NATIONAL CLIMATE CHANGE ACTION PLAN

REPUBLIC OF KENYA

Knowledge Management and Capacity Development

Chapter 5.0: Integrating Climate Change in Education System

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Abbreviations and Acronyms

CCS	Climate Change Secretariat
EPA	Environmental Protection Agency
GoK	Government of Kenya
KIE	Kenya Institute of Education
MEAs	Millennium Ecosystem Assessment in Human Impacts
MoE	Ministry of Education
MTP	Medium Term Plan
NCCRS	National Climate Change Response Strategy
NGO's	Non Governmental Organisations
NITA	National Industrial Training Authority
TIVET	Technical Industrial Vocational Entrepreneurship Training

5.0 INTEGRATING CLIMATE CHANGE INTO THE EDUCATION SYSTEM

5.1 Climate Change and Education

The Government of Kenya (GoK) has, since independence in 1963, developed a number of education policies geared towards provision of quality, targeted and complete education. The policies are captured in reports developed by various commissions appointed by successive governments to address emerging issues that have needed to be integrated into the education system. The first such commission, known as the Kenya Education Commission, was chaired by Prof. Simeon H. Ominde and it started work in 1963. Its general mandate was to survey existing education resources in Kenya and advice the government on the formulation and implementation of national policies of education. Its main recommendation was that the education system inherited from the colonial government be reformed to make it responsive to the needs of independent Kenya. Climate change was not an issue of concern at that time.

The Ominde Commission was followed by the National Committee on Educational Objectives and Policies which was chaired by Mr. Peter J. Gachathi in 1976. Its mandate was to redefine the education policies and objectives, giving special attention to national unity, economic and social cultural aspirations of Kenya. Its recommendations revolved around objectives, structure and content of the education system that would provide the government with the framework of introducing far-reaching changes in education. The Gachathi report too did not feature climate change.

The next commission was established in 1982 and mandated to explore the establishment of a second university in Kenya. It was chaired by Prof. C.B. MacKay. It recommended, among other things: the establishment of a university which would be technically oriented; the establishment of the 8.4.4 system of education; establishment of the commission of higher learning; and expansion of other post-secondary training institutions. The need for climate change integration into education system was still not addressed by this commission.

A subsequent commission was constituted in 1988 known as The Presidential Working Party on Education and Manpower Training for the Next Decade and Beyond. This was chaired by Mr. James Mwangi Kamunge. Its mandate was to review the whole education philosophy, policies and objectives to ensure that they were in consonance with the changing social, cultural, economic and political demands of Kenya. The Kamunge Commission's main recommendations constituted proposals and strategies for financing and maintaining quality and relevant education for the next decade and beyond. As in the previous reports from the commissions cited above, the issue of climate change did not feature in its report.

In 1999, a Commission of Inquiry into the Education System in Kenya was formed and chaired Dr. Davy Koech. Its main mandate was to analyse the education system and focus on a number of aspects including: training for national development; challenges of education and training for the 21st century; planning, management and financing of education and training; content and structure of education; and the implementation process. The Koech Commission recommended strategies to be addressed to resolve emerging issues and challenges in education. But like the previous commissions, climate change issues were still not addressed in its report.

In 2005 the Government of Kenya developed Sessional Paper No.1 of 2005 on Policy Framework for Education, Training and Research. It spelt out the education policy towards the realization of the national economic blue print. The main issues addressed here included: the macroeconomic context of education, philosophy, vision, goals and objectives of education and

training; expanding access, equity and improving quality, management and planning of education and training; human resource management, information and communication technology; research; and development, financing and partnership in education. It too did not feature climate change.

In 2011, a Task Force on Realignment of the Education Sector to the Constitution of Kenya 2010 was appointed by the government. Its mandate was to streamline the education sector to be in tandem with the Constitution of Kenya (2010). Its recommendations included, reviewing the structure of the curriculum of the Kenyan education system, the national assessment system and the national qualification framework in Kenya; instructional management and governance of education and training; mentoring and moulding to nurture national values, research and development; provision of open and distance learning; public-private partnership and; regulatory and legal frameworks. The task force report, just like other reports before, did not explicitly address climate change issues.

From the foregoing, it is evident that climate change is not formally acknowledged in Kenya's education policies at primary, secondary and tertiary levels. The National Climate Change Response Strategy (NCCRS) acknowledges this reality and notes, "A major concern in Kenya is the lack of adequate climate change information, knowledge and long-period data to researchers, planners, policy makers and the general public on climate change impacts, adaptation and mitigation measures." Among the measures it recommends include curricular review to integrate climate change into the Kenya education system. The development of this action plan for integrating climate change into the education system was informed by this need.

5.2 Methodology

Two main approaches were used in order to establish the extent to which climate change has been integrated into Kenya's education system if at all namely: content analysis and interviews. Content analysis involved examination of the relevant education policy documents since independence. Also analysed were present curricular of primary, secondary and tertiary levels of education all of which are developed by the Kenya Institute of Education (KIE). In the case of universities in-depth interviews were held with heads of departments of relevant sections where climate change courses might be taught. A purposeful sample of universities was used, mainly because there was a substantial limitation of both time and resources for completing the exercise.

5.2.1 Analysis of Policy Documents

The analysis process involved the analysis of the main policy documents related to education with the aim of finding out the extent to which climate change issues have been addressed throughout the evolution of Kenya's education system. This analysis was undertaken through a desk review of main education policy documents since independence.

5.2.2 Content Analysis of Curricula

This involved reviewing appropriate curricula and syllabi starting from primary to tertiary levels excepting universities. The content of curricula of post-secondary institutions, mainly Teacher Education and Technical Industrial Vocational and Entrepreneurship Training (TIVET) institutions was similarly analysed.

5.2.3 In-Depth Interviews

It is notable that universities use different curricular and course outlines and as such the consultant undertook in depth one-on-one interviews with lecturers and heads of departments likely to offer climate courses at selected universities.

5.3 Analysis of Curricular in Relation to Climate Change Issues

All the subjects' content, at primary school, secondary school, and teacher education levels were analysed. However, TIVET education and training programmes were stratified into four strata namely: Technical and Engineering; Industrial and Applied Science; Vocational; Business and Hospitality Management. In each stratum, three curricular were randomly sampled and content analysis undertaken.

In addition to content analysis of course outlines of selected universities, a total of six key education experts one from each of the following universities; Catholic University, Mount Kenya University, Kenya Polytechnic University College, Kenyatta University and two from the University of Nairobi were interviewed on issues of climate change in relation to:

(i) Knowledge, skills and attitudes that ought to be taught in tertiary institutions and universities to address issues of climate change

(ii) Subjects that could carry messages about weather patterns, in their institutions' curricular

(iii) Level of education at which climate change should be taught in Kenya's Education system,

(iv) Online teaching/learning resources on climate change provided by or available to a specific institution

(v) Presence of partnerships with other institutions /organisations that deal with climate change issues for learning purposes

(vi) The most effective approach for integrating climate change in the education system in Kenya

5.4 Findings Based on Interviews of Key Educationists

Since universities use different curricular, in-depth one-on-one interviews with lecturers and heads of departments at universities that were considered likely to offer climate courses at selected universities was done. The interviews revealed that:

(a) Knowledge to address issues on climate change should be in themes related to agriculture, environment, environmental resources, geological and natural resources management

(b) The interviewees indicated that climate change could be infused in agribusiness, agro-forestry, environmental sustainability, development studies and natural resources management

(c) Other courses into which climate change could be integrated included: conservation and water management

(d) The majority (50 %) of respondents suggested environmental science, and environmental studies should be the subjects in which climate change should be taught; while only 16 % suggested geography, meteorology, human health, agro-forestry and soil science

(e) About (33 %) of the respondents suggested that climate change be taught as a stand-alone subject, while 17 % suggested environmental protection, waste management and disaster preparedness as the specific subjects which should include climate change as a topic of

study

(f) All (100 %) respondents suggested that climate change should be taught at all levels of education in the Kenya's education system

(g) According to the respondents, there are no online teaching/learning resources on climate change provided by their institutions. They also pointed out that there were no teaching/learning resources on climate change from their institutions accessible online

(h) Three approaches were identified as the most effective methods for integrating climate change in the education system in Kenya. These were: integrating new courses at tertiary institutions; introducing compulsory common units at the university and; introducing in post school institutions climate change as stand-alone courses

(i) Another notable suggestion was revising the existing curricular in learning institutions to include content to address climate change

Table 5.1: Summary Analysis of Possible Entry Points for Integrating Climate Change in the Education System

National Goal of Education No.8	Levels of Educations	General Objectives	Specific Objectives	Env.	%	Issues.	%	Total
Education in Kenya should: Promote Positive Attitudes Towards Health and Environmental Protections	Primary	19	5,387	15	0.27	4	0.07	19 (0.35)
	Primary Teacher	12	1,710	9	0.52	10	0.58	19 (1.11)
	Secondary	15	4,183	18	0.43	4	0.09	22 (0.53)
	Secondary Teacher		5,793	21	0.36	17	0.29	38 (0.66)
	TIVET		32,148	94	0.29	43	0.13	137 (0.43)
	Tertiary		6,303	30	0.46			0.46
	Universities	408		112	27.5			27.5

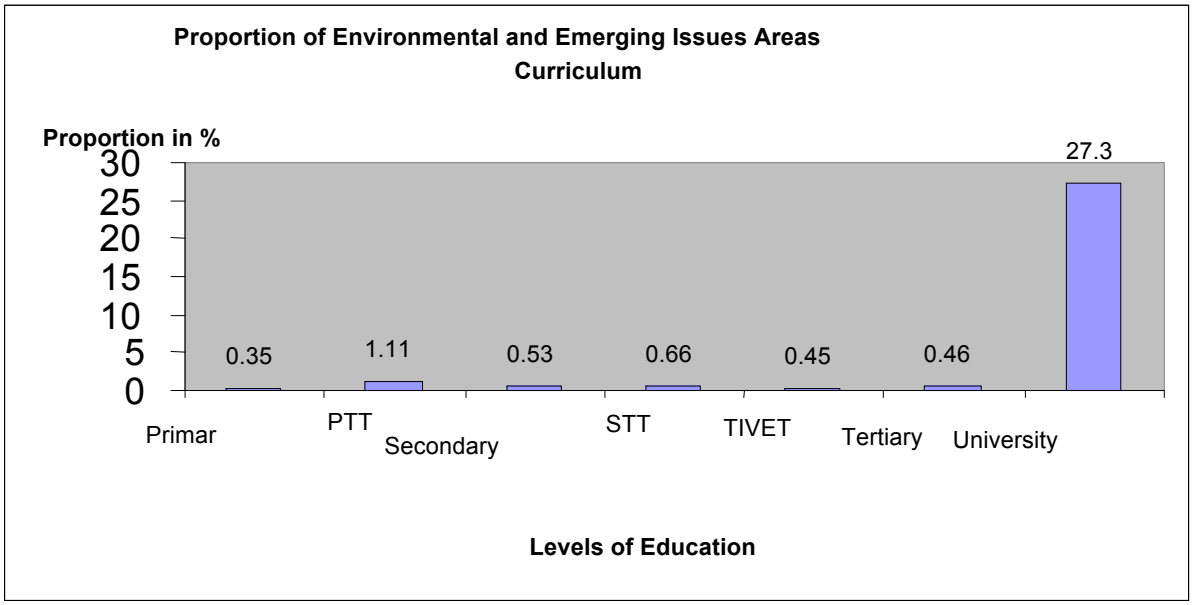

Figure 5.1: Summary of Proportions of Environmental and Emerging Issues in Curricular as Possible Entry Points to Climate Change in Education

Key

Primary	*Primary schools*
Secondary	*Secondary schools*
PTT	*Primary Teachers' Training Curriculum*
STT	*Secondary Teachers' Training Curriculum*
TIVET	*Technical, Industrial, Vocational, and Entrepreneurship Training Curricular*
Tertiary	*Other Middle Level Training Curricular Apart From PTT, STT, TIVET and Universities*
Env	*Environment*

5.4.1 More Findings

The various curricular at primary, secondary and tertiary level excluding universities were analysed in relation to the areas that comfortably render themselves for infusion of climate change content with the following findings as shown in Fig. 5.1:

(a) ***Primary school curriculum****:* Only 0.36% of the primary school curriculum addresses directly or indirectly issues related to climate change and would therefore be suitable carrier content for infusion and integration of climate change.

(b) ***Secondary School Curriculum:*** Only 0.53% of the secondary school curriculum addresses directly or indirectly issues related to climate change.

(c) ***Primary Teacher Curriculum:*** Only 1.11% of the primary teacher training curriculum addresses directly or indirectly issues related to climate change.

(d) ***Secondary Teacher Education Curriculum:*** Only 0.66% of the secondary teacher education curriculum addresses directly or indirectly issues related to climate change.

(e) ***TIVET curriculum:*** For TIVET institutions, analysis was performed based on a sample of twelve out of more than 80 courses that are offered. The twelve sampled courses were catering and accommodation, management, electrical and electronic engineering, applied biology, tourism management, science laboratory technology, chemical engineering, sales and marketing, human resource management, tour guiding management, food science and processing technology, petroleum management and; mechanical engineering. It was found that only 0.45% of the TIVET curriculum addresses directly or indirectly issues related to climate change. Similarly analysis of other tertiary institutions revealed that only 0.46%, of their curricula address directly or indirectly issues related to climate change.

5.4.2 University Courses

Data analysis revealed that only 27.3% of the university curriculum addresses directly or indirectly issues related to climate change. University course outlines were analysed in relation to areas that comfortably render themselves suitable as carrier content for infusion and integration of climate change. The specific courses are as follows:

(i) Kenyatta University Courses: environmental studies (community development), environmental studies (science), environmental planning and management, environmental studies (resources conservation), environmental education, climate and environmental sustainability

(ii) Moi University Courses: environmental studies (science)

(iii) University of Nairobi Courses: meteorology (science), environmental conservation and natural resources management, environmental chemistry, climate change (science), agro-meteorology

(iv) Egerton University Courses: environmental science

(v) Kenya Polytechnic University College Courses: earth, environmental science and technology

(vi) Jomo Kenyatta University of Agriculture and Technology Courses: There is no climate change course offered at the University, but a few climate change related courses are offered such as environmental information systems and environmental legislation and management.

(vii) World Meteorological Organisation Regional Training Centre and the Institute of Meteorological Training and Research (University of Nairobi): There were two courses with bias in climate change namely: applied climatology and; climate change and sustainable development

(viii) African Nazarene University courses: There is a course named: dry land natural resource management

(ix) Maseno University courses: There are two courses namely: hydrology and water resources management and climate change and development

(x) Masinde Muliro University courses: There is disaster preparedness and environmental technology

5.5 Conclusions, Recommendations and Intervention Strategies

5.5.1 Conclusions

It is evident that climate change absent in the curricula at primary, secondary, and teacher training education. In TIVET and tertiary institutions programmes, climate change coverage is wanting. At the universities, climate change coverage is significant but inadequate. University programmes have the highest proportion of courses that present possible entry points for climate change content, compared to other lower levels of the Kenyan education system.

5.5.2 Recommendations

(a) Primary level education: Kenyan primary schools already offer courses which introduce children to nature study and agriculture. Some schools have agriculture clubs with some in rural areas, even having school gardens and rearing livestock. At this level, children ought to be taught the basic principles of adaptation to climate change through these and other subjects. It is recommended that the formulators of the primary school curriculum make a conscious effort to introduce climate change and its impact into the primary school subject matter by integrating it into all subjects to the extent possible.

(b) Secondary schools: Kenya having developed an Action Plan to set on a low carbon development pathway, students at secondary school will need to be equipped with skills to support a future climate resilient economy. As has been recommended for primary schools; integrating climate change in secondary education should happen through the introduction of content that makes learners aware of the need to develop climate adaptation and mitigation capacities for the country. Courses touching on specific areas such as clean energy alternatives and reduction of deforestation should then be introduced incrementally at secondary school level.

(c) Post secondary vocational institutions: Kenya experiences a dearth of middle level technicians to support widespread adoption of technologies that will be required to support the country's aspirations towards a low carbon development pathway. For example, whereas it is desirable for Kenyans to adopt solar technology on a mass scale; supportive networks for installation and maintenance of solar power systems are not well established nationally. Furthermore, standards for such system are non-existent. The same can be said of other technologies such as geothermal and wind. There is therefore an opportunity to train technicians with these skills to support the widespread adoption of adaptation and mitigation practices needed to support the National Climate Change Action Plan (NCCAP).

(d) Universities: Climate change permeates all sectors of the economy. Because of that, climate change should be infused into the various professions taught at universities in Kenya. Civil engineers for example need learn how to design and develop structures that can withstand climate shocks; doctors need to be aware of the effects of climate change on human health, while architects should have the skills and training to design houses that need minimal energy to run and maintain. Teachers ought to be equipped with knowledge about climate change in order for them to be suited to teach a curriculum that integrates climate change across all subjects taught at schools in Kenya. Whereas it is already the case that climate change as a subject is now being taught at some Kenyan universities there will be need for institutions of higher learning to develop policies to ensure that all students trained there are familiar with climate change and its impact.

5.5.3 Intervention strategies

Based on the conclusions and the recommendations of this study, steps that need to be taken to integrate climate change into the formal education system are as follows:

(a) Development of curricular

(i) Develop curricula that integrate and infuse climate change issues in all levels of the education system namely:
- Early childhood education
- Primary school
- Secondary school
- Middle level colleges
- Universities for both undergraduate and post graduate courses

(ii) Introduce programmes to infuse and integrate climate change at TIVET and university levels of training.

(iii) Develop curricular support materials to address climate change issues in education institutions

(iv) Mass production and distribution of the various curricular and curricular support materials to the education institutions and communities

(v) Induct teachers/trainers/instructors/lecturers of the various education institutions on matters pertaining to climate change issues in the various curricula

(vi) Develop policy and put in place infrastructure for implementing the programme

(b) Establishment of Climate Change Related Institutions

There is need for concerted effort towards developing expertise in climate change. Some of the areas of interest include renewable energy sources such as geothermal, solar, wind power, biogas, hydro, gasohol and bio-fuels. These efforts can be achieved by infusing climate change content into the education system and establishment of climate change related institutions such as the proposed Kenya Energy Institute in the Energy Bill (2012) and the recently launched Climate Innovation Centre in Kenya.

Presently among other efforts, the Ministry of Energy in collaboration with The Kenya Renewable Energy Association is in the process of engaging National Industrial Training Authority (NITA) in the testing at proficiency level of solar energy technicians. The Ministry in collaboration with Kenya Biogas Programme are also in the process of engaging NITA in developing artisan biogas programmes for technicians.

5.6 How to Integrate the Climate Change in Curricular

The decision to integrate climate change into Kenya's education system would have to be formulated into a national policy. Once approved the subsequent stages will include; identification of climate change experts, curriculum design, climate change content development, curriculum support materials design and development, validation and approval of the curriculum, teacher preparation/orientation, piloting of the curriculum and then implementation of the curriculum on national scale. Integrating climate change into Kenya's education system is achievable and can be infused within the framework of the Medium Term Plan (MTP).

There are currently four education related draft bills that are targeted at re-aligning Kenya's

education system with the new governmental dispensation. These are: The Technical, Vocational and Entrepreneurship Training (TVET) Bill 2012, The Kenya Institute of Curriculum Development (KICD) Bill 2012, The Education Bill (2012), The Science and Technology Bill 2012 and Teachers' Service Commission (TSC) Bill 2012). A sessional paper has been prepared to guide the development of a policy framework for education and training titled *Reforming Education and Training in Kenya*. It is aimed at harmonizing and operationalizing all the above bills. Since there is still opportunity for stakeholders to make input in this process there is an opportunity to have these bills taking on board climate change as an issue of integration in the education system.

5.6.1 Conceptual Framework

In Kenya curriculum development for basic and tertiary institutions follows the model shown below. However, the model does not include what the universities follow but this is a general model that can be adopted by all interested learning institutions with little modification. The interlinked steps are as follows:

(i) Training Needs Assessment
(ii) Policy Formulation
(iii) Development of Curriculum
(iv) Development of Curriculum Support Materials
(v) Validation
(vi) Teacher/Trainers/Education Officers Preparation (Orientation/Induction)
(vii) Piloting
(viii) National Curriculum Implementation
(ix) Curriculum Monitoring, Evaluation and Feedback**.**

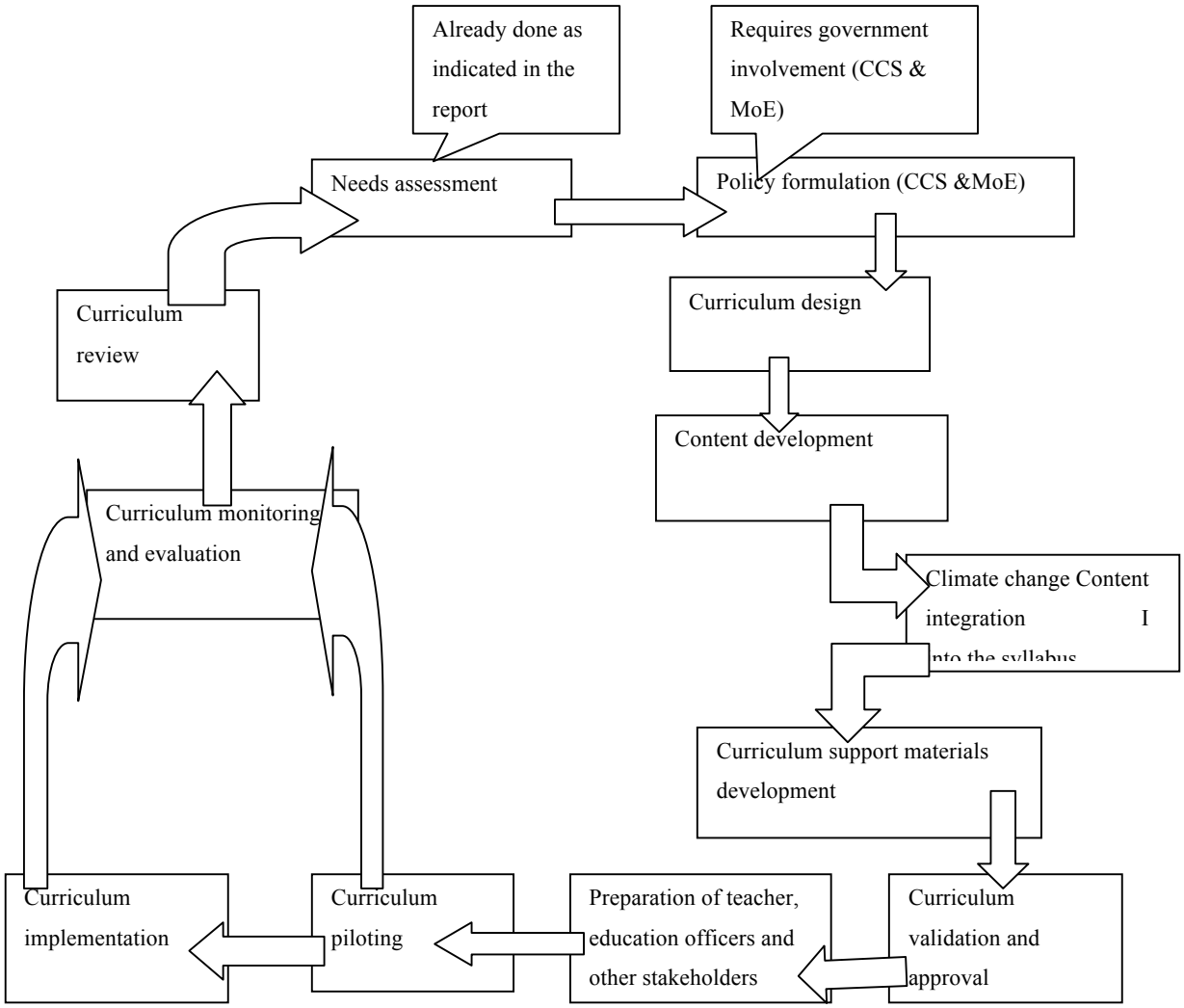

Figure 5.2: The Curriculum Development Process

(a) Training Needs Assessment

This is always carried out to identify the gaps that exist between education/ training, and the real world of operation. The findings in this report have indicated that there exist gaps in knowledge, skills and attitudes on matters of climate change in the curricular offered in the Kenyan education system.

(b) Policy Formulation

Based on the findings and the recommendations of the needs assessment, and guided by other existing government policies and findings, a policy guideline is formulated to guide the development of curriculum spelling out;

(i) General objectives of the programme
(ii) Specific objectives
(iii) Curriculum delivery methods
(iv) Evaluation methods

Such a policy guideline is a product of the curriculum proposing organisation and the ministry responsible for education and training. In this case CCS and MoE will formulate a policy to guide the inclusion of climate change knowledge in the curricular across all levels of the education system and training.

(c) Curriculum Development

This stage involves formulation of the objectives. It includes designing of the kind of product one expects. Objectives indicate the learner is expected to be able to do after going throughout the training process. They can be general or specific. Developing objectives is a major activity in curriculum development. This is then followed by selection of the content. Content here refers to the topics and sub-topics in a subject or course. The content is based in the objectives that have been formulated. In many cases the formulation of the objectives and the selection of the content go together. Some curriculum developers may want to think of the content and then the objectives that could be covered through that content. The caution one needs is that content may be meaningless unless the objectives of including that content are clear.

(d) Development of Curriculum Support Materials

Curriculum support materials include all that is needed to help the teacher/trainer and the learner to efficiently and effectively achieve the set objectives. Commonly used curriculum support materials include teachers/trainer's guide, learner's manual and other print and non print materials; all these make a complete package of the Curriculum. This will be especially important in teaching climate change curriculum because there are very few experts in the area.

(e) Validation

All curriculum and curriculum support materials require to be validated through an institution(s) that is mandated to do so. Curriculum validation facilitates in removing ambiguity and ensures standardisation, to allow for similar interpretation by various teachers/trainers and stakeholders. In the development of climate change, it will be important to present it for validation.

(f) Teacher/Trainers/Education Officers Preparation (Orientation and Induction)

The achievement of the national development goals (GoK, Vision 2030) highly depends on the capacity of the education system to support the Vision pillars. Human resource is the most important asset of any country. Climate change is a new phenomenon in the country, and hence most teachers and other trainers lack adequate capacity to implement the concepts and thus will require capacity building.

(g) Piloting

Curriculum piloting involves trying out curriculum and curriculum support materials in sampled schools and training institutions. In the pilot period, monitoring and evaluation is done. The data collected is used to make the necessary adjustments to the new and reviewed programmes before full national implementation. It will therefore be of importance to pilot the climate change curriculum in selected schools and other training institutions.

(h) National Curriculum Implementation

The ultimate objective of the curriculum development is national implementation. The ministry responsible in the matters of education and training gives the guidelines on how the curriculum is to be implemented. The phase- in- phase- out or full implementations are some of the strategies that may be applied. The policies guiding the development of climate change curriculum will dictate how this issue will be implemented in the national curricular.

(i) Curriculum Monitoring, Evaluation and Feedback

The objective of monitoring and evaluation of the curriculum, whether on pilot or on full implementation, is to find out whether the curriculum is being implemented as planned and if it is fulfilling the objectives for which it was designed. The feedback obtained is used to improve the curriculum and its implementation strategies. This activity is carried out by the organisation that developed the curriculum and other stakeholders. The findings of monitoring and evaluation on a fully implemented curriculum are used to initiate curriculum review on the immediate or in the long term. For climate change curriculum to have any impact, its implementation will require to be monitored up to the full cycle. There will be need for formative evaluation (regular continuous monitoring) and summative evaluation (final monitoring, when a group of learners have gone through the whole syllabus).

5.7 Implementation

Table 5.1 shows a suggested process of integrating climate change issues in the curriculum for basic and tertiary institutions. However, the universities need to come up with strategies to address the issues of climate change using the laid down mechanisms in their institutions in addressing emerging issues on climate change. It is important to note that learners graduating from basic education institutions require continuous learning and hence the need for climate change programmes in universities. Universities may introduce climate change as a new course, introduce compulsory units for all the learners or choose to integrate the climate change issues in the already existing curriculum.

Table 5.2: Implementation matrix

Strategy/ Activity	Objective(s)	Output(s)/ indicator (s)	Cost	Time (weeks)
Policy formulation	• Formulate a policy on the development, implementation and assessment and evaluation, of Climate Change curriculum	A national policy on Climate Change curriculum	Communication costs and other statutory requirements costs	Based on the existing government business and policies
Identification of experts(in Climate Change and education) in Climate Change	• Identify persons who are knowledgeable in matters of Climate Change , and have the expertise in curriculum development and curriculum implementation	A list of curriculum developers (experts) for all levels of education	Communication cost	1
Curriculum design for Climate Change	• Come up with the scope and sequence charts for various levels of education and training • Identify teaching methodologies for Climate Change • Identify teaching/learning resources for each content identified • Identify suitable assessment and evaluation methods	Climate change Curriculum design on identified levels of education and training	Experts upkeep, transport and their input allowance Stationary Secretarial services	2
Climate change Content development	• To develop the syllabus content based on the scope and sequence charts and the designs	Draft syllabus and regulations	Experts upkeep, transport and their input allowance Stationary Secretarial services	2

Climate change Curriculum support materials design	• To develop curriculum support materials	Designs for ; Teacher's guide Learner's manual Non print materials	Experts upkeep, transport and their input allowance Stationary Secretarial services	2
Curriculum support materials development	• To develop Climate Change content for the curriculum support materials • To illustrate Climate Change messages in the manuals • To edit the content of the support materials	Draft Teacher's guide Draft Learner's manual	Experts upkeep, transport and their input allowance Stationary Secretarial services	2
Validation and Approval	• To validate draft syllabi on Climate Change for various levels of education and training • To validate and approve curriculum support materials	Teacher's guide Learner's manual	Experts upkeep, transport and their input allowance Stationary Secretarial services	2
Teacher preparation	• To induct the teachers, education officers and other stakeholders on the new curriculum content on Climate Change	Induction reports	Experts upkeep, transport and their input allowance Stationary	1
Curriculum piloting	• To identify schools for Climate Change curriculum pre test • To pre-test the curriculum on Climate Change	Knowledge acquisition ,attitude and behaviour change	Cost of all necessary curriculum materials for dissemination	Continuous

Monitoring and evaluation	• To prepare data collection instrument • To visit piloting schools and evaluate the progress of the Climate Change curriculum implementation • To collect data on the performance of the curriculum • To write a report on the curriculum	Report	Experts upkeep, transport and their input allowance Stationary	
Curriculum implementation	• To implement Climate Change curriculum in all the levels identified	Knowledge acquisition and attitude and behaviour change	Cost of all necessary curriculum materials for dissemination	Continuous

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