FIRST REGIONAL CENTRE OF EXPERTISE CONFERNCE

HELD AT KENYATTA CONFERENCE CENTRE

NAIROBI, KENYA.




BY

THE NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

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NAIROBI

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ABBREVIATIONS AND ACRONYMS

ESD	-	Education for Sustainable Development
JKUAT	-	Jomo Kenyatta University of Agriculture and Technology
KU	-	Kenyatta University
MEMR	-	Ministry of Environment and Mineral Resources
NEMA	-	National Environment Management Authority
RCE	-	Regional Centres of Expertise
UNESCO	-	United Nations Educational Scientific and Cultural Organization
UNCED	-	United Nations Conference on Environment and Development
UON	-	University of Nairobi
CECOD	-	Conservation Efforts for Community Development

1.0 INTRODUCTION

Opening Remarks – Dr. Mary Otieno

Dr Mary Otieno welcomed the participants to the first National Regional Centre of Expertise (RCE) conference. She informed them that RCE are mobilized to deliver education for sustainable development. She mentioned that this was the 1st National RCE conference and they have invited neighbors to share the expertise that we can replicate for sustainable development. She mentioned that RCE aspire to achieve the goals of the decade of ESD and to translate the benefits of ESD, local objectives within local communities and meet the needs of the local community. She mentioned that RCE are inclusive of learning institutions, environmentally friendly NGOs, Scientists and researchers, private sectors, volunteers, media and individuals.

Objectives of the conference

- Take stock of the achievements made in the implementation of Education for Sustainable Development in Kenya
- To enhance information sharing among various stakeholders in ESD
- To show-case local sustainable development initiatives

2.0 REMARKS

Ag. Director General, NEMA

The Director was pleased to launch the Education for Sustainable Development (ESD) Implementation Strategy and the first national conference on RCEs on Education for sustainable development in Kenya. The theme of the conference was "***RCE – Turning a Green Leaf towards Sustainability***" which was meant to urge all stakeholders to reorient all their activities towards the achievement of sustainable development. He reiterated that the United Nations General Assembly in December 2002, adopted resolution 57/254 that designated the period

2005-2014 as the Decade for Education for Sustainable Development. UNESCO was tasked to spearhead the global process and develop an international implementation scheme. In Kenya, NEMA coordinated a multi-stakeholder team that developed the national ESD implementation strategy with the technical help from UNESCO.

The ESD implementation strategy provides a dynamic concept that addresses awareness, education and training to enhance understanding of sustainability. The goal is to integrate the values inherent in sustainable development into all aspects of learning to encourage changes in behavior that promotes a more sustainable, economically viable and just society for all. It aims to provide opportunities for all to benefit from education, value acquisition, behavior change and lifestyles that ensure a sustainable future.

The objectives of ESD include:

1. To enhance the role of education and learning for equitable, efficient and sustainable utilization of the country resources.
2. Promote quality education through diverse learning and public awareness for improved quality of life and productive livelihoods.
3. To promote teaching and learning that inculcates appropriate values behavior and lifestyles for good governance and sustainability.

He informed the conference that ESD has achieved tremendous achievements to include policy formulation by different institutions, public awareness and advocacy, development of ESD materials, sensitization meetings on ESD for twenty one ministries, training of senior officers in different ministries, carried out national survey on primary schools on ESD carried out research and innovations to address sustainability.

The RCE conference brought together stakeholders from eight regions so as to share their experiences, innovations and information on how best to address the sustainable development challenges.

He urged the participants to develop solutions that can work for their specific regions. Each RCE should learn from others and partner strongly with government, private sector, civil society organizations and media in the sphere of sustainable development. Participants were encouraged to build networks beyond the conference and continue to share information, innovation, best practices and develop common research concepts for RCEs even globally. NEMA will continue playing its role of focal point for ESD implementation and RCE coordination for any future follow up conferences and take stock of the progress RCE is making as the ESD decade approaches its end.

Minister of Environment and Mineral Resources

The Minister speech was read by the Permanent Secretary, MEMR. The Minister was pleased to launch the ESD implementation strategy and open the first National Conference on the Regional Centres for Expertise on ESD. He reiterated the 1992 UN Conference on Environment and

Development (UNCED) which recognized education as an important tool for enhancing the attainment of sustainable development.

Kenya as a member of the UN family is obligated to observe the decade on ESD. The ministry of Environment and Mineral Resources through NEMA developed the ESD implementation strategy which was adopted by the National Environment Council in April 2008. The medium term plan of vision 2030 has captured ESD as a cross cutting issue which envisions the formulation of an ESD Policy for Kenya and the reorientation of curricula at all levels to address ESD concerns. The constitution of Kenya has elevated environmental matters in section 67. It states that every person has a right to a clean and safe environment and has the right to have the environment protected for the benefit of present and future generations.

To attain sustainable development, Kenya has ratified international conventions and domesticated them to suit local needs. Different regulations have been gazetted which include, Environmental Impact Assessment and Audit Regulations (2003), Waste Management Regulations (2006), Ozone depleting substances regulations (2007), Wetland regulations (2009) and Noise and Excessive Vibrations Pollution (2009), with other regulations in the pipeline. He urged the relevant lead agencies especially local authorities to play their rightful role with respect to environmental management.

The Ministry of Environment is implementing some flagship programs within the vision 2030. Some of the projects include waste management system that will see the decommissioning of Dandora dump site and the establishment of a sanitary landfill, carbon offset scheme, compensation for environmental services and streamlining of exploration and mining. The Ministry has achieved the Clean Development Mechanism (CDM) guidelines, the climate change strategy and the e-waste guidelines.

He informed the participants that 2010 state of environment report has flagged out a number of challenging areas that need attention to include invasive and alien species, hazardous waste, bio-piracy, climate change and biodiversity loss. Through NEMA, the ministry has recently launched a toll free service number, **I-Call**, for disseminating environmental messages. The Ministry also launched the environmental education and awareness campaign targeting school across the country.

The Permanent Secretary (PS) Ministry of Environment and Mineral Resources –Mr. Ali Mohammed Launch the Kenya ESD Implementation Strategy during the conference.

The Permanent Secretary distribute the ESD implementation strategy document to RCE Coordinators

3.0 PRESENTATION

Role of science and Technology in prompting Sustainable Development – National Council for Science and Technology (Prof. M. K. Rugut)

He mentioned that the year 2005 marked the beginning of the *United Nations Decade of Education for Sustainable Development* therefore it was timely to deliberate on *Sustainable Development from a Science and Technology Education perspective*.

He mentioned that a school curriculum should achieve three broad educational aims which include acquisition of knowledge, skills, abilities or capacities; development of competencies, i.e. the ability to apply the knowledge and skills imparted by education to real-life situations; development of key competencies, i.e. those that are essential in order to participate effectively within society. (Eurydice, 2002)

Bearing this in mind, he said that it was pertinent to ask three key questions

- Can science and technology education be developed with a view to playing an active role leading to true sustainable development?
- What effects are educational institutions and NGOs expected to have during the United Nations Decade of Education for Sustainable Development so as to play a positive role in promoting more appropriate science and technology education (especially for sustainable development)?
- Can educational institutions (at primary, secondary and tertiary levels) and NGOs have the vision, strength of direction and expertise to enhance greater self-empowerment and guide the abandoning of inappropriate 20^{th} century (and often 19^{th} century) science education practices for more suitable practices that enhance meaningful sustainable development and by so doing, use their power to enhance greater equity and fairness in developing scientific literacy for all?

He further mentioned that vision for the education sector in the Kenya Vision 2030 is ‘‘to have globally competitive quality education, training and research for sustainable development’’. Ensuring environmental sustainability is one of the goals of the United Nations Millennium Development Goals (MDGs).

He mentioned that there is an urgent need for a number of major changes in the orientation and development of science and technology education if it has to enhance and promote sustainable development. Five paradigm shifts are put forward, each suggested as playing a key role in enhancing science education for sustainable development.

- Ensuring the purpose of science education is scientific literacy (in terms of relevance, practicality, values)

- Taking greater measures to enhance and sustain student motivation in and about science, thus enabling science and technology education to play a role in education for sustainable development. Science education is not and cannot be the same as science.
- Enacting more effective teacher preparation/professional development for science and technology education and determining the role of the teachers geared to professional development for sustainable development.
- Placing greater emphasis within student learning on an understanding of the Nature of Science and Scientific Inquiry (Abd-El-Khalick, 2004: McComas, Almazroa & Clough, 1998; Lin and Chiu, 2004), noting their importance for the promotion of sustainable development. Policy makers should consider what will encourage a better balance between teaching science as established yet often irrelevant information for today's world and those features of science that are referred to as the Nature of Science and relate to civil commons aspects of sustainable development.
- Recognize the crucial need for the setting up of effective partnerships. All stakeholders, including local governments, non-governmental organizations, the industrial sector, learned (science) societies, schools and community groups, need to participate in the sustainable development efforts. Human resource development should focus the development process to increase their knowledge, skills and understandings, and to develop the attitudes needed to bring about the desired developmental change. More efforts must therefore be undertaken to build a fair relationship between scientific and traditional knowledge, to strengthen the capacity of communities to revitalize and manage their own knowledge base, and to promote the integration of local knowledge, values, traditions and practices, in sustainable development projects. National partnerships are seen as crucial in meeting the need to ensure general support for moving science education forward in promoting sustainable development which is seen as essential for more responsible citizens, improved human rights, and developing a universal culture of peace.

Regional ESD Implementation - Promoting ESD through Partnerships in Eastern Africa WWF- Zipporah Musyoki- Webola

She mentioned that goal of the programme **is** to secure the ecological integrity & sustainability of the Lake Victoria catchment for the benefit of its inhabitants & biological diversity. The purpose is to empower catchment communities, schools and regional partners with knowledge, motivation and abilities for sustainable use and management of natural resources. This is through empowering of Civil Society Organizations through capacity building to ensure successful Programme Implementation. The programme is funded by Sida and implemented in collaboration between WWF ESARPO and WWF Sweden. The Implementing Partners in East Africa are Kenya – Wildlife Clubs of Kenya; Uganda – Nature Uganda; Tanzania – WWF Tanzania Country Office and Rwanda – start up activities collaborating with the government through Rwanda Environment Management Authority and Ministry of Education.

She mentioned that the expected outputs are:

Output 1 – Formal Education

She said that this include building capacity of teachers/teacher trainers to deliver EE as part of normal education and strengthened. The programme has achieved several milestone in this aspect that include

- Working with 66 schools, and 7 primary Teacher Training Colleges in Kenya, Uganda and Tanzania within the Lake Victoria Catchment.
- On average 95 % of targeted educators are able to coordinate and monitor ESD programmes in model schools in Kenya and Uganda. In Tanzania 80 % have improved monitoring & coordination of activities.
- Whole school approach has led to transformation of schools into green model schools
- LVCEEP's capacity building in teacher training colleges has led to pre-service training of teachers on ESD which will contribute to curriculum re-orientation towards ESD.
- Additional training on entrepreneurship and Education for Change Concept
- Mainstreaming of climate change adaptation in ESD workshops has led to increased awareness schools and communities

- Teachers are now using Locally Relevant Themes (LORETS) to teach the school curriculum.
- School inspectors have mainstreamed ESD in their schools assessment
- LVCEEP Schools have continued to engage in diverse greening initiatives to include tree nurseries, woodlots, beehives, water harvesting, hand washing facilities for improved sanitation, fish ponds and botanic gardens.
- To date 70 % of school children in Kenya & Tanzania are able to engage in conservation activities. In Uganda 97% of ESD in schools has filtered to household levels.
- LVCEEP Schools have received recognition during world events days and also won awards.
- The schools have become demonstration centres and visitor centres transforming them to centres of excellence.
- In Kenya and Tanzania 70 % of targeted communities are transferring EE /ESD learning practices to their households. Uganda has had 97 % of this knowledge transfer to date
- In Kenya over 20,720 trees have been established in Target schools.
- In Tanzania over 3,500 seedlings planted in 3 schools have survived and doing well.

Output 2 – Non Formal Education

Riparian communities achieve capacity to conserve and sustainably manage natural resources within selected sites of the Lake Victoria catchments and best practices spread in the wider area:

- On average 75 % of targeted riparian communities are engaged environmentally friendly practices
- 75 % of targeted farmers are practicing sustainable agriculture within the catchment area.
- 77.6 % of communities have developed a more holistic perception on environmental management.
- Communities have been capacity built on soil conservation, organic farming and on income generating activities that have led to poverty alleviation.
- 40,200 tree seedlings planted along riverine and shoreline of Mara River and Lake Victoria respectively in Tanzania to mitigate Climate Change.
- In Kenya, eco-jiko adoption rates from Nandi Hills, Transmara & Homabay sites average to 59 %.
- In Uganda there is 67% increase in income, sales & savings with households living on an average of US$3 per day.
- 70% of communities in Kenya use clean drinking water due to rain water harvesting
- A regional ESD Day that will be celebrated annually in the East African countries was launched in July 2010.
- The LVBC gave it official recognition during this year's event in July 8, 2011 in Mwanza.
- Awards were put in place;
  - Best farming communities
  - Best Eco-friendly Income Generating Activities for communities
- National Community Exchange Visits carried out. In Uganda – upstream – downstream visits between Masaka and Kyenjojo Communities, Kenya – Nandi & Homabay; & Transmara; Tanzania – Mara Region
- Regional Exchange Visits done communities in Tanzania visited Kenya; previously Uganda communities visited Tanzania

Output No.3: Material

Education materials to support formal and non-formal environmental Education and Awareness initiatives developed and disseminated:

- A Regional termly newsletter launched in July 2010.
- Low cost water treatment methods posters produced in Kenya, Uganda and Tanzania.
- 2,000 Resource booklets, 1,500 calendars, 4,000 posters, 4,000 guide books developed as at 2011.
- Documentation for best practices ongoing in all countries
- Radio Programmes
- A LVCEEP documentary produced through Wildlife Clubs of Kenya
- East African version of Learning Sustainable Ways developed

- ESD Methodology Book – demystifies ESD and provides hands on ESD activities for educators
- An ESD Toolkit for Schools in the Mara River Basin developed for use in Kenya and Tanzania.
- A LVCEEP Programme Profile

Output 4: Networking

A practical partnership building mechanism for EE / ESD delivery within & among key stakeholders developed

- Regional Advisory Committee – top most advisory organ for the programme
- Capacity building of Project Executants and Core Team
- Regional Network on Education for Sustainable Development for East Africa formed during workshop held on October 2010 in Dar es Salaam. 2nd Meeting held in October 2011 in Kampala. WWF to provide secretariat until sustainability is achieved.
- Upstream – Downstream networks – Uganda we have community conservation networks & organic farms community networks.
- Networking with other stakeholders helped communities market their goods.

Lessons Learnt

She mentioned introduction of ESD villages in Kenya will lead to social transformation and exemplary communities of practice in ESD. While Community Conservation Banks in Tanzania will lead to promoting a culture of saving and investing and contribute to poverty alleviation.

She further mentioned that partnerships with the Private sector e.g. the Transmara community has led to steady income and has empowered the Maasai women who package and sell the honey; Construction of granaries in Uganda has led to increased food security among communities; Growing of alternative food crops like sorghum, cassava and millet in Musoma will help the communities cope and adapt to climate change.

Other lessons learnt include

- Gender balance in community workshops and activities have led to women productively engaging in decision making and conservation of their own environment.
- Energy saving initiatives like the eco-jikos and fireless cookers have led to a decline in deforestation.
- Continued capacity building of communities on ESD concept,entrepreneurial learning,Gender mainstreaming, HIV&AIDS and ESD Village developemental framework.
- Use of organic manure by communities has led to the protection of soils, rivers and saving of money and increased food production and reduced wetland encroachment.
- WWF and LVCEEP have contributed to strengthening civil society and policy support to policy makers to push for the sustainable development agenda.

- Networks provide a way forward for sustaining development interventions once a donor or development partner is not present.
- Ground level networks can be sustained by the actors if they are involved in sustainable activities.
- National and regional networks - currently national nodes of ESD Networks in East Africa hosted by government agencies – for sustainability.
- EAC Network for ESD Practitioners to be hosted by the East African Community – WWF currently providing secretariat.

The programme is looking forward to working with schools to promote food security, improved health and sanitation, Promote Sustainable Cities, celebrate Earth Hour 2012 in four cities in the region– Nairobi, Entebbe, Mwanza and Kigali – Energy and Climate Change ,Support ESD Policy work with National Curriculum Centres in the East African Countries, Regional ESD Policy Workshop 2012 – East Africa Community Countries, South – South Exchange Programme, Support ESD Network for Eastern African to achieve sustainability and Exploring Climate Change work opportunities with communities using ESD as a strategy

PRESENTATIONS BY REGIONAL CENTRES OF EXPERTISE ON EDUCATION FOR SUSTAINABLE DEVELOPMENT

RCE MAU COMPLEX – Dr. Wilkister Moturi

She mentioned that the RCE was launched at after a consultative stakeholder's workshop organized by Egerton University and NEMA from 15-18th November, 2009 at ARC Hotel.
A steering committee meeting was later held on 20th January 2010 where the governance structure, programme action plans were agreed upon.
The RCE was officially registered at United Nations University, Tokyo Japan on 2nd September 2011.

She mentioned that the vision of the RCE is to ensure that Mau complex ecosystem retains its ecological functions and sustainably provide goods and services to support livelihoods and contribute to regional and global environmental benefits'. The mission is to *'Facilitate a platform for knowledge management within Mau complex for informed decision making'*

The RCE has set up various Strategies to address the challenges. The immediate actions were suggested include:

1. Raise levels of environmental awareness among the population
2. Promote marketing regional products
3. Raise production in agriculture and livestock to promote household food security
4. Address issues on climate change through appropriate climate change mitigation and adaptation measures at household, community and regional level
5. Promote sustainable waste management in urban and rural areas
6. Promote conflict resolution / peace education in the region

7. Promote water resource management
8. Promote animal and human health and reduce intra-regional health inequalities
9. Conduct research on determinants of various development challenges in the region

Management structure

RCE PWANI

RCE Pwani was established to address local sustainable development challenges in the coastal region. The RCE is coordinated by Pwani University College. He mentioned that the principal appointed a committee of ten officers to coordinate the programme.

He mentioned that the thematic areas include

1. Land ownership / tenure and governance
2. Environment and ecosystem management
3. Climate change and disaster management
4. Agriculture and food security
5. Health, drug and substance abuse
6. Poverty unemployment,

He mentioned that so far the RCE has set up the RCE management committee, developed a draft policy for Pwani University, strengthened environmental club in the university, and established an operational network in Kilifi County with the stakeholders. He further mentioned that the RCE has undertaken various cleanup activities and tree planting and held sensitization meetings with the university management.

He said that some of the proposed activities include sensitization workshops, initiate university/ stakeholder joint research project, to implement project proposals and register RCE with the United Nations University (UNU).

RCE UPPER EASTERN -Patrick Gitonga RCE Contact Person

He mentioned that Eastern Province has its northern boundary with Ethiopia; the North Eastern Province and Coast Province lie to the east and south; and the remainder of Kenya's provinces, including Central Province, run along its western border. He further indicated that RCE Upper Eastern includes Embu, Meru, Isiolo and Marsabit

He mentioned that the main issues of concern for the RCE are as follows:

- Insufficient Environmental Awareness,
- Environmental degradation,
- Waste management,
- Unsustainable agriculture,
- Unaffordable and unsustainable energy resources,
- Poor health,
- Insecurity and violence,
- Poor governance and corruption.
- Lack of entrepreneurial skills,

The main goal is to advance public awareness, education, training and capacity building to achieve sustainable development. While the key objectives are;

1. To promote understanding and awareness of ESD
2. To enhance stakeholder participation
3. To train trainers in ESD
4. To develop context-specific ESD materials and tools
5. To disseminate best practices in the region
6. To improve the livelihood of poor families
7. To promote sustainable rural and urban development.

He concluded by mentioning that the RCE has proposed several activities which include

1. Consultation with stakeholder members February 2012
2. Consultation with stakeholder members April 2012
3. RCE Registration- May 2012
4. Regular consultation, review and recruitment of membership

RCE NYANZA- MONICA OMULO

RCE Nyanza report was presented by Mrs. Monica Omulo from Maseno University who mentioned that Nyanza RCE is configured around the Lake basin region and seeks to address the issues on

1. Liquid waste management
2. Solid waste management
3. Soil erosion
4. Unsustainable mining

She mentioned that so far the RCE Nyanza have been able to develop botanical garden

1. Wetland restoration
2. Tree planting
3. Beekeeping
4. Mat making
5. The action plan is to establish a regional steering committee
6. Advocacy
7. Research and innovation
8. She mentioned that they are looking forward to the registration of Nyanza RC E

UPPER RIFT RCE – DR. GRACE CHESEREK

Dr. Cheserek mentioned that the major activities of the RCE are awareness to communities from WRUAS, Cleaning of river Sosian and tree planting activities in their various areas. The action plans focus on:

1. Integrating ESD in the universities , secondary and primary schools
2. Environmental conservation at community levels
3. Integrate ESD into agricultural technology
4. Encourage use of indigenous knowledge in combating climate change
5. Integrate sustainability in water reuse and energy efficiency

RCE NAROK: - MR. SALATON

He mentioned that the key environmental issues in Narok are:

1. Masaai mara
2. Loita forest
3. Environmental degradation
4. Ecological integrity
5. Wildlife ranging and property issues right and access to natural resources

INNOVATION ON THE ENERGY SECTOR: MR. GARY LEWIS – KENYA TAA

He shared his innovation on the energy sector and his plan to resolve the high energy costs in the slums by availing cheaper affordable technologies / alternatives

GREATER MBARARA - RCE – MR BASIL TIBANYENDERA

He mentioned that the Regional Centre of Expertise covers Greater Mbarara, Greater Bushenyi and Ntungamo Districts.

The vision is to promote partnership between civic and private sector organizations to enhance sustainable utilization of human, capital and natural resources for prosperous and sustainable livelihoods in the Greater Mbarara Region through ESD.

The activities of Mbarara RCE include:

- Community-based health and sanitation education
- Participate in ESD Awareness Week with Conservation Efforts for Community Development
- Community mobilization in tree planting activities – partnered with Bishop Stuart Core PTC and community in a tree planting activity.
- Child and maternal health initiatives – following up mothers from the Maternity Ward in Mbarara National Referral Hospital to their homes in accessible radius of the university.
- Research activities in ecology, malaria, HIV/AIDS, newborns.
- Stakeholders' Conference was held on 2 June 2011 which was heavily supported by Uganda National Commission for UNESCO and Conservation Efforts for Community Development (CECOD)

He mentioned that some of the achievements of the short-term objectives – networks, gaps identification and research areas, increased awareness about environmental degradation, increased students enthusiasm and participation in environmental conservation efforts, disseminated research findings at Annual Research Conferences and other fora in communities and improved health and sanitation practices, child health care and nutrition.

He mentioned that the challenges of RCE Mbarara are:

1. Financial
2. Poverty
3. Harmonization of existing activities
4. Scarcity of volunteerism spirit

SESSIONS REPORTS

A SUMMARY REPORT ON CLIMATE CHANGE

Chairperson: Dr. Wilkister Nyaora Muturi, Egerton University

Rapporteur: Mr. Emmanuel Ngumbi, RCEGN and AFEW (K) Ltd.

Climate change has direct effects on the physical infrastructure of a city. Its network of buildings, drainage and energy systems-which in turn impact the welfare and livelihoods of its residents. It's impacts disrupt transportation systems through weaker conditions that have immediate impacts on travel and damages that house lasting service interruptions. By their very nature, cities are centres of high demand for energy and related recourses. Climate change is likely to impact both energy demand and supply. The combination of urban population growth, changing local weather conditions urban heat-island impacts and economic growth has the

potentials to substantially increase demand for energy. Climate change will also affect energy generation and distribution for instance, electricity transmission infrastructure may become increasingly vulnerable to damage and interference as storms and flooding become more frequent and intense.

Mitigating climate change is becoming an important issue in relation to urban infrastructure, but one that reputes for attention with other pressures for energy security and affordability and the provision of basic services. Nevertheless, NEMA and other government, private and civil society actors have undertaken a range of scheme in order to reduce Green House Gas emissions through the refurbishment and development of urban infrastructure systems.

The following papers were presented during this workshop

1. **Climate Change Mitigation and Adaptation Strategies in Coastal Region, by Dr. Mwakumanya Ali, Pwani University College.**

The presenter gave an account of the climate change as a major global concern and the major contributing factors both anthropogenic and natural factors. He also gave a board perspective of the problems associated with climate change effects from a broad Kenyan perspective and why the coastal region is highly vulnerable to these effects due to its location and high dependence on natural resource for socio-economic development.

It was reported that there is need to come up with climate change adaptive strategies which are appropriate for the coastal region, such strategies should integrate both formal and informal knowledge. ESD should also be integrated into the climate change mitigation measures.

2. **Production of Biogas from 50Tons/day Municipal Solid waste by Anaerobic Process, A Case of Nairobi, by Mr. Charles Etale Butiko, Green Scietekplus**

The presenter elaborated on issues concerning the model biogas project by highlighting on cost estimation, specification, establishment period which was stated to be 2 years and lifespan which was approximated to be 35 years. It was emphasized that this project was ideal as solid waste management is today a major concern for many municipal councils.

In conclusion it was observed that this biogas project was an ideal technology to deal with urban waste through turning it into green energy, mitigating climate change effects and improving general environmental status.

3. **Use of Greener Solvent to Synthesis Juglone, Dr. Najia, Pwani University College.**

It was reported that Juglone is an organic compound that is derived from 1, 4 naphthoquinone through replacement of 1 hydrogen atom by hydroxyl group. The presenter discussed its chemical composition and synthesis. It was noted that juglone has been traditionally used as a

fabric dye, ink and herbicide. But Juglone has been synthesized in a lab through use of light and solvent. It was recommended that this process is environmentally friendly.

4. **Impacts of Climate Change in ASALs, By Dr. George Kennedy, Global Green Organization**

It was reported that climate change is a reality in ASALs and its impacts have had devastating effects especially on pastoralists. The presenter discussed the effects of climate change on ASALs at length and the mitigation measures being adopted to overcome the same effects through use of indigenous knowledge, agroforesty and involving young scientists to carry out research and document findings for replication.

5. **Country Research Agenda in Kenya, Dr. Kennedy Ondimu, Director of Planning and Research, NEMA**

It was noted that a close examination of the national environmental research work in our universities has been skewed towards biodiversity conservation and there is lack of documentation. As a result most of the findings are not implemented in areas targeted by the research work.

To overcome this challenge NEMA through the Department of Planning and Research has developed an Implementation Action Plan on Research Agenda on priority thematic research areas based on the mid term plan as well as major global environmental concerns. In conclusion

it was observed that there is need to incorporate RCEs in the agenda and focus on action research to drive the country development plans.

He recommended that databases should be created to localize the sustainable environmental innovations on climate change mitigation and adaptation strategies. It was recommended that the government should adopt policies that promote green innovations and action research to promote sustainable development.

5.0 EDUCATION FOR SUSTAINABLE DEVELOPMENT

Chairperson: Dr. Kennedy Mutundu, Kenyatta University

Rapporteur: Sarah Kamau, Environment Officer – Nairobi Province

1. **Developing sustainability curriculum in the institutions of learning: A theoretical framework by Moses Wandera (Research Student, Policy Studies) Education Foundations Department, Kenyatta University**

The concept of the lifelong education or learning to learn is otherwise referred as human or sustainable education is timely for development in developing and developed societies. The paper addressed components of education, training and teaching and its relevance in development. Global concepts relating to planning for sustainability as well as sub-systems, characteristics and indicators covered include curriculum development, control measures and quality concerns are components of relevance. The paper recommended all stakeholders in education to consider development and humanity now and the future in sustainable education.

2. **The Place of Technology Supported Learning for ESD in the Kenyan Education System**

The education system in Kenya has made institutions in the country promote developmental education at the expense of the environment. The system has given very little emphasis on ESD in the curriculum in practice. One of education's chief roles is to prepare future workers and citizens to deal with the challenges of their times.

Knowledge work—the kind of work that most people need in the coming decades-can be done anywhere by anyone who has the expertise through a cell phone, a laptop, and Internet connection. But to have expert knowledge workers, every country needs an education system that produces them. Kenya as a country needs to re-examine herself and prioritize her needs with a view to opting for an educational paradigm which not only develops the potential of the citizens but also maximize on the use of their potential in addressing and meeting the national needs.

The paper advocated for the promotion of Education for sustainability through technology in the 21st century learning in the Kenyans educational system and institutions.

3. **An investigation into effects of drought on school attendance among primary school pupils in Pokot North District by Sarah Chepleting, Moi University.**

Efforts have been made in developing countries in the struggle to achieve the millennium development goals. The first goal "to eradicate extreme hunger and poverty" is possible through education and training. While the rest of the world has made significant progress towards poverty alleviation, Africa, in particular Sub-Saharan Africa continues to lag behind. Hunger is the most extreme manifestation of the multi-dimensional phenomenon of poverty, and the eradication of hunger is therefore instrumental to the eradication of other dimensions of poverty.

The paper assessed the drought conditions around schools in Pokot North District and to determine effects of drought on school attendance among primary school children in North Pokot District. The findings revealed that the there are long periods of dry spell leading to scarcity of water, food and pasture for livestock in the district. Consequently, during these periods most pupils miss school to assist their parents look for food by mining small amounts of gold and to look for pasture and water for their livestock. The sales from gold mining were used to buy food.

Based on the findings, it was recommended that the government should dig boreholes and water points in the District to facilitate irrigation of quick maturing food crops and provision of relief food (3 meals) should done throughout the year to schools to sustain these children in school.

4. **Turning a Green Leaf towards Sustainability by Mrs. Jacqueline Onyango, Kenya Institute of Education**

Education is the process of imparting intellectual, moral, social skills and values to learners for a particular purpose. Human security and economic prosperity depend on the ability of a country to educate and prepare its people to thrive in a rapidly changing world. Education for sustainability aims to tackle the underlying causes of unsustainable trends with a focus on systematic change by building capacity to re-orient the way we think, behave, live and work. Creating a sustainable community requires that individuals and organizations have the knowledge, skills, values, capacity and motivation to respond to the complex sustainability issues they encounter in their personal and working lives.

The goal of the Decade for Education for Sustainable Development is to integrate the values inherent in sustainable development in all aspects of learning to encourage changes in behaviour that promote a more sustainable, economically viable and just society for all. School as a community offers the perfect environment to empower learners through mutual interaction and participation with teachers. Learning about sustainable development should be introduced at an early age to help young people understand the needs and rights of present and future generations, and to consider the best ways to tackle interrelated challenges.

The Kenya primary and secondary curriculum is designed in a spiral way building from simple to complex concepts. The content takes cognizance of the social, cultural, geographical and environmental challenges and disparities faced by learners in the various regions and thus, provides a holistic framework for concepts on the three spheres of sustainable development:- social, environmental and economic- to be developed. Nevertheless, the teaching methodology in most Kenyan schools is largely teacher-centred and theoretical thus limiting the learners' participation. This contributes to making education fall far short of what is required to impact skills, knowledge and values that recognize the importance of sustainable development.

The paper based its argument on the constructivist theory of curriculum that schools emphasis too much on rote learning and not on real understanding and thinking. For learning to be meaningful, there must be opportunity for the learners to take some responsibility of the learning process and make decisions and judgment on circumstances they find themselves in. Learners should be facilitated to construct their own knowledge based on what they already know and to use that knowledge in purposeful activities requiring decision making, problem solving and judgment. In this regard, teaching and learning processes need to be re-oriented to facilitate learners' acquisition of knowledge, skills and values through active participation and self-directed activities to enhance their capacity for contributing to social, economic and environmental sustainability.

5. **Basic & Higher Education Policy Implications For Sustainability In Kenya: Current Hurdles And Opportunities For The Future By Dr Otieno Mary A., Kenyatta University.**

The role of education for sustainable development (ESD) is to help people develop the attitudes, skills, and knowledge to make informed decisions for the benefit of themselves and others, now and for the future, and to act upon those decisions. While many nations around the world have embraced the need for education to achieve sustainability, only limited progress has been made on any level. This lack of progress stems from many sources with the main one being a lack of policy framework to support the mainstreaming of ESD in both basic and higher education curriculum (university). The paper examined current basic and higher education policies in place, and how they are an impediment for sustainability including possible future hurdles this poses for ESD. The vision for the education sector for 2030 is "to have globally competitive quality education, training and research for sustainable development". To achieve this vision, four strategic areas, namely, access, quality, equity, science, technology and innovation have been identified for support based on their impacts on the economic, social and political pillars (Kenya vision 2030, final report, 2007). However, the challenge is the sustainability strategy which failed to be identified. By addressing education policies as critical impediments in the planning stage, Kenya specifically can prevent or reduce delays or derailment of ESD efforts and, ultimately, the attainment of sustainability. The national study involved basic and higher education stakeholders as government, private sector, civil society, learning institutions and the international community among others, who participated in providing their opinion.

The paper noted that at the moment, unfortunately, education policy in Kenya is not clearly defined and does not optimally support **holistic** learning. The paper concluded that learning for sustainable development constitutes a trigger for innovations in education and should therefore be supported. Kenya like any other developing country faces a fundamental decision in addressing an ESD strategy. She must decide on a method of implementation whether to create another "add on" subject, (e.g., Sustainable Development, Environmental Education, or Population Education) or to reorient entire education programs and practices to address sustainable development. This is best done through clear policy frameworks In this regard sustainable development education is an ideal vehicle for interdisciplinary learning and can be used to bring relevance, depth, challenge and breadth to learning. Embedding sustainability themes within the curriculum, and in the life of the school, develops our children and young people as global citizens and equips them with skills, values and attributes for learning, life and work

6. **Efficiency and Efficacy of Natural Resources Tertiary Education in Sustainable Development in Kenya by Olivia Chepkemoi, Lucy Wanjohi and Francis Mwaura, Moi University, Chepkoelel Campus, Makerere University.**

Provision of tertiary education has been recommended as a long term intervention to address challenges associated with natural resources management and environmental conservation. A number of countries have invested on natural resources policies, frameworks, research and provision of professional education with evaluation and monitoring of the interventions showing mixed results. The Kenyan government has shown commitment of environmental conservation by passing of the Environment Management and Coordination Act (EMCA), 1999 and has gone on in providing financial supports to government Ministries and other agencies involved in natural resources management. Elsewhere public and private institutions continue to invest resources on personnel, goods and studies to ensure compliance on environmental requirements. Albeit all the efforts the country, firms and individuals have put on environmental issues, a consensus is being reached that our environment continue to deteriorate.

A number of reasons have been raised on why even with all the efforts natural resources management in Kenya is worsening with no scientific prove of the allegations. Although environmental issues awareness is high among Kenyan population of all works government workers, private sector actors and at individual levels, paucity of technical capacity to address sustainable development has been reported as a major constraint. While the government and individuals are spending a significant amount of money in sponsoring and/or pursuing professional training on environment sciences, the impact of such investment are yet to be seen. Queries have been raised on sufficiency of institutions to train on natural resources management, levels of training available and accessible to Kenyans, approach of training (theoretical or practical), training orientations and institution prospects on the graduates and professional training. The paper attempted to respond to queries raised on efficiency and efficacy of our tertiary level professional training on sustainable management of natural resources in Kenya. The findings of the survey undertaken by Elixir Service Masters Ltd. in collaboration with Natural Resources Management Group (composed of experts in natural resources from various

institutions in Kenya) upto 2011. It highlighted various institutions offering certificates, diplomas and degrees in both Kenya and Uganda, reviews various natural resources training offered, their orientation and prospects against situational demands on natural resources management, accessibility requirements.

6.0 INDIGENOUS KNOWLEDGE

Chairperson: Dr. Mary Otieno – Kenyatta University

Rapporteur: Mr. Godfrey Wafula – SEEI&PPO Coast Province.

1. **Application of Indigenous Knowledge in Monitoring Climate Change and Land Use Practices for Sustainability in Agriculture and Food Security in Kilifi District, by Bertha Othoche, Pwani University College.**

The paper aimed at identifying the strategies necessary for attainment of food security in Kenya. Kenya is faced with food shortage hence the current upward trend in food prices and import of basic food items. The World Food Summit of 1996 defined food security as existing "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life". Food security is built on three pillars: food availability, food access, and food use, (WHO 2011). The world's population is expected to grow by more than 30%, resulting in an estimated 2.3 billion more mouths to feed by the year 2050, (USAID 2010). In Africa and Kenya in particular, food security is still a major threat to the survival of mankind due to factors such as climate change, land use conflicts, and government policies. In arid and semi-arid areas in Kenya, drought has intensified and in formerly watered regions there is variability in climatic conditions which has adversely affected agricultural activities. The changing lifestyles mean that food preferences have also changed.

There is therefore need to strategize on sustainable agricultural practices, awareness campaigns and education on food production and consumption as well as adoption of new techniques and skills in the agricultural sector. These are some of the concerns of RCEs which strive to promote sustainable development through collaboration, research, governance and transformative education and hence Education for Sustainable Development, (ESD). This paper is in line with the various goals of RCEs. The paper looked at strategies for monitoring climate change, food production and sustainability. Special emphasis was on traditional ways of monitoring climate change, traditional food items that can withstand changing climatic conditions, traditional ways of food and seed preservation and post harvest storage. The results from the study included increased awareness on climate change and food security among the residents of Kilifi which will also be useful in the agricultural sector and for the RCE stakeholders.

2. The Use of Indigenous Knowledge in Turning A Green Leaf Towards Sustainability

There is a growing recognition that centralized forest regimes which exclude local knowledge and customary practices have not achieved sustainable forest management. The shift from traditional to contemporary policy and governance systems has caused problems. This includes lack of consultation with the local people and hence the policies fail to address the local challenges comprehensively.

Now there is a new evolving international understanding on forest management requiring the recognition of local people's interest, their rights and access to forest resources so as to contribute to their livelihoods. This has been supported by wider moves to reform national policies leading to a shift in forest management practices in Kenya. Consequently, much of the public especially in rural areas of Western Kenya have little interest in using environmental resources.

The study therefore accessed the effectiveness of Community Involvement in Forest Management (CIFM) in local communities around Maragoli Hills, Vihiga District through evaluation of parameters like awareness of CIFM, benefits and challenges of its implementation. This study is not only restricted to sustainable natural woodland management but also makes reference to exotic plantations and trees that have been planted on the farm.

From the communities around Maragoli hills, 63 households were selected randomly and interviews conducted. This was done with the help of the local chief who availed names of the village members from each village and helped in choosing the elderly people who could give more information about the status of the hills some years back.

The findings revealed that most respondents were aware of CIFM. There were successes noted by Kenya Forest Service however although they faced a number of challenges while implementing the use of indigenous knowledge.

The results of the study will help in stakeholder sensitization about the use of indigenous knowledge in overcoming the challenges faced thus making community involvement in forest management a better strategy for turning a green leaf towards sustainability.

3. **"Promoting a More Sustainable, Economically Viable and Just Society for All" by Wachira, James Maina, Moi University, Eldoret, Kenya.**

In taking stock of the achievements NEMA is making in the implementation of Education for Sustainable Development (ESD) in Kenya, this paper participates in sharing some insights on how indigenous knowledge (would) enhance(s) innovations that our societies need in 'promoting a more sustainable, economically viable and just society for all.' Specifically, the insights discussed in this paper draw from some Samburu Oral Poetry. The community makes use of oral poetry, first, as an archive of preserving values that sustain the continuity of the community and also that ensure the sustainability of its physical environment. In addition, the poetry serves as a resource for instructing the community on its role in ensuring the sustainability of the physical environment. Using some selected praise oral poems the community performs to animals (collected among the Samburu of) the paper illustrates how the community constitutes a model complete with content, a methodology for disseminating the value of sustaining the environment to an audience that practices them values. An analysis of such poetry reveals that the community makes effort to conserve plants like the acacia and animals like ostriches and elephants due to the role they play in the survival of the Samburu. The poetry serves as an site of the community representing its awareness of first, the flora and fauna found in its environment and second, the relevance of conserving the environment.

The paper considered the need to treat this poetry as a resource that needs to be integrated in other modes designed and intended for aiding in the attainment of a more sustainable and economically viable society. The oral poems used for the development of this paper were collected between August, 2009 and October, 2009 at Wamba Division, Samburu County as part of a research that has been going on since August 2008. The research was has been investigating the place of Samburu animal praise oral poetry as a way of making sense of the Samburu cosmos. The paper accomplished its end by paying attention to how the Samburu structure this poetry during its performance it as a discourse as well as the features of its diction that Mikhail Bakhtin labels as discourse in art. To conceptualise the structure of this poetry, John Carlos Rowe's definition of a structure was applied while Foucault's rules regarding the production (read performance of the poetry) of discourse aid our

discussion on the performance of this poetry. The paper recommended that more studies on how various communities employ(ed) such poetry (read resources) would provide information on what communities have and/or lack in terms of means and approaches in participating in Education for Sustainable Development.

7.0 HEALTH AND SANITATION

Chairperson: Dr. Salaton Narok University College

Rapporteur: Anne Theuri- SEEI&PPO Nairobi Province

1. **RCEGN And Sustainable Development Through Open Innovation Initiatives In Education And Health By Dr. Robert Muhia Karanja, (JKUAT) and Peter Mbuchi Methu, (University of Bremen)**

2. **Accountability in Community Based Rehabilitation (CBR) Programmes through Innovative Rural Assessment Techniques By Maurice Buri Marube, MSW-Community Development Projects**

"If the global agenda is to be probably addressed, a true partnership between civil societies and the united nations agencies is not an option, it's a necessity" Koffi Annan. Accountability/participation occupies a central place in Development thinking and practice. United Nations agencies, Government, funding Institutions, Donors and civil societies including NGOs have all arrived at a near consensus that transformation, Holistic and inclusive development can't be sustainable and long lasting unless community participation is made central to the rehabilitation process. According to Cohen and Uphoff 1977, community participation includes people's involvement in decision making processes, in implementing programmes, their sharing in benefits of development programmes and their involvement in efforts to evaluate such programmes. Community participation has been a constant theme in development dialogues world wide, more recently about inclusive society through innovative participation and bottom-up approach. Community Based Rehabilitation (CBR) is a strategy in the community Development for rehabilitation, equalization of opportunities and social inclusion of all persons with disabilities. According to WHO, CBR focuses on enhancing the quality of life of persons with disabilities and their families, meeting their basic needs and ensuring inclusive andparticipation.CBR is a multi-sector approach with five major components including Health, Education, livelihood, social and empowerment.CBR was developed in 1980 to enable disabled persons access to rehabilitation in their own community using local resources. "Villages are the backbone of India" Mahatma Gandhi. Rural appraisal techniques are methods and approaches for learning about rural life and conditions from, with and by rural people. Empowers the community to plan, act, monitor and evaluate. The community is capable of collecting accurate information, order, analyze it and start a process of development if given opportunity.

8.0 WASTE MANAGEMENT AND POLLUTION

Chairperson: Barakatch- DEO Naivasha

Rapporteur: Gladys Nthenya – RCEGN

Pollution is basically degradation of environment where lot of harmful gases, liquids and solids get produced from the various chemical reactions due to poor waste management and these toxic gases, liquids and solids get released into environment. These toxic products seriously damage the environment and cause serious health problems for the all animals, plants and human beings.one example is like discharge of effluent from a Dairy plant into atmosphere without treatment. First day this effluent only carries traces of milk, yogurts, butter fats, some minerals, metals traces and few organic acids. Once it comes into contact with air born bacteria many chemical reactions starts at same time and too many toxic products get produced like phenols, formalins, alcohols, organic acids, and toxic gases. If this effluent get treated on first day the all will get converted into harmless products and some use full products which be even sold. However once it is discharged into environment without treatment it becomes a big pollutant. Same is about solid waste like cow dung and other organic waste from kitchen etc. Once managed well it can be converted into the organic manure which can be used to increase the food production. If just thrown like that at Dandora dump site then after few days so many toxic chemicals and gases get formed due to various chemical reactions that it becomes serious environmental pollution.

Pollution is result of mishandling of waste management. Due to urbanization of life lot of effluent and solid waste is get generated from very small area. Nairobi city carries half the population of Kenya. Half the solid waste and effluent of Kenya get generated in the area of like 260 Sq Kms. This all waste both solid and liquid is either dumped into Nairobi Riverand at Dandora dump site. There is no proper program for the treatment of solid waste and effluent .this is degrading the Nairobi environment day by day and new type of diseases like cancers, high Blood pressure, mental disorders, skin disorder, Kidney failures, diabetes are making thousands of people sick every day. Due to discharge of untreated effluent from various sugar factories, slaughter houses, Kisumu, other towns in the area and various industries into the Lake Victoria, the Lake Victoria is not choked with high COD. All the marine life is in the danger in the lake. Even some time back there was lot of loss of marine life in the lake Naivasha also due to poor management of effluent from the Naivasha and nearby towns and from the various industries, flower firms, hotels etc. in the area.

This is one result of serious pollution and high COD in the lake waters due to poor waste management. Good environment is very important for the healthy human life .however healthy environment is not possible without correct waste management. All human activities generate the waste. However this waste has to be managed before discharging into the atmosphere to avoid serious environmental consequences. By mismanaging the waste we are getting closer to a serious time bomb which may even wipe out whole human life on the earth like dinosaurs. Time is now to wake up and to manage the waste to have the healthy environment for the healthy tomorrow for the all of us. A one day visit to Lake Naivasha or lake Victoria will show you what

happens when untreated effluent is discharged into lakes and from there we can easily calculate the quality fish we will catch from these lakes for our kitchens after 10 years from now if waste will not be managed from today.

9.0 BIODIVERSITY AGRICULTURE AND FOOD SECURITY

Chairperson: Dr. Ali Mwakumanya Pwani University College

Rapporteur: Mr. Solomon Kihiu DEO NEMA Nyanza

The chair reported that there were three presentations and the issues raised included

1. Building partnerships
2. Rehabilitation of Cherengani
3. Organo chlorine

They observed the need to develop RCE journal to present scientific information
Encourage alternative materials i.e recycled papers
Research on marketing systems to enhance livelihoods

1. **Building Partnership in Biodiversity Conservation for Sustainability: A Case of Biodiversity thematic Working Group of RCEGN.Mr. Emmanuel Ngumbi, AFEW (K) Ltd and Ms. Margaret Otieno, Wildlife Clubs of Kenya**

Kenya is categorize as a mega diverse country alongside countries such as Indonesia, Brazil, Congo, Madagascar and Tanzania. This has been attributed to its species richness, endemism and ecosystem diversity.

Biodiversity refers to the total variety of life; it is classified into three categories to include genetic diversity, specie diversity and ecosystem diversity. Biodiversity is the basis of ecosystem health and of provision of ecosystem services which drives the socio-economic development. However over the last 50 years changes in biodiversity due to human activities have been more rapid than any other time in human history.

According to the UNEP Year book 2010, increasing pressure of Human population, over exploitation, pollution and climate change has already pushed some ecosystems over critical thresholds.

Other ecosystems are edging closer to threshold beyond which a return to stable conditions could be difficult if not impossible. Due to these biodiversity changes sustainable conservation is of world concern. For instance sustainable biodiversity conservation was a major topic of discussion at the Rio earth Summit which called for partnership between all stakeholders involved in its conservation.

This paper outlines how the members of the Biodiversity Thematic Working Group of the RCEGN have been operating its activities and programmes either as individuals or in partnership to promote the goals and objectives of RCE to achieve goals of United Nations Decade for Education for Sustainable Development. The paper concludes by highlighting key achievements made, challenges faced during implementation process and makes recommendations on how to overcome the challenges in the future to promote efficient achievement of the RCE aspirations for a sustainable future

2. Integrated approaches in Rehabilitation and Restoration of Cherangany Forest Ecosystems By: Cheserek G.J.; Upper Rift Valley Regional Centre of Excellence

The Cherangany Hills are recognized by Nature Kenya and Birdlife International as an Important Bird Area. The hills occur on l 16'S, 3551 'E, in Rift Valley Province, spreads through six constituencies namely; Marakwet west, Marakwet east, Keiyo north, Sigor, Kapenguria and Cherangany. They cover an area of 95,600 ha on an altitude: 2,000 - 3,365 m above sea level. Of this, around 60,500 ha is closed-canopy forest, the remainder being formations of bamboo, scrub, rock, grassland, moorland or heath, with about 4,000 ha of cultivation and plantations (Blacken 1994i.j). Kapkanyar, Kapolet and Kiptaberr Forest Reserves together form a large western block of forest, totaling about 20.000 ha. To the east, the Forest Reserves of Lelan, Embotut Kerrer, Koisungur, Sogotio, Toropket, Chemurkoi, Kipkunurr, Cheboit, and Kapchemutwa are fragmented and separated by extensive natural grasslands, scrub and farmland.

The Cherangany forests are recognized as one of the most important water towers for Kenya together with Mt. Kenya, Aberdares, Mau complex, Elgon, and Nandi hills. The Forests are

critical water catchments, and sit astride the watershed between the Lake Victoria and Lake Turkana basins. Streams to the west of the watershed feed the Nzoia River system, which flows into Lake Victoria; streams to the east flow into the Kerio River system that feed to Lake Turkana. Cherangany hills is the source of these rivers; Weiwei, Muruny, Arorr, Kerio and Moiben.

The forests are highly responsible in keeping and sustaining local and national ecosystems, climate and rain patterns. They support livelihoods of communities living around it in terms of supplying herbal medicine, firewood, source of water for domestic use, fodder for livestock and aesthetic beauty including creating a favourable atmosphere for human and animal habitats. Cherangany is thus a forest of local and global significance for people and biodiversity.

The Cherangany forest is currently faced by both human induced and naturally occurring problems namely; encroachment by farmers and livestock keepers, destruction from commercial lumbering and charcoal burning, water springs destruction, biodiversity loss, poor agricultural practices that cause pollution.

The Upper Rift Valley RCE in collaboration with stakeholders will undertake the following measures to address these problems. They include; create awareness on environmental conservation to community through school pupils; encourage community ownership of the forest ecosystem; identify and utilise existing indigenous knowledge in conservation; establish functional tree nurseries and encourage farm forestry; participate in planting one million seedlings; encourage formation of active community forest associations (CFA) and water resource users associations (WRUA); form youth groups to watch illegal activity taking place in the forest and introduce eco-friendly farming and soil conservation technology.

Based on the above stated activities, we have developed concept paper and look towards identifying funding organizations to kick start the processes of rehabilitating and restoring the Cherangany forest and water tower.

10.0 ENTREPRENEURSHIP AND INFRASTRUCTURE

1. Composite Structures by Use of Sustainable Eco-Material for Infrastructure and Constructions

Due to population growth, in recent years, increased urbanization, climatic changes and technological advancement, the capacity of infrastructure has been largely constrained, and there is great pressure on construction and buildings materials. Alternatives to convection materials and practices are the key to provision of sustainable eco-materials that are environmentally friendly, durable easy to work with and will reduce effects of economic inflation, insufficient supplies-cement(2009), variation of prices-timber(2011),droughts(2009),environmental degradation(cements and tree cutting) and carbon emission-cements manufacturing for convectional materials.

Waste plastics and polythenes and plastic materials, form one of the largest parts of the irritating solid wastes in landfills. In Kenya, plastic waste is estimated to be about 150,000 tons per month and currently only about 1200-1500 is recycled currently. In addition, this non-biodegradable waste inhabit aerobic conditions in landfills, hence encourages release of methane gases, having a green-house effect 21 times greater than carbon.

The aim of this paper is to show the applicability of eco-materials that may be used for low-cost housing e.g. beams, trusses, joinery and civil Engineering projects, in road furniture, such as, channels, bollards kerbs and Investigation of composite structures using concrete and recycled plastic is feasible and sustainable. In this investigation are findings from a research undertaken to determine the suitability of recycled polythenes and plastic material in the composite beams concrete, metal straps and use of suitable additives. These poles were re-melted and remoulded from waste plastics materials. Test were undertaken to determine the flexural strengths of composite beams with plastic at different positions and compressive strength of cubes made using a nominal concrete mix of compressive strength of 20N/mm.

The results indicated composite material higher flexural strength as compared, to the control specimen (i.e. plain concrete samples). Their weights were also lower hence giving a remarkable strength weight ratio. The deflections control measures was also recommended.

Generally the applicability and improvement that can be made on plastics and composite for low cost houses was confirmed by the properties measured. Recycled plastics were also easy to work with and low earners can prefer them for fast but durable constructions with wood work tools and less resources and labour requirements. To improve on quality and quantity, better waste management techniques, good code of practice and standard, regulations and policies implementations are recommended from the government, environmental and construction industries.

Question and Answer

Q. ***Can any institution host RCEs?***

A. Other institutions that are not universities can also host RCEs so long as they meet the criteria required.

Q. ***How can RCE be enhanced where there are land ownership problems?***

In Pwani, there have been problems where squatters are settled along the ocean shore lines. NGOs have teamed up with communities settled along the shorelines to get land ownership documents. Kilifi Land Board has been brought on board to assist in getting the land ownership documents. When these land issues are resolved, then RCEs can succeed.

In Mau Narok, land tenure is also an issue that needs to be resolved. The boundary of Mau and Narok needs to be mapped out in conjunction with the Egerton RCE so as to manage the commonly shared natural resources.

Q. What is the problem of not using or embracing new technology in our schools?
A. *Teachers should embrace new methods and technologies for teaching in order to effectively use the new technologies*.

Q. What is the policy implication as far as funding is concerned?
A. *Organizations with policies should set aside funds to carry out and enhance ESD activities. ESD policy is at an advanced stage and will be subjected to stakeholders for amendment.*

Q. How can i-Earn which is mainly used for school and teachers be used by other stakeholders?
i-Earn is a new technology which should be embraced by all interested.

Q. Is there any way that the current ESD policy can be used to reorient curricula?
A. *Different institutions have introduced ESD into their curriculum using the current policy taking into consideration different aspects of the existing curricula.*

Q. Are there other factors contributing to pupils not going to school apart from drought in Pokot?
A. *The other factors that contribute to pupils not attending school include early marriages, circumcision rites, security and absenteeism from boarding schools due to shortage of water.*

Exhibitions during the conference

The permanent Secretary – Ali Mohammed and Ag director General NEMA – Dr Ayub Macharia visits exhibitions mounted at KICC during the conference

AFEW – Exhibits their products

NEMA – exhibition

Tosheka industries exhibits their baskets made from waste plastic bags

Pure and cure Matters

Wildlife Clubs of Kenya Exhibits their Conservation best practices

Consumer Kenya Exhibits jiko

Ngei 1 Youth Development Exhibition

Nairobi International School's showcase

KOOE exhibition

Dr. Isaack Misiko displays indigenous medicine

11.0 WAY FORWARD – DORCAS OTIENO

The world is gearing towards the end of the decade. UNESCO has identified the steering committee.

The steps that are to be taken towards end of the decade

- Stock taking – what ESD related activities has been taking place in Kenya (published)
- Prepare country reports
- Stakeholders discussions on the way forward with the private
- Baseline survey and policy (plan for 10 years)
- Identify and strengthening the mechanisms to implement ESD thematic issues as leaders with best practices
- Statistics of ESD implementation in university and RCE, impacts on quality of life and solution to real problems
- Stakeholders involvement and development of action plans for the next few years
- Effective advocacy for ESD – general awareness on all the ministries , private sectors civil societies
- Promote ESD as viable strategy for development, develop communication strategy
- Provide evidence based on different strategy i.e. publications, videos, research and innovation
- Activities proposed by Kenya and the region in promotion of ESD

She encouraged the members to adopt these and the others as the way forward

12.0 CONCLUDING REMARKS

The Ag. Director General NEMA- Dr. Ayub Macharia gave the concluding remarks reiterating that Kenya has made milestones and is ESD compliant. Environmental matters have been elevated into the constitution of Kenya with ESD being entrenched through the bill of rights and other sections. With its diversity, ESD through RCE has to incorporate the different ideas to achieve its goal. RCEs have gone through storming and have now reached the norming stage, where there is order with strategies having formulated on the way forward for RCE.

RCEs should engage NEMA to push forward their agenda. NEMA has developed a research agenda which the universities can use to enhance RCEs in their institutions. In instances where they have publications and journals, they can be supported. A communication strategy should be formulated and embraced at the local level to enhance RCEs. There is need to strengthen RCEs through mottos, songs, poems and other achievements. RCEs need to team up with NEMA to integrate capacity and resources in order to achieve Education for Sustainable Development.

JKUAT has reoriented their curriculum towards ESD and its only waiting for senate's approval. NEMA is currently working with Pwani University College to embrace RCE. In future conference, awards should be given to best ESD compliant institutions.

ANNEX 1: PROGRAMME

<table>
<tr><th></th><th>Monday, 14th November (Day 0)</th><th>Tuesday, 15th November (Day 1)</th><th colspan="2">Wednesday, 16th November (Day 2)</th><th>Thursday, 17th November (Day 3)</th></tr>
<tr><td>Breakfast</td><td rowspan="3"></td><td><u>8:30-9:00</u> Registration

<u>9:00-10:30</u>
• Minister arrives and visits Exhibitions then enters Conference Hall
• Entertainment
• Welcome address by DG-NEMA Remarks by CEO NCST
• Key Note address by Guest-CEO KCB
• Launch of ESD Strategy and Official Address by Minister to Open the Conference.</td><td colspan="2"><u>8:30-9:00</u> -Recap of Day One

<u>9:00-9:30</u> -Role of RCEs as strategy to promote ESD (UNU)

<u>9:30-10:00</u> - Governance and Coordination of RCEs
-Open Discussions Q&A
-Introduction and briefing for the thematic discussions</td><td rowspan="3">Departures</td></tr>
<tr><td></td><td><u>10:30-11:00</u> Break</td><td colspan="2"><u>10:00-10:30</u> Break</td></tr>
<tr><td></td><td><u>11:00-1:00</u>
RCE Presentations (10 Mins each)
1. RCE - Mau Complex
2. RCE - Greater Nairobi
3. RCE - Western Kakamega
4. RCE - Pwani
5. RCE - Upper eastern
6. RCE - Nyanza
7. RCE - Narok
8. RCE - Upper Rift
Open Discussion Q&A</td><td><u>11:00-1:00</u>
Thematic Issue A
Pollution/Waste Management

Thematic Issue C
Agriculture & Food Security</td><td>Thematic Issue B
Climate Change

Thematic Issue D
Indigenous Knowledge</td></tr>
<tr><td>Lunch</td><td></td><td><u>1:00-2:00</u> Lunch</td><td colspan="2"><u>1:00-2:00</u> Lunch</td><td></td></tr>
</table>

<table>
<tr><td rowspan="4">Afternoon</td><td rowspan="4"><u>17:30</u>
-Registration
-Welcome Reception
-Setting up Exhibitions</td><td><u>2:00-2:30</u>
Regional ESD Implementation-(WWF-LVCEEP)

<u>2:30-3:00</u>
- ESD/RCE in Africa UNEP/UNESCO

<u>3:00-3:40</u>
- ESD in MESA Programme

<u>3:40-4:00</u>
- Implementing ESD and Coordination of RCEs in Institutions of Higher Education (IHE) - The case of Rhodes University-South Africa</td><td><u>2:00-4:00</u>
Thematic Issue E
Health and Sanitation

Thematic Issue G
Biodiversity and Agro-forestry</td><td>Thematic issue F
Education and Sustainability

Thematic Issue H
Entrepreneurship and Infrastructure</td><td rowspan="4"></td></tr>
<tr><td><u>4:00-4:30</u> Break</td><td colspan="2"><u>4:00-4:30</u> Break</td></tr>
<tr><td><u>4:30-5:00</u>
- RCEs and Community Engagement</td><td colspan="2"><u>4:30-5:30</u>
Report to the Plenary and General Discussions</td></tr>
<tr><td>Dinner</td><td>Welcome Dinner</td><td>Free</td><td colspan="2">Free</td></tr>
</table>

ANNEX 2 : PARTICIPANTS' LIST

No.	NAME	ORGANIZATION	ADDRESS	EMAIL ADDRESS
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