Nile Transboundary Environmmetal Action Project

Nile Basin EE Lecturers' Network

PROCEEDINGS - Volume II

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NTEAP

NILE BASIN INITIATIVE

Initative du Basin du Nil

CHAPTER FIVE: Annex I - PAPERS PRESENTED

Official Opening Speech

Mr. Chairman,
UNDP Representative
NBI Technical Advisory Committee Members
Distinguished Participants,
Ladies and Gentlemen.

It gives me great pleasure to be with you this morning to officiate the opening of this important workshop on the Network of Environmental Education Lecturers in the Nile Basin Countries. On behalf of the Vice President's Office and my own behalf, I wish to welcome you and express my sincere gratitude to you all for having accepted the invitation to attend the workshop in spite of your busy work programs. Indeed it is my hope that you will find this workshop rewarding and interesting, since it gives us an opportunity to discuss and develop an educational program that aims at ensuring sustainable existence of a very important global resource, the Nile River. I sincerely thank you for the honour of your presence.

Mr. Chairman,
The Nile River is a shared resource between riparian states of Tanzania, Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Eritrea, Kenya, Rwanda, Sudan and Uganda. As we all know, the Nile River is the world's longest river; it traverses 6700 kilometers. It is home to world class environmental assets such as Lake Victoria and the wetlands of the Sudd. Also, the Nile Basin is home to 160 million people, while about 300 million people live in the countries that share and depend upon the Nile waters. The Nile River holds significant opportunities for development of the countries of the basin; it could enhance food production, energy availability, transportation, industrial development, tourism and environmental protection. These qualities compel us to ensure that the Nile resource is sustainably managed and its ecological integrity protected, so that it continues to benefit many generations of the people of our region and beyond.

Mr. Chairman,
The countries of the region have recognized that the sustainable and peaceful future depends upon sustained cooperation. Therefore the countries of the Nile Basin have formed a co-operational mechanism to pursue a vision shared by all, which is "*achieving sustainable socioeconomic development through the equitable utilization of and benefit from, the common Nile Basin water resources"*. This mechanism which known as Nile Basin Initiative (NBI) was formed on recognition that the cooperative partnership in development and management of Nile waters holds the greatest prospect of bringing mutual benefits to the region.

The pursuit of the shared vision of the Nile Basin countries through the Initiative, is being done through the implementation of seven projects. The Nile Transboundary Environmental Action Project which has organized this workshop is one of them. The project's main objective is to support the development of a basin-wide framework for actions, to address high priority transboundary environmental issues within the context of the Nile Basin Initiative. The project implementation is organized through five components. One of the components is the Environmental Education and Awareness. This component is aiming at increasing public awareness and understanding of the community interests and the common ecological space that the Nile River creates. The components intervention will act on three levels namely, the general public, primary and secondary schools and Universities. This workshop is part of implementation of these interventions.

Mr. Chairman,
I am told that this workshop has three main goals which are:
• To form a network of environmental education lecturers within the Nile Basin;
• To discuss modalities and develop a work plan on the development of a university level course on environmental education; and
• To come up with an efficient and sustainable environmental education student exchange programme within the Nile Basin.

This workshop is a step towards achieving the goals of the project and also a step towards turning the aspiration and expectations of the people of the Nile Basin countries into reality. It will contribute in; harmonizing our countries interest on the Nile resources, strengthening friendship between people of our countries and nurturing peace through raising understanding of our younger generations.

I think these are dignified workshop goals, but there is a challenge to overcome in meeting these goals, considering that you only have two days of deliberations. Nevertheless with the people of your caliber I am confident that the objectives of the workshop will be fully met.

Mr. Chairman,
It is my sincere hope that this workshop is just a start and that you will spare no effort in the course of these two days to ensure that you achieve what you have set to achieve. It should also be recognized that in this workshop, you will be nurturing the efforts whose results will touch communities beyond Universities. In the long run, the curriculum and studies that will be developed from the program that you will initiate, will ensure that we inculcate scientific knowledge and expertise on the Nile River resource into today's students who are our future leaders. The friendship and the exchange programs that will be developed will add onto efforts of maintaining peaceful and cordial existence of our countries and strengthen the resolve to equitably share the benefits and resources from the Nile River.

From this perspective I find this workshop timely. It should be able to significantly contribute into our desire to share information and knowledge on the Nile River resources for the benefit of our countries.

Mr. Chairman,

Once again, let me thank the organizers for inviting me to this workshop. It is my hope that your two days of deliberations will contribute to the strengthening of cooperation among countries of the Nile Basin and will be a good start in developing relevant environmental education curriculum for institutions of higher learning.

With these brief remarks, it is now my pleasure and duty to declare this workshop officially open.

I thank you for your attention.

Education environnementale dans l'enseignement supérieur in Burundi

Dr Marc NGENDAHAYO – Université de Ngozi &
Dr Samuel BIGAWA – Université du Burundi

I. Contexte

A travers le monde, beaucoup d'Universités ont ouvert dans leur structure d'enseignement et de recherche un département environnement. Il en est de même dans certaines universités de la région. Actuellement au Burundi, nombreuses sont les institutions qui offrent des enseignements de niveau supérieur dans plusieurs domaines. Néanmoins la formation environnementale reste un défi à relever. Aussi les enseignants qualifiés en matière d'environnement sont peu nombreux ou n'existent pas du tout pour les niveaux du secondaire et supérieur. Pour l'enseignement supérieur, les programmes sont encore à concevoir. Le constat reste donc amer : l'absence de formation permanente à ce niveau qui se traduit par une absence de connaissance approfondie du domaine de l'environnement.

L'enseignement supérieur va sans conteste de pair avec la recherche. En effet, des études et des recherches doivent être préalablement menées pour déterminer les actions à mener. Il n'est de toute façon pas pensable de résoudre le problème de l'environnement sans en avoir une connaissance approfondie et pratique : dans ce domaine les recherches en sont encore malheureusement trop souvent à leurs balbutiements, les crédits accordés à la recherche fondamentale étant le plus souvent très réduits pour ne pas dire inexistants.

II. Politiques

Il convient ici de signaler que le Gouvernement du Burundi a promulgué la loi n°1/010 du 30 juin 2000 portant Code de l'Environnement de la République du Burundi. Le Code « fixe les règles fondamentales destinées à permettre la gestion de l'environnement et la protection de celui-ci contre toute forme de dégradation.

Cette loi cadre de l'environnement précise les domaines d'intervention du département du Ministère de l'Aménagement du Territoire et de l'Environnement notamment « la promotion de l'éducation et de la recherche environnementale ».

Il est prévu que le Ministère de l'éducation nationale poursuivra ses efforts dans le sens de la formation et l'encouragement des chercheurs nationaux.

De même les institutions de recherche sont encouragées à poursuivre le ciblage déjà entamé des thèmes de recherche qui cadrent avec les besoins du secteur environnement. Il est prévu un appui de ces institutions à améliorer leurs connaissances sur la vulnérabilité de l'environnement et les mesures d'adaptation.

Le Gouvernement projette la redynamisation des structures d'appui à la production agro-sylvo-zootechnique par **le biais de la formation**, **l'éducation** et la **communication** sur les techniques tenant compte de la préservation de l'environnement et de la durabilité des productions agricoles

III. Institutions assurant des cours sur l'environnement

A. Niveau des cours offerts

L'Université du Burundi à travers la Faculté d'Agronomie et l'Institut supérieur d'Agriculture, le Département de biologie et le Département de Géographie, dispensent des cours dont certains modules traitent partiellement des problèmes environnementaux.

L'UNG a inscrit parmi ses objectifs, à travers le département d'agronomie, l'amélioration de l'alimentation et de l'agriculture dans une perspective de contribuer à la réduction de la pauvreté des populations. Comme pour l'Université du Burundi, certains modules touchent certains aspects de l'environnement.

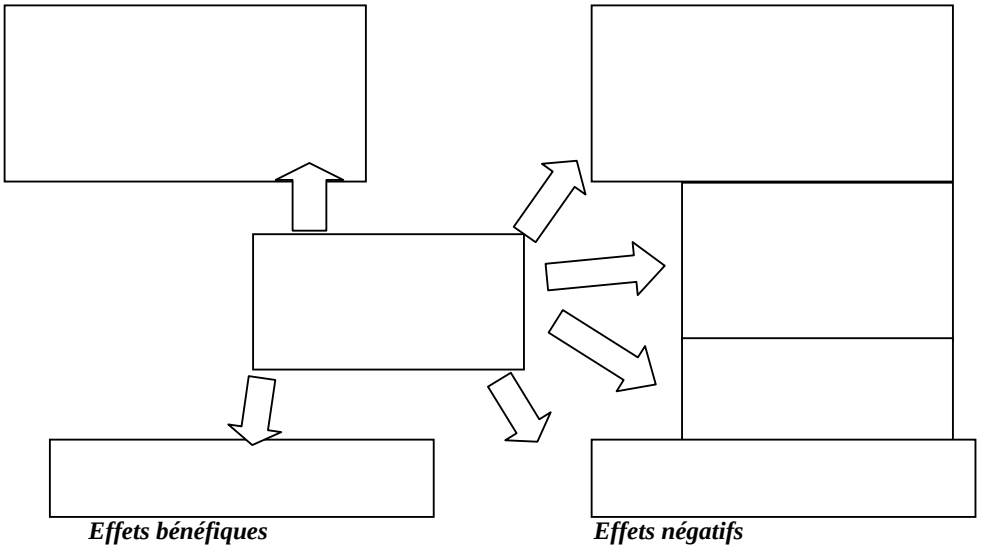
L'Ecole Normale Superieure dispense des cours de biologie et de chimie traitant de l'environnement

Ces trois institutions délivrent des diplômes de niveau : Licence en biologie, Ingénieur agronome, DEA en biologie, DEA en Espace & Environnement, Ingénieur industriel. Même s'il ne s'agit pas de diplôme ou certificat spécifiquement environnemental, les solutions applicables dans le cadre de la gestion de l'environnement et qui se réfèrent aux principes d'éco-consommation sont reprises dans différents modules transversaux.

B. Principaux modules proposés

a. Généralités

Les différents modules dont il est question se retrouvent dans le domaine de l'enseignement agronomique. Or, l'agriculture, plus que toute autre activité entretient des relations privilégiées avec l'environnement. Ses pratiques influent en effet directement sur le milieu, que ce soit positivement ou négativement (voir schéma ci-dessous). Nombreux modules interviennent à différents niveaux de ce schéma.



b. Principaux modules

Module agroécologie

► ***Objectif***

Ce module agroécologie a pour objectif de fournir un bagage intellectuel pour comprendre le concept d'une agriculture durable qui contribue à un développement durable

Pour la FAO, le développement durable est la gestion et la conservation de la base des ressources naturelles et l'orientation des changements institutionnels et technologiques de manière à garantir la satisfaction continuelle des besoins humains de la présente et des futures générations.

► ***Appellations***

L'agriculture biologique : s'oriente vers la production d'aliments plus sains, plus énergétique et renonce à l'utilisation d'herbicides et d'autres biacides synthétiques.

Comme l'agriculture biologique intègre des aspects écologiques, on la désigne par l'expression « **agriculture écologique** » dans certains pays.

Elle fait un appel prioritaire à la matière organique pour l'entretien de la fertilité des sols, d'où l'expression « **agriculture organique** »

Enfin, elle vise à la préservation des sols, des ressources naturelles, de l'environnement et au maintien des agriculteurs, d'où l'expression « **agriculture durable** ».

► ***Caractéristiques***

L'agroécologie doit être :

1° Economiquement sain :

En d'autres mots, elle préserve la qualité des ressources naturelles et qu'elle améliore la dynamique de l'ensemble de l'agroécosystème.

« Un écosystème est un champ d'action composé d'organismes vivants, de composantes naturelles dénuées de vie et d'éléments techniques, qui sont en interaction pour l'énergie, la matière et l'information, entre eux et avec leur environnement »

On peut faire une distinction entre : a. écosystèmes **naturels** ; b. écosystèmes **anthropogènes** : écosystèmes agraires et écosystèmes forestiers d'une part et écosystèmes techniques (urbains et industriels) d'autre part.

2° Economiquement viable

Elle permet aux agriculteurs de produire suffisamment pour assurer leur autonomie et/ou un revenu, et de fournir un profit suffisant pour garantir le travail et les frais engagés.

La viabilité économique se mesure non seulement en terme de production agricole directe (rendement) mais également en fonction de critères tels que la préservation et le recyclage des ressources et la minimisation des risques sur l'environnement..

3° Techniquement approprié

Ceci veut dire avoir la **capacité d'adaptation** aux changements incessants des conditions dans lesquelles évolue l'agriculture (croissance démographique, politique, demande de marché, changements climatiques, etc.). Ceci implique le développement des techniques plus appropriées et des innovations sur le plan social et culturel.

Aspect écologique de l'agriculture durable

Le système agroécologique se base sur une exploitation des ressources naturelles durables, avec un minimum d'apport extérieur. L'idée maîtresse est le recyclage. Le recyclage des résidus de récolte et les ordures ménagères sont utilisées pour produire du compost et retourner dans les champs.

Principales menaces écologiques en agriculture

Etant donné que l'agriculture utilise essentiellement des ressources naturelles comme facteurs de production, la durabilité de l'agriculture dépend d'abord de la durabilité de ces ressources naturelles. Les principales menaces sont le suivantes :

Pollution des eaux
Facteurs de la pollution : pesticides en suspension, notamment par traitements aériens ; dégagements d'ammoniac à partir des engrais et des lisiers

Dégradation des sols

Selon le cas : baisse du taux de matière organique ; érosion ; contamination par les pesticides et métaux lourds ; salinisation ; alcalinisation ou acidification ; compactage

- **Réduction de biodiversité**

Par simplification des systèmes agricoles ; agrandissement des parcelles par suppression des haies, talus, fossés, bois, landes ; par drainage des zones humides ; par suppression du pâturage dans certaines zones ; par empoisonnement dû aux pesticides ; par disparition des variétés anciennes et développement de variétés hybrides

Modification du climat

La contribution de l'agriculture est due principalement aux combustions, fermentations diverses et à l'emploi de certains pesticides, en particulier le bromure de méthyle. Les ruminants produisent du méthane.

- Menaces sur l'environnement humain :

- aides alimentaires (excédents subventionnés pour l'exportation par les pays occidentaux) contribuent à désorganiser les agricultures locales
- organismes génétiquement modifiés (OGM)

Module fertilisation

Dans ce module, il faut attirer l'attention sur deux aspects de la fertilisation : aspect pollution et aspect protection de l'environnement

- **Effet de pollution :**

Deux types de pollutions par les engrais sont à craindre : pollution minérale et pollution organique

a. Pollution minérale

- L'accumulation de NO_3^- dans les nappes phréatiques : ***Les sources de l'augmentation*** de la pollution aux nitrates
  - drainage des nitrates dus à l'utilisation d'engrais artificiels à base d'azote minérale. si les doses appliquées dépassent les besoins physiologiques des plantes ils se retrouvent dans les nappes souterraines et polluent l'eau
  - l'accumulation de déchets solides (déchets des jardins, ordures ménagères)
  - pool d'azote par la minéralisation des résidus des récoltes et les engrais verts des régions agraires intensivement exploitées
  - des sols surengraissés avec du purin

Tout l'azote drainé n'atteint pas nécessairement la nappe, il peut y avoir dénitrification dans des horizons profonds et réducteurs. Il faut souligner que le risque est important sur les périmètres intensifiés, sur les plantations industrielles (canne à sucre, thé, coton, …).

- l'eutrophisation : elle correspond à un enrichissement de l'eau en substances minérales nutritives telles que les phosphates et les nitrates : de fortes concentrations en phosphates et nitrates entraînent un développement excessif de la végétation aquatique (particulièrement les algues vertes microscopiques et des bactéries). La prolifération d'algues vertes et de bactéries finit par consommer presque tout l'oxygène du système. Le fonctionnement de l'écosystème aquatique est gravement perturbé mettant en danger les autres êtres vivants du milieu. Ce risque existe même sans engrais : **il est accentué par une mauvaise maîtrise de l'érosio**n.

- En outre, l'engrais peut apporter des impuretés à l'état de trace qui s'accumulent dans le sol. L'exemple actuellement discuté est celui du cadmium apporté par les phosphates provenant

des gisements d'origine sédimentaire. Dans des sols acides le cadmium est relativement soluble et il est absorbé par la plante.

- Dans les études sur l'évolution globale de l'atmosphère et du climat, une grande attention est portée aux émissions d'oxydes d'azote (N_2O, NO et NO_2) et d'ammoniac (NH_3). La dénitrification produit des oxydes d'azote, notamment dans les rizières, les apports d'engrais azotés augmentent cette émission. De même, la volatilisation de l'ammoniac est un phénomène fréquent après les apports d'urée, aussi bien dans les sols drainés que dans les rizières.

b. Pollution organique

- la pollution organiques : les effluents domestiques en sont à l'origine de même que l'agriculture via les engrais organiques entraînés par ruissellement et de nombreuses industries comme les fabriques agro-alimentaires (laiteries, abattoirs, conserveries, sogestal…)

En matière de pollution et dégradation du milieu naturel, il faut bien distinguer entre :
- les zones à apports d'engrais excessifs, où il existe des risques de pollution par excès ou accumulation
- les zones à apports d'engrais insuffisants, où l'on risque des dégradations par épuisement du sol, éventuellement accrus par l'extension des surfaces cultivées vers des zones fragiles

❑ **Protection de l'environnement**

L'utilisation raisonnée des engrais est bénéfique pour l'environnement :

➢ L'engrais peut avoir un effet d'épuration ou de protection de l'environnement. Il permet d'augmenter la biomasse produite et donc la quantité de CO_2 de l'air transformée en matière organique (séquestration du carbone). Cette matière organique sera minéralisée progressivement, mais une partie reste stockée pour une longue période dans le sol ou les sédiments.

➢ D'autre part, l'augmentation des rendements des terres favorables permet de laisser les zones marginales sous végétation naturelle, ce qui évite des émissions supplémentaires de gaz carbonique dues au défrichement de ces zones.

➢ De nombreuses zones urbaines souffrent de la dégradation de l'environnement. L'agriculture urbaine bien entreprise et bien suivi peut contribuer à la restauration de l'environnement de ces zones, reverdir les zones dénudées et restaurer les régimes hydrologiques et conserver le sol. Les espaces verts ou la plantation des arbres d'usage multiple peut rencontrer les besoins environnementaux et alimentaires

➢ Les ménages urbains produisent des déchets pouvant être réutilisés par l'agriculture urbaine pour la fertilisation et les eaux usées pour l'irrigation des cultures

Module phytotechnie

Le feu et l'agriculture

Le feu est le moyen habituel pour réduire une végétation devenue encombrante, pour éliminer les résidus de culture gênante en cendres fertilisantes avant le semis. Il est aussi utilisé pour l'entretien des pâturages. Mais c'est aussi l'incendie qui ravage les plantations ou même des forêts entières pendant les périodes déjà sinistrées par la sécheresse. C'est enfin une pratique magique pour purifier, pratique souvent efficace car le feu détruit une grande quantité de ravageurs et de vecteurs de maladies humaines et animales. Il n'est donc pas étonnant que la question des feux déchaîne des passions.

➢ Le feu détruit la plus grande partie des matières végétales présentes à la surface du sol. Le carbone est transformé en CO_2. L'émission totale de gaz carbonique d'origine agricole n'est pas négligeable. Mais d'après Fontan (1933), le brûlage annuel de la savane ou des résidus de

récolte recycle dans l'atmosphère le carbone prélevé et il ne modifie donc pas le bilan à long terme du CO_2 de l'air

➢ L'azote, transformé en produits volatils, est évacué dans l'atmosphère principalement sous forme de N_2. Une petite partie, émise sous forme de NH_3, et d'oxydes d'azote (NO et NO_2), peut atteindre la haute atmosphère où elle séjourne plus longtemps et participe aux réactions de formation et de destruction de l'ozone.

➢ Les autres minéraux forment les cendres, produit basique en raison de sa richesse en potasse qui contient en outre des bases (Ca, Mg et Na), du phosphore et des oligo-éléments, dans des proportions qui reflètent le contenu minéral des plantes qui ont été brûlées.

L'alternative serait de récolter et de collecter cette végétation et résidus encombrants et gênants pour faire du fumier ou du compost, ce qui pose de nombreux autres problèmes (transport, organisation, etc.). Cette alternative limiterait considérablement les pertes en matière organique, en azote et en soufre. Une partie non négligeable de la biomasse serait ainsi recyclée dans toutes les régions où l'association agriculture-élevage est développée.

Résidus de récolte et pailles de brousse peuvent aussi être compostés à proximité des lieux de récolte, ce qui limite les transports.
La fabrication, avec des moyens rudimentaires, à l'échelle familiale, de biogaz pour l'éclairage et/ou la cuisine constitue souvent une technique alternative au brûlis des résidus de récolte

Module amélioration des plantes

L'agriculture est par nature un système biologique qui n'est pas en équilibre avec son environnement. Il s'agit en effet de ce que l'on appelle les conséquences de la domestication.

La domestication est l'ensemble des modifications apparues chez les espèces à la suite de leur mise en culture. L'agriculteur introduit, consciemment ou inconsciemment, des pressions de sélection nouvelles qui provoquent, dans les populations, des changements rapides dans les fréquences allèliques

En nature, les populations sont hétérogènes, à cause de la **diversité et de l'irrégularité des facteurs d'environnement.** La mise en culture correspond toujours à une uniformisation des pressions de sélection exercées sur les plantes et entraîne par conséquent chez celles-ci une réduction rapide de la diversité. Or normalement :

- les plantes sont soumises à une pression de sélection de la part des animaux phytophages. Elles s'y sont adaptées par l'acquisition de moyens de défense mécaniques: épaississement de l'écorce ou de la cuticule, différenciation de poils, d'épines ou d'aiguillons. L'homme a domestiqué et multiplié, chaque fois que c'était possible, les formes inermes, à graines et fruits accessibles; la protection naturelle est alors remplacée par une protection artificielle qui ne cadre pas toujours avec la protection de l'environnement.

- les plantes spontanées ont en outre acquis une résistance au moins partielle à de nombreuses maladies locales. Les formes cultivées sont placées dans un environnement où les chances d'infection sont plus rares. Cependant, quand une infection se produit, ses conséquences sont plus désastreuses que chez leurs ancêtres, parce que beaucoup de gènes de résistance ont été perdus. L'introduction d'un parasite étranger ou la culture d'une plante dans une région nouvelle peuvent avoir les mêmes conséquences graves, parce que la plante n'a pas eu l'occasion de sélectionner des moyens de défense contre ces parasites.

« La monoculture, la culture d'une même variété sur de grandes étendues en sont des illustrations extrêmes ».

Quand ces variétés portent des caractères de résistance à des agresseurs biologiques ou à des herbicides, notamment dans le cas des OGM, peuvent avoir un effet indirect sur leur environnement biologique en favorisant la multiplication de parasites capables de contourner ces résistances ou de mauvaises herbes résistantes à telle ou telle molécule phytotoxique.

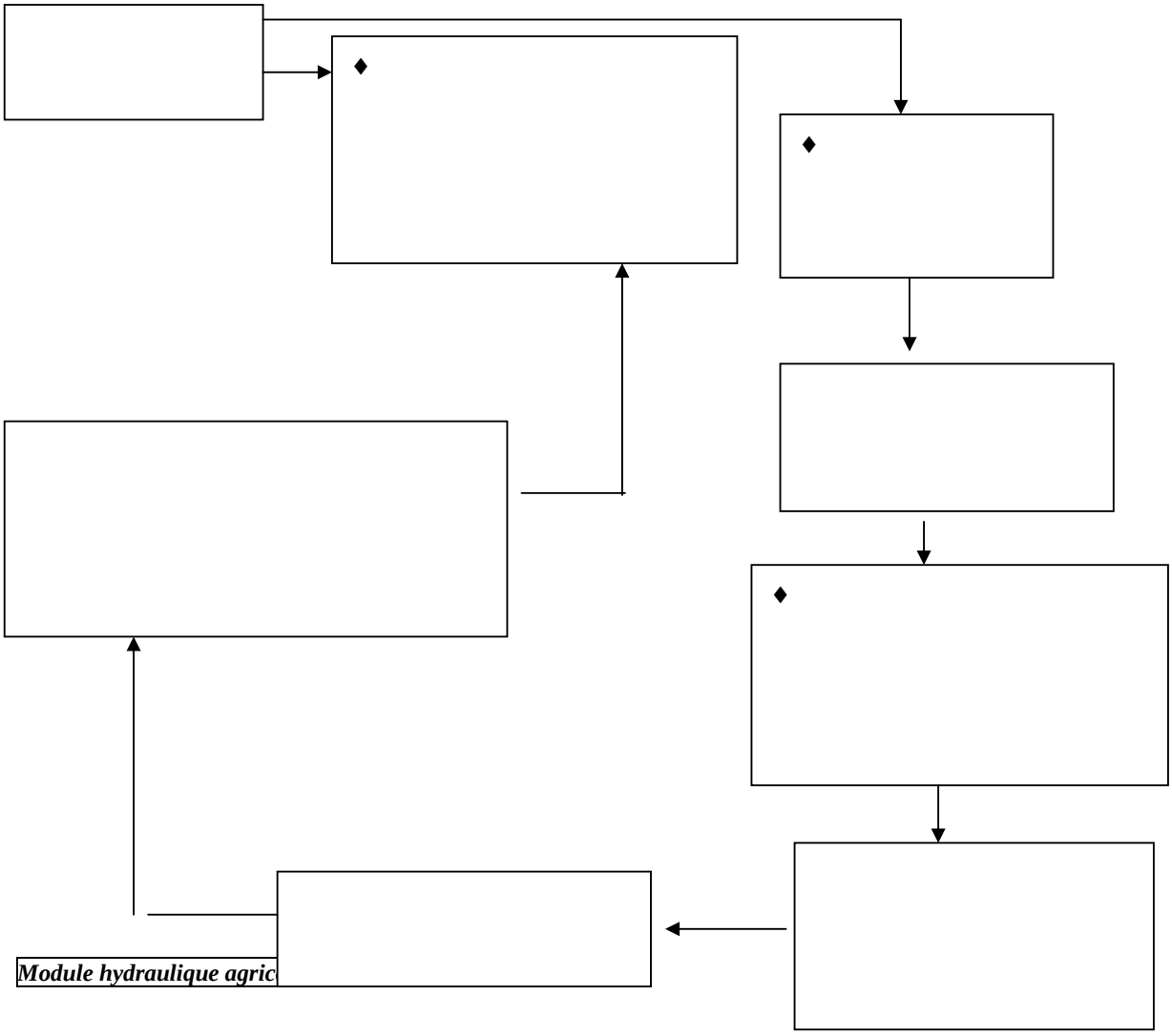
En d'autres mots, l***es mesures d'intensification*** provoquent un appauvrissement des variétés de plantes et d'animaux.

Pour atténuer les problèmes (**charge sur l'environnement**) le concept suivant est avancé :

- l'extensification de l'agriculture : diminution quantitative de la production . Cette diminution éventuelle du rendement et une gestion plus difficile sont compensées par des buts écologiques : une plus grande richesse de variétés, une meilleure protection des variétés de plantes et des espèces animales

Ce concept implique la conservation et l'utilisation efficiente de la diversité génétique

Source de la variation génétique, maintien et utilisation de la diversité génétique



Pour aménager les eaux on détruit souvent la végétation des rives. L'anéantissement des variations de zones d'ombre et d lumière entraîne une homogénéisation des espèces. La consolidation des rives et des horizons est nuisible aux espèces spécialistes de ces biotopes.

L'anéantissement des sols d'eau par les mesures de construction diminue le nombre d'espèces installées, surtout de plantes d'eau, et entraîne un appauvrissement des espèces animales

Module Ecologie des paysages

L'écologie des paysages ou écologie géographique fait partie de la géographie. Elle analyse d'un point de scientifique l'organisation des paysages et son incidence dans l'espace

IV. Opportunités et recommandations

Pensez-vous qu'il soit possible de traiter de la problématique de l'environnement dans la plupart des cours dispensés dans les institutions supérieures du pays ?

Même s'il ne soit pas indispensable de créer des départements spécialisés, la naissance ces dernières années des institutions offrant des enseignements supérieurs, le fait que beaucoup de modules dispensés dans certaines de ces institutions traitent de l'environnement constitue une opportunité pour une formation permanente dans le domaine. La recommandation serait une sensibilisation des titulaires des modules en question pour le renforcement de l'aspect environnemental. Ceci permettrait de lever une des contraintes majeures qu'est le manque où l'insuffisance du personnel qualifié.

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PROGRAMME DE L'EDUCATION ENVIRONNEMEN TALE EN R.D.C.

Prof. AYOBANGIRA SAMVURA et Prof. ULYEL

I. INTRODUCTION

La R.D.C. est un pays se trouvant à cheval sur l'équateur, s'étendant de l'océan Atlantique jusqu'à mi-chemin vers l'océan Indien. Il comprend une vaste cuvette centrale dominée par un massif forestier à formations climatiques, des plateaux à forêts sèches et savanes ainsi que de hautes montagnes à forêts sempervirentes et à formations alpines.

De ce fait, le pays couvre une diversité des sites environnementaux qu'il faut :

- bien identifier par des outils et méthodes actualisés ;
- connaître leur histoire ;
- déterminer les indicateurs pertinents tel que ;
  - la concentration de tel polluant ;
  - la présence ou l'absence de telle espèce végétale ou animale ;
  - la concentration de tel métal dans le sol ;
  - la présence et l'intensification des activités humaines ;
- déterminer l'interaction des facteurs environnementaux sur les sites et ses conséquences.

Pour y arriver, il faut un programme soutenu articulé sur les principales disciplines de l'écologie actuellement dispensées dans les Instituts et Université de la R.D.C.

II. PROGRAMMES ACTUELS D'ENSEIGNEMENT INTERVENANT EN MATIERE DE L'ENVIRONNEMENT.

L'enseignement supérieur et universitaire en R.D.C compte plusieurs facultés et options bien avancées en science de l'environnement et forme des Gradués et Licencié dans divers domaines. Nous pouvons citer :

2.1.1. UNIVERSITE DE KINSHASA
2.1.1.1. FACULTE DES SCIENCES
2.1.1.1.1. DEPARTEMENT DE BILOGIE

2.1.1.1.1.1. Gradués en Sciences Biologiques
2.1.1.1.1.2. Licenciés en Sciences Biologiques, Option Biotechnologie et Ecologie
2.1.1.1.2.2. Diplôme d'Etudes Approfondies (DEA) en biologie
2.1.1.1.1.4. Doctorat en sciences Biologiques

2.1.1.1.2. DEPARTEMENT DE L'ENVIRONNEMENT

3.1.1.1. Pré – Licence en environnement pour les Gradués d'autres Facultés que la Faculté des Sciences
2.1.1.1.2.2. Licence en Environnement
2.1.1.1.2.3. Diplôme Spéciale de Gestion en Environnement pour les Licenciés
2.2.1.1.1.3.4. Diplôme d'Etudes Approfondies (DEA) en environnement
2.1.1.1.2.5. Doctorat en Environnement

2.1.1.1.3. DEPARTEMENT DES SCIENCES DE LA TERRE

2.1.1.1.3. 1. Gradués en Géographie et en Géologie
2.1.1.1.2.2. Licenciés en Géographie et en Géologie
2.1.1.1.2.3. Diplôme d'Etudes Approfondies (DEA) en Géographie et en Géologie
2.1.1.1.3.4. Doctorat en Géographie et en Géologie

2.1.1.2. FACULTE DES SCIENCES AGRONOMIQUES
2.1.1.2.1. DEPARTEMENT DE GESTION DES RESSOURCES NATURELLES

2.1.1.2.2. Ingénieur en Gestion des Ressources Naturelles
2.1.1.2.3. Diplôme d'Etudes Approfondies (DEA) en gestion des Ressources Naturelles
2.1.1.2.4. Docteur en Agronomie/ Gestion des Ressources Naturelles.

2.1.1.2. FACULTE DE MEDECINE

2.1.1.2.1. Ecole de Santé Publique
Diplôme en santé publique pour médecins de formation

2.1..2. UNIVERSITE DE KISANGANI
2.1.2.1. FACULTE DES SCIENCES

2.1.2.1.1. Gradués en Sciences Biologiques
2.1.2.1.2. Licencié en Sciences Biologique
2.1.2.1.2.1. Ecologie et Conservation de la Nature
2.1.2.1.2.2. Biologie Cellulaire
2.1.2.1.3. Diplôme d'Etudes Approfondies (DEA) en Biologie
2.1.2.1.4. Doctorat en Sciences Biologiques.

2.1.2. UNIVERSITE DE LUBUMBASHI
2.1.2.1. FACULTE DES SCIENCES

2.1.2.1.1. Gradués en Géographie et en Géologie
2.1.2.1.1.1. Licencié en Géographie et en Géologie
2.1.2.1.1.2. Diplôme d'Etudes Approfondies (DEA) en Géographie et en Géologie
2.1.2.1.2.3. Doctorat en géographie et en Géologie

2.1.4. UNIVERSITE CARDINAL MALULA
2.1. 4.1. FACULTE DES SCIENCES DE L'ENVIRONNEMENT

2.1.4.1.1. Gradués en Sciences de l'Environnement
2.1.4.1.2. Licencié en Sciences de l'environnement
2.1.4.1.3. Diplôme d'Etudes Approfondies (DEA) en Environnement
2.1.4.1.4. Doctorat en Environnement

2.2.4. INSTITUT SUPERIEUR DE DEVELOPPMENT RURAL , BUKAVU
KANANGA , GOMA

2.2.4.1. Gradué en Développement Rural : Option : Environnement et Développement Durable
2.2.4.2. Licencié en Développement Rural : Option : Environnement et Développement Durable

Pour l'ISDR- GL (à ouvrir en septembre)

2.2.4.3. Gradués en Gestion des Ressources Naturelles et Bonne Gouvernance
- Licenciés en Gestion des Ressources Naturelles et Bonne Gouvernance

2.2.1.5. INSTITUT SUPERIEURS PEAGOGIQUES

2.2.5.1. .Licenciés en Géographie et Gestion de l'Environnement
2.2..5.2. Gradué en Ecologie et Protection de la Nature, (ISP/RUTSHURU)

2.2.6. INSTITUT SUPERIEUR DE TOURISME (IST /GOMA)
2.2.6.1. Gradués en Tourisme, Loisir et Conservation de la Nature

2.2.7. INSTITUT SUPERIEUR D'ECOLOGIE et CONSERVATION DE LA NATURE (Lwiro/Bukavu)

2.2.7.1. Gradués en Ecologie et Conservation de la Nature

2.2.8. INSTITUTS SUPERIEURS DES MILIEUX URBAINS

2.2.8.1. Gradués en Développement Communautaire : Option Gestion de l'Environnement
2.2.8.2. Licenciés en Développement Communautaire : Option Gestion de l'Environnement

2.3. QUELQUES COURS DISPENSES DANS LE CADRE DE L'EDUCATION A L'ENVIRONNEMENT

2.3.1. INSTITUT DES BATIMENTS ET TRAVAUX PUBLICS
Grade : Ir Constructions Industrielles et Bâtiments :

Option : Hydraulique et Environnement

- Hydrologie
- Les Installations Sanitaires
- Hydraulique urbaine et travaux Hydrauliques
- Traitement des eaux
- Assainissement Urbain
- Hydraulique Agricole
- Salubrité de l'Environnement

2.3.2. INSTITUTS SUPERIEURS DE DEVELOPPEMENT RURAL
Grade : Licencié en Développement Rural

Option : Environnement et Développement Durable

- Aménagement Agro – pastorale
- Gestion durable des ressources naturelles
- Droit de l'Environnement
- Agriculture durable
- Sylviculture
- Utilisation durable des ressources naturelles
- Gestion de l'Environnement
- Eco développement
- Problématique energétique en milieu rural
- Pisciculture et technique de pêche
- Théories et pratiques de la protection de l'Environnement
- Economie de l'Environnement
- Ecologie végétale

Option : Gestion de l'environnement

- Cycles biochimiques, bilans radioactifs
- Perception des problèmes de l'Environnement
- Industrie, Energie et Environnement
- Pathologie humaine et Environnement
- Agriculture, Forêt et Environnement
- Environnements et Tourisme
- Aspects socio – politique de la problématique de l'Environnement
- Aspects économiques et juridiques de l'Environnement
- Séminaire de Gestion de l'Environnement

2.3.3. INSTITUTS SUPERIEURS PEDAGOGIQUES

Grade : Licencié en Pédagogie Appliquée
Option : Géographie et Gestion des l'Environnement

- Notion de l'Environnement et de Géographie
- Notions de mathématiques et de physique appliquées à la Géographie et à l'Environnement
- Gestion des ressources naturelles
- Pollution, nuisances et la toxicologie
- Education mésologique et le droit de l'Environnement
- Méthodes de recherche en géographie et en Environnement

- Ecologie et conservation de la nature
- Techniques d'assainissement du milieu
- Ecologie et conservation des ressources naturelles

2.3.4. UNIVERSITES
Faculté d'Agronomie
Grade : Ir agronome
Option : Eaux et Forêts

- Législation agricole et Environnementale
- Ecosystèmes forestiers et Gestions des aires protégées
- L' Economie et l'Environnement

Option : Faune et Flore

- La Dynamique des systèmes Environnementaux et le reboisement
- Economie des ressources naturelles et l'éco- développement
- La gestion du sol, de l'eau et l'écocotoxicologie
- L'équilibre agro – pastorale en milieu tropical
- La législation agricole et Environnementale
- L'hygiène Environnementale et la gestion des ressources aquatiques
- La gestion des aires protégées des zones périphériques

FAULTE DES SCIENCES
Grade : Licencié en Science
Option : Environnement

- Introduction générale à l'étude de l'Environnement
- Le droit de l'Environnement
- La démographie et l'Environnement
- La statistique appliquée à l'Environnement
- La pathologie et nuisance
- La gestion des ressources naturelles
- La toxicologie, l'écotoxicologie, la biotechnologie et l'Environnement
- L'Environnement et la santé publique
- La gestion de la qualité de l'Environnement et évaluation d'impacts sur l'Environnement
- L'analyse systémique et la modélisation en gestion de l'Environnement et la méthodologie de la recherche scientifique
- L'écoclimatologie
- La géologie de l'Environnement
- Les techniques de planification de la gestion de l'Environnement
- La géologie de l'Environnement
- Les techniques de planification de la gestion de l'Environnement

Cependant avec ces programmes l'accent n'est pas suffisamment mis sur l'éducation à l'Environnement et Assainissement.

III. RENFORCEMENT DU PROGRAMME DE L'EDUCATION ENVIRONNEMENTALE EN R.D.C.

Avec les structures actuelles de l'enseignement supérieur et universitaire en R.D.C., il est possible de renforcer le programme d'éducation environnementale par un programme articulé sur l'ossature des modules ci-après :

- Méthodes d'identification des sites environnementaux ;
- Outils d'identification et de surveillance de l'environnement.
- Climatologie comparée des biotopes de la R.D.C.
- Actions anthropiques dans les biosopes et leurs conséquences ;
- Mouvements migratoires ; des espèces animales (y compris l'homme) et leurs impacts sur les différents biotopes ;

- Orographie et hydrographie des bassins versant de la R.D.C.
- Droit congolais de l'Environnement ;
- Les ressources naturelles transfrontalières de la R.D.C.
- Gestion transfrontalière des ressources naturelles ;
- Droit comparé de l'Environnement ;
- Ornithologie.

Les modules seront complétés par des voyages d'études à l'intérieur du pays et dans les pays du bassin de Nil.

IV. ORGANISATION DES ENSEIGNEMENTS DE L'EDUCATION A L'ENVIRONNEMENT DANS LE CADRE DU BASSIN DE NIL

La partie orientale de la R.D.C. comprend plusieurs instituts et universités ayant des programmes axés sur l'environnement.
Ces institutions offrent un cadre idéal pour renforcer les recherches dans le cadre d'études environnementales.
La priorité sera donnée sur la prise des photos aériennes des différentes sources du bassin de Nil afin de constituer les données actuelles de références permettant d'évaluer la dégradation et prévoir l'évolution future.

- Organiser les sites de visite du bassin : Rutshuru, Manguujipa , Rwenzori,
- Dresser le cartes des sites caractéristiques (végétation, cours d'eau, concentrations humaines,
- Identifier les espèces migratrices Gorilles de montagnes, éléphants, les oiseaux (station Lulimbi, Kyavinyonge)
- Rréaliser des films sur les différents sites et les problèmes environnementaux de chaque site (Vitshumbi, Kyavinyonge , lisière du Parc National des Virunga)
- Lancer le programme d'éducation environnementale dans les institutions et Universités/ISDR-GL, UNIKIS)

Pour y arriver il faudrait renforcer les capacités des institutions ci – après :

1. INSTITUT SUPERIEUR DE DEVELOPPMENT RURAL DES GRANS LACS

- Appareil Photo digitale
- Equipement informatique pour projection film et dias
- Renforcer le service informatique pour connection Internet
- Réhabiliter la station ornithologique de Lulimbi sur le Lac Edouard à la frontière RDC et Uganda entre deux grandes rivières du bassin du Nil (Rutshuru et Ishasha)
- Matériel de camping (tente, Lit de camp, groupe électrogène, etc)
- Véhicule tout terrain

2. STATION HYDRO BIOLOGIQUE DE KYAVINYONGE

a. Matériel de Navigation sur le lac et d'équipement des recherches hydro - biologiques

3. UNIVERSITE DE KISANGANI (Faculté des sciences)

Environmental Education at the Higher Education level in Egypt

Dr.Solafa Goueli and Dr. Hassan Kamal

Introduction

The environment is increasingly becoming an area of great concern all over the world. The scope of today's environmental problems is unprecedented: depletion and degradation of natural resources; global warming; pollution; deforestation; destruction of the ozone layer; population pressure, and the escalating waste production of consumerist societies. These are only the most obvious signs of the stresses that the Earth is suffering as a result of human activities. Although these and other environmental problems are not new phenomena, their exponential growth over the last two decades led to the realization of their short-term and long-term impact on the very survival of the Earth.

Environmental Education and Environmental Awareness are viewed though lots of international conferences and events as the foundation of any strategy targeting the environment at the higher education level that are capable of presenting and transferring practical directives for youth and adults in order to assist them in dealing with environmental challenges (For example, causes, behavior and attitudes, consequences and suggested solutions).

Realities of Environmental Education and Environmental Awareness in Egypt

Egyptian universities are generally interested in training specialists in definite fields such as medicine, engineering, law, etc. as well as training researchers. While training, the concept of environmental education may not find its proper channel to reach the respective students.

University staff members believe that general education is the responsibility of the pre-university level. This may be due to the lack of conviction on the part of university planners of the utility of deviation from traditional lines used for several decades, which may have been taken from old rigid systems, but they still believe that such lines should not be altered.

Certain fields of specialization like agriculture; engineering and oceanography require direct contact of the students with the environment, but within the narrow limits of their specialization, and not necessarily with the wider scope of the complicated factors that enter in these relationships. Faculties of Science and Faculties of Agriculture offer a reasonable number of courses that are directly or indirectly related to the environment.

Faculties of Education offer two courses of environmental Studies/Education for first and second year primary education students who are enlisted for the degree of BA in Education. However, no environmental courses are offered for students in other department in the same Faculties.

In addition, other specialized courses in many Faculties include environmental dimensions depending on the nature of the course. For example, a few Faculties of Engineering offer some courses like Bases of Environmental Sciences; Environmental management and Theory of Architecture, Environment and Climate. Health Engineering and Irrigation and Environment.

Some planners in universities took interest in the incorporation of environmental dimensions in their teachings, and used it only as a factor in the study without emphasizing the necessity to work for the environment for its own sake. In fact, there is a growing number of university staff members, who are favoring the implementation of a general course of EE to all university students, supplemented by a special course according to the field of specialization.

The first postgraduate course in natural resources and environment in the Egyptian university education system was initiated in 1971, with the establishment of the Department of Natural Resources within the Institute of African Research and Studies of Cairo University, as a requirement for a Master's Degree in Natural Resources.

The "Institute of Environmental Studies and Research," was later established at Ain Shams University in 1983 to serve as a postgraduate institute for environmental sciences/studies. The institute offers different specializations such as Humanities; Educational Foundations, Environmental Media, Law Studies, Economics, Medicine, Engineering and Agriculture. It has now become the center of activity for environmental education on the local, regional and interregional levels. There is also a diploma of environmental sciences in Alexandria University.

Cairo University also has a center for Environmental Studies and Research. However, it was not possible at the time of writing this report to check on the components of their courses or interests.

The attention accrued to the inclusion of environmental education components and/or courses at the higher education level is still far from satisfactory. The realities of the content, andragogy and educational organizations constitute a number of challenges that hinder the success of environmental education. They include but are not exclusive to the following:

- There is no census on the number of courses that are wholly or partially dedicated to the environmental at the higher education level in Egypt.
- Content of courses are usually abstract and not directly linked to the everyday lives of students. Thus, it becomes de-contextualized.
- Content of the courses provide facts and information that are hardly enough to play a meaningful role in fostering environmental awareness and transforming students' values and attitudes towards the environment.
- Huge class sizes at most Egyptian Faculties do not allow the University members to engage with their students to help them think critically about the root causes of environmental problems and empower them to make the necessary attitude transformation.
- Lack of resources in most Faculties (for example, poor libraries, physical conditions, etc.) hinders the process of research for courses related to the environment.
- The importance represented by giving environmental courses less degrees compared to specialized courses results in students' lack of attention or interest in such courses.

Recommendations

Based on the previous report and on the realities that environmental education face in higher education, a number of recommendations could be suggested:

- A reconsideration of university programs in the light of the need for effective environmental education programs for the general university student.
- Implementing a special program in environmental studies and/or education to deal with environmental problems in general and in the Nile Basin environment in particular.
- The necessity of including environmental dimensions in different curricula in all Faculties according to the nature of the curriculum.
- Raise the awareness of the university staff members of the importance of environmental issues and hazards and training them on the different mechanisms to include environmental dimensions in their courses.
- Planning different activities (visits, trips, contests, etc.) in addition to the educational programs that are related to the Nile Basin environment; its problems and viable solutions.
- Activating the "Units for Environment Affairs and Community Development" in all Faculties so as to raise awareness about environmental problems and issues especially in the Nile Basin countries.
- Encouraging scientific studies and research that are conducted by University staff members and students in different environmental fields.
- Establishing an award (or more) in different universities for the best research/study related to Nile Basin environmental problems.

The teaching of Environmental Education within tertiary institutions in Ethiopia

Wolde Mekuria and Solomon Bogale

1. Introduction

➢There are eight Government Universities in Ethiopia,
➢Mekelle and Bahir-dar Universities lie within the Nile basin,
➢Both institutions upgraded to the University level in the year 2000
➢In addition, there are over a dozen private and other governmental higher education institutions.

Ethiopian Case

➢Most of the higher institutions in Ethiopia offer Environmental education:

•Graduate program in Environmental science/engineering in AA University,
•Under graduate and graduate program in Water resource management in Arbaminch University,
•Undergraduate program in Water resource Engineering in Bahirdar University,
•Graduate program in Environmental Forestry in Wondo Genet college of Forestry,
•Undergraduate program in Forestry and Natural Resource Management in Wondo Genet college of Forestry,
•Undergraduate program in Environmental Health science in Jimma University, are some.

➢In addition to the higher institutions, Ethiopia also has ENVIRONMENTAL PROTECTION AUTHORITY
➢Environmental policy:- (improve the well being of the nation through sustainable management of Natural, man- made and cultural resources and the Environment as a whole.

Typical Structural Setup of tertiary institutions (MU- Academic)

2. Land Resource Management and Environmental Protection

Introduction

➢Taking the reality within the country (mainly Land degradation), (LaRMEP) has been evolving the last few years to encompass the entire Land Resources and the Environment.
➢LaRMEP has been commenced its functions with slogan of "efficient utilization of land resources with protected environment"

Structural set-up

➢LaRMEP is set-up to encompass the following five sections that are responsible to:
•train manpower,
•conduct research, and
• provide consultancy services in the respective subjects:

Environmental related courses of the department

➢Environmental courses that are currently offered by the department are:
•Introduction to environmental science
•Integrated Environmental Planning and Management
•Natural Resources and Environmental policy and law
➢However, all of the courses that have been offered by the department are related to natural resources management and environmental protection

Unique feature of LaRMEP (FDANR) - PAP

➢The program was started in the faculty of Dry-land agriculture and natural resources in 1996 with the purpose of:
➢Familiarizing the students to the practical farming world,
➢Furnish students with practical skills,
➢Build their technical capacity for independently experimenting, monitoring and analysing results and report writing.

Research Projects

➢The main research areas of the department are:

•Soil science, management and conservation;

•Water resources management and hydrology;
•Dry land forestry and agro-forestry;
•Land resource survey, land use planning and Evaluation;
•Environmental Management and protection

Selected ongoing Research Projects
➢Environmental impact assessment: a case study at Mesobo cements industry with emphasis on the physical and socio-economic environment.
➢Forest Rehabilitation through Natural Regeneration in Tigry, Northern Ethiopia.
➢Zala-Daget Project (success and failures of soil conservation and dam construction in Tigray highlands, Northern Ethiopia).
➢On-farm water harvesting for rain fed agriculture development

The Way Ahead
➢The department believes in dynamism as a process of development.
➢It uses time telescope: to look at the future closely.
➢The department has decided to upgrade the Environmental Protection section into stream or area of specialization in the academic year 2005/06.
➢To achieve this plan, curriculum development and teaching material preparations are in the processes.
➢Some of the courses recommended to be added on the existing curriculum of the department by the Environmental Protection section include:
•Management of dry-land environment
•Population and Environment
•Modelling Environmental systems
•Introduction to climate change and mitigation
•Ecological tourism (Ecotourism planning and management)
•Biodiversity and nature conservation
•Environmental pollution I & II, and
•Urban planning and Urban Waste Management
•Introduction to Environmental Impact Assessment.

Extracurricular activity of EP section
➢**Environmental club**
➢The EP section of the department of LaRMEP administer, strengthen, and monitor the environmental club of MU.
➢The club is established on June 5, 2001, by students of LaRMEP.
➢**Objectives:**
•To create environmental awareness at local, regional and national level;
•To promote environmental education at all educational institutes of the country;
•To undertake environmental research within the country;
•To facilitate communication among different environmental institutes of the world;
•To collect and disseminate information on temporal and spatial environmental changes; and
•To introduce environmental impact assessment for its members.

Examples on environmental club activities:
Greening the compound of the campus;
➢Organizing and preparing monthly seminars, and
➢Creating awareness particularly on resource management and depletion at community level

currently the members of the club are more than 500.

Graduate prospects
➢Clearly, the merits of graduates in LaRMEP are very broad, he/she may serve as:
•Soil fertility expert;
•Soil and Water conservation expert;
•Analysts in soil and water testing laboratories;
•Environmentalists;
•Dry-land forestry expert;
•Researcher in areas of various natural sciences;
•Water resources management expert.

➢Indeed, the department accepts the reality that its graduates are not fully quenched with their academic desire, they may want to specialize further.
➢The following and other similar fields really fit to them for further specialization:

•Environmental sciences
•Water resources management
•Soil chemistry and soil fertility
•Soil survey and Land Evaluation
•Forest management and utilization
•Soil and water conservation engineering
•Forest ecology, etc.

THE TEACHING OF ENVIRONMENTAL EDUCATION WITHIN TERTIARY INSTITUTIONS IN KENYA

By Raphael J.A. Kapiyo, PhD Associate Director. School of Environment and Earth Science (SEES) Maseno University, Kenya and
Dr. Ayub Macharia Ndaruga, Kenyatta University, Kenya

Education System in Kenya

Kenya currently operates on the 8-4-4 system of education, where learners go through eight years of primary education, four years of secondary education and a four year minimum for university education. At each stage of the system, a school leaver can branch off to a training institution. Post form four group may join a tertiary institution to undertake a broad range of programmes dictated by the professional area of interest, such as computer technology, medical, forestry, fisheries, teacher education to name a few.

The tertiary institutions that exist in the country include the universities (public and private) polytechnics, institutes of technology, technical teachers college, science teachers college at diploma level, technical training institutions and the teacher training colleges for primary schools. These institutions are spread around the country and offer specific programmes to suit the needs of the job market.

Sometimes private colleges provide training which are tailor- made like saloon and beautification courses. The population handled in any given year could be up to 30,000 for all these institutions.
Although the curriculum offered other than at university are specific and efficient, they are narrow and focused only on their specific agenda. This raises concern about their level of sensitivity to the surroundings of the impact employment encounters would have on the environment in general. A scrutiny of the curricula at TTC's, KTTC, and Technical training institutions indicate complete absence of a course on environment or natural resource management. Elements of environmental concerns only come in as content specific but not as an environmental agenda. For examples; issues of soil erosion or deforestation come up in agricultural courses but as a productivity issue/problem. Similarly topics of waste disposal might come up in workshop management courses, or hotel and catering studies, but not as typical environmental courses. These training institutions have not paid close attention to the environmental agenda.

It is only in one institution at diploma level, namely, the Kenya Science Teachers college where environmental studies was undertaken as one of the general subjects in the curriculum. This was mainly because both at primary and secondary school levels there is no time allocated for the study of the environment. The examinable subjects completely exclude Environment as an area of study. If a tertiary institution teaches this general area of environment, then it is merely for awareness but with limited indication of where it could be applied.

Given their nature, it is these institutions which should incorporate the study of environment as a crucial component in their syllabus. Most graduates from these institutions are largely self employed in varied sectors and may need a greater knowledge on environmental management

Growth of Environmental Education in Kenya

General Environmental Education Policy in Kenya
Development in environmental concerns internationally have influenced policy responses to EE & T in Kenya. Nevertheless, EET evolution has been very slow in Kenya with only limited integration into formal and non formal education. Policies influencing EET are documented below.

- 1971- Formal of adhoc committee to prepare Kenyan Environmental Report that was presented at Stockholm conference of 1972
- 1974 – Formation of the National Environment Secretariat
- 1977- Ministry of education issued a policy requiring senior education inspectors and other senior educationists to meet and develop guidelines to integrate environmental issues in the curriculum

- 1979 - Kenya Science Teachers College integrated EE as a score course for teacher trainees
- 1981 – UON Small unit on education with in department of Architecture and design – later phased out
- 1984- New 8.4 curriculum introduced – Environmental issues well integrated
- 1986 – Kenyatta University integrated EE as a core course for teacher trainees as undergraduate level. Late 1980s – post graduate Environmental courses at Moi Univesity.
- 1988 – Parliament approved sessional Paper No 6 on Education and Manpower training for the next decade and beyond with a call to make environmental studies part and parcel of every training
- 1994 – National Environment action Plan (NEAP) launched – chapter 09 dedicate to public participation and environmental education.
- 1999 – Kenyan parliament passes the Environmental Management and Coordination Act (EMCA) – Party III – 9 (2)(m) authorized NEMA to undertake in cooperation with relevant lead agencies, programmes, intended to enhance EE and public awareness.
- 2000- NEMA formed – An institution legally bound to coordinate environmental conversation activities (including education) in Kenya.
- 2003 – Present – NEMA in collaboration with lead agencies are in the process of developing an environmental education strategy for Kenya.

University Education

Kenya currently has six public Universities and about 12 private universities all offering a broad range of degree programmes up to PhD levels. Among the public universities within their constituent colleges, each has had a particular area of focus, even though this has changed over time. Whereas the University of Nairobi started with a wide range of focus areas eg, Medicine, humanities, engineering, Law, Basic Science, Commerce, Education, Languages, Food Science and Technology, others started with single focus areas. Kenyatta University started as a college of Education and later broadened; Egerton University started as an agriculture college, Moi University as a technological University, Jomo Kenyatta University of agriculture and Technology's name speak for itself and the youngest of them all Maseno University inherited education but has also widened her scope and coverage. This arrangement allowed for a general reflective programme which could focus on issues about environment form their focal areas. At their inception the curriculum of these institutions had nothing on environmental studies/education.

It was in 1981 when University of Nairobi had a small unit within the Department of Architecture and Design on environment, but it was phased out in due course. Around mid 1980s the issue of introducing environmental education as programme was discussed and implemented at Kenyatta University. This programme later expanded and there are about three programmes as founing area of study. The orientation of the programmes is to sensitize scholars on the degrading condition of the environment, and to lean about conventions and mitigation strategies. Moi University introduced a programme on environmental studies in the late 1980s. The programmes at post-graduate level offered under the school of Environmental Studies. All the eight programmes do not touch directly on the environmental education component. They programmes focus on environmental law, biological aspects, information processing, earth/physical sciences, etc. The training here has been at a higher level but only for a few people. Issues of River Nile, Lake Victoria come in but as concepts only . Egerton University have a programme on Environment and Natural Resources Management at undergraduate level. This programme is broad and approaches the field from efficient and sustainable use of resource Management. Only about 30 students are involved in a given year.

There are limited elements of environmental concerns raised within the Agricultural education programme. The content covered could touch many areas but not specifically priontized on issues like River Nile.
The Maseno University programme for Environmental studies was mounted in 1988 with 22 students who graduated in 2003. The programme raises the environmental concerns, identifies the reasons and delves into techniques and approaches for their mitigation. This programme is on-going and the Department of environmental Studies has since been expanded to the School of Environment and Earth

Sciences. Most of the school courses will be taught from the environmental angle. Environmental studies here is given a very wide multidisciplinary approach where all the relevant aspects are included. The specific areas included environmental ethics, environmental Law, environment economics among the many ecology courses. At Maseno, there is a students Association on Environment. Every week they produce a message on a critical issue

As part of the educations programme all the 400 or so students take in their fourth year an environmental education course. It is only one but quiet general. It covers the environmental issues and techniques of teaching environmental concerns at the secondary School level.

Generally the environmental education at the university is just getting stronger and prominent, but the students are quiet apprehensive about employment prospects. Of the private
Universities only three offer an environmental component. They include Catholic University, Daystar and Baraton.

It is only the EMCA 1999 Act which has brought a lot of ho9p in the line light, particularly with the Creation of the National Environmental Management Authority (NEMA). As far as content is concerned, issues on the Nile basin are scanty and incidental, only used as examples whenever they occur. The approach used to teach is principally to raise awareness and equip the learns with basic initiative skills for improved environmental management.

Constraints to Development of Environmental Education in Kenya.

EE at tertiary

Tertiary institutions produce the top personnel for government, public service, private sector/industry and all walks of life. It is therefore imperative that tertiary institutions strive to produce graduates with functional environmental literacy to promote faster integration of environmental dimension into all aspects of development of sustainability to be realized.

Incoorporation of EET into Kenya's tertiary institutions has been quite slow. Some of the factors responsible for slow growth of EET in tertiary institutions in Kenya include

- Low priority given to environment due to lack of job opportunities for EE graduates
- High poverty levels which make individuals, families and government to adopt survival tactics.
- Poor economic performance which hinders the government from investing in non urgent but expensive ventures e.g. integration of EE into the curriculum at all levels
- Lack of appropriate policies and legislation to guide prioritization of EET
- Lack of strong environmental movement backed by research, methodology etc.
- Lack of incentives at school and undergraduate levels.
- Student not sure of what EE entails and hence not one of their popular choices
- No mutually sustaining partnerships with government and communities
- Lack of personnel on EE&T

Developing a University Level Course on environmental education based on Nile threats

One of the problems faced with environmental education course in the institutions as it is, is that in the primary and secondary school curriculum there is no specific subject called Environment or Environmental education, This scenario then leaves the graduate teacher who took the environmental education course with a challenge to see how to incorporate environment issues within his/her teaching subjects. The case here is one of mainstreaming environmental education across the curriculum. By this approach it is unclear how much time can be allocated to environmental education specific concepts, or even the amount of content that can be incorporated. For stakeholders in the Environmental educations sector, that approach can be regarded as one step in the right direction. The situation is worse if particular emphasis should be laid on a particular area of content such as River Nile basin threats the question is with a mainstreamed environmental education program, how much of Nile basin threat. Issues would be included among the many environmental education concepts?

In my view this issue can be tackled both in the long term and short term basis. In the long term, one would like to see the subject Environment introduced as a core Curriculum subject like English, Mathematics or branches of Science. Environment has emerged as a new discipline with its own content, method and style of assessment. This area of study deserves recognition, and when that is achieved areas such as River Nile Basin issues could be taught fully within the subject sub-sector, along with other similar content areas.

In the short term mainstreaming of environmental education can continue, but at the University level course, particular attention can be given tot issues of River Nile basin threats. A

complete University level course on River Nile Basin threats is not possible. What the former would call for is development of comprehensive education material eg. books, videos, pamphlets addressing different components of the River Nile basin threats. Although River Nile basin is unique and touches on so many countries, most of the threats are not exclusively unique. Some of those threats are found elsewhere.

An area where this style of environmental education would suffice is through Open Learning or Distance Education. These schemes rely on Modular Courses addressing particular issues. A module could be developed which is River Nile basin threats specific. The module could be offered for two to Three weeks running.

The other approach would be through the Environmental Science/Studies programme which most Universities have. Here again there can be specific mention of River Nile basin threats, and if there is sufficient material then they can be used prominently to teach concepts such as erosion, biodiversity loss, and other forms of degradation including legal implications.

Way forward

It is critical that Environmental educators and environmentalists work together to ensure Environment becomes a core area of Study in all tertiary Institutions.

A network of lecturers in the Universities within the Nile basin or with interest in this area should be formed to become active in the development of the discipline. This would entail critical focus on environmental hot spots that need to be addressed in the Nile basin region and others. There could then be student and Lectures exchanges, and further research and material development in the core areas.

THE TEACHING OF ENVIRONMENTAL EDUCATION WITHIN TERTIARY INSTITUTIONS IN RWANDA

Introduction

There are at least nine (9) tertiary institutions in Rwanda. These include the following universities and institute: Kigali Institute of Education(KIE), Kigali Institute of Health (KHI), Kigali Institute of Science and Technology(KIST), National University of Rwanda(NUR), UNILAK, ULK, Catholic University, ISAE, etc.
Two Research Institute(IRST and ISAR). The overview presented is from the three most important public institutions in the country: NUR, KIE and KIST.

- Apart from NUR the other two and indeed the rest of the universities are very young; all of them having only several years of existence. Even NUR can be considered young because most of the lecturers there joined after 1994.
- Most of the staff members are from different backgrounds and that alone puts some pressure on curricula development.
- The teaching of Environmental Education is given in Rwanda in order to address environmental problems such:
  - Land degradation (Soil erosion, fertility)
  - Water availability and pollution
  - Deforestation and tree cuttings
  - Natural Resources Management Policy implementation

General objectives

- To understand basic principles, management, tools and techniques in environmental systems, with an emphasis on agroforestry, soil and water resources management
- To address the socio-economic development of Rwanda by an increase in agricultural yields and to improve access of the population to good quality drinking water.
- To enhance human resource capacity in natural resources conservation and management

Three main tertiary institutions offer Environmental education related courses

1. NUR curricula

Environmental courses are given at undergraduate level in the faculty of agronomy and the faculty of science and technology respectively in the 2nd, 3rd and 4th years (department of biology, chemistry, geography and civil engineering)

At postgraduate level, two programs at MSc level are going to be launched in agro forestry and soil management and water resources and environment management. These programs will be covering a period of two academic years.

2. KIE Curricula

KIST has a department of environmental education which has several other elements Environmental economics, chemistry, ecology and environment etc.

3. KIST Curricula

The main subjects here include: Environmental management, public health, waste management, etc.

Challenges

- Young institutions, rudimentary facilities, harmonizing approach in curricula development
- Popularizing environment education in non traditional disciplines
- Spreading the basic courses that are critical for an adequate appreciation of environmental issues: biology, chemistry, law etc (introductory college courses)
- Availing resources for adequate field work and practical work
- Sensitizing departments to develop joint courses where appropriate

ENVIRONMENTAL EDUCATION COURSES IN TERTIARY INSTITUTIONS OF LEARNING IN SUDAN

Dr. Elhag Abu Gabr Elhag

Background:

The Nile system total surface area in Sudan, including other minor tributaries and lakes, covers ≈ 10 m acres. This area has been and is subjected to drought, soil deterioration and desertification, fresh water shortage, civil wars and social structure disturbances and intermigration, poverty and tropical diseases. This is in addition to land-based activities, introduction of foreign species and global warming.

Such an area, an intricate mosaic of ecosystem extending from arid areas to tropical forest areas, deserves an evolution of environmental education (EE) and awareness programs.

In Sudan the term environment appeared in relation to protection of the natural resources from deterioration leading to desertification or from man-impacts. Legislation of laws appeared in 1935 in forestry, fisheries and protected areas local ordinances. These were followed by soil conservation law in 1944.

However, environmental education started in Sudan universities as glimpses of cross-cutting in the offered courses dealing mainly on hygiene, desertification, wild life and preventive medicine. By the end of sixties, courses related to environment started to appear in curricula of zoology, botany, geography, geology, public health, medicine and departments of education.

An integrated approach of EE is very pristine in Sudan. Such an integration of multi-facet courses is lacking. However, and by wise direction of Ministry of Higher Education, a course of 'Principles of Environmental Sciences' is delivered in curricula of scientific departments.

It is in the policy of higher education and the legislation of universities and the goals of universities that EE finds a seat. Thus provision of programs and studies in different specialized disciplines, educational capacity building and encouragement of research, all these legislated articles furnish a substratum for EE.

Institutions offering EE:

Tables 1-7 show the courses offered by the different established universities in Sudan. It appears that EE is included as a part in courses such as natural resources and their management and environmental control in Gazeira University; environmental health, applied climatology, wild life management and conservation, environmental geology, arid and semi-arid environment and soil science conservation, environmental impact assessment, Sudanese environmental problems in Juba University; in AlNeelain University courses such as environmental studies and medical and economic entomology are also EE components; in Omdurman Islamic University the ecology course is spiced with EE aims.

However two universities stand ahead in EE, these are University of Khartoum and Omdurman Ahlia University.

Integrated courses of EE are taught in different departments and postgraduate programs (M.Sc – PhD) are offered (Table 9), different departments in the two universities offer courses on environmental sciences. Environmental law, environmental economics… etc in semi-modular units.

A noticeable feature in these courses, that there is no definite interim partnership or collaboration which support or sponsor these courses. The scattered collaboration met with is only personal contacts and willingness to help in releasing staff to qualify in the different areas of EE by the different stakeholders.

Main constraints:

- The main constraints on teaching and offering EE as a course is the lack of sufficient knowledge, technical know-how, research and capacity building of recognized trained teachers and lecturers.
- Hence, the lack of EE guidelines.
- The often mix-up of ecological and advanced ecological courses with EE course particulars.
- The lack of modular units approach in teaching EE and clear cut units of natural sciences, social science, emerging issues, case studies and interdisciplinary approaches.
- Lack of problem-oriented research and analysis of ecosystems which are closely linked to EE teaching.
- Lack of a common regional EE standardization.

Opportunities:

- Exchange of knowledge and raising capacity building of the stakeholder countries.

- Standardization of methods of teaching.
- Common modules for teaching in universities.
- Tackling cross-boundary problems by regional teams.
- Regional visits, brain storming meetings and regional workshops
- A regional network and focal points of information.
- Formation of flagship study cases and replicable Tran boundary phenomena.
- Identified partnerships and collaborators both nationally and regionally.

Recommendations:

- Standardization of common EE courses in the Nile basin countries.
- Prioritization of common case-studies in the Nile basin countries e.g. wild-life seasonal migration across-boundaries, River Nile hyacinth and other introduced species… etc.
- Regional networks of biodiversity studies, protected areas, Pan-Nile basin community participation… etc.
- Data-base generating unit serving national units and utilizing standard GIS and remote sensing courses.
- Developing and/or strengthening collaborative research relationships between African scientists and overseas partners through funding from PACOM*.

Acronyms:

PACOM: the Pan-African Committee for START^{+}.

START: The Global Change System for Analysis, Research and Training – which promotes regional Research networks, conduct research on regional aspects of environmental change, assess impacts and vulnerabilities to such changes, and provides information to policy-makers.

THE TEACHING OF ENVIRONMENTAL EDUCATION WITHIN TERTIARY INSTITUTIONS IN TANZANIA

By Dr. Egino M. Chale

Dr Egino M. Chale is the Deputy Vice Chancellor at St Augustine University of Tanzania, Mwanza. He holds a doctorate, D. Phil. in Distance Education (London, UK 1983), and previously a Master's Degree in Education (University of Dar es Salaam 1975). He is thus a Senior Lecturer with initial specialisation in the teaching of English and later in adult and distance learning. His academic career includes teaching at the Institute of Adult Education and Faculty of Education, University of Dar es Salaam. Prior to his current position he was the Registrar of the Open University of Tanzania (1994-2002).

1. History of Environmental Education Teaching

The teaching of Environmental Education in universities in Tanzania is at best of very recent phenomenon, its diverse forms notwithstanding. The experience of St Augustine University of Tanzania (SAUT) is probably a case in point.

For over the past three years, SAUT in partnership with Makerere University Kampala (MUK), National University of Ruanda, Daystar University Kenya and Press House of Burundi have jointly carried out a training programme in "Environmental Journalism and Communication." SAUT got involved partly for its geographical location by Lake Victoria but largely because issues of environment in recent years have been on the spotlight.

At national levels one may note in the partner countries Environment Management Authorities / Councils. At regional level attempts have been made to develop and harmonise environmental laws especially during the period 1995/8. There is also evidence of sub-regional studies jointly sponsored by the United Nations Environment Programme (UNEP) and the United Nations Development Programme (UNDP). Results of such studies indicate potential environmental threats in connection with water quality, wetland depletion, fishing, genetic and biodiversity loss and land degradation. This explains why environment has attracted the attention of most eminent leaders and academicians.

While the chief objective of the CEJC could be seen as to inform the general public, the EE & A would be to spearhead public education on the environmental to sustainable levels. It would not be a one-off campaign. Rather, it would be one of the regular institutionalized university disciplines. On the experience gained from the CEJC, SAUT would be looking forward to mounting the EE & A programme, resource permitting. It would carry forward the current non-degree course modules to comprehensive degree awards.

2. Universities that teach EE in Tanzania

Of the universities that are on HEAC register, it is public universities that have had a stint on EE & A in a variety of forms. Private universities are a later comer on this. Of public universities, EE has been initiated at the University of Dar es Salaam and Sokoine University of Agriculture. Of the private, St. Augustine University has probably taken the lead.

The focus however could be conceived to be slanted. This might reflect more of the complexity of environmental issues than any thing else. Whereas at SAUT and at its partner universities the emphasis given is on environmental journalism, elsewhere is on such perspectives as environmental conservation, environmental ethics, environmental law, environmental economics and not least environmental management. Such diverse focuses might call for harmonization so that key environmental problem is addressed. This would also bring the EE into the mainstream of university programmes as a respected discipline instead being a relegated one.

A focused environmental education programme might be of extended interest of such organs as the Inter-University Council for East Africa (IUCEA) and the Catholic University of Eastern Africa (CUEA). Already the IUCEA supports studies under "*the Lake Victoria Research Initiative*" (VicRes) as funded by Sida/SAREC. Because of complexity of the ground *VicRes* has been adopting thematic approach thereby covering such concerns as water-bodies, wetlands, health and nutrition, socio-economic –

cultural-political aspects and data base management and dynamics. The diversity presents a healthy situation for collaboration and harmonization.

3. **Sample EE module or Curriculum**

From the outset, a number of core frontiers of knowledge and skills from research will have to be identified for the programme curriculum. This principle would apply across intended awards: Certificate, diploma, undergraduate or postgraduate levels. It might also have to be decided whether the programme offered would be for core or elective courses. Each course would need to be identified with its code number e.g. EE & A 301 followed by its title. Once this is decided, the course description will have to be written, its objectives stated in measurable terms, number of units in a semester defined, number of hours for lecturers, seminar and practicals/field work worked out. Each curriculum would also call for laid down concurrent requirements/prerequisites. These would best be depicted in a tabulated matrix.

Course Code No.	Title & Description	No. of Credit Hours Lecturers	No. of Hours Seminars/Practicals	No. of Units	Concurrent Requirement/Prerequisites	Remarks
EE & A 301	*Studies in the NB Problems* Contemporary concepts in EE & A and their applicability in the African region	120	30	2	Field practicals/visits	required
EE & A 302	*Nature of the NB crises* An overview of the crises, depletion of biodiversity, overstanding deforestation, pollution degradation, bush fires	45	15	1	EE & A 208	required
EE & A 308	*Networking & collaborative linkages* This course assumes resource sharing, adoption/adapting, staff & student exchange joint outreach projects	90	20	2	N.A	compulsory

Model objectives:

(i) To build human resource capacity in handling environmental issues.
(ii) To create a cadre equipped with awareness and skills in environmental conservation and improvement.
(iii) To enable graduates in a variety of education related fields to gain environment management skills.
(iv) To help raise awareness of the local populace on the link between restored environment and welfare.
(v) To allow course participants for an in-depth analysis of inter-connectivity in such fields as low, ethics, economics public health, gender, agriculture, forestry, medicine zoology & botany.

4. **Strengths, Weaknesses, Opportunity and Treats (SWOT) to EE Teaching in Tanzania**.

If the EE Teaching in Tanzania is to emulate regional programmes on ground, what is sown would be reaped. Its sustainability would initially call for an administrative structure at each university, as well as resources. Whereas partnership from within and without Tanzania is of great value, donor dependence might be a serious threat.

Courses developed for face-to-face teaching could be transformed to distance learning modules. These would be a valuable resource for adoption, adaption and broadening the access to the EE cost effectively. Already there are a number of universities within the region who are sharing their distance learning programmes notably Makerere University Kampala, University of Nairobi and the Open University of Tanzania. As ICT applications gain ground, the Region's role in the global village is eased. All that perhaps needs to be ensured is to "*start right and to stay right*."

5. **Future Prospects of the EE teaching in Tanzania**

Given the considered justification for EE & A programme vis-à-vis prevailing political will, prospects seem to be indisputably bright. This workshop might need to workout proposals for take off and way forward. An appropriate course of action in looked forward to.

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ENVIRONMENTAL EDUCATION IN TERTIARY INSTITUTIONS IN UGANDA

Background

Within the background we shall look at environmental policy and legislation in Uganda and general theoretical and conceptual issues of Environmental Education.

Legislation and Policy

Environmental Education is a relatively new area of study in Uganda's tertiary institutions although a number of environmental related courses and disciplines have been in existence throughout the existence of such institutions. The recent overt emphasis on and upsurge in the number of environment training programmes in the different tertiary education institutions can be traced to the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro. Chapter 36 of Agenda 21, the official document of the conference, which also informs Uganda's Environmental policy, emphasises the role of Education and Awareness in achieving sustainable development.

Uganda's National Environmental policy stresses the central role of Environmental Education and Awareness as a strategy for achieving sustainable development and environmental protection. People's involvement in environmental planning and management is seen as largely dependent on the role of EE & A.

The policy points out three major roles for tertiary institutions (MNR 1994) namely to:

- Increase awareness and understanding of the need for sustainable environment management among different stake holders
- Develop skills necessary for the implementation of national programmes;
- Conduct demand driven research to inform the proper management of the country's environmental resources

The policy stipulates that the teaching of Environmental Education be mandatory in all formal education institutions including Universities and other post secondary institutions. It also calls for the strengthening of existing higher level institutions to offer programmes tailored to produce environmental economists, planners, trainers, lecturers, lawyers and enforcement officers and to conduct research that will inform environmental management processes in the country.

The NEAP (National Environmental Policy) specifically mentioned MUEINR (Makerere University), MISR (…..), Institute of Adult and continuing Education, Institute of Statistics and applied Economics, Faculties of Law, Agriculture and forestry, as the ones to spearhead the implementation of EE & Awareness in Makerere University. The faculties of Arts, Social Sciences, Technology, Education, Human and Veterinary medicine were surprisingly not included in the list of central actors.

Since the formulation of the policy and the publishing of the NEAP, the number of tertiary institutions in the country has tremendously grown, together with the courses meant to address different environmental concerns. Although a number of tertiary institutions exist in Uganda for the purpose of this paper we have decided to focus on the bigger two universities namely Makerere and Kyambogo. The reason is to closely examine key characteristics of such programmes in order to draw lessons for further improvement in the design and delivery of EE, rather than the numerical status of EE programmes in the institutions.

Theoretical and Conceptual Issues of Environmental Education

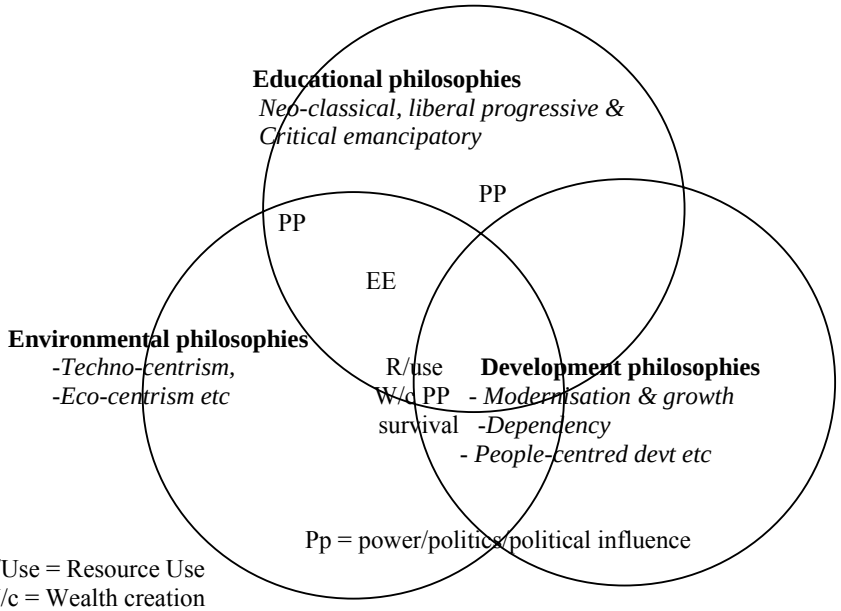
An analysis of EE in Ugandan tertiary institutions is premised on the view that knowledge is never neutral and neither are scholars who produce it. Like knowledge, education too is not a neutral process or activity. Different people will therefore conceptualise EE and the related processes differently. The different conceptualisations certainly influence the practical actions taken by educators to address environmental matters, whether the educators are aware of it or not. Thus the curricula, methods, learning activities and outcomes always reflect the dominant thinking of the educators and the socio-political and professional institutions they belong to. Analysing EE therefore calls for clear understanding of the different philosophical orientations to education and their implications on

education practice, which helps to explain why educational Programmes yield particular learning outcomes.

Educational, Environmental and Development Philosophies as Foundations for EE

EE is particularly a complex concept and its implementation a composite venture informed by diverse philosophical currents; including philosophies of development, education and environmentalism.

Fig. 1 **Philosophical positioning of EE**



R/Use = Resource Use
W/c = Wealth creation

Educators writing from a critical perspective have identified three broad educational orientations (Kemmis et al 1983) namely: the neoclassical/vocational, liberal/progressive and socially critical/transformative orientations. The orientations are classified according to the underlying knowledge-constitutive interests[1]. While this classification might have its own limitations, it also has considerable value, particularly, in characterising and explaining different educational processes and their related outcomes. The framework of educational orientations in the table in Appendix 1 represents the various angles from which different educators operate, and view the world of education and educating. These professional positions are ideological, and they always consciously or unconsciously filter into the educational practices by different people, influencing the direction of educational programmes and their ultimate outcomes.

In the case of EE, in addition to the educational orientations of practitioners, the way different environmentalists interpret and respond to environmental challenges; and the dominant development discourses (fig.1) influences its direction and emphasis. This is because by its very nature, EE is not education for education's sake, but responsive to socio-economic, human and ecological concerns of society. This is largely why the character and dimension of environmental education, represents a manifestation of the different environmentalisms (Pepper 1986).

As educators try to respond to the broad range of sustainability concerns, their minds are actually preoccupied with not only the desire to educate, but also do so in such a manner that satisfies their interpretation of the environment, environmental concerns and their world view of good environmental management. This probably explains the different dimensions of EE. Educators informed by techno-centric environmentalism for example design technocratic educational programmes that not only exhibit their confidence in the potential of science, technology, 'experts' and regulations to address

[1] Habermas (1972), argues that there are three fundamental human interests; namely the technical, the practical and the critical or emancipatory, knowledge-constitutive interests that influence the different types of knowledge and educational processes.

sustainability concerns, but also fail to recognise the central role of key stakeholders (e.g. local communities), in interpreting their local situations and generating home-grown responses.

Likewise, educators with an eco-centric environmentalist bias design educational programmes that aim not only to empower people to manage the environment but also create more harmonious relations between society, nature and individuals within society. They also aim to re-orient society's modes and relations of production. The central role of those directly affected by particular sustainable development challenges is emphasised, not as passive recipients of 'expert' advice and directives but active analysts of their situations and co-creators of home-grown solutions to the challenges. In other words, EE is viewed as a social rather that a technical process

At another level, society's development goals and the philosophies that inform them form an integral part of EE. This is because of the organic relationship between development practices and the environmental crisis/sustainability challenges which EE aims to address. For example, the twentieth century perception of development as economic growth, and modernisation as the right strategy for pursuing it, has led to unsustainable patterns of development and it is largely responsible for many of the environmental and development problems experienced in the world to day. Environmental Education should overtly challenge and address these concerns.

In order for EE to play its transformative role of re-orienting society and its systems, it is not only enough to critique modernism and its basic assumptions, but also to recognise all philosophies underlying actions geared towards the attainment of sustainable development as this will empower all stakeholders to pursue options that are sensitive to the socio-economic and ecological impacts of development processes well understanding each others' limitations**.**

The IUCN(1971) Definition of EE

EE as a concept has proved a little more complex than one often imagines. As mentioned in the foregoing discussion there are different orientations to education which are manifested in the different ways people have defined EE. These differences also reflect the perspectives of different institutions on education and environment. What should be noted however is that a once-and-for-all definition of EE is difficult to describe and may perhaps not be that useful at all.

To many people, EE is a new idea. They ask, "What is EE?" Usually they want a universal definition. People often think that if something can be defined, then it is easy to understand and easy to implement. This view can be very simplistic as it is not always appropriate to reduce EE to a 'fixed thing' to be implemented. The broad nature of 'environment' and the inter-connected nature of environmental issues, environmental educators often find it difficult to draw a line between what counts as EE and what does not count as EE. This difficulty will always be with us, because of the complex nature of the crisis to which we are responding.

The IUCN, in 1971, defined environmental education as:

> The process of recognising values and clarifying concepts in order to interrelatedness among man [sic], his culture and his biophysical surroundings. Environmental education also entails practice in decision making and self-formulation of a code of behaviour about issues concerning environmental quality.

The IUCN is a global scientific institution, which aims to offer internationally relevant, all encapsulating and clearly delineated solutions to the environmental crisis. The language used in this definition and other IUCN documents at the time, reflect rational, linear, developmental ways of thinking about environmental education reflecting the neo-classical education orientation. At the time this definition was described, environments and environmental problems were mainly associated with biophysical problems hence the conservation-oriented character of EE implied.

If one looks carefully at the language of the definition by IUCN it can be noticed they viewed the problem as a lack of knowledge, poor decision making skills and an inappropriate 'code' of behaviour

among individuals. The proposed solution was to recognise the 'right' values, to practice decision-making and to change behaviour through (informal) rules i.e. follows the right code. Thus in attempting to choose one definition, applicable to all environmental education practices, the IUCN definition became abstracted and was not necessarily useful to a wide range of diverse environmental education processes, arising in many different situations of risk. Unfortunately, many educators uncritically continue using the same definition with all its limitations.

The EE scenario in Tertiary Institutions in Uganda

A review of a number of courses offered by the different departments and faculties in Makerere University and one degree programme offered by Kyambogo University.

The Makerere University Experience

In the case of Makerere University a number of courses are offered at different at the Bachelors, Masters and PhD levels. I specifically looked at the following courses in the different faculties.

- Bachelor of Arts Environmental Management in faculty of Arts - Geography Department;
- Bachelor of Science in Forestry, Bachelor of community forestry and Bachelor of wood science and technology in the faculty of Forestry and Nature conservation;
- Master of science in forestry, master of science in Agro-forestry;
- Master of science in environment and natural resources offered by the Institute of environment and natural resources
- Master of Education Science Education by the Department of science and technical education;
- Bachelor of Adult and community education by the Institute of Adult and Community Education;

The Kyambogo University Experience

Kyambogo University is a new university with was born as result of a merger of three tertiary institutions namely Uganda Polytechnic Kyambogo-UPK (an engineering and science based institution). Institute of Teacher Education-ITEK (a teacher training institution for arts, science and vocational subjects), Uganda National Institute of Special Needs Education-UNISE (Institute offering training to teachers and other social workers who deal with people who less advantaged (disabilities)). Because of the different objectives/roles and backgrounds that these different institutions had, the way in which they in which different departments/faculties view and handle EE issues, at the moment does vary. A process to unify the "EE thinking" if necessary is yet take place.

Faculties of Education, Arts and Vocational Studies

Almost all programmes in the faculties of education, arts and vocational Studies

originate from the former ITEK, except for programmes in technical education and special needs. Lets us therefore consider the background of EE at former ITEK as this has tended to influence EE in these faculties. Between 1996 and 1997 NEMA (National Environmental Management Authority) sought to integrate EE into the all disciplines of the ITEK curriculum. This was in accordance with the National Environmental Strategy document (1996) which stipulated the EE be integrated in all teaching programmes at all level in the formal education sectors right from primary to tertiary institutions.

NEMA did run a series of workshops at ITEK initially with some members of top management and a few handpicked members from staff and student bodies who had reputation for caring /affinity for the environment. The first workshop formulated a framework, which the various departments would use to integrate EE in their different curricula. At this workshop it was agreed the all subjects/disciplines would integrate EE in their teaching/learning processes. The second workshop experts of EE worked with heads of subjects to identify criteria to determine appropriate points/areas where EE would be integrated. This was done by way of example where sample courses were selected including a course in

music and drama and experts worked together with the workshop participants to insert EE teaching/learning knowledge, attitudes and activities into the subject. Heads of subjects were then asked to go work with their members to integrate EE into the different courses of the entire curriculum of the institutions. A time frame was given for the exercise and also members were asked to begin teaching the EE matter once integrating was done. In the third workshop, which was meant to monitor and evaluate progress, most heads reported defeat and gave many reasons for failure and suggestions to improve the exercise. They requested to be given more workshops on Environmental Issues stating have had limited knowledge on environmental concerns globally leave alone in Uganda they could not integrate such knowledge in the curriculum. This request seemed quite enormous for NEMA realizing that environmental concerns can be very broad and have not called another workshop since then. Individuals were encouraged to keep doing their best in their capacities to keep integrating EE in their day-to-day teaching. Also clubs such as Wildlife, Harmony that dealt with environmental awareness at the institutions were encouraged to do their best to educate the college community about environmental issues.

Programmes, therefore in these faculties have tended not to have specified stipulated course content on EE but several individual affirm that they always point environmental concerns in relevant areas within their subject matter. In programmes such as Bachelor of Education were a mention of "Environmental" has been made the curriculum it is Environmental Psychology which deals with issues such isolation, groups, crowding and how these affect personalities. However, the department of Technical education (formerly a UPK department) runs an EE course that it provides to whichever other department asks for it. The advocacy by this department has been that all students in the university be given a chance to benefit from it but this has not been realized yet. About five programmes so far have enrolled their students on it. Content of this course includes: Introduction to Environmental Education, Population and the Environment, Problems of resource utilization and environmental management, sustainable development, communication in EE.(see detailed course content in Appendix 2).

Also the department of Geography has designed a course: Master of Science in Urban Environmental Management with the following outline: Urban Environmental Issues, Urban governance, The Urbanisation process, Urban-Rural interactions, Urban use planning, Urban Environmental planning, Environmental planning for urban transportation, urban pollution, sustainable urban energy systems.

Faculties of Engineering and Science

Because all the programmes in the faculty of engineering and all most all programmes in the faculty of science originate from former UPK, the background of EE at former UPK will be considered in this respect.

While NEMA still sought to find a process that would eventually work successfully for former ITEK, it asked management of former UPK to come up with suggestions as to how best EE could be integrated into the institutional curriculum. In 2000 an individual at the institution then carried out a survey to determine how staff, students and management perceived EE and how they wanted it to be handled in their departments/institutions.

The survey revealed that the general feeling was that technicians/engineers play an essential role in using and developing technology in contribution to development. But that a wide range of technological applications are a potential threat to human, plant and animal life. Technicians/engineers being at the interface of the environment, technology, economy, and society, have a key role to play in helping society realize a balance between socio-economic development and environmental protection. In this case technicians/engineers need very rigorous training in the field of environment in order to be able to meet this challenge.

The feeling, according to the survey was therefore, that in its essentials EE could be integrated into the total technical learning process and should be a crosscutting theme in all aspects of the curriculum. This could done by providing content for course units within all existing programmes of the institution and providing content that relates environmental concerns in appropriate areas within the rest of all the

course units. Also, that department in faculty of education could design a general course and service the rest of the departments. In addition, fully fledged environmental programmes would helpful training scientists and engineers in the field of environment capable of designing solutions for acute environmental problems, which exist as a result of technological and/or other activities. The combination of these four levels of approach to EE would provide

Although the transition of the merger of the three institutions interfered with NEMA's plan to engage an expert to scrutinize the findings of the survey and help the institution to implement a sound EE system, a number of the existing programmes in these faculties do reflect the suggestions found in the survey report. The faculty of science runs a full program "Bachelor of Environmental Science, Technology and Management" while the faculty of Engineering runs a course "Bachelor of engineering in Environmental Engineering and Management". The major themes of the Bachelor of Environmental Science, Technology and Management are: Natural Resource management, Pollution management, Occupational hazards management, EIA, Integrated Environmental Management. From the objectives of Bachelor of engineering in Environmental Engineering and Management the major themes emerge as follows: Engineering principles for the solutions of Environmental problems, Industrial needs and requirements with respect to environmental issues, Optimum solution for pollution control, sensitivity towards public concern for the Environment,
(See detailed course content for each of these in Appendix 3&4).

Almost all programmes in these two faculties have each a course unit that relates the major program subjects to environmental concerns. Examples of such include:

Programme	Course unit	Content of course unit
Bachelor of Engineering in Mechanical and Manufacturing Engineering	Environment Technology	Air pollution, Water pollution, Land pollution, Waste water impacts to the environment, Renewable Energy technologies, and The environmental impact of vehicle cycle.
Bachelor of Industrial Engineering and Management	Environmental pollution	Ecology, Factors causing pollution, Environmental Legislation, EIA, Cleaner production, waste water treatment
Bachelor of Electrical and Electronic engineering	Environmental Technology	Environmental Legislation, Occupational health and safety, Renewable Energy, energy saving devices.
Bachelor of Science Technology(Chemistry option)	Environmental Chemistry	Ecosystems, nutrient cycles, energy flow and food webs, Biodiversity The hydrological cycle and atmospheric pollution, water pollution, land pollution, Toxicology, Geochemical cycles
Bachelor of Engineering in Civil and Building Engineering	Environmental pollution	Environmental Legislation, Occupational health,Atmosheric pollution and safety, Geochemical cycles, Urban environment Engineering and planning

While there seems to be a lot being done in the field of Environment and EE particularly in the faculties of Science and Technology , the department of technical education in last five years, and the department of Geography, there is need to carry out an evaluation to determine the effectiveness of the these courses.

Appendix

Table 1: Educational orientations, characteristics and implications

Characteristics/assumptions on:	Neo-classical/ Education	Liberal/ progressive Education	Critical/ emancipatory/transformative education
Education	- Viewed as a technical activity, and an instrument/tool for achieving pre-determined behavioural goals; - Preparing people to perform specific tasks; - Teacher-centred, - Neutral activity fully in the hands of the educator/technical expert to manipulate in order to change learners behaviour;	- a social process preparing people for life rather than work (which is narrow) - should be learner centred	- a social process empowering people to critique and transform oppressive socio-cultural, political and economic structures; - political and ideological - used to perpetuate dominant socio-economic and political relations - levels power gradients in society, - inextricably linked to the social, economic, cultural and political structure of society
Educators	- Viewed as experts in changing learners behaviours, - Designers of learning environments that elicit desired behaviour, - Knowledgeable authority transmitting knowledge	- viewed as facilitators of the learning process - organisers of learning opportunities - enabling learners to take advantage of those opportunities	- co-learners and co-constructors of knowledge in a situation of mutual respect in order to respond to challenges collectively and individually; - collaborative agent
Learning objectives	- behavioural and predetermined by the expert educator	- co-constructed and outcomes collectively determined/derived from community	- co-constructed based on material conditions of the people
Learners	- lack the right knowledge skills and attitudes (must be taught by the expert – like an empty vessel to be filled)	- central to the educational process, - learners experiences are seen as the basis for learning, - Seed to nurture	- experienced co-constructors of knowledge and central actors in the learning process; - critical, constructive co-participants - -fire to kindle
Learning and change	- a linear process involving knowledge	- social process in which all	- social transformative

	acquisition, attitude and behavioural change, (all depend on being equipped with knowledge)	those concerned actively and willingly participate; - depend on understanding social phenomena and being able to interact with it; - expected to occur through reform based on people's understanding of the situation and informed decision making rather than technical	process; - revolutionary aimed at levelling power gradients
Knowledge	- 'True knowledge' helps to solve technical problems, and its creation is a responsibility of the expert educator/researcher - through objective science - pre-packaged learning experiences	- knowledge is socially constructed in participatory manner, -	- socially constructed and dependent on one's personal location - should enable people to be critically aware and challenge the dominant oppressive power relations and structures in society
Teaching/learning Methods	- Transmittal/teacher centred - Social engineering	- bottom-up participatory - democratic and experiential - collaborative	- bottom-up, creating critical awareness; - conscientisation through dialogue; - critical enquiry
Educational failure	- associated with learners weakness	- associated with the exclusion of the majority of people from the planning and development of educational plans and strategies; - lack of ownership of educational programmes	- autocratic socio-political structures which lead to transmittal educational processes; - disempowering methods and content

(Adapted from Kemmis et al 1983 and Janse van Rensburg 1995 and modified)

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