources Policy Analysis Network

FAO   Food & Agriculture Organisation

IPCC   Intergovermental Panel on Climate Change

NCCRP   National Climate Change Response Policy

SAQ   Sustainability Assessment Questionnaire

SAQA   South African Qualification Authority

SARUA   Southern African Regional Universities Association

ULSF   University Leaders for a Sustainable Future

USAT   Unit-Based Sustainability Assessment Tool

Introduction

The driving factor for the development of the tool was the need to establish the level of Climate-Smart Agriculture policy and approach integration into the agriculture curriculum throughout the agricultural system. The aim was to develop a tool that could enable users to gain an insight into the 'whole' picture of Climate-Smart responsiveness within the agriculture curriculum and to support and track innovation towards a Climate-Smart responsive curricula and policies. The tool is designed in a way that an individual lecturer, curriculum developer or manager can use it to review his/her subject curriculum outline and programme, teaching approaches, community engagement, assessment and staff expertise's climate responsiveness. The tool is also indicator-based as modelled in the Unit-Based Sustainability Assessment Tool (Togo & Lotz-Sisitka, 2009). The tool is useful for surfacing contradictions, and identifying absences, and thus for charting out the start of reflexive learning and change processes needed for introducing climate responsive knowledge in the agricultural education system.

The tool is mainly based on and supported by the inductive analytical processes that examined the drivers and conversion factors of the Climate-Smart Agriculture concept, the agricultural knowledge flow within systems and the agricultural curriculum responses to the approach. During the development of the tool other examples of curriculum evaluation tools and sustainable assessment tools were investigated and relevant dimensions adapted to produce a tool that could be used within the agricultural education system to support and track innovation.

Curriculum Evaluation Tools

Other examples of curriculum evaluation tools were investigated and relevant aspects were adapted to produce this innovation tool. The study drew mainly upon the SARUA (2014) recommendations, as well as on the concept developed by CGIAR Research Programme on Climate Change, Agriculture & Food Security (Beddington et al., 2011). The programme also focused on overcoming climate change challenges, threats to agriculture and food security by exploring new ways of helping vulnerable rural communities adjust to global changes in climate (Moorhead, 2009). Well-known Climate-Smart Agriculture issues such as carbon dioxide emissions, adaptation and resilience towards climate change were also included in the tool (FAO, 2013).

The United Nation's Millennium Project's Millennium Development Goals were investigated during the development of the tool (UNESCO, 2000). The Sustainability Assessment Questionnaire (SAQ) (University Leaders for a Sustainable Future [ULSF], 1999), the Auditing Instrument for Sustainability in Higher Education (AISHE) (Roorda, 2001) and Graphical Assessment of Sustainability (GASU) (Lozano, 2006), were also examined.

The Sustainability Assessment Questionnaire's (SAQ) major strengths are that it is useful as a conversational and teaching tool and the assessment can help to identify weaknesses and set goals. However, the Sustainability Assessment Questionnaire is not practical for large universities to complete and there is no mechanism for comparison or benchmarking (ULSF, 1999). The Auditing Instrument for Sustainability in Higher Education (AISHE) was designed to measure the success in campus implementation of sustainability, while also creating a mechanism for knowledge exchange (Roorda, 2001). AISHE is an auditing method and a policy instrument that is process-orientated focussing on qualitative over quantitative measures. The United Nations Environment Programme's Unit-Based Sustainability Assessment Tool model was developed for use in the Swedish/Africa International Training Programme (ITP) on Education for Sustainable Development in Higher Education. The main purpose of the tool was to facilitate reflexive learning, rather than precise measurement of sustainability occurrence and improvements within a Higher Education Institute. The tool was implemented as an educational tool in the Africa-Asia International Training Programme on Education for Sustainable Development in Higher Education since 2009

These tools helped to form the basis for developing indicator competencies for this review tool, with built-in flexibility to be used at curriculum or subject level. The tool is indicator-based and modelled on the United Nations Environment Programme's Unit-Based Sustainability Assessment Tool (USAT). It was used to guide the development of the tool as the USAT model is based on a disciplinary framework where assessment is possible at the level of individual departments and units (Togo & Lotz-Sisitka, 2009). The USAT model was useful and it has proven capacity to support reflexive curriculum innovation processes for sustainability, although it has not been adapted as an indicator for Climate-Smart responsiveness or within an Agricultural College context (Togo & Lotz-Sisitka, 2009; Togo, 2015). The USAT method of indicator clusters within cluster groups was used to guide the format of the Climate-Smart Innovation Tool. The various sections of the tool are also adapted from the USAT's three sections namely, Part A: Teaching, Part B: Operations and Management and Part C: Student Involvement (Togo, 2009).

Background

Climate-Smart Agriculture potentially offers a way forward for conceptualising how to enhance food security in a rapidly changing environment characterised by increased climate variability and longer-term climate change within a southern African context (FAO, 2013). The approach was designed to identify and operationalise sustainable agricultural development within the explicit parameters of climate change. It promotes strategies to increase food security such as using agricultural resources efficiently by using less water, land and inputs to produce food more sustainably, while increasing the agriculture systems' resilience to change and shock (FAO, 2013). Climate-Smart Agriculture aims to address the main issues concerning food security namely:

- the availability and access to food,
- the utilisation of food for adequate nutrition, and
- the security of food supply.

Climate-Smart Agriculture integrates the economic, social and environmental components of sustainable development by jointly addressing food security and climate challenges through three pillars of sustainable development. The concept is structured under three pillars or three goals:

- sustainably increase agricultural productivity and income,
- adaptation and strengthen resilience to climate change and variability, and
- reduce agriculture's contribution to climate change by reducing greenhouse gas emissions and Carbon storage on farmlands. (FAO, 2013, p. ix).

Climate-Smart Agriculture is a responsive concept for strategic implementation and is currently used to inform curricula and to enhance the realisation of national food security and development goals. It is a strategy for long term innovation that considers national and local priorities and challenges (Food & Agriculture Organisation [FAO], 2013). The inclusion of Climate-Smart Agriculture in the agriculture curricula is an important contributing factor to sustainable development of agricultural systems (FAO, 2013). Chakeredza et al. (2008) emphasised that graduates in agriculture should be competent to analyse and solve climate change related problems, to anticipate and prepare for future climatic challenges, as well as to create and seize opportunities to apply their knowledge to a specific individual localised situation. (AgriSETA, 2014; DoE, 2008; PCA, 2014).

Climate-Smart Agriculture provided the foundation to develop this review tool for curriculum transitioning to plot the direction for curriculum innovation within the curriculum and learning systems.

Climate-Smart Innovation Tool

The tool is designed to review and support the Climate-Smart curriculum innovations. The reviewer, teaching staff, curriculum developer or management can use the tool to review the responsiveness of his or her specific or overall curriculum outline and content, teaching approaches, community engagement, assessment, staff expertise, operations and management of the college. The tool can be used by management to assess the agricultural training institute's overall Climate-Smart responsiveness. The different parts of the system include curriculum content, teaching approaches, assessment, student and community involvement, management unit contributions and college policies. Section A and B of the tool focusses on the curriculum content and teaching approaches whereas Section C reviews the management practices of the institute. The tool facilitated a quick identification of the agricultural training institute or individual actors of the system's Climate-Smart responsiveness. It allows the detection through the tool indicators of specific areas of strengths and areas that may require future development in relation to Climate-Smart responsive concepts, principles and policies. It therefore simplifies more complex emergent properties but helps to identify areas of innovation and success through a relatively easy review technique. Thus, the tool is a type of "rapid assessment" that allows for catalysing reflexive deliberation and further investigation and discussion of the findings that merge from the tool.

The Climate-Smart Innovation Tool is divided into three parts for ease of administration

- **Part A** deals with teaching approaches that include the theoretic and practical curriculum content's Climate-Smart responsiveness. It focusses on student competencies, research, community engagement, assessment and staff expertise and willingness to participate in the process of innovation towards Climate-Smart responsiveness. Part A focusses on lecturers and Departments' general Climate-Smart responsiveness.

- **Part B** of the Climate-Smart Innovation Tool pays attention to the Climate-Smart responsive concepts and principles in the curriculum outline, core competencies and the curriculum content in relation to general topics such as climate change, Rural wealth creation, food security, agriculture as a sustainable profit-making business, development of entrepreneur skills, organic farming, climate adaptation and resilience. Indicators under Part B are meant to establish the Climate-Smart responsiveness of the Agriculture Training Institutes curriculum content, course competencies, curriculum outcomes and specific subject content. Part B is specific topic orientated.

- **Part C** reviews the Agriculture Training Institute's operations and the management of the Institute. Part C identifies the institutes performance towards Climate-Smart responsiveness. It also deals with the student involvement and activities that are linked to address issues relating to Climate-Smart approach and community engagement. Part C concludes with the policies and written statements of the Institute and its alignment with Climate-Smart responsiveness and the National Agriculture Strategic plan for Agriculture Training Institutes.

Section A of Climate-Smart Innovation Tool

Section A deals with teaching approaches that include the theoretic and practical curriculum content's Climate-Smart responsiveness. It focusses on student competencies, research, community engagement, assessment and staff expertise and willingness to participate in the process of innovation towards Climate-Smart responsiveness. Section A consists of 49 indicators in seven clusters.

- C1: *Staff expertise and innovation.*
- C2: *Development of Climate-Smart Agriculture awareness competencies among students*
- C3: *Climate-Smart Agriculture general topics*
- C4: *Examination (Assessment) of Climate-Smart Agriculture topics*
- C5: *Practical curriculum content and research*

Indicator Cluster 1: Staff expertise and innovation.

This cluster reviews the level of expertise of the lecturer in relation to the Climate-Smart Agriculture approach. It also considers if the participating reviewer finds the integration of these topics relevant and the willingness of the participating reviewer to incorporate these topics within the curriculum. Attitude towards further training and what type of training the specific participating reviewer might find useful are also reviewed.

Indicator Cluster 2: The Development of Climate-Smart Agriculture awareness competencies amongst students.

This indicator determines to what extent the teaching approach contributes to the development of the Climate-Smart responsive competencies and skills among students. This cluster addresses development of critical thinking skills, informed decision-making, anticipatory skills, respect for others, system thinking skills, anticipatory skills and other responsive competences (SARUA, 2014; FAO, 2013). These competences are essential to prepare graduates to engage in adaptation and resilience practices and climate-smart responsive practices (SARUA, 2014). The selection of these competencies to inform indicators in the Climate-Smart curriculum response tool was guided by SARUA (2010).

Indicator Cluster 3: Climate-Smart Agriculture general topics

Cluster C3 focusses on what type of general topics are included within the curriculum. These topics include food security, renewable energy, organic farming, development of entrepreneur skills and agriculture as a sustainable profit-making business using sustainable agricultural practices.

Indicator Cluster 4: The Examination (Assessment) of Climate-Smart Agriculture topics

Cluster C4 reviews to what extent Climate-Smart responsive concepts are practically and theoretically assessed within the Diploma programme/ Department or the lecturer's specific subject.

Indicator Cluster 5: The practical curriculum content and research

Cluster C5 focusses on the extent of integration of Climate-Smart responses within the practical projects and assignments. It establishes whether Climate-Smart Agriculture practical competencies are integrated within the practical projects.

Section B of Climate-Smart Innovation Tool

Section B of the Climate-Smart Innovation Tool pays attention to the Climate-Smart responsive concepts and principles in the curriculum outline, core competencies and the curriculum content . Indicators under Section B are meant to establish the Climate-Smart responsiveness of the Agriculture Training Institutes curriculum content, course competencies, curriculum outcomes and specific subject content. Part B is specific topic orientated.

Section B consists of 45 indicators in eight clusters. This section focusses on the curriculum content outline of topics related to Climate-Smart Agriculture within the Diploma.

Section C of Climate-Smart Innovation Tool

Section C of the tool includes the review of student involvement in voluntary community engage activities related to Climate-Smart Agriculture. This cluster includes indicators to evaluate student orientation programmes, career counselling and student politics and governance for Climate-Smart responsiveness, collaboration of students and management on these topics and student involvement in Climate-Smart responsive practices in residences.

Section C of the tool also evaluates the policy and mission statements of the Agricultural College or Training Institute's relation towards the inclusion of Climate-Smart responsive topics and Climate-Smart Agriculture principles within the curriculum policies. This tool also reviews the alignment of the AGricultural College or Training Institute with the national and provincial agriculture strategic plan on agriculture education (READ, 2015; AgriSETA, 2014).

Assessment Criteria

Rating		
0	None	There is no evidence on the indicator
1	Unsatisfactory	The indicator does not meet the necessary requirements.
2	Needs Development	Indicates performance, but improvement is required.
3	Adequately	Evidence show adequate Climate-Smart responsiveness
4	Meets requirements	Evidence indicates that the Climate-Smart responsive standard has been met.
5	Exceed requirements	Evidence indicate that expectations has been exceeded and Climate-Smart responsiveness has been successfully attained.

Instructions

- **Complete** the Climate-Smart Innovation Tool by rating each cluster indicator's relevance and evidence indicating the presence of the identified indicator and relevant practices by choosing between five options ranging from 0 to 4.

- After completion of tool use the **score analysis sheets** to enter your scores and calculate the Climate-Smart responsiveness of the particular curriculum or subject evaluated.[1]

- **Interpret** your score analysis.[2]

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[1] See Pages 22 & 23
[2] See Page 24 for guidelines

SECTION A Curriculum, teaching approach and student-community engagements							
		LEVEL					
		None (0)	Unsatisfactory (1)	Needs development (2)	Adequately (3)	Meets requirements (4)	Exceed requirements (5)
C1	**STAFF EX PERTISE AND INNOVATION**						
A1	The level of expertise of staff members in the area of Climate-Smart Agriculture.						
A2	The level of training that staff members have completed in any of the aspects concerning Climate-Smart Agriculture including Climate Change etc.						
A3	The extent to which staff members are willing to integrate Climate-Smart Agriculture aspects / topics within their practical framework.						
A4	The extent to which you as lecturer are willing to teach Climate-Smart Agriculture topics.						
	C1 TOTAL						
C2	**DEVELOPMENT OF CLIMATE-SMART AGRICULTURE AWARENESS COMPETENCES AMONG STUDENTS**						

		LEVEL					
	Which of the following Climate-Smart Agriculture competencies does your teaching approach develop amongst the students?	0	1	2	3	4	5
B1	The capacity to make informed decisions related to Climate-Smart Agriculture issues and challenges						
B2	Critical thinking skills						
B3	Systems thinking skills to understand complex problems from an integrated social-ecological systems perspective to solve Climate-Smart related problems						

	Which of the following Climate-Smart Agriculture competencies does your teaching approach develop amongst the students?	LEVEL					
		0	1	2	3	4	5
B4	To anticipate possible scenarios and consequences, while assessing the vulnerability and risk of a specific agriculture system at risk of Climate-Smart Agriculture related problems						
B5	The competence to adapt by conceptualising appropriate alternatives and responses that are sustainable and viable through planning and strategic development.						
B6	To consider the implications of decisions and how these decisions can affect the current and future well-being of the surrounding community, agriculture system and ecological systems.						
B7	To be able to engage in adaptive management and to participate in social innovations that generate new practices						
B8	A sense of responsibility towards the community, ecological system and the environment, while understanding the role one has to play as part of these systems						
B9	Integrated problem solving						
B10	Respect of the opinions of others						
B11	Does the teaching approach contribute to the development of paradigm thinking such as systems thinking, integrative thinking, critical and creative thinking?						
B12	Does the teaching approach create awareness of values and ethics including, democracy, respect for planet appreciation of nature; care and concern towards all life forms?						
B13	Does the teaching approach capacitates the student for social learning and innovation by exposing students to knowledge concerning the past, present and future Climate-Smart Agriculture challenges?						

		LEVEL					
	Which of the following Climate-Smart Agriculture competencies does your teaching approach develop amongst the students?	0	1	2	3	4	5
B14	Does the teaching approach develop Climate-Smart Agriculture core competencies such as adaptability?						
B15	Does the teaching approach follow an interdisciplinary approach where various knowledge are combined and connected?						
B16	Does the teaching approach combine practical and theoretical teaching methods to explain Climate-Smart Agriculture concepts?						
	C2TOTAL						
C3	**CLIMATE-SMART AGRICULTURE GENERAL TOPICS**						
	Which of the following Climate-Smart Agriculture topics are integrated into your subject content?	0	1	2	3	4	5
D1	Climate Change						
D2	Rural wealth creation						
D3	Food security						
D4	Agriculture as a sustainable profit-making business using sustainable agricultural practices						
D5	Development of entrepreneur skills						
D6	Organic farming						
D7	Renewable energy						
D8	Climate adaptation and resilience						
D9	Rainwater Harvesting and Conservation						
	C3 TOTAL						

C4	EXAMINATION (ASSESSMENT) OF CLIMATE-SMART AGRICULTURE TOPICS						
		LEVEL					
		0	1	2	3	4	5
E1	The extent to which Climate-Smart Agriculture aspects are practically assessed during course.						
E2	The extent to which Climate-Smart Agriculture aspects are examined during course.						
E3	The extent to which Climate-Smart Agriculture aspects are considered in evaluating and assessing projects.						
E4	The extend to which Climate-Smart Agriculture aspects are assessed when evaluating service learning programmes.						
	C4 TOTAL						
C5	PRACTICAL CURRICULUM CONTENT AND RESEARCH						
		LEVEL					
		0	1	2	3	4	5
F1	The extent to which the department (staff and students) are involved in research in the area of Climate-Smart Agriculture.						
F2	The extent to which the department or individual pursuit solutions for the climate change challenges and vulnerability within local community and context by applying Climate-Smart Agriculture practical techniques.						
F3	The extent to which the department within the study programme is collaborating with other research organisations to pursuit of solution to Climate-Smart Agriculture problems and adaptability.						
F4	The extent to which aspects of Climate-Smart Agriculture are integrated within the practical projects and teaching.						

		LEVEL					
		0	1	2	3	4	5
F5	The extent of the practical application of Climate-Smart Agriculture competencies in student practical sessions.						
F6	The extent to which bursaries for studying Food Security, conservation natural resource and water harvesting are granted.						
F7	Using practical methods to practice Climate-Smart Agriculture in farming and other activities on campus.						
	C5 TOTAL						

C6	**COMMUNITY ENGAGEMENT**						
		LEVEL					
		0	1	2	3	4	5
G1	Extend of community engagement (staff and students) are involved in community engagement in the area of food security and rural development utilising the Climate-Smart Agriculture approach						
G2	Level of commitment of the college resources to Climate-Smart Agriculture projects in the community.						
G3	The degree to which local agriculture issues and challenges that can benefit from the application and innovation of Climate-Smart Agriculture form part of the reviewer or the department's community engagement.						
G4	The extent to which the department or individual reviewer collaborates with other stakeholders in addressing the household and small-scale farmers' climate change challenges.						
G5	The extent to which aspects of Climate-Smart Agriculture is used in the selection/execution of community engagement projects.						
	C6 TOTAL						

C7	CLIMATE-SMART AGRICULTURE INTEGRATION WITHIN THE FORMAL CURRICULUM						
		LEVEL					
		0	1	2	3	4	5
H1	The degree to which issues and challenges surrounding the sustainable increase of agriculture productivity and income forms part of the teaching programme.						
H2	The degree to which issues and challenges surrounding the adaptation and building resilience to climate change forms part of the teaching programme.						
H3	The degree to which issues and challenges surrounding the reduction of greenhouse gas emission by the agriculture industry forms part of the teaching programme.						
H4	The degree to which issues and challenges surrounding the food insecurity and small-scale farming forms part of the teaching programme.						
H5	The extent to which the program is relevant to climate change challenges that the farmers and extension officers are facing						
H6	The degree to which interdisciplinary education forms a component of the curriculum e.g. linking extension education, food security and climate change.						
	C7 TOTAL						

SECTION B

CURRICULUM CONTENT OUTLINE OF TOPICS RELATED TO CLIMATE-SMART AGRICULTURE	Level					
	None (0)	Unsatisfactory(1)	Needs development (2)	Adequately (3)	Meets requirements(4)	Exceed requirements(5)
B1 ANIMAL PRODUCTION						
TA1 Sustainable livestock management and pasture management						
TA2 Indigenous knowledge						
TA3 Techniques to capacitate livestock farmers to enhance resilience towards Climate change effects such as increase in pathogens and increase in variations of temperature.						
TA4 Adaptation to Climate Change problems and challenges effecting livestock farming.						
TA5 Reducing Carbon footprint of livestock farming.						
TA6 Methods to increase nutrition quality that will increase reproduction efficiency. Protect against diseases and reduce Greenhouse gas emissions.						
B1 TOTAL						
B2 CROP PRODUCTION						
TC1 The benefits of mixed farming.						
TC2 Sustainable crop management.						
TC3 Indigenous knowledge inclusion						
TC4 Resilience to Climate Change						
TC5 Adaptation to Climate Change problems and challenges						
TC6 Reducing Carbon footprint of crop production						

		Level					
		0	1	2	3	4	5
TC7	Methods to increase yield while sustaining natural resources and ecosystems.						
TC8	Methods to reduce agriculture expansion by intensification on already established cultivated land.						
	B2 TOTAL						
B3 NATURAL RESOURCES – WATER							
TW1	Sustainable Water management						
TW2	Indigenous knowledge on sustainable water management						
TW3	Integration of watering system and fish farming						
TW4	Monitoring, improving and maintaining water quality of water resources						
TW5	Water Harvesting techniques (Adaptation and resilience practices to save and manage water resources)						
TW6	Hydroponics						
	B3 TOTAL						
4 NATURAL RESOURCES – SOIL							
TS1	Adaptation and resilience practices to improve quality of soil and decrease erosion.						
TS2	Indigenous knowledge and practices to improve quality of soil						
TS3	Sustainable management of soil quality while increasing yield and productivity of livestock and crop production.						
TS4	Reducing the Carbon footprint.						
TS5	The sustainable increase in nutrient cycle.						
TS6	Water saving irrigation techniques						
	B4 TOTAL						

		Level					
		0	1	2	3	4	5
B5 HORTICULTURE							
TH1	Adaptation and resilience to climate change						
TH2	Indigenous knowledge and application of alternative farming techniques.						
TH3	Reducing Carbon footprint						
TH4	Sustainable increase in productivity and incomes in a sustainable way						
	B5 TOTAL						
B6 AQUA AGRICULTURE							
FH1	Adaptation and resilience						
FH2	Indigenous knowledge and alternative farming techniques.						
FH3	Reducing Carbon footprint						
FH3	Sustainable increase in productivity and incomes in sustainable way.						
	B6 TOTAL						
B7 – NATURAL RESOURCES - RENEWABLE ENERGY							
RE1	Solar power						
RE2	Bio-technology						
RE3	Biogas						
	B7 TOTAL						

SECTION C						
Climate-Smart Innovation – Management and institutional policies	Level					
	None (0)	Unsatisfactory (1)	Needs development (2)	Adequately(3)	Meets requirements (4)	Exceed requirements (5)
P1 — CURRICULUM OUTLINE OF THE NATIONAL DIPLOMA						
I1 — The extent that issues and challenges surrounding the sustainable increase of agriculture productivity form part of your teaching programme.						
I2 — The extent that challenges surrounding adaptation and building resilience to climate change is covered within the institute's teaching programme?						
I3 — The extent that the challenges relating to greenhouse gas emission is included in the educational programme?						
I4 — The extent to which food security and homestead farming are covered in the curriculum.						
I5 — The extent to which the curriculum is relevant to the Climate-Smart Agriculture responsive challenges that farmers and extension officers are facing in South Africa.						
I6 — The extent to which interdisciplinary education forms a component of the curriculum e.g. linking extension education, food security and climate change.						
P1 TOTAL						

P2	OPERATIONS AND MANAGEMENT							
		Level						
		0	1	2	3	4	5	
O1	The degree of waste reduction practices on the campus.							
O2	The extent of recycling practices on the campus.							
O3	The extent to which practices to reduce greenhouse gas emissions are implemented on campus.							
O4	The extent to which energy conservation practices are implemented on campus.							
O5	The extent of Climate-Smart Agriculture awareness on the campus.							
O6	The extent that water saving practices are implemented on campus.							
O7	The extent to which rain water harvesting and conservation practices are implementation on campus.							
	P2 TOTAL							
P3	STUDENT CLIMATE-SMART RESPONSIVENESS & PARTICIPATION							
S1	Is there a student climate and environmental organisation or group on campus?							
S2	Does students have access to career counselling that focusses on work opportunities related to climate change and agriculture sustainability?							
S3	Is there sustainable and environmental practices practiced within the residence or dormitories by students (e.g. recycling, water conservation and waste reduction)?							
S4	Is there a community garden programme that students are involved in?							
S5	Are students involved in practical programmes that promote food security, homestead gardening and entrepreneurship.							
S6	Does student assessment projects allow for the practical application of Climate-Smart Agriculture concepts?							

		Level					
		0	1	2	3	4	5
S7	Does the college have a Climate-Smart Agriculture responsive awareness programme that promotes awareness of climate change, food security and sustainable agriculture?						
	P3 TOTAL						
P4	**POLICIES & WRITTEN STATEMENTS**						
PS1	The extent to which the province's policies related to agriculture reflects the educational engagement with Climate-Smart Agriculture and climate responsiveness.						
PS2	The extend which national and global Climate Change issues inform decision making processes in the institutes policy and structure.						
PS3	The level of support that your College / Agriculture Training Institute receives for the integration of Climate-Smart Agriculture and climate responsiveness aspects into the Diploma.						
PS4	The level of integration of Climate-Smart Agriculture concepts such as sustainability into the existing institutional policies.						
PS5	The level of integration of Climate Change and other Climate-Smart Agriculture concepts into the institutes vision and mission statement.						
PS6	Level of implementation of policies related to Climate-Smart Agriculture concepts.						
PS7	The level of future consideration to improve the integration of Climate-Smart Agriculture concepts in the next policy review cycle.						
	P4 TOTAL						

Sore analysis for Section A:				
Indicator	Topic	Score	Total Score	% Climate-Smart responsive
C1	Staff expertise and innovation.		/20	
C2	Development of Climate-Smart Agriculture awareness competencies among students.		/80	
C3	Climate-Smart Agriculture general topics		/45	
C4	Examination and assessment of Climate-Smart Agriculture Topics		/20	
C5	Practical curriculum content and research		/35	
C6	Community engagement		/25	
C7	Climate-Smart Agriculture integration within the formal curriculum		/30	
Total Climate-Smart responsiveness for Section A		*(%C1+%C2+%C3+%C4 +%C5+%C6+%C7) ÷ 7[3]*		

Score analysis for Section B: Curriculum Content outline of topics related to Climate-Smart Agriculture				
Indicator	Topic	Score	Total Score	% Climate-Smart responsive
B1	General Topic		/30	
B2	Animal Production		/30	
B3	Crop Production		/40	
B4	Natural Resources – Water		/30	
B5	Natural Resources – Soil		/30	
B6	Horticulture		/20	
B7	Aqua Agriculture		/20	
B8	Natural Resources – Renewable Energy		/15	
Total Climate-Smart responsiveness for Section A	*(%B1+%B2+%B3+%B4 +%B5+%B6+%B7+B8) ÷ 8*[4]			

Score analysis for Section C: Climate-Smart Innovation Tool - Management				
Indicator	Topic	Score	Total Score	% Climate-Smart responsive
P1	Curriculum outline and National Diploma		/30	
P2	Operations and Management		/35	
P3	Student Climate-Smart responsiveness and participation		/35	
P4	Policies and written statements		/35	
Total Climate-Smart responsiveness for Section C	*(%P1+%P2+%P3+%P4 +%P5+%P6+%P7) ÷ 4*[5]			

[4] Formula to calculate the total Climate-Smart responsiveness for Section B
[5] Formula to calculate the total Climate-Smart responsiveness for Section C

Interpreting the score analysis

The calculated score rating can be interpreted easily according to the Rating Table below.

Rating		
0%	None	There is no evidence on the indicator
≤ 20%	Unsatisfactory	The indicator does not meet the necessary requirements.
≤ 40%	Needs Development	Indicates performance, but improvement is required.
≤ 60%	Adequately	Evidence show adequate Climate-Smart responsiveness
≤ 80%	Meets requirements	Evidence indicates that the Climate-Smart responsive standard has been met.
≤ 100%	Exceed requirements	Evidence indicate that expectations has been exceeded and Climate-Smart responsiveness has been successfully attained.

Climate-Smart Innovation Tool – Section A:

Less than 60% for any of the Cluster Indicators of Curriculum, teaching approach and student-community engagement requires development. Helpful resources to increase rating scores towards climate responsiveness in Section A include:

Helpful resources include:

- The Climate-Smart Agriculture Manual for Education in Zimbabwe (Ngara, 2017) available at https://www.ctc-n.org/system/files/dossier/3b/climate-smart_agriculture_manual_final.pdf
- The Climate-Smart Agriculture programme by FANPRA available at https://www.fanrpan.org/archive/documents/d01603/climate_smart_agriculture_programme.pdf
- Climate-Smart Agriculture Sourcebook (FAO, 2013) available at https://www.westerncape.gov.za/text/2015/march/climate-smart_agriculture_forestry_and_fisheries_csa.pdf
- Southern African Regional Universities (SARUA) (2014). *Climate Change Counts. Strengthening university contributions to climate compatible development*. Volume 1: Knowledge Co-Production Framework. Retrieved July 7, 2016 from www.sarua.org

The table below list Section A's scoring sheet outlining the cluster indicators and recommendations towards Climate-Smart responsive curriculum.

SECTION A: Curriculum, teaching approach and student-community engagements	
Score below 60% on any of the Cluster Indicators shows that development and innovation in the area is required.	
C1 Staff expertise and innovation	This section focuses on the reviewer's views on • The reviewers's or the department's level of expertise on Climate-Smart responsive concepts. • The relevance of Climate-Smart Agriculture concepts to the curriculum. • The integration of Climate-Smart Agriculture concepts into curriculum • Further training for lecturers • Type of further training for lecturers A low score rating for Indicator C1 shows that focus on staff developments should be a priority.
C2 Development of Climate-Smart Agriculture awareness competencies among students	This section reviews to what extent the teaching approach contributes to the development of the Climate-Smart responsive competencies and skills among students. This cluster addresses the development of critical thinking skills, informed decision making, anticipatory skills, respect for others, system thinking competences, normative competence and socially engage practical competence.. Rating score below 60% indicates that curriculum should focus more on the development of sound competencies and skills amongst students that are essential to prepare graduates to engage in adaptation, resilience and Climate-Smart responsive practices
C3 Climate-Smart Agriculture general topics	This section reviews the integration of Climate-Smart responsive content and principles within the curriculum. General Topics include Climate Change, food security, Rural health development, Entrepreneur skills, Climate adaptation and resilience, Rainwater Harvesting and Conservation, Sustainable Agriculture, Organic farming and Renewable energy. A low score indicates that more Climate-Smart Agriculture general topics need to be integrated into the curriculum.
C4 Examination (assessment) of Climate-Smart Agriculture topics	Rating score below 60% for C4 indicates that Climate-Smart responsive concepts are not practically or theoretically adequately assessed within curriculum under reviewed.

C5 **Practical curriculum content and research**	This section evaluates the extend of the integration of Climate-Smart responsiveness within the practical projects and assignments. It establishes if specific Climate-Smart practical competencies are integrated within the practical projects. Low scores in C5 indicates that more emphasis on practical training should be prioritised.
C6 Community engagement	This section reviews the staff and students within curriculum involvement in community initiatives that addresses Climate-Smart responsive issues and focuses on green job creation, poverty eradication and food security. Scores below 60% indicates that students and staff needs to realign with community and development community driven climate responsive projects.
C7 **Climate-Smart Agriculture integration within the formal curriculum**	This section explores the integration of Climate-smart responsive topics into the curriculum. Climate-smart Agriculture topics that are recommended for integration into the agriculture curricula include • Climate Change • Principles of Climate-smart agriculture • Rural health creation • Food security • Sustainable agricultural practices • Renewable energy and energy management • Agro-forestry • Soil and water management' • Sustainable irrigation systems • Sustainable crop and livestock production • Rain water harvesting and conservation (DAF 2008; DAFF 2010; FAO 2013; Ikehi Ifeanyieze & Ugwuoke 2014). Score rating below 60% for Cluster 7 indicates that the above recommended topics need to be integrated within the curriculum in review.

Climate-Smart Innovation Tool – Section B

Section B focused mainly on Climate-Smart Agriculture topics within the agricultural curriculum, but also on specific fields of expertise including Animal Production, Crop/Plant Production, Natural Resources and Horticulture. If the curriculum or specific area under review scored less than 60% the curriculum or subject needs to be revised and updated to increase it's climate responsivess. Resources to assist in the development of a Climate-Smart responsive curriculum:

Websites:
- CCAFS has a comprehensive website with CSA development plans, resource library, Case study reports and other assessment tools. https://csa.guide/csa/practices#article-9
- Food and Agriculture Organization of the United Nations on Climate-Smart Agriculture: http://www.fao.org/climate-smart-agriculture/en/
- Climate Change, Agriculture and Food Security (CCAFS) on Climate-Smart Technologies and Practices: https://ccafs.cgiar.org/flagships/climate-smart-technologies-and-practices
- FAO (2017) FAO Success Stories on Climate-Smart Agriculture. Available at: http://www.fao.org/3/a-i3817e.pdf
- The World Bank on Climate-Smart Agriculture http://www.worldbank.org/en/topic/climate-smart-agriculture

The table below outlines the cluster indicators of Section B including the suggested Climate-Smart related topics to be include in the agricultural curriculum.

SECTION B: Curriculum content outline of topics related to Climate-Smart Agriculture within the Diploma	
B1 Animal Production	- Sustainable livestock management and pasture management - Indigenous knowledge - Techniques to capacitate livestock farmers to enhance resilience towards Climate change effects such as increase in pathogens and increase in variations of temperature - Adaptation to Climate Change problems and challenges affecting livestock farming - Reducing Carbon footprint of livestock farming. - Methods to increase nutrition quality that will increase reproduction efficiency. Protect against diseases and reduce Greenhouse gas emissions
B2 Crop / Plant Production	- The benefits of mixed farming - Sustainable crop management - Indigenous knowledge inclusion - Resilience to Climate Change - Adaptation to Climate Change problems and challenges - Reducing Carbon footprint of crop production - Methods to increase yield while sustaining natural resources and ecosystems - Methods to reduce agriculture expansion by intensification on already established cultivated land.

B3 Natural Resources – Water	o Sustainable water management o Indigenous knowledge on sustainable water management o Integration of watering system and fish farming o Monitoring, improving and maintaining water quality of water resources o Water harvesting techniques (Adaptation and resilience practices to save and manage water resources) o Hydroponics
B4 Natural Resources - Soil	o Adaptation and resilience practices to improve quality of soil and decrease erosion o Indigenous knowledge and practices to improve quality of soil o Sustainable management of soil quality while increasing yield and productivity of livestock and crop production o Reducing carbon footprint o The sustainable increase in nutrient cycle o Water harvesting techniques
B5 Horticulture	o Adaptation and resilience to climate change o Indigenous knowledge and alternative farming techniques o Reducing carbon footprint o Sustainable increase in productivity and incomes in a sustainable way
C6 – Natural Resources – Renewable energy	o Solar power o Bio-technology o Biogas

Climate-Smart Innovation Tool – Section C

Section C reviews the level of integration of Climate-Smart Agriculture concepts and policies into the existing Management and institutional policies. Less than 60% indicates that the management and institutional practices require some integration of Climate-Smart responsiveness. The table below shows the Scoring sheet outlining the indicators and discussion for Climate-Smart Innovation Tool: Section C – Management and institutional policies

P1 **Curriculum Outline of the National Diploma**	This section of the review identifies the challenges and possibilities for change and transformation towards a more Climate-Smart responsive curriculum. If low scores are obtained in this section more general Climate-Smart Agriculture concepts should be integrated into the agriculture curriculum under review.
P2 **Operations and management**	The score rating of Operations and managment enables the reviewer to identify the institutes performance in relation to Climate-Smart responsiveness. Issues that needs to be focused on and incorporated into the curriculum if low scores are obtained in this cluster include waste reduction practices, recycling, reduction of greenhouse gas emissions, energy conservation practices and water conservation practices. The introduction of an awareness of Climate-Smart Agriculture and sustainable agriculture programs is highly recommended
P3 **Student Climate-Smart Agriculture responsiveness & participation**	This section ranks the student involvement in voluntary community engage activities related to Climate-Smart Agriculture responsive concepts such as food security, homestead-gardening community projects and water conservation projects. This cluster also includes indicators for student orientation programs, career counselling and student political and governance relating to Climate-Smart responsiveness. To summarise, if the score rating was not satisfactory emphasis on the integration of Climate-Smart Agriculture into student-community activities while also providing support for students to develop should be initiated.
P4 **Policies & written statements**	A score rating less than 60% indicates that the policies and written statements needs to be revised and more aligned with Climate-Smart Agriculture concepts, climate responsiveness and the National Agriculture Strategic plan for Agriculture Training Institutes.

Resources for Climate-Smart responsive policy and management development include:

- Mnkeni, P. & Mutengwa, C. (2014). *A comprehensive scoping and assessment study of CSA policies in South Africa.* Report 30 April 2014. Food, Agriculture and Natural Resource Policy Analysis Network (FANRPAN). Available at https://www.fanrpan.org/archive/documents/d01761/South%20Africa_Comprehensive_Scoping_Assessment_of_CSA_Policies.pdf
- Food, Agriculture & Natural Resources Policy Analysis Network (FANRPAN) 2017. *Policies and practices for Climate-Smart Agriculture in Sub0Saharan Africa. Available at https://www.fanrpan.org/sites/default/files/publications/CSA%20Synthesis%20Report%20FINAL%2012%20August%2017.pdf*
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Online Climate-Smart Innovation Sub-tool links

Climate-Smart Innovation Tool – Lecturer	https://www.onlineassessmenttool.com/my-dashboard/my-assessments/assessment-dashboard/item3253?quizId=55808
Climate-Smart Innovation Tool – Plant Production	https://www.onlineassessmenttool.com/my-dashboard/my-assessments/assessment-dashboard/item3253?quizId=82135
Climate-Smart Innovation Tool – Irrigation	https://www.onlineassessmenttool.com/my-dashboard/my-assessments/assessment-dashboard/item3253?quizId=82119
Climate-Smart Innovation Tool – Animal Production	https://www.onlineassessmenttool.com/my-dashboard/my-assessments/assessment-dashboard/item3253?quizId=55477
Climate-Smart Innovation Tool – Management	https://www.onlineassessmenttool.com/my-dashboard/my-assessments/assessment-dashboard/item3253?quizId=55035

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