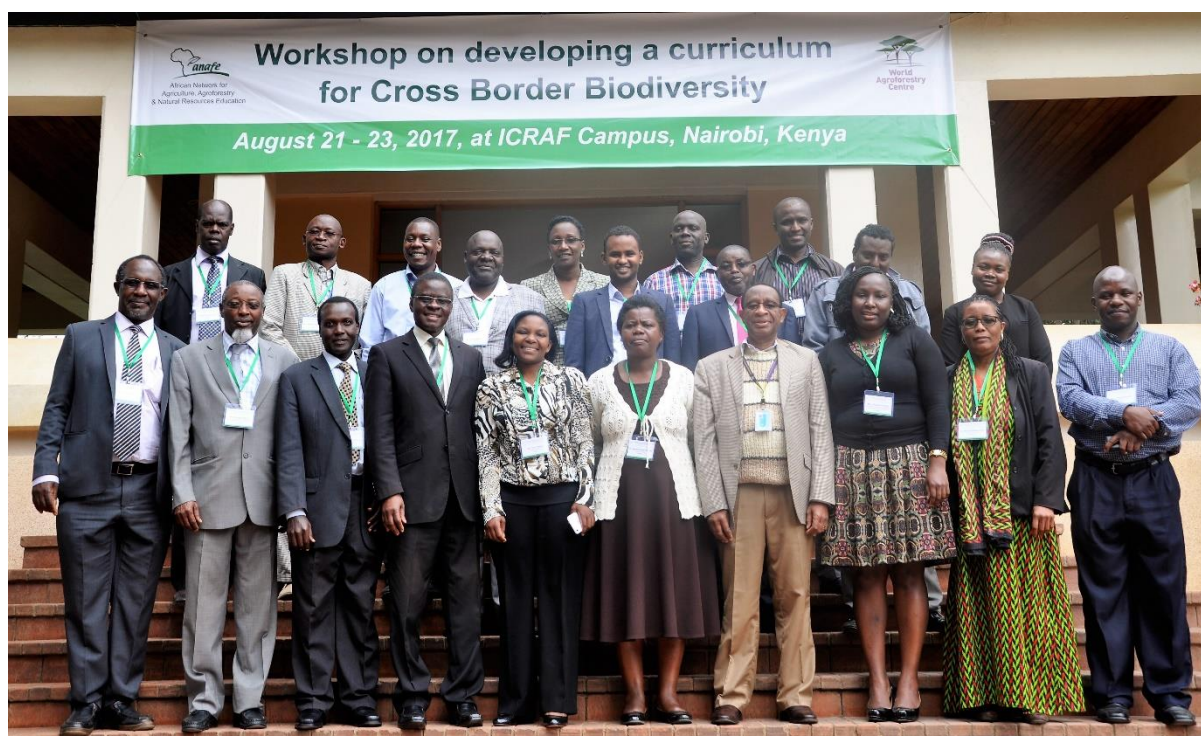


CROSS-BORDER BIODIVERSITY

POTENTIAL, MANAGEMENT CHALLENGES AND CAPACITY NEEDS



**PROCEEDINGS OF A WORKSHOP ON THE DEVELOPMENT OF A CURRICULUM GUIDE ON
CROSS BORDER BIODIVERSITY, ICRAF CAMPUS, NAIROBI, KENYA: 21-23 AUGUST, 2017**

EDITORS

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SEPTEMBER, 2017

PREFACE

The Kyoto Protocol addresses issues of climate and biodiversity. The Clean Development Mechanism (CDM) arising therefrom provides opportunities for countries to reduce greenhouse gas emissions, while the Aichi Targets set approaches to biodiversity management and conservation. Both climate and biodiversity are of prime importance to human development. The majority of foods and medicines currently consumed emanate from natural plant and animal sources. Therefore, biological diversity underpins human livelihood.

Despite the importance of biodiversity, various aspects of human development impinge on the natural ecological systems, resulting in the loss of genes, species or whole ecosystems. Governments have responsibilities for protecting and conserving the biodiversity within their countries, so they enact policies and develop strategies to that effect. However, biological systems are either mobile (fauna) or can spread (flora) across political boundaries. This brings about the need to harmonize policies and strategies for biodiversity protection and conservation. However, there are practical challenges in actual management of biodiversity across borders, even where the policies and strategies are in harmony. Such challenges include inter alia the differences in beliefs/traditions, perspectives of local communities, levels of knowledge, the state of political harmony and the usual competition for resources.

These challenges were the basis for the conceptualization of a project in 2013 between ICRAF and IGAD to study the management of cross-border biodiversity between Kenya and Somalia. We studied cross border exchanges, land use planning, community biodiversity conservation, biodiversity value chains and options for agroforestry interventions. The inspiring findings call for three main actions:

- ❑ Sharing of lessons on biodiversity management across countries.
- ❑ improving institutional capacities to strengthen transboundary biodiversity land/seascapes; and
- ❑ Inclusion of biodiversity in the curricula of teaching institutions

This report emanates from a workshop collaboratively convened by the world Agroforestry Centre (ICRAF) and the African Network for Agriculture, Agroforestry and Natural Resources Education (ANAFE) to use the research findings to develop a curriculum on cross-border biodiversity management. The curriculum is presented as a separate document. We look forward to the adoption and use of this curriculum.

Dr. Wilson Kasolo
ANAFE Executive Secretary

Dr. Jeremias Mowo
ICRAF Regional Coordinator for Eastern and Southern Africa

ACKNOWLEDGEMENT

The ideas contained in this workshop report were generated by all the participants as listed in Annex 1. We are grateful to all participants and their institutions for permitting them to attend the workshop. We convey special thanks to the Cross-border biodiversity research team led by Josephat Nyongesa and -Malesu Maimbo and ICRAF scientist Sammy Carsan. Their exposure of the participants to the research outputs helped in defining learning areas for the curriculum. The workshop was facilitated by Prof A. B. Temu who also contributed tremendously in the drafting this report. We are most grateful for his good work. Finally, we thank ICRAF for availing its facilities to ANAFE and for the excellent links with IGAD country office and the European Union.

Dr. Wilson Kasolo
ANAFE Executive Secretary

Dr. Jeremias Mowo
ICRAF Regional Coordinator for Eastern and Southern Africa

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INTRODUCTION

Purpose of the workshop

This workshop was a collaborative effort between The World Agroforestry Centre (ICRAF) and the African Network for Agriculture, Agroforestry and Natural Resources education (ANAFE). It was conceptualized as an important component of a research and development project on cross-border biodiversity supported by The Inter-Governmental Authority on Development (IGAD) through a European Union grant, to study the challenges of managing biodiversity in the border area between Kenya and Somalia.

The Biodiversity Management Programme (BMP) is a project being implemented by ICRAF in the Tana-Kipini-Laga Badana Bush Bushle Land and Seascape between Kenya and South Somalia. The four year project started in 2013. The work contributes to poverty reduction by improving the social and economic wellbeing of the inhabitants in the IGAD region, through better regional integration in the environmental sector. Its purpose is the conservation and sustainable management of the ecosystems in the IGAD region.

The technical capacity of the IGAD member countries to effectively deliver on global and national biodiversity conservation targets needs to be enhanced through inter alia strengthened government policies and institutions. One crucial aspect on this is the development of human resource capacity by mainstreaming biodiversity into the curricula of institutions of higher learning in the member countries. IGAD through the BMP has been promoting cooperation between research and training institutions through cross country forums such as the cross border dialogue platform and people exchange activities involving learning institutions.

Following the collection and analysis of quality data on cross-border biodiversity, it became necessary to consider how the knowledge generated can be used in to enhance biodiversity conservation. One effective approach is to incorporate it into teaching programmes especially at College and university levels. These efforts will be better anchored by a proper cross-border biodiversity curriculum.

This workshop brought together 20 experienced educators from Kenya, Somalia, Tanzania and Uganda. Experts on biodiversity from ICRAF were also represented. The expected workshop outputs were:

1. Clear objectives of a cross-border biodiversity curriculum at different levels of training and education;
2. Employment opportunities and tasks for graduates with cross border biodiversity competence
3. A sequenced list of topics to be included in a biodiversity curriculum
4. An elaborated biodiversity curriculum
5. The way forward.

Analysis of workshop participants

The participants were diverse by training and experience. The full list of participants is attached as annex 1 to this report. Table 1 illustrates their areas of experience and number of participants per category.

Table 1 Areas of experience of participants

BROAD CATEGORIES	Strong experience in	Number of participants
	Biodiversity	13
	Forestry	4
	Food and agriculture	5
	Wildlife and Tourism	4
	Climate Change and environment	7
	Agroforestry	2
	Plant sciences	3
	Genetics	1
	Community work/social sciences	3
	Marine sciences	0

In addition to the details shown in table 1, nine participants had teaching experience, 12 had research experience four worked with private sector and nine had experience in policy and decision making. Of the 20 participants there were 8 women and 12 men.

The workshop was kick started by an elaborate presentation of the IGAD biodiversity project being implemented by ICRAF.

OPENING STATEMENTS



Dr Wilson Kasolo (Executive Secretary of ANAFE) gave an introduction on ANAFE, highlighting the mission, vision, composition and governance structure, key partnerships and outputs over time. He emphasized that ANAFE is keen on developing curricula and contextual learning resources as a way of empowering the member colleges and universities to deliver quality education. He emphasized the organic link between ANAFE and research institutions such as ICRAF which is a major source of new and interesting knowledge and innovations.

Dr. Kasolo making opening statements

He pointed out the vision of ANAFE as ***A continent with quality and relevant tertiary agriculture and natural resources education, research and extension for profitable agriculture and sustainably managed natural resources***”.

ANAFE’s mission is

“to work with member institutions to improve the quality, relevance and effectiveness of tertiary education, research and extension in Agriculture, Forestry, Agroforestry, and other Natural Resources for sustainable socioeconomic transformation in Africa”

Dr Wilson Kasolo informed participants that ANAFE was started in 1993 with 29 member institutions and that membership had since then, increased to 146 universities and colleges in 36 African countries. He pointed out the structure of ANAFE, highlighting the regional agricultural training forums – RAFTS (East and Central Africa, Southern Africa, African Humid Tropics and Sahel RAFTs) as a convenient mechanism for mobilization of member institutions.

He indicated the priority areas of ANAFE as:

1. Enhancing the appeal and relevancy of agriculture and natural resources management education, through curricula reviews, development of contextual learning materials and improving programmes delivery and environments.
2. Promoting sustainable agriculture and management of natural resources through skilling of managers, entrepreneurs, farmers and other stakeholders with the science and practice of new innovations and paradigms
3. Retooling lecturers, researchers and development workers with relevant skills and knowledge for socioeconomic transformational initiatives in Africa through agriculture and sustainable natural resources management.
4. Empowering youths and women to engage in sustainable agriculture and agribusiness



Dr. Mowo making opening remarks

The official workshop opening was done by Dr Jeremias Mowo, ICRAF’s Regional Coordinator for Eastern and Southern Africa. He highlighted the relevance of the workshop to the IGAD (BMP) project implemented by ICRAF. He urged the participants to focus on the workshop objectives. Dr Mowo challenged the researchers and educators to review

the existing curricula, with the special mission of enabling teaching institutions to access and use useful biodiversity research products. Participants noted that the curriculum to be

developed is to serve as a model and should not be taken to be specific to any training or research institute. Therefore it is expected that teaching institutions can adopt and tailor the curriculum to fit their specific needs. Dr Mowo was glad that the good research products generated by the BMP team will eventually reach classrooms and help in raising the human resources capacity in biodiversity.

A Primer on Cross-border Biodiversity Management, Challenges and opportunities

Prof. Gerald Eilu from the School of Forestry, Geographical and Environmental Sciences, Makerere University, (Uganda) made a presentation on the above subject. He pointed out that the patterns of distribution of biodiversity do not necessarily follow political boundaries. Critical organisms or ecosystems/communities occur across the political boundaries, and various names have been coined for some of these. The Albertine Rift, Mt. Elgon Transboundary Ecosystem serve as examples. Therefore, we experience ineffective conservation efforts undertaken at national level with each authority following its own policies, and doing its own protection and monitoring. The benefits of trans-boundary management are greater, contributing significant benefits beyond each country.

The benefits of joint management accrue in the form of ecological, political, community, economic and organisation among others. Protected areas (within an ecosystem) face similar threats like illegal use of resources and pressure for agricultural land. Even if one side of the border is well protected, unsustainable resource use on the other side of the border may adversely affect resource use. There is thus a need for collaborative efforts to strengthen biodiversity conservation and public awareness management within a trans-boundary context, especially where we have migratory species that move across borders in search of food or breeding habitats or other phenomena are crucial. The benefits of collaboration include:

- **Ecological** – promotes ecosystems management, improving protection of shared resources (e.g. water and wildlife) and increasing the area needed to maintain minimum viable populations of fauna with large home ranges (particularly large mammals), thereby reducing the extinction risk, and promoting re-colonisation
- **Political** – improves regional cooperation in natural resource management between countries.
- **Economic** –Increases efficiency in protection and monitoring, eliminates duplication of effort, and creates economies of scale. This enhances economic opportunities through increased tourism potential and revenue. Programmes will be planned and implemented in harmony and jointly.
- **Sharing resources:** skills, equipment and standardized methods.
- **Organisational** – builds capacity among the stakeholders and promotes an enabling environment for better decision making on common problems. Opportunities for

increased international support will be exploited better jointly. Enhances the availability of a larger pool of expertise for problem solving.

- **Enhanced co-operation**, which is needed for effective law enforcement in dealing with illegal activities across the border.
- **Enhanced tourism** through joint marketing and tour operator training. Fees and visitor management strategies will be agreed to ensure harmony.

He pointed out the relevant mechanism for cross border biodiversity conservation and the potential strategies for implementation of Cross –Border Biodiversity Management (CBBM), citing relevant examples. He made the following recommendations on stronger collaboration with regard to:

- Wildlife trafficking
- Control of invasive species in biodiversity-rich ecosystems
- Benefit-sharing of ecosystem services
- Domestication and implementation of Multilateral Environmental Agreements.
- Development of Regional Reference Information System (RRIS)

In the ensuing discussions participants pointed out the existence of other boundaries, beyond political ones, such as:

- Cultural boundaries, where the communities living side by side may have quite different cultures with regard to different species and ecosystems
- Religious beliefs
- Ecosystem boundaries
- Knowledge boundaries
- Livelihood boundaries such as we see among sedentary agriculture and transhumance communities

Participants concluded that in the context of the workshop, only national boundaries would be considered in the curriculum development exercise.

An Overview of the IGAD Biodiversity Management Programme

Josephat Nyongesa of ICRAF introduced the BMP project, time frame, key objectives as well as activities and expected results. He highlighted the project target sites, groups and beneficiaries and gave the background of previous work that recommended the development of the cross border biodiversity curriculum linking it to IGAD BMP project. He pointed out that the 4-year project is aimed at conservation and sustainable management of the ecosystems in the IGAD region, in order to contribute to lasting ecosystem goods and services. Therefore the project is focused on strengthening biodiversity conservation and improving institutional

capacities for management in the North-East Kenya and South Somalia cross-border land and seascapes. The project covers the following thematic areas: Cross border exchange; Land use planning, Community biodiversity conservation; biodiversity value chains and agroforestry interventions.

With a goal of benefiting local communities in all project sites, the main project site is in the cross-border area of North Eastern from the Tana River delta in Kenya extending to the Laga Badana Bush Bushle National Reserve in Southern Somalia; Lamu County as the main site in Kenya and Badhaadhe District Bush Bushel area in Somalia. The target groups for the project were Policy makers, biodiversity managers, NGO's, researchers, local communities, civil society and national governments.

Through cross border experience and sharing of lessons learned, the project envisions improvement of institutional capacities and thereby strengthening conservation of transboundary biodiversity land/seascapes and socio-economic development linkage. Incorporating biodiversity in teaching institutions curriculum has potential to enhance natural resources conservation. He pointed out that insecurity, political instability and lack or weak governance/ institutions undermine cross-border cooperation in biodiversity conservation. Nyongesa pointed out the earlier work done by the project with ANAFE, specifically the development of a book on biodiversity-based value chains. He shared the lessons also learnt from the project. More information on the BMP project can be seen at <http://www.worldagroforestry.org/project/igad-biodiversity-management-program-horn-africa>.

Discussion

Participants raised the following points:

- Source of funding for biodiversity conservation and evaluation of ecosystem services
- Need for political goodwill and institution to mobilize resources (internal and external) for cross border biodiversity conservation.
- Need to look at biodiversity conservation from a tangible product point of view
- Need for information dissemination and sharing platforms e.g. NEMA portal
- Need for further research on marine and other biodiversity issues which are not well articulated

- Need to create awareness of imparting environmental education at different level of training and the shape people's perceptions on biodiversity conservation

Biodiversity and the Aichi Targets

The 10th Conference of Parties (COP) held at Aichi district of Nagoya, Japan gave birth to i) The Nagoya Protocol on Genetic Resources and ii) The Aichi Targets for biodiversity. The latter contains 20 specific targets, given under for five strategic areas A to E as summarized in the table 2. They are an important frame of reference for the cross-border biodiversity curriculum.

Table 2: The Aichi targets

<p>A: Address the causes of biodiversity loss</p> <ul style="list-style-type: none"> • Make people aware about the values of biodiversity • Integrated biodiversity values in development and poverty reduction plans • Subsidies which are harmful to biodiversity and eliminate them, phase them out or reform them • Sustainable production and consumption. 	<p>B: Reduce the direct pressure on biodiversity and promote sustainable us</p> <ul style="list-style-type: none"> • Reduce the rate of natural habitat loss + forest loss by at least 50% • Reduce overfishing • Agriculture, aquaculture and forestry in sustainable manner • Reduce pollution and excessive use of fertiliser • Prevent invasive alien species (non-native) • Minimise the coral reef destruction, ocean acidification
<p>Area C: Safeguard ecosystems, species and genetic diversity</p> <ul style="list-style-type: none"> • Conserve terrestrial and inland water, coastal – marine areas • Prevent extinction of threatened species • Maintain genetic diversity of agro-plants, domesticated animals and minimising genetic erosion 	<p>Area D: Biodiversity benefits to all</p> <ul style="list-style-type: none"> • Safeguard ecosystems for women, tribals, and poor. • Combat desertification and restore the degraded ecosystem • Operationalise the Nagoya Protocol on genetic resources, via national legislations
<p>E: Participatory planning, capacity building</p> <ul style="list-style-type: none"> • National biodiversity strategy and action plans – update for participation • Integrate the knowledge of tribal communities • Scientific and technological knowledge sharing application • Financial resources mobilisation 	

Source: www.cbd.int/sp

CURRICULUM DEVELOPMENT PROCESS

A Primer



Dr Wilson Kasolo took the participants through ANAFE's curriculum development process. He covered the rationale and steps in the process from the composition of a curriculum development workshop, through identification of job areas, listing the curriculum topics, sequencing subjects and finally drafting the curriculum. Elaborating on the DACUM (Developing A CURriculum) process usually applied, he indicated who does what, as shown in Table 3

Workshop participants exchanging views

Table 3: The Curriculum Development process

Activity	Leadership	Participants
1. Planning the curriculum development workshop <ul style="list-style-type: none"> situation analysis and training needs assessments; analysis of demand for cross border biodiversity conservation knowledge and skills in job markets resource requirements and mobilization carry out stakeholder analysis plan the workshop process identify and select participants set the workshop programme 	Usually undertaken by educators concerned	<ul style="list-style-type: none"> policy makers, such as ministries of education, forestry and agriculture educators
2. Implementing workshop(s) <ul style="list-style-type: none"> describe purpose and intended outputs to participants agree on job opportunities that the curriculum will target identify competencies (knowledge, skills, attitudes) demanded in the job market set the objectives 	workshop facilitator in collaboration with institutional leaders	Stakeholder analysis undertaken in activity 1 above is used. Usually includes farmers, policy makers, students and would-be employers of graduates
3. Course development or planning <ul style="list-style-type: none"> select content, methods, materials, time prepare syllabi; and sequence the topics 	This is led by experts in the subject matter and in sequencing	All stakeholders: the mode of participation determined through consultation
4. Implementation of the curriculum <ul style="list-style-type: none"> Secure approval for the curriculum from the appropriate authority organize human, financial and material resources teach the course 	Educators and education managers	Educators, students and others involved in education service delivery

Dr Kasolo elaborated on the sequencing process and carried out a sequencing exercise. This helps the development of a teaching order basing on agreed topics. Sequencing helps in identifying interdependency levels of modules. Sequencing requires an understanding of the job performance order and is done so that the educator can undertake the teaching by starting from the simplest to the most complex topics (that is moving from the known to the unknown). Other benefits of sequencing and ranking include exposing:

- The relative importance of the topics.
- Possible cause-to-effect relationships
- Dependent relations among topics
- Supportive relations among topics



Dr. Sammy Carsan (Left), ICRAF Scientist and Adam Ali Mohamed (Right), East Africa University-Somalia listening to workshop presentations

The whole sequencing and ranking process has the benefits of enhancing curriculum coherence, revealing the logical relationships between modules in a curriculum, enhancing the effectiveness of learning, minimizing inconsistencies in the curriculum and

curtailing duplication. Participants found the process very helpful and requested ANAFE to run short courses in curriculum development processes.

Job areas for graduates with Cross-border Biodiversity knowledge and skills

Participants debated on the areas of interest where a person with Cross-border biodiversity could be employed. The following job areas emerged as possible for such a person:

1. Biodiversity conservation and development
2. Biodiversity tourism
3. Wildlife management
4. Forest management
5. Germplasm and gene bank management
6. Natural resources valuation
7. Landscape management
8. Entrepreneurship (bioprospecting)
9. Ecologist (ecosystem management)
10. Marine Resources management
11. Crop and livestock Farming/farm management
12. Breeding: Plant and Animal
13. Cross-border Biodiversity management
14. Research
15. Education



Prof. Temu (right) and Dr. Kasolo (left)consulting during the curriculum development workshop

16. Curation (Museums)

Participants further discussed and agreed that for one to be able to perform in the above identified job positions, graduates with cross-border biodiversity knowledge must have the competencies listed in tale 4:

Table 4 List of competence areas for biodiversity experts

<p>Understanding and measuring biodiversity</p> <ol style="list-style-type: none"> 1. Biodiversity fundamentals (definition, meaning and importance of) 2. Identification and mapping of biodiversity resources (flora and fauna) 3. Biota, habitats, ecotones and ecosystems 4. Biodiversity inventory/mapping and characterization (typology) 5. Biodiversity valuation (CITES, threatened/endangered species) 6. Knowledge of available species diversity and phenology/reproductive biology 7. taxonomic principle, technical sampling techniques 8. Developing species identification manuals 9. Developing databases on species 10. Terrestrial, coastal and marine ecosystems 	<p>Planning and Managing Biodiversity</p> <ol style="list-style-type: none"> 1. Principles of biodiversity conservation 2. Cultural values and application of IK 3. International, regional national and local biodiversity related policies 4. Understanding user rights 5. Creating awareness on Biodiversity 6. Enforcing biodiversity laws and regulations 7. Resolving/managing conflicts 8. Strategic planning and management of Biodiversity 9. Identifying and mitigating threats/risks to biodiversity 10. Farmer-based biodiversity management 11. Cross-border biodiversity challenges 12. Criteria and indicators of sustainable biodiversity 13. Joint cross-border biodiversity conservation initiatives
<p>Investing in Biodiversity</p> <ol style="list-style-type: none"> 1. Agricultural biodiversity 2. Agrochemicals, pollinators, parasitism, invasive species, commensalism. 3. Agroforestry to enhance biodiversity 4. Valuing landscape as a natural, cultural, economic and educational resources 5. Biodiversity and farm productivity 6. Germplasm collection and testing 7. Germplasm propagation and conservation 8. genomic data and DNA-based markers in breeding programs 9. Gene bank design and management 10. Germplasm exchanges/transfers 11. Plant propagation and nutrition, phenology and ecology 12. Biotic and abiotic needs of plants and animals 13. genetic selection and improvements 	<p>Biodiversity products and services</p> <ol style="list-style-type: none"> 1. Economic analysis: tangible and intangible biodiversity products and services 2. Biodiversity valorization and value chain analysis 3. Biodiversity enterprises 4. Evaluating investments in biodiversity 5. Payment for ecosystem services 6. community mobilization and sensitization 7. Designing and employing communication strategies and packages 8. Risks analysis and management 9. cross-border biodiversity resources 10. Resource mobilization 14. Opportunity cost related to loss of biodiversity 15. Biodiversity value chains to enhance livelihoods
<p>General knowledge and Skills</p> <ol style="list-style-type: none"> 1. Writing skills 2. Pedagogy and andragogy 3. Basic research skills 4. Data management/analysis and publishing 5. GIS tools in landscape analysis, 6. Designing research projects for land scape resource management 7. Interpreting and acquiring intellectual property rights for biodiversity innovations and products 8. Accounting principles 	

How Cross-Border Biodiversity is linked to Sustainable Development Goals and Targets

This curriculum contributes to meeting SDG targets as shown in Table 5

Table 5 Role of curriculum in meeting SDG targets

Goal 1. End poverty in all its forms everywhere	
TARGETS	ROLE OF CURRICULUM
1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters	Species that are adaptable to climate change will enhance livelihoods of the rural poor
Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture	
TARGETS	ROLE OF CURRICULUM
2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons	Improved nutrition (e.g. fruits and vegetables) from underutilized plants and animals
2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	Ecosystems that provide species that mitigate the effects of climate change and enhance adaptation.
2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed	Teaching these areas will improve utilization of our highly diverse resources.
Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	
TARGETS	ROLE OF CURRICULUM
9.3 Increase the access of small-scale industrial and other enterprises. in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets	It generates capacity to better utilize useful flora and fauna for development
9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including. by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending	

Goal 12. Ensure sustainable consumption and production patterns	
TARGETS	HOW EVA CAN CONTRIBUTE
12.2 By 2030, achieve the sustainable management and efficient use of natural resources	It will reduce substantially the pressure on plant resources, reduce greenhouse gas emissions and improve ecosystem functionality
12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	
Goal 13. Take urgent action to combat climate change and its impacts	
TARGETS	ROLE OF CURRICULUM
13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	Diverse resources have the capability to contribute to effective risk management, particularly those arising from climate change
13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	
Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	
TARGETS	ROLE OF CURRICULUM
15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	The curriculum will enhance <ul style="list-style-type: none">• Landscape regeneration• Ecological integrity• Reduced desertification• Increased biodiversity
15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	
15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world	
15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development	

THE WAY FORWARD

Workshop participants discussed the way forward regarding the management and development of cross border biodiversity initiatives, and strategies for capacity development for sustainable management of cross border biodiversity and upscaling the related activities. The following suggestions were made:

General

1. Cross border biodiversity Curriculum implementation level and methods
 - i. It was recommended that the curriculum can be offered as a formal course at the following levels:

- Diploma level
 - Postgraduate level
 - ii. The curriculum can be used as a source material for cross biodiversity elements to be integrated in training programmes at the following levels:
 - Elements can be integrated in existing courses.
 - Undergraduate levels
 - Postgraduate levels
 - iii. The curriculum can be used to offer on-line courses at certificate, diploma, undergraduate and postgraduate levels
2. An International centre of Excellency on cross border biodiversity should be established in Africa, and such a centre should develop training courses for various professionals and stakeholders using the cross border biodiversity curriculum guide. Such training could be rotated in various parts of Africa, targeting various Biodiversity hot spots in Africa

Actions for participating institutions

As one of the strategies for taking forward the process of integrating cross border biodiversity elements into existing training programmes, participants indicated personal actions to be undertaken in their institutions as summarized in table 5.

Table 3. Summary of planned actions by participating institutions

Participant	Institution	Action to be taken
Prof. Gerald Eilu	School of Forestry, Geographical and Environmental Sciences, Makerere University, Uganda	Publicize the cross border biodiversity curriculum guide in the university, and integrate elements of cross border biodiversity into the Post graduate courses in his School.
Grace Koech	ICRAF	Available for any contributions to the development of the curriculum and its implementation
Dr. Geoffrey Kironchi	University of Nairobi, Kenya	Will use the cross border biodiversity curriculum guide to strengthen the dryland agriculture biodiversity elements, and effort will be made to mainstream cross border biodiversity elements in programmes in other depts. Geoffrey also pledged his continued support to the ANAFE, ICRAF and IGAD in cross border biodiversity related initiatives.
Prof. Grace Njoroge	Jomo Kenyatta University of Agriculture and Technology, Kenya	Will use the Curriculum guide to integrated cross border biodiversity elements in the courses she teaches.
Dr. Flora Namu	Karatina University, Kenya	Will integrate cross border biodiversity elements in the programmes she teaches
Dr. James Odanga	Kenya National Museums	Willing to participate in the development of cross border biodiversity teaching materials, covering the insects part. He will also use the curriculum to enhance his cross border biodiversity knowledge and understanding.

Participant	Institution	Action to be taken
Josephat Nyongesa	ICRAF	The curriculum guide will be useful in developing and implementing cross border biodiversity conservation training programmes, and that the curriculum guide will also be used to: <ul style="list-style-type: none"> • Influence cross border exchange of knowledge and experiences on biodiversity conservation • Strengthen cooperation between transboundary research and training institutions.
Mr. Adam Ali Mohamed	East Africa University, Somalia	Will get his institution to integrate cross border biodiversity elements in the training programmes offered
Dr. Joseph Hitimana	University of Kabianga, Kenya	Offered to assist with issues related to gap analysis in biodiversity
Dr. Sammy Carsan	ICRAF	Offered to assist with Genomics
Mr. Daniel Makokha	Kenya Forestry College	Will integrate elements of cross border biodiversity into his training activities, and he will use the curriculum guide as a source material. And he will get college management to set up a botanical garden (gene bank) as a teaching aid.
Dr. Nambiri Evelyn Wamali	Kenyatta University, Kenya	Will use DACUM for developing a curricula for other programmes at her institution, and will also integrate cross border biodiversity elements in the education and environmental programme. She will also conduct a seminar in her university about cross border biodiversity.
Dr. Mariane Maghenda	Taita Tavet University, Kenya	The curriculum guide will be used to integrate cross border biodiversity elements in the new curricula for agroforestry, forestry, and others they are about to develop.

Actions proposed for ANAFE

The following actions were proposed for ANAFE:

1. Development of online courses
2. Packaging of available research and information from other sources for use in education, training and other biodiversity management and conservation initiatives.
3. Sensitize member institutions about the cross border biodiversity curriculum and encourage member institutions to use it.
4. Develop teaching materials to support the implementation of the cross border biodiversity curriculum guide
5. Train lecturers in cross border biodiversity

Actions proposed for ICRAF

The following actions were proposed for ICRAF:




1. Undertake tracer studies of previous training undertaken by the IGAD project on biodiversity, and identify training needs to guide the development of new training programmes to be undertaken with the help of the curriculum guide.
2. Development of a network for cross border biodiversity for sharing of information and knowledge. Participants at the curriculum development workshop to be registered as champion members.
3. Conduct research in cross border biodiversity, indigenous knowledge, policy issues, migration impacts – social, economic, environmental, etc.
4. Develop mechanisms and strategies for monitoring cross border biodiversity
5. Pilot the development of cross border biodiversity business enterprises




Annex 1: List of Participants



No	Name	Institution/Designation	Country	Email
1.	Mr. Adam Ali Mohamed	East Africa University Somalia	Somalia	mradamhared@gmail.com
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3.	Dr. Rebecca Karanja	Jomo Kenyatta University of Agriculture and Technology- JKUAT	Kenya	rebeccakaranja@gmail.com rkaranja@jkuat.ac.ke
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20.	Ms. Josephine Oyoo	African Network for Agriculture, Agroforestry and Natural Resources Education-ANAFE	Kenya	j.oyoo@cgiar.org

Annex 2: Workshop Programme

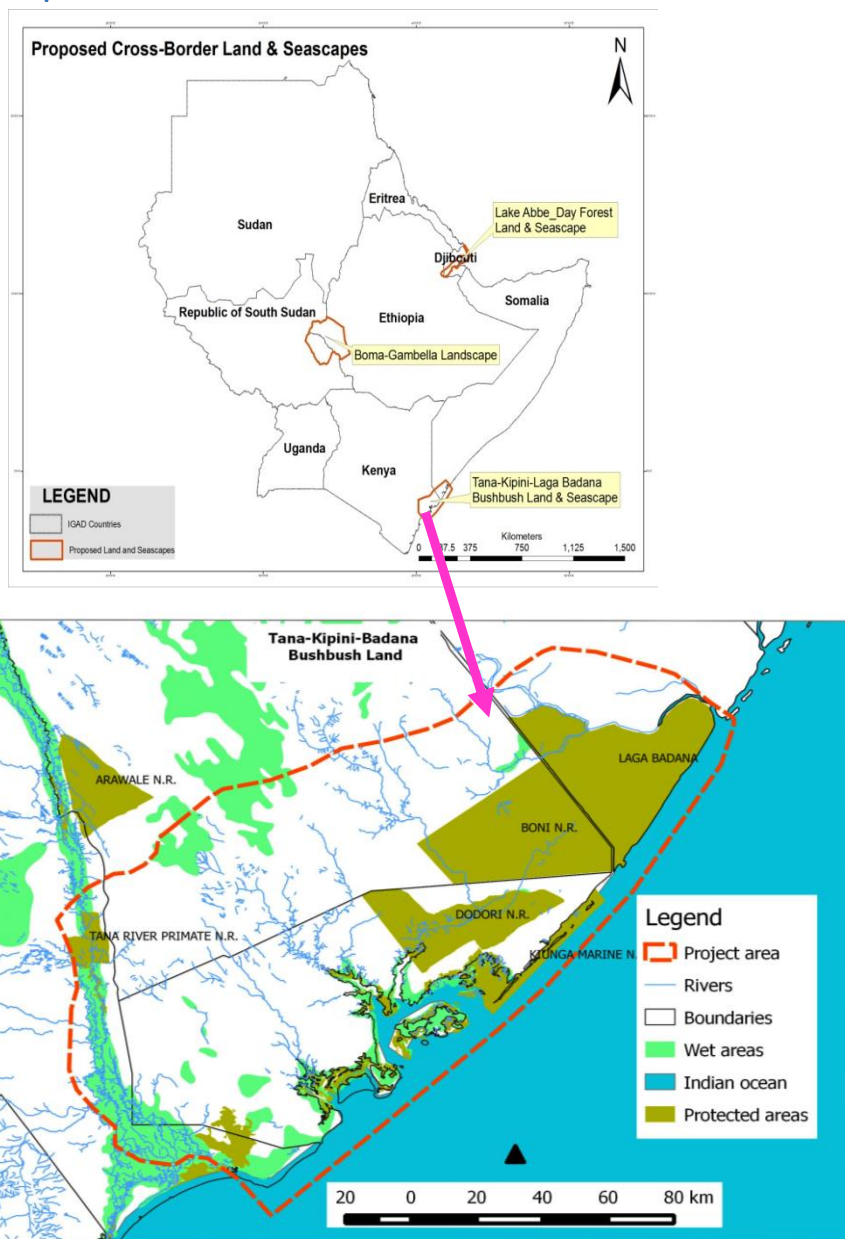
21-23 August 2017

Time	Day 1: Monday 21 st August 2017	
08:30	Arrival Registration and briefing (Be seated at venue by 08:45)	
	Activity	Leadership
09:00	Introductions and workshop programme	Dr. Wilson Kasolo
09:15	Welcome remarks	Dr. Jeremias Mowo: ICRAF Regional Coordinator for Eastern and Southern Africa
09:30	Keynote Address : The IGAD Biodiversity project (Past work, future objectives)	Dr Gerard Eilu Makerere University, Uganda
10:00	Why the work on biodiversity curriculum? Providing context	All: Discussion
10:15	Questions and Discussions	All
10.30 -11.00	Group Picture followed by Coffee/Tea Break 	
11:00	Setting the objectives of a cross-border biodiversity curriculum for different stakeholder groups	Facilitator
11:30	Group work assignment: process and outputs, with examples	Facilitator
12:0	<u>Group work</u> Synthesis of biodiversity situations in Kenya and Somalia	Country-based groups
13.00 – 14.00	Lunch break 	
14:00	Group work continues	All
15:00	Group reports (20 minutes each)	Group rapporteurs
15:40	 Coffee/tea	
16:00	Plenary: Discussion of group reports. Agreement on the substance to include in curricula	Facilitator
17:00	Closure for the day, followed by a Cocktail to 18:30	ANAFE

Time	Day 2: Tuesday 22 nd August 2017	
8:30	Synthesis report of Day 1 and	Appointed participant/s
08.45	Objective1 for Day 2: Tasks and competences	Facilitator
09:00	Group work Developing Competences required and tasks	Mixed groups
10:00	 Tea/Coffee break	
10:30	Presentation of group work	Rapporteurs
11:00	Discussions	All
11:30	Objective 2 for Day 2: Listing Biodiversity topics for inclusion into curricula and illustrating them	Facilitator
12:00	Groups form and meet to initiate discussions	All
13:00 – 14:00	 Lunch Break	
14.00	Group work continues	Facilitator
15:00	Group work presentation	Rapporteurs
16.00	Coffee/Tea Break 	
16.30	Discussions	Facilitator
17:00	Closure for the day, Transfer to Hotel	

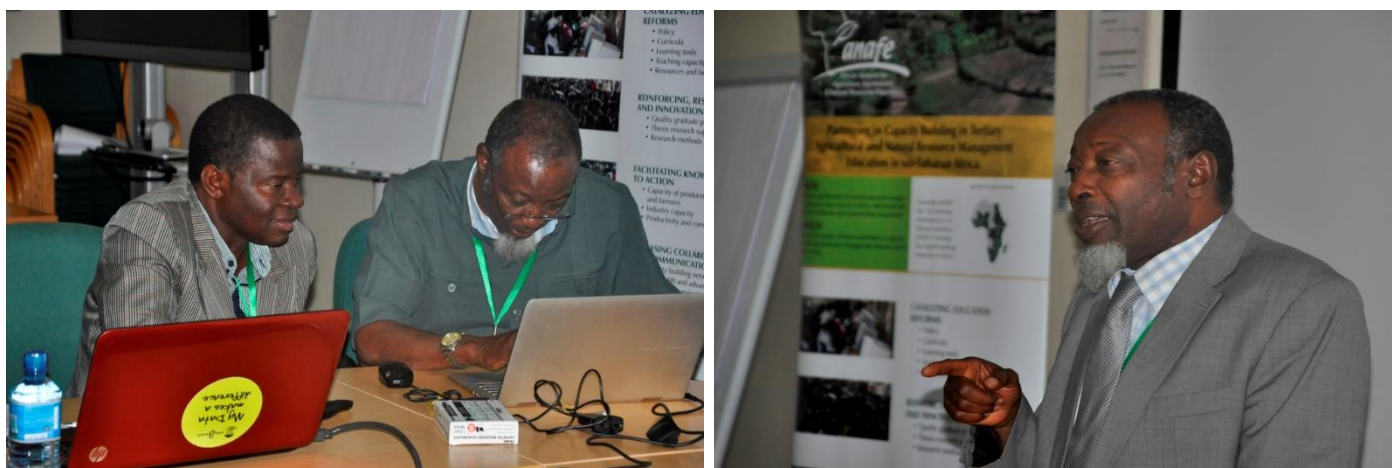
Day 3: Wednesday 23 rd August 2017		
08.30	Sequencing topics and subjects to produce a logical curriculum (A primer)	Dr. Wilson Kasolo
09:00	Group work to sequence Biodiversity topics and subjects	All
10:30-11:00	Coffee/Tea Break 	
11:00	Presentations of group work results (20 minutes each)	Group leaders
11:40	General discussion	Facilitator
13.00	 Lunch	
14:00	Developing Learning Resources in Biodiversity – ideas and approaches + sources	
15:00	The way forward (each participant to make own statement)	Facilitator
15:30	Vote of thanks	Dr. Wilson kasolo
15:45	Closing statement	IGAD Project Representative: Josephat Nyongesa
16:00	Participants Leave	

Annex 3: The Tana-Kipini-LagaBadana Bush Land and Seascape Project Sites Map



Source: IGAD BMP project

Selected Workshop Pictorial



Dr. Kasolo (Left) and Prof. Temu (Right) moderating workshop proceedings



Dr. Mowo (Left) make welcome remarks and Prof. Eilu (standing-right) giving key note Address



Dr. Kasolo (Left/ standing) during his presentation



Prof. Kungu (holding paper- left photo) and Dr. Ondimu (Right photo/ right row in blue neck-tie) make comments in two group discussions



Group discussion Rapporteurs (all standing) make plenary presentations: Dr. Hitimana, Dr. Namu and Dr. Nambiri

Back cover picture

