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# Assessment of Integrated Environmental Management in Public and Private Schools in the Copperbelt Province of Zambia

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**Abstract**
Copperbelt Province is one of the ten provinces of Zambia. It has public and private schools which have been faced with escalating levels of environmental problems due to growth in human population and economic growth. The environmental problems which are matters of concern in the schools include, unsound waste management, loss of vegetation cover, runoffs, and water and air pollution. The integrated environmental management approach could help reduce and curb the escalating levels of environmental degradation. The study was aimed at generating information on the levels to which the IEM intervention has been implemented in the public and private schools of Kitwe and Kalulushi districts in the Copperbelt. It focused on the existence of integrated environmental management activities and related IEM plans. It also ascertained the understanding of the IEM approach, the national environmental legislations and compliance. In addition, the research focused on finding out how schools are managing the problems of waste and runoffs. A purposive non- random sampling approach was used to obtain data from the study area, focusing on key stakeholder representatives from ZEMA, local authorities, DEBS, and the teachers from primary and secondary schools.The study showed that participants have a narrow and limited knowledge of the IEM. Integrated environmental management plans were not in existence. There was also lack of understanding of the national environmental legislations and sound waste management. The results also implied that there is little or no collaboration between the schools, local authorities and ZEMA.Important documents regarding national legislations regarding environmental management (such as the EMA. No. 12 of 2011) have not been availed to the public and private schools. It is evident that the stakeholders need to narrow the gap existing between them.

## Introduction

Environmental degradation that is natural or human induced still remains a serious concern (Orenstein, 2004). Interventions have been introduced to try and mitigate environmental problems emanating from the degradation. The escalating levels of environmental problems has expanded considerably over the past decades from population and economic issues at local, regional and international levels, to loss of vegetation cover, soil erosion, declining water tables and other forms of natural resource depletion and degradation to global concerns such as biodiversity loss, climate change and the ozone layer depletion (UNDESA, 2010). The Earth's ecosystems that provide the essential life support, or the goods and services, on which seven billion people depend, is being severely degraded due to compounded pressures of rapid population growth (WWF, 2010).In Zambia,13 million people require food, water, shelter, sanitation, clothing, energy, transport, education, employment and provisions for the future CSO, (2010). These needs are largely derived from or depend upon our environment. A global Footprint Network (2010) data source, on the other hand, indicates that humanity's lifestyle has a great influence on the planet's ecological capacity to regenerate. Humanity's ecological footprint has been at 50% higher than the earth's ability to support it, (United Nations Department of Economic and Social Affairs, 2010).Therefore; concerted efforts are needed to mitigate this issue.

Further, the earth's natural ecosystems have been known to provide clear water, fertile soils, fresh air and allowing for development of human civilization from ancient times to date (UNDESA, 2010).Unfortunately, the health of the ecosystems that provide this essential life support is being degraded due to rapid population growth and lifestyle as earlier alluded to. This has resulted into major environmental problems both in urban and marginal areas. They are more severe than what the earth can accommodate. The paper focuses on an assessment of existence of Integrated Environmental Management (IEM) in public and private schools in trying to reduce or curb the problem of environmental degradation. The integration of the IEM endeavours to improve environmental performance through enforcement of environmental legislation, enhancement of stakeholder participation and establishment of environmental management IEM plans (MTENR, 2011). The IEM mechanism is important as it encourages thinking about the environment as a whole and managing the environment in a way that recognises links between elements of the whole, meaning the adoption of a holistic and integrative approach to development (NEMA, 2004).

Despite the increase in documentations and publications on the environmental conditions such as public health awareness, education, agriculture to mention but a few, environmental degradation remains a matter of

concern in Zambia. The understanding of environmental issues in both secondary and primary schools leaves much to be desired (ECZ, 2004). The degree of understanding the environmental impacts varies significantly among different segments in Zambia like elsewhere.

It is prudent therefore that environment related problems and their consequences be addressed with an integrated effort to be managed. District Education Board Secretary (DEBS), teachers, and other policy implementers need to collaborate. The lack in collaboration among the stakeholders is partly evident by a number of factors which have emanated from the environmental degradation. Most of the environmental degradation that occur in schools today are as a result of the failure of society and educational systems to provide citizens with the basic knowledge and skills needed to make informed choices about interactions and interrelations in the environment. It is understood that learning would inevitably be more successful if teachers relate to and build upon the pupils' existing understanding of whatever concept or phenomenon is being addressed (Palmer and Suggate, 2004). Therefore, it is important to investigate the knowledge, conceptions and understanding of IEM by teachers and how the knowledge could further influence their practices and attitudes towards the environment.

Therefore, effective implementation of IEM in schools as a regular part of the curriculum and school management practices could increase public environmental management and demonstrate a commitment to environmental protection. Zambia is a youthful country and they comprise a large percentage of the country's population and are to be decision makers of the future. Therefore, their way of thinking about the environment could better shape tomorrow's world. The involvement of today's youth in environmental issues, decision making and implementation of the environmental programs has been internationally recognised as critical to sustainable development (UNEP, 2007).

**Literature Review**

Review on literature on the concepts of environmental management gives us insights on IEM application across us the world and identifies international perspectives. Since 1985, the government of Zambia has taken a number of important steps to preserve the environment and ensure conservation of its biological resources. There are a number of environmental and related conventions, treaties and agreements which it has ascribed to since 1985 (ECZ, 2004). An Act to continue the existence of the Environmental Council and renamed it as the ZEMA was: to provide for integrated environmental management and the protection and conservation of the environment and the sustainable management and use of natural resources; for the preparation of the state of the environment reports, environmental management and sustainable development; to guide in the conduct of strategies and other plans for environmental assessments of proposed policies plans and programmes likely to have an impact on environmental management; for the prevention and control for public participation in environmental decision making and access to environmental information as is provided by the (MTENR, 2011).

IEM is one of the many interventions or innovations being used to try and control the environmental problems. It addresses the question of environmental quality as a matter of public policy which is integrative and comprehensive. IEM also adapts to the dynamics of environmental change and to progressive stages in the solutions of environmental problems and applying appropriate science and technologies to the problem. Therefore, it is worth emphasising in the public and private schools in Zambia. After all, targeting educational institutions means spreading the idea faster. The UNEP policy series considers `integration' in restoring the natural foundation to sustain a Green Economy (UNEP, 2011). Such a transition must take society as a whole recognising the boundaries imposed by the ecosystem service capacity, within which society operates.

In order to achieve the objectives of the IEM, it is necessary to utilize appropriate concepts, approaches, strategies and tools. The Ecosystem Management approach which is synonymous with IEM encompasses what is required in order to set the foundations on which a Green Economy is based (UNEP, 2011). The approach represents a development from earlier concepts of sustainable natural resource management, and genetic, species and ecosystem conservation to a much broader, holistic concept that includes biophysical, social, economic and political considerations to support sustainable development. In so doing, human activities must be recognized as an integral component of ecosystems (Millennium Ecosystem Assessment, 2003).

The IEM cannot work on its own but needs to be enforced by the environmental management policies and legislation. Internationally, the standard environmental management system is the ISO: 14001 which control environmental practices (Design for the Environmental Report: 2001). The ISO 14001, an environmental management system, provides a widely recognised set of principles and standards for integrating environmental management into quality control and other business activities, (Design for the Environment Report: April, 2001). The IEM as an intervention is effectively being implemented in most companies through the use of the ISO 14001. It is vital to enforce the IEM in service institutions to help reverse the environmental issues.

The global perspectives of IEM show that countries in Europe, Asia, Brazil, to name but a few have effectively implemented the intervention. The European Commission adopted a strategy in trying to improve the quality of the urban environment due increase in accumulation of the carbon content in the atmosphere, hence

 

creating air pollution leading to global warming and climate change, The European Commission (2006). The Strategy described the problems facing many urban areas of the European Union and recognised the widely divergent circumstances of European cities. The guiding strategy presented aims to assist municipal authorities in establishing systems for integrated environmental management approaches to improve environmental performance across a broad range of issues. The strategy emphasised adequate financial support to curb the carbon dioxide ($CO_2$) emissions in the buildings. Sustainable urban development requires an *integrated approach* and the Thematic Strategy advocates that national and regional authorities support municipalities in achieving more integrated management at the local level.

Asia like the European community has embraced the IEM mechanism. Millions of people have been lifted out of poverty through sustained economic growth. However, there clear indication of high vulnerability to climate change due to pollution and adverse impacts of urbanisation (Shenzhen Government Report, 2007). One of the critical issues raised during the roundtable was how the exponential growth of the cities could be decoupled from environmental degradation that is excess of the carrying capacity of the planet, now and in the future. For instance, the increasing number of vehicles in Beijing is clogging the streets and magnifying the city's pollution burden. Like China, India on the other hand, is urbanising at an extraordinary rate with a good number of households still living in abject poverty and still not having access to safe drinking water sources within premises (ibid).

As regards the Brazilian perspective, an integrating cross cultural management in people practices study has been done focusing on their socio cultural aspects with expatriates. As is indicated by (McSweeney et al, 2008), it endeavours to rid individualism and encourage collectivism so as to improve their organisational businesses. In the globalized world, people have to work with people of different cultural heritages. McSweeney *et al* (2008), states that, the different cultural backgrounds should be taken into account when communicating and interacting across nations and across cultures within nations. Samovar et al (2004), strongly indicate that, other than integration having a great influence on their business growth, it also influence their attitudes toward the environment where natural resources required for their businesses come from. They employ a holistic approach to improvement of their relationships: boosting their businesses and utilizing their natural resources in a sustainable manner.

In the regional context, the IEM concept has been promoted in South Africa since the late 1980s. In the early 1990s, the approach was widely communicated through the release of the Integrated Environmental Management Guidelines Series - a series documents published by the Department of Environment Affairs and Tourism (DEAT, 2004). The Southern African Development Community's goals for sustainable development have emphasized the importance of a people-driven approach in the context of developing countries. This shift in emphasis was also echoed in the outcomes of the World Summit on Sustainable Development (WSSD) held in Johannesburg in 2002 (United Nations, 2002). The country emphasises IEM pertaining to life cycle analysis of products in industries, a cradle to grave approach, and then the future re-use of the area or resource, i.e. cradle to cradle.

In the South African context, IEM provides a holistic framework that can be embraced by all sectors of society for the assessment and management of environmental impacts and aspects (1) associated with an activity (2) for each stage of the activity life cycle (3); taking into consideration a broad definition of environment and (4) with the overall aim of promoting sustainable development. Therefore any person or organisation has the legal right to take action to protect the environment as stipulated in Agenda 27- Principle 4 (UN, 2000). The clause is of great importance for it enables communities directly affected by the actual or apprehended environmental degradation to take effective action and to launch mitigation measures for environmental protection.

The UNDP (2013) report on Namibia, states that, it has proudly involved its communities directly in the management of their surroundings. Regardless the concern, be it, water, conservation, agriculture or wildlife management, the country is well known as a global pioneer in integrated management practices. The goal of the practice is to mitigate the impact of land degradation on communities by promoting rangeland management. Climate Change Adaptation (CCA) has introduced indigenous drought tolerant crops and animals such as Boer Goat and Guinea Fowls in order to adapt communities against droughts caused by climate change. This is an integrated effort to adapt to this environmental problem.

UN (2002) report on Botswana, states that, the country experiences frequent unplanned fires. The nation is faced with fire prone areas and lacking in resources, coordination and management capacity. The mechanism explores sustainable fire management approach in Botswana. A fire management strategy that is based on the use of fire for land use management emphasises community inclusiveness which is one of the key principles of IEM.

According to the Sixth National Development Plan (SNDP, 2011-2015), Zambia is endowed with vast and diverse natural resources that form the basis for economic activity. These include land, wildlife, forest, minerals, natural heritage and wetlands. Effective and efficient management of these natural resources can significantly contribute to national development through foreign exchange earnings and employment creation. In addition, various natural resource products and ecosystem services are important sources of livelihood and

energy. The focus for SNDP is therefore, to reverse deforestation, wildlife depletion, heritage sites degradation, and land degradation. Further the sector is aimed at enhancing collaboration among players in natural resources management in order to ensure sustainable exploitation of natural resources (MTENR, 2011). The article exhibits that, environmental management in Zambia is based on the principles as stipulated in the EMA of 2011.

Notably, IEM is an approach that has been used in various situations to improve environmental performance all around the world but in this case, the study investigates its effectiveness of environmental management in schools.

**Objectives of the study**

To contribute to existing knowledge on IEM to reduce environmental degradation leading to enhanced sustainable environmental management in public and private schools of Zambia.

**Specific Objectives**

1. To establish the existence of IEM plans designed to address IEM problems in schools.
2. To determine the understanding of IEM in public and private schools.
3. To determine the levels of compliance in public and private schools and their management in accordance with environmental legislation.

**Methodology**

i. **Respondents:** The study is conducted on employees of Zambia Environmental Management Agency (ZEMA), Kitwe and Kalulushi Local Authorities, Kitwe and Kalulushi District Education Board Secretary (DEBS) and public and private schools in Kitwe and Kalulushi.

ii. **Instrument:** Questionnaire was used to understand the perception of employees' on existence of IEM approach in schools. Both open-ended and close-ended questions were used to get the insights from respondents about the topic.

iii. **Data collection:** Relevant primary data was collected by means of observation and semi-structured questionnaires as described by (Bernard, 2002).Senior managers and class teachers were interviewed for preparing the questionnaire for analysis of data. Both interviewer and respondents were free to follow the new lead (Sichilongo, 2003).

iv. **Sampling design**

**Sampling size**

Out of 182 public and private secondary and primary schools in Kitwe and Kalulushi, 20% was sampled (37 schools). Each school had a representation of two a head or deputy manager and a class teacher, giving a total of 74 respondents and the other five respondents were one from ZEMA, the two local authorities and two DEBS officers. In totality, the size was 79.

**Sampling technique**

Purposive non-random convenience sampling is used for the research.

Analysis instrument

The research employed qualitative research design with a quantitative approach. The qualitative nature of the study involved descriptions of situations and events leading to the amalgamations of detailed perspective of knowledge on IEM approach. The quantitative nature allowed for numeric analysis of data by analyzing percentage frequencies that were associated with the number of respondents expressing a common or different view

Interview data was analyzed using SPSS Version 16 and Micro soft excel. The data was presented using SPSS Inc. Version 16; this was achieved using descriptive statistics and the entered into the spreadsheet using MS Excel 2007 to generate graphs, pie charts and tables

v. **Limitation of the study**

Due to limited time and resources, the study was restricted to only two districts on the Copperbelt Province.

 

**Results**

**To assess the existence of IEM plans in public and private schools.**

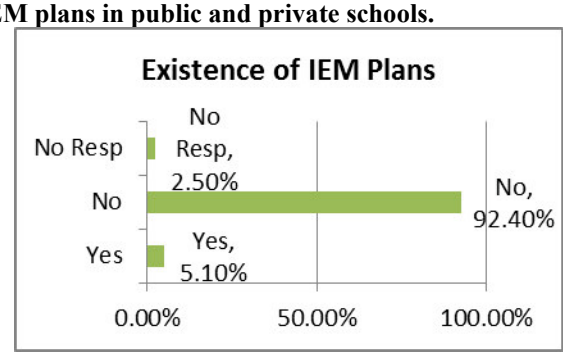


**Figure 1**: Existence of IEM plans in public and private schools

In Figure 1, 5.1% respondents from both public and private schools said the IEM plans existed in the Preventive Maintenance Programme in which they were embedded and 92.4% respondents denied the existence of IEM plans. On the other hand, 2.5% expressed ignorance.

**Extent of natural resources protection**

The results show that about 97.4% 0f the respondents indicated that natural resources are being protected while 2.5% did not know whether this is being achieved or not.

**To assess understanding of IEM approach in schools**

The results reviewed that 70.90% responses indicated an understanding of the IEM mechanism, while 29.1% indicated ignorance.

**To assess compliance with environmental legislation in schools**

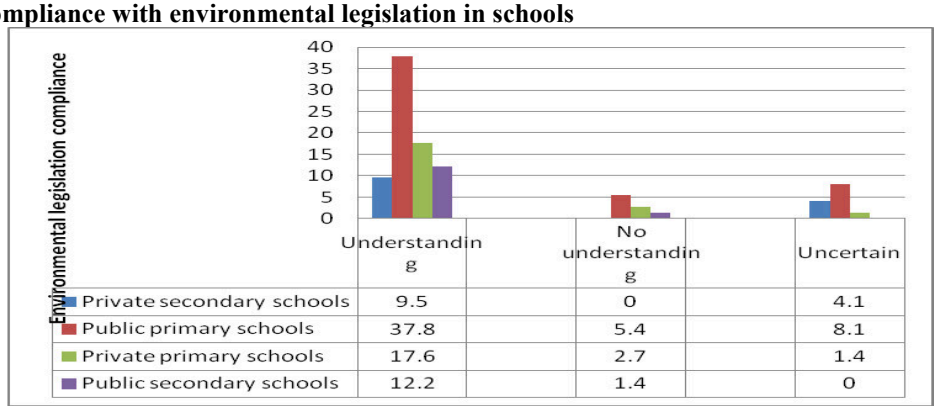


**Figure 2:** Levels of compliance with environmental legislation in schools

The study showed that levels of compliance with environmental legislation were about 77%. Respondents from secondary and primary schools both in public and private stated that they were compliant. On the other hand, of 9.5% respondents from all the schools indicated no knowledge of compliance with the national environmental legislation. According to the report 13.5% respondents from all the schools exhibited ignorance (Figure 2).

**To assess understanding of waste management**

Categorically in Figure 3, 5.4% of the respondents in the public secondary schools exhibited an understanding of sound waste management while the other 5.4% indicated ignorance. About 2.7% were not certain with the kind of waste management they were practicing.

According to the research findings, 5.4% of the respondents in the public primary schools indicated an understanding of sound waste management whereas 21.6% did not know how manage their waste. About 24.3% of the respondents on the other hand exhibited uncertainty.

In private secondary schools, 1.4% indicated correct understanding of waste management while the other 1.4% depicted no understanding. The other 8.1% of the respondents stated that they had no proper understanding of the sound waste management.

Private primary schools on the other hand, had 9.5% respondents who exhibited an understanding of sound waste management. Another 9.5% of the respondents stated that they know how to manage the variety of waste in their schools. About 5.4% of the respondents exhibited uncertainty.

 

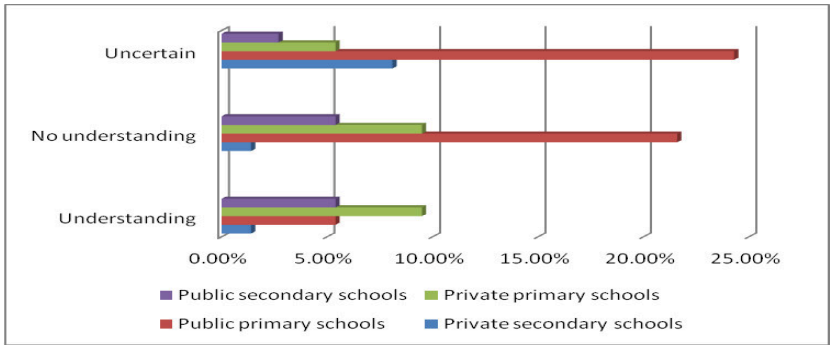


**Figure 3:** Understanding of waste management

**To assess understanding of management of problem of runoffs.**

**Table 1:** Understanding of management of problem of runoffs

| **School type/Response** | | **Frequency** | **Percent** |
|---|---|---|---|
| Public Secondary | Yes | 9 | 12.2 |
| | No | 1 | 1.4 |
| Public Primary | Yes | 38 | 51.4 |
| | No | 0 | 0 |
| Private Secondary | Yes | 6 | 8.1 |
| | No | 2 | 2.7 |
| Private Primary | Yes | 18 | 24.3 |
| | No | 0 | 0 |
| **Total** | | **74** | **100.0** |

According to the research, a record of 12.2% respondents portrayed understanding of how to manage the problem of rainwater or runoffs in the public secondary schools of Kitwe and Kalulushi. About 1.4% of the respondents confirmed their lack of understanding on the sound management of runoffs.

The results also show that all the 51. 4% respondents in the public primary schools had an understanding of the management of runoffs. This was similar to the response given by the 24.3% respondents in the private primary schools.

Consequently, 8.1% of the respondents in the private secondary schools indicated an understanding of sound management of runoffs. The other 2.7% of the respondents exhibited ignorance.

## Discussion

According to the research findings regarding the existence of IEM plans, the understanding of the IEM approach, compliance to national environmental legislation and the management of waste as well as runoffs by administration and teachers in public and private schools in Kitwe and Kalulushi districts, still have gaps. The IEM mechanism as described by (NEMA, 2004) has not been well understood.IEM plans which conform to the EMA of (MTENR, 2011) were not there but the respondents claimed that they were embedded in the preventive maintenance school programme. The understanding of the approach was based or attributed to context of the concepts. Compliance to the legislations concerning the environment, on the other hand, was there although the respondents exhibited ignorance of the in-depth understanding of the law. All kinds of waste are not being managed well in conformity with (KCC, 2009). The civic authorities in Kitwe and Kalulushi districts need to help schools to understand and improve on their waste management. Both public and private schools exhibited knowledge of sound management of runoffs as described by (Beven and Horton).

## Conclusion

The government has recognised the IEM approach with its principles and management tools in trying to maintain sustainable environmental management. The expectations include: establishment of IEM plans, improved stakeholder involvement, enforcement of environmental legisltlation and enhancement of environmental protection.

Without doubt, there was no significant difference with regard to existence of IEM plans and the understanding of IEM approach by the respondents in public private secondary and primary schools in both Kitwe and Kalulushi districts. However, mixed responses were exhibited with regard to understanding of the national environmental law and waste management. Public schools indicated high levels of poor waste management where as private schools exhibited better understanding. Compliance to environmental law in both

public and private schools was not in conformity with the expectations of the EMA of 2011. Gaps in compliance are exhibited by respondents as they were still involved in activities that are contributing to degrading the land and polluting air and water.

All the findings suggest that ZEMA and the civic authorities need to provide more capacity in order to improve on the IEM implementation. This will enhance their inspection programme. The well being of the natural resources in the environment need to be nurtured by all the stakeholders from the various government departments.

**Recommendations**

Based on the study conducted, and the challenges faced by public and private secondary and primary schools with respect to existence of IEM tool, the following recommendations are made:-

1. It is important that generic IEM plans for the schools be formulated as is required by EMA No.12 (2011) to serve as a guide.
2. The laws should be enforced by ZEMA and the Local Authority in the public and private schools.
3. Improve collaboration between stakeholders ZEMA, Local Government Authority and Ministry of Education (Debs).
4. Routine sensitization of the schools and communities' members on environmental management can help to change the negative mindset so that a holistic approach is emphasised.
5. Routine or quarterly inspections of environmental management need to be enforced by ZEMA, Council and the Debs office.
6. Capacity building needs to be addressed by both ZEMA and the Councils so as ensure a proper check on the schools' compliance to the national environmental legislations.
7. The problem of solid waste has to be addressed. For now, schools need to be provided with skeep bins by the council as they await the involvement of Solid Waste Contractors to be allocated the various zones of operations.

**Suggested further research**

1. Challenges of integrated environmental management approach.
2. Challenges of collaboration among government sectors.
3. Assessment of pupils and community involvement in environmental management in schools.
4. Assessment of solid waste management in schools.

**References**

Bernard, H. R. (2002).Research Methods in Anthropology: Qualitative and Quantitative Practical Framework in Hulme, D and Murphree, M (2001) Editors. Oxford: John Curry Ltd.Porttsmouth NH: Heinemann

Beven, K and Horton R.E., (2014). *Perceptual Model of Infiltration Processes*: Hydrological Processes, U.S.A., John Wiley & Sons, Ltd.

Central Statistical Office, Government of Zambia. [CSO, 2010]

"Data Sources". Global Footprint Network. 2010-06-05. Retrieved 2012-03-17. http;//www.footprintnetwork.org/en/index.php/GFN/page/world_footprint/

Department of Environmental Affairs & Tourism (DEAT).( 2004). *Environmental Management Plans, Integrated Environmental Management Information Series 12.*Department of Environmental Affairs and Tourism, Pretoria.

Design for the Environment, (April. 2001).Environmental Management System Case, A Cooperative project between the U.S.Environmental Agency and Industry.EPA 744- F-01-002

ECZ, (2004) State of environment in Zambia 2003. Norwegian agency for Development Corporation: Lusaka. Geography: Implementation at the European and Regional Scales.

KCC Municipal Solid Waste Management By-Laws, (2009). *The Local Government Act* (Laws, Volume 16, Cap, 281).

McSweeney, B., Smith, C. and Fitzgerald, R., (2008), 'Remaking management: neither global Nor national', in Ch. Smith, B. McSweeney and R. Fitzgerald (Eds.): Re-making Management: Between Local and Global, pp.1–16, Cambridge University Press, Cambridge.

Millennium Ecosystem Assessment, Ecosystems and Human Wellbeing: a framework for assessment. 2003.

Ministry of Tourism Environment and Natural Resources, (2011). *The Environmental Management Act*. Lusaka: Government Printers.

National Environment Management Authority.(2004). State of Environment Report. Nairobi, Kenya.

Orenstein, D., (2004). Population growth and environmental impact: Ideology and academic discourse in Israel. *Population and Environment*, *26*(1), 41–60.

Palmer JA and Suggate J. (2004) The Development of Children`s Understanding of Distant Places and

Environmental Issues: *Report of a UK Longitudinal Study of the Research Development of Ideas between the Age of 4 and 10 Years.* The University of Durkham, UK Papers in Education. 19 (2), 205-236.

Samovar, Larry A and Richard E Porter, (2004), *Communication between Cultures*, 5th Ed. Thompson and Wadsworth.

Shenzhen Government, Fifth Roundtable of Asia- Europe Forum. Achieving Urban Sustainability: Integrated Environment Management- Nov 28-29, 2007 / Shenzhen, China, Report

Sichilongo M. (2003). The Significance of Community, Resource Boards (CRBs) in Zambia for Achieving National and International Conservation Objectives. Unpublished M.Sc.Thesis. University of Kent, The United Kingdom

The European Commission Integrated Environmental Management- Guidance in relation to The Thematic Strategy on the Urban Environment, 11 January 2006 www.asef.org/images/docs/620-Report.

UNDP (2013) Integrated Community Based and Nationally Driven Environmental Management. United Nations Development Programme (Namibia)

UNEP (2007). Environmental performance reviews Georgia 2nd Edition. UNEC for Europe: New York.

UNEP. Toward a Green Economy – Pathways to Sustainable Development and Poverty Eradication (http://www.unep.org/greeneconomy/online Sept. 28, 2011)

UNESCO, (2006). A Handbook for Measuring the Progress and Outcomes of United Nations, .2002. Johannesburg Summit (2002) Key outcomes and Commitments.

United Nations Department of Economic and Social Affairs, "Population Facts," Fact Sheet, New York, November 2010: http://www.un.org/esa/population/publications/popfacts/popfacts_2010-6.pdf, Accessed 4/20/11

UNITED NATIONS. (2000). Sustainable development: Agenda 21. Web:] Visited: 6 November 2003.

United Nations, (2002). *Country Profile*: Botswana. Government of the Republic of Botswana WWF Report 2010: biodiversity, biocapacity and development. Living Planet Report. See: http://wwf. panda.org/about_our_earth/all_publications/living_planet_report/2010_lpr/